

Determination 2005/37

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

1 THE DISPUTE TO BE DETERMINED

- 1.1 This is a determination 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 (“the Act”) as amended by section 424 of the Building Act 2004. The applicant is the owner, who was also the builder, and the other party is the territorial authority. The application arises from the refusal by the territorial authority to issue a code compliance certificate for a 2-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, columns and beams 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 a level 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 ground floor slabs, and all the external walls are sheathed with monolithic cladding. The house is of a fairly simple shape, but with a complex roofing system at two main levels. The upper low-pitched roof is clad in asphalt shingles laid over a plywood substrate and is surrounded by parapet walls. The parapet walls are monolithic clad on the both faces, including additional polystyrene thicknessings, and the flat top is finished with a proprietary wrap laid over a fibre-cement substrate. The lower pitched roofs are steel tiled and have numerous hip, valley, and roof to wall junctions. The eaves to the lower roofs generally have 600mm wide projections, but there are additional roof overhangs above the ground floor terraces. The aluminium external windows and doors are recessed into the cladding reveals.
- 2.2 The house has a large covered terrace to the north elevation that is tiled and has monolithic clad timber-framed columns supporting the roof projections over it. The front entrance has a pitched roof over it supported by monolithic clad timber framed beams and columns. There is also one high-level timber-framed balcony constructed over a habitable space with the deck covered by a butyl-rubber membrane laid over a plywood substrate and finished with selected tiles. The balcony balustrades are timber-framed, with monolithic clad faces and wrapped top as for the parapet walls. A stainless steel tubular handrail is fixed to the balustrade top.
- 2.3 The owner asserted that the exterior wall framing is H1 LOSP treated, with the exception of the bottom plates, which are H3.2 treated. However, I have seen no documentary evidence to support this claim.
- 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 60mm thick expanded polystyrene (EPS) grooved backing sheets fixed through a building wrap directly to framing timbers. These backing sheets are finished with a proprietary fibreglass mesh reinforced polymer-modified cement plaster system supplied by the manufacturer of the backing sheet system. The systems have been subject to an appraisal by an independent testing organisation. A 6mm drainage gap is also formed at the bottom plate edge of the floor slab

- 2.5 The cladding applicator issued a producer statement dated 20 April 2004 in respect of the cladding.

Sequence of events

- 2.6 On 18 September 2002, the territorial authority wrote to the owner noting that a building certifier was carrying out the inspections during construction of the house. It also stated that if the building certifier did not cover all of the inspections, then the territorial authority might be required to undertake certain inspections.
- 2.7 The territorial authority issued a building consent on 18 November 2002, based on a certificate provided by a building certifier dated 3 September 2002.
- 2.8 The building certifier carried out various inspections throughout the construction of the house and passed the preline building inspection on 23 April 2003. The building certifier carried out a final building inspection on 26 May 2004 and issued a code compliance certificate on 24 June 2004. The code compliance certificate noted that it was issued in respect of the building work, but excluded certain elements, including the exterior cladding.
- 2.9 The building certifier wrote to the owner on 24 June 2004, stating that as its authority had been amended, the building certifier could no longer inspect and approve the cladding. Accordingly, the building certifier would forward all documentation to the territorial authority so that the territorial authority could then issue a code compliance certificate.
- 2.10 On 30 July 2004, the building certifier wrote to the territorial authority and attached a building certificate and a producer statement covering the exterior wall cladding. The building certifier also requested the territorial authority to issue a code compliance certificate.
- 2.11 On 19 August 2004, the territorial authority wrote to the owner, advising that it declined to issue a code compliance certificate as the territorial authority had not been involved during the construction of the house. In addition, the territorial authority said that, as the cladding system was monolithic, the territorial authority was not satisfied, on reasonable grounds, that it would apply with clause E2. 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.

2.12 The owner applied for a determination on 13 September 2004.

3 THE SUBMISSIONS

3.1 In a letter to the Authority dated 16 September 2004, the owner described the process leading to the territorial authority's decision not to issue a code compliance certificate. The owner noted that particular care had been taken with the house with regard to the cladding system. H3 treated timber had been used for the bottom plates and H1 LOSP treated timber for the balance of the external wall framing. The owner had used the specific cladding system for over 10 years and had not experienced any problems with it.

3.2 The owner provided copies of:

- The building plans and specification;
- The building consent information;
- The building certifier's inspection records;
- The interim code compliance certificate;
- The correspondence with the building certifier and the territorial authority;
- The cladding manufacturer's instructions;
- Various producer statements, including the statement from the cladding applicator; and
- Invoices from the timber supplier.

3.3 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 say:

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 can 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, 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 Department commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert inspected the building and furnished a report that was completed in February 2005. It stated that the quality of the applied cladding system has been well executed with attention to details at all junctions. There were no hair cracks in the cladding nor were there any signs of cladding movement. The expert noted that the external windows and doors were fully flashed, with the head flashings slotted for drainage. The expert did not carry out any invasive testing in this respect. The expert's report made the following specific comments on the cladding:

- There is insufficient ground clearance to the base of the cladding above some of the garden areas;
- The tops of the parapet walls and the balcony balustrade are flat; and
- The balcony balustrade handrail was fixed through the top of the balustrade.

5.2 The expert carried out a series of moisture tests to the interior of the house using a non-invasive meter. The highest reading obtained from these tests was 10%. The expert then took further non-invasive readings at the parapets, where the highest reading was 12%. An invasive test below the balcony balustrade capping gave a reading of 14%. 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. The owner responded with a letter to the Department dated 2 March 2005. In summary the owner stated:

- The ground levels could be easily adjusted;
- As the tops of the parapets and balcony balustrades are undulating water can run off and not pond;
- The bolt fixings to the balustrade handrail are filled up with a commercial grade sealant, and the bolts do not fully penetrate the timber top plate;
- The multi-layered parapet tops alleviated the need for a metal cap flashing; and
- The owner was concerned that in paragraph 6.4 of the report the expert referred to issues outside the parameters of the determination.

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 low level roofs with 600mm wide eaves or verge projections and roof overhangs that provide excellent cladding protection;
- Has high level parapet walls that do not provide any protection to the cladding;
- Is built in a high wind zone;
- Is two-stories high;
- Is generally simple in plan, but with a complex lower roof configuration;
- Has exterior windows and doors that are fully flashed;
- Has one upper-level balcony built over a habitable space; and
- Has, based on information supplied by the owner, external wall framing that is constructed with H1 LOSP timber that is likely to decay if it absorbs and retains moisture, apart from the bottom plates, which are H3CCA treated and will resist decay if they get wet.

Weathertightness 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 insufficient ground clearance to the base of the cladding above some of the garden areas;
- The flat tops of the parapet walls and the balcony balustrade; and
- The fixing of the balcony balustrade handrail through the top of the balcony balustrade.

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;
- There are grooves set into the back of the backing sheets that afford some drainage if moisture passes through the cladding;
- The lower level roof spaces provide ventilation to the upper-level wall framing;
- 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 three elevations of the house demonstrate a medium weathertightness risk and the remaining elevation a high 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 will consequently 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 21 March 2005.

John Gardiner
Determinations Manager