

Determination 2005/53

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 45

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 territorial authority and the other parties are the 2 joint owners of the property (referred to throughout this determination as “the owner”). The application arises from the refusal by the territorial authority to issue a code compliance certificate for a 5-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 wall cladding as installed (“the cladding”), which is applied to the external walls, beams and columns of this house complies with the building code (see sections 18 and 20 of the Act). By “external 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 Act or the building code.
- 1.6 The house itself is described in paragraphs 2.1 to 2.5, and paragraph 8 sets out the decision.

2 PROCEDURE

The building

- 2.1 The building is a two-storey detached house, with some single-storey attached wings, situated on a sloping site, which is in a high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The external walls of conventional light timber frame construction are built on a patent concrete ground floor slab system. The timber-framed external walls are sheathed with monolithic cladding. The house is of a fairly complex shape, with some curved walls and window projections. The concrete tiled pitched roofs are at varying levels, and have hip, valley, and wall to roof junctions. The roofs are extended at certain locations to form verandas and are supported on monolithic clad columns and shaped beams at these locations. A small butyl rubber clad “eyebrow” roof is constructed over the bay window. The aluminium external windows and doors are fixed to the timber wall frames rather than being fixed to the surface of the cladding. As a consequence the windows and doors are recessed into the walls. Sills and head mouldings are planted below and above, including the upper level windows with radiused heads. Generally the eaves have 220mm projections and the verges are without projections. Shaped monolithic clad timber-framed corbels are attached to the cladding at the junctions of the eaves and verges.
- 2.2 The house has one small open balcony at the upper level that is constructed over a living space and this has a small cantilevered radiused projection. The balcony deck has a ceramic tile finish over a butyl rubber membrane covering fixed to a plywood substrate. The membrane is turned up under the wall cladding and turned down over the exposed edges to drain off any water collected on the deck. The balcony has a wrought iron balustrade that is secured through the tiled deck. The house also has a timber-framed deck and associated steps to one elevation at the lower level. The deck is supported on timber piles and beams and decked with close-boarded timbers. Timber framed pergolas are attached to the first floor level of the building at the west and north elevations and are also supported on monolithic clad timber-framed columns and beams. A similarly constructed pergola is constructed off the upper

balcony. There are two monolithic clad chimneys formed in the external walls. One of these is full height, partially set into an upper-level roof, extends above the roofline, and is finished with a shaped projecting capping. The other chimney is similar but its cladding commences at a lower level roof.

- 2.3 The specification calls for all wall framing to be No 1 Treated to TPA Specification. However, no evidence has been forwarded as to the treatment, if any, applied to the external wall framing.
- 2.4 The building is clad with what is described as monolithic cladding. The wall 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 60 mm thick expanded polystyrene (EPS) backing sheets fixed through building wrap directly to framing timbers and finished with a proprietary mesh reinforced product plaster system supplied by the manufacturer of the backing sheet system. The plaster is also finished with three coats of 100% acrylic exterior paint system. The system has been subject to an appraisal by an independent appraisal organisation. I note that the installed cladding differs from that shown on the consented plans. The territorial authority has referred to this in its letter to the owner of 30 April 2004, and the territorial authority noted that no amended plans had been submitted in respect of this amendment.
- 2.5 The cladding to the pergola columns and beams, and the shaped eave corbels consist of a fibre-cement backing finished with a plastered textured finish.
- 2.6 The cladding system manufacturer provided a "Producer Statement" dated 1 February 2005, covering the cladding.

Sequence of events

- 2.7 The territorial authority issued a building consent on 22 January 1999.
- 2.8 The territorial authority made various inspections during the course of construction, and approved the "Preline Building Inspection" on 16 August 1999 and the "Postline/Bracing Inspection" on 27 August 1999. Three "Final Building Inspections" were undertaken on 13 November 2000, 15 March 2004, and 28 April 2004. The house was not passed after these inspections, as there were outstanding items to complete. The territorial authority noted on 15 March 2004:

No CCC due to:

1. No battens behind [Named cladding].
2. Age of consent.
3. Floor to ground levels incorrect.

- 2.9 The owner engaged a firm of building surveyors ("the consultants") to inspect the property and the consultants carried out such an inspection on 21 April 2004. The consultants prepared a report that described the house, roof, and cladding in general

terms. The consultants had carried out a series of moisture readings to the interior of the external walls of each room at both levels, using a non-invasive moisture meter. Readings of 11% to 13% were recorded at the ground floor and readings of 9% to 11% were recorded at the first floor. The consultants considered that there were no problems concerning the external windows and doors, but noted that there were some problems relating to ground clearances. The consultants were of the opinion that the house had no current moisture ingress problems. The house would also comply with the territorial authority's requirements at the time of construction and at the time of inspection, and also with the terms of clauses B2, E2, and E3 of the Building Code.

2.10 The territorial authority wrote to the owner on 30 April 2004, stating:

We have received your request for a 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 specific periods of time after the code compliance certificate is issued.

You will be aware of the current weathertightness issues often reported in the media. These issues have highlighted the care that must be taken to establish that all building elements, but particularly cladding, is durable before any CCC can be issued.

As your building is face fixed (monolithic) construction with no cavities we are unable to verify that it fully complies with the Building Code requirements, manufacturer's details application (*sic*) at the time and that it will remain durable for the required period. Visual Inspection has revealed the following:

1. Cladding not done as per approved plans, ie [Named cladding] used (verified by builder and inspector and no amended plans submitted for change in cladding. Report from [Consultant] indicate solid plaster.
2. High risk design.
3. Timber framing treatment unknown.
4. Ground levels non complying.
5. Height of step between deck and floor.

We would advise we do not accept any reports from [the Consultants].

There has been recent information and knowledge that face sealed cladding systems without adequate drainage and ventilation cavity will cause irrevocable damage to structural elements in the event of leakage and/or the effect of residual moisture.

Council cannot be satisfied that the cladding system as installed on the above building will meet the functional requirements of Clause E2 External Moisture of the New Zealand Building Code and is therefore unable to issue a code compliance certificate...

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

2.12 The territorial authority applied for a determination on 9 July 2004.

3 THE SUBMISSIONS

- 3.1 The territorial authority made a submission in the form of a letter to the Authority dated 9 July 2004, which summarised the consent and inspection processes relating to the house. The territorial authority also noted that no specific cladding inspections had been undertaken for building wrap, flashings, board fixings, etc. The territorial authority then listed the major risk issues set out in their letter to the owner of 30 April 2004. The owner had been informed that, due to the type of monolithic cladding applied to the house and its attendant risk factors, the territorial authority was unable on reasonable grounds to accept the compliance of the cladding.
- 3.2 The territorial authority supplied copies of:
- The plans and specifications;
 - The consent documentation;
 - The territorial authority's inspection documentation; and
 - The correspondence with the owner.
- 3.3 The owners wrote to the Department on 7 February 2005 stating that the matter was stressful and arduous to handle, as they were not the original owners who had built the house. The owners noted that there was a wide variance in what builders, tradesmen, and the territorial authority have agreed to as being right and being wrong with the house. The owner also supplied a copy of the cladding manufacturer's producer statement.
- 3.4 The copies of the submission 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. 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; and
- 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 Authority commissioned an independent expert (“the expert”) to inspect and report on the cladding. The expert inspected the building and furnished a report dated January 2005. It noted that the “the quality of the surface finish to the cladding was

consistently high and synonymous with a recent recoating”. The expert removed the plaster coating to reveal the window flashing details at two locations, and noted that the windows were appropriately flashed. The expert was of the opinion that control joints were not required for a house with the dimensions of the one in question. The expert noted that the apron and chimney flashings were not neatly constructed, but was of the opinion that the presence of under and over flashings alleviated these shortcomings. The expert also made the following comments regarding the cladding:

- There were cracks in the plaster face at 2 locations;
- There were some locations where the recommended ground clearances at the base of the cladding had not been achieved;
- There is inadequate sealing where the pergolas adjoin the cladding;
- The problems with the ends of the apron flashings at some locations; and
- At an external corner of a gutter there is an entrapment void, the decoration is incomplete, and the eaves PVC angle protrudes into the gutter.

5.2 The expert took non-invasive readings at the interior linings of the external walls throughout the house and no readings in the “damp range” were recorded. The expert also took invasive moisture readings through the skirting boards fixed to the exterior walls. Moisture readings of 9% to 13.7% were recorded in these instances. 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 in a letter to the Department of 7 February 2005, noting that:

- A producer statement was issued;
- There are no timber fascias, and there are plastered fascias at the gabled ends of the house;
- There are double fascias on the gable ends; and
- The supplier’s records relating to the frame and timber trusses supplied had been found. (I note that no written evidence concerning the treatment, if any, of the timber was submitted to me).

The owners noted that while they were not suitably qualified to comment on other aspects of the expert’s report, they supported the comments that the house does not show any signs of dampness, and that after 6 years it is in excellent condition.

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 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 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 I believe 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. I believe 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, the I find that this house:

- Has 220 mm wide eave projections that provide little protection to the cladding under them. However the veranda roof projections provide some additional protection;
- Has no verge projections that would provide cladding protection;
- Is in a high wind zone;
- Is mainly two storeys high;
- Has exterior joinery units that are fully flashed;
- Has an envelope that is fairly complex on plan, with a roof system having hip, valley and wall to roof junctions;
- Has a small balcony constructed over a living space at the first floor level. The metal balustrade to the balcony has some fixings that penetrate the balcony floor;
- Has a deck at the lower level;
- Has two pergolas at the lower level and one pergola at the upper level; and
- Has external walls constructed with what I accept, in the absence of evidence to the contrary, is timber that provides little resistance to decay if it gets wet and cannot dry out.

Weathertightness performance

6.8 I find that generally, some aspects of the cladding appears to have been installed according to good trade practice and to the manufacturer's instructions, but some junctions and edges are not well constructed. These areas are:

- The cracks in the plaster face at 2 locations;
- The locations where the recommended ground clearances at the base of the cladding has not been achieved;
- The inadequate sealing where the pergolas adjoin the cladding;
- The problems with the ends of the apron flashings at some locations; and
- The external corner of a gutter where there is an entrapment void, the decoration being incomplete, and the eaves PVC angle protruding into the gutter.

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, and notwithstanding the deficiencies that have been identified, the cladding appears to have been installed according to good trade practice;
- The windows are fully flashed; and
- The cladding itself is not allowing the penetration of moisture at this time.

6.10 I consider that these factors adequately compensate for the lack of a drainage and ventilation cavity, and can allow the house to comply with the weathertightness and durability provisions of the building code.

6.11 I also accept the expert's opinion that there is no requirement to provide control joints in the cladding and that the additional under and over flashings provide adequate protection to the apron flashings.

6.12 I recommend that the balcony be carefully checked to confirm that the connections of the balustrade to the balcony floor are not allowing the entry of moisture.

6.13 I note that one elevation of the house demonstrates a low weathertightness risk rating, and the remaining elevations 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 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 It is emphasised that each determination is conducted on a case-by-case basis. Accordingly, 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 cladding to 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 27 April 2005.

John Gardiner
Determinations Manager