

## *Determination 2005/62*

# *Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 54*

## **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 two joint-building 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 7-year old house, unless changes are made to its monolithic cladding system.
- 1.2 The question to be determined is whether there are reasonable grounds to believe that the external wall cladding as installed (“the cladding”), which is applied to all the external timber-framed walls of the 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 Building Act or the building code.
- 1.6 The extensions themselves are described in paragraphs 2.1 to 2.3, and paragraph 8 sets out the decision.

## **2 PROCEDURE**

### **The building work**

- 2.1 The building is a single 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 a concrete slab supported by concrete foundation walls. All the timber-framed external walls of the building are lined with a monolithic cladding, and the aluminium windows are recessed into plastered reveals. The house is of a relatively complex shape, comprising 4 wings, and the main roofing is corrugated steel with some valleys and one roof to wall junction. A narrow length of the garage has a flat roof over it, which is covered with a butyl rubber membrane over plywood sarking. The membrane is dressed under the pitched roofing for one length, is finished against a parapet at one end and is dressed into the spouting for the other length and end. There is a flat roof over the entry area and adjoining rooms, which is either covered with butyl-rubber membrane over plywood sarking or has glazing set into glazing bars. This roof is extended to form a veranda that is supported by timber beams fixed to concrete posts and has roof to wall junctions. A similarly constructed veranda adjoins the western elevation. A timber framed open pergola supported on concrete columns is fixed to the full length of the northwest elevation. Apart from the veranda overhangs and the soffit of the recess adjoining the den, there are no eave or verge projections.
- 2.2 The specification calls for all framing timber to be No1 Boric treated, but I have not received any evidence, by means of invoices or other documentation, as to the framing timber purchased for the house construction.
- 2.3 All of the timber-framed external walls of the house that are the subject of this determination are clad with a stucco system that is described as monolithic cladding. In this instance it incorporates 4.5mm thick fibre-cement backing sheets fixed through the building wrap directly to the framing timbers, stainless steel reinforcing mesh spaced off the backing, and a 20mm thickness of solid plaster. The plaster in

turn is finished with a paint system. No information has been given as to what jointing, plaster and paint systems were applied to the house.

### Sequence of events

- 2.4 The territorial authority issued a building consent on 8 May 1997.
- 2.5 The territorial authority made various inspections during the course of construction, and approved the preline inspection on 24 July 1997. A final inspection was undertaken on 2 July 2002. Following this inspection, the territorial authority wrote to the owner on 5 July 2002, noting that 5 items required completion or change. Three of these involved the cladding as follows:
2. Seal stringer embedded in wall where the pergola comes off it.
  3. Seal wall where the plaster is embedded into the plaster eastern side.
  4. Repair the cracks in the plaster walls.
- 2.6 According to the owner, the items requiring attention were carried out, but there was a delay due to a small defect in the plaster adjoining the garage entrance, which was later remedied.
- 2.7 The territorial authority carried out a further inspection in January 2004. Following this inspection, the territorial authority wrote to the owner on 19 May 2004. In this letter, the territorial authority stated:

Section 4 of the Building Act 1991 requires that Council issue a Code Compliance Certificate if it is satisfied on reasonable grounds that the Building Code has been met.

The Council in respect to this project cannot be satisfied that the Building Code requirements of Clause E12 (sic) external moisture and Clause B2 durability have been achieved for the following reasons:

1. The solid plaster system is reliant on correct installation and in particular, reinforcement, flashing installation and correct placement of shrinkage control joints. The Council was not given the opportunity to inspect any of these aspects.
2. There is evidence of failure of the cladding system, ie portions of the cladding being replaced, silicon sealant being applied at various junctions.

The Council is aware that its decision not to issue a Code of Compliance Certificate (sic) will be of concern.

The Council considers that to resolve this issue the options available are to reclad the dwelling and have all the appropriate inspections carried out or to make application to the Building Industry Authority for a determination.

The refusal to issue a Code Compliance Certificate is not a reflection on the quality of building work carried out. As I discussed on site, Council's insurance company have been very specific about what we accept and

unless we have inspected all aspects (particularly the critical elements associated with the cladding system), we are not in a position to issue the Code Compliance Certificate.

- 2.8 I am concerned that the territorial authority appears to have assessed compliance on the basis of its insurer's requirements, rather than by reference to the building code as the Building Act obliges it to do.
- 2.9 The territorial authority did not issue a Notice to Rectify as required by section 43(6) of the Act.
- 2.9 The owner applied for a determination on 27 October 2004.

### **3 THE SUBMISSIONS**

- 3.1 In a letter to the Authority dated 25 October 2004, the owner described the sequence of events leading up to this determination. The owner also commented on the territorial authority's letter to the owner of 19 May 2004 as follows:

As far as we are aware the [territorial authority] was given the opportunity to inspect and this seems to be confirmed by the site check sheet. Council had not previously claimed lack of opportunity to inspect.

As far as we are aware there has been no failure of the cladding system.

Re cladding of our house is not a viable option.

The [territorial authority] should not be controlled by what the Council's insurance company specifies it should accept. The Council is in a position to issue a certificate and should do so.

- 3.2 The owner supplied copies of:
- The plans and specifications;
  - The consent documentation;
  - The correspondence from the territorial authority; and
  - The territorial authority's inspection sheets.

- 3.3 The territorial authority made a submission in the form of a letter to the Authority, dated 15 November 2004. The submission described the building project and the inspections that the territorial authority had carried out. The territorial authority believed that the house showed all the identified "at risk" features that have contributed to many of the leaking building claims. In addition, the territorial authority had not been provided with window details, reinforcing details, details of flashings or position of control joints. The territorial authority also set out its reasons for not issuing the code compliance certificate, which were:

1. Areas of cracking to plaster

2. Area of replacement through earlier failure
3. Exposed ends of columns
4. Sealant to the glazed roof junction
5. Pergola framing fixed through cladding
6. Lack of flashings and seals over windows
7. Junctions of roof and wall claddings
8. Spouting penetrating cladding Timber beam penetrating cladding
9. Lack of flashings and seals around windows

3.4 The copies of 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 current Acceptable Solution, E2/AS1, allows for solid plaster systems with fibre cement backing sheets, but requires that they be fixed on battens to create a 20mm cavity between the sheet and the framing. The previous acceptable solution E2/AS1, which was in force when this consent was issued, allowed for mesh reinforced solid plaster to be applied to fibre cement backing sheets that were face fixed to the framing. The cladding is not currently 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; 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. It noted that the standard of workmanship on the house is average. However, the installation of the cladding system is below the required standard and the paint coating appears to be allowing water to get into the plaster in some instances. The expert was of the opinion that there is an undue reliance on sealant beads, which in some cases are quite thin and inappropriately applied. The plaster appears not to be of the required strength/density and the expert suggested that samples of the stucco be removed for laboratory analysis. The expert also made the following comments regarding the cladding:

- There are no signs that any control joints in the stucco have been installed as specified in E2/AS1 or the relevant Standard, or as recommended by the manufacturer in the backing sheets;
- The recently applied paint system had many pinholes in it and is not extended behind at least one light fitting;
- There are a number of horizontal ridges in the paint at the sides of some windows and a diagonal crack above the head of one door that appear to be the result of prior cracking, that are filled with either sealant or paint;
- There are a number of vertical cracks in the plaster above some doors on the western wall;
- There is insufficient ground clearance to the base of the cladding on each side of the garage door;
- The plaster above the apron flashings is hard down on the flashing, and the lower ends of the flashings are not turned out from behind the plaster, preventing moisture from draining away;
- There are no apron flashings where the plaster abuts the pergola glazing;
- There is a gap between the fascia board and the top end of the apron flashing at one location;
- There are no adequate flashings where the concrete masonry walls extend beyond the cladding to the walls of the garage, and the flashing beneath the cladding over the top of the concrete masonry wall is inadequate;
- As the pergolas were attached to the house before the cladding was applied, the plaster is installed around the stringers, the ends of the rafters and the ends of some fascias, and there are no flashing to the base of the stringers;
- There are no saddle flashings installed where the pergola beams or boundary rafters abut the cladding;
- At the northeast side of the garage, the junction between the membrane of the pergola roof and the cladding is partly unsealed;
- There are no jamb or sill flashings or sill trays installed to the external windows and doors, nor is any effective sealing present;
- The plaster is taken over the face of the external windows and doors at the heads, jambs, and sills and the sealant bead is incomplete or has pulled away;
- Some window head flashings are sealed at their lower edge between the plaster and the flashing and/or frame preventing moisture from draining away;

- The fascias and gutters are generally extend too far, and accordingly, the required thickness of plaster and paint is not continuous behind their ends; and
- Some of the penetrations of the cladding are inadequately sealed.

5.2 The expert inspected the interior of the house for signs of water damage and noted swollen skirting boards in two locations, shrinkage cracks and damaged paint in the dining room, twisted sill reveals in the en-suite, and dampness on the concrete floor under the skirting board adjacent to the garage door.

5.3 The expert took invasive readings at the interior of the external walls, and elevated readings were obtained at 3 locations as follows:

- 18.5% at the main bedroom bottom plate; and
- 22% and 22.5% at the garage bottom plates.

The expert also took invasive readings at the exterior of the external walls, and elevated readings were obtained at 4 locations as follows:

- 20.5% at the passage bottom plate;
- 25.5 % at the garage bottom plate; and
- 34.5 and plus 40% at the en-suite sill trimmers.

Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure. While drilling probe holes, the expert found the plaster to be very soft and of a dark colour that indicated that it was wet. The expert also confirmed that the backing sheets were wet, and that drilling by-products indicated that the en-suite sill trimmer timber was soft, darkened and wet.

5.4 The expert also observed that the southwest concrete masonry wall to the garage has no paint or other weatherproof coating.

5.5 Copies of the expert's report were provided to each of the parties, and the territorial authority did not respond. In a letter to the Department dated 6 February 2005, the owner stated that the house was considered to be in a sound condition and that the expert's report was overstated in some respects. The owner also attached copies of letters from the architect and the builder as described below.

5.6 The main issues raised in the architect's letter of 31 January 2005 can be summarised as:

- The cladding used is not experimental or untested and is an effective system used for decades in New Zealand;
- Contrary to the expert's report, an on-site inspection shows the general condition of the cladding to be excellent. The cladding was installed to absolute best practice at the time and the builder and plasterer are both long established and reputable and their work is of a high quality and integrity;



- With the exception of the bath bay window, the measured moisture levels obtained by the expert are generally within expected levels and are not indicative of timber decay due to moisture;
- NZS 4251 should be the document used in assessing the cladding, and in terms of this document a small number of remedial items may require attention. All work was carried out to ruling trade practice and thoroughly inspected and approved by the territorial authority at the time. The expert's assertions relating to plaster strength and density and defective paint coating are all speculative and not supported by definitive testing;
- The garage masonry wall has been sealed with a specialist silicone waterproofing and while further sealing may be required, it is not a regulation requirement for such a wall; and
- The time elapsed before the owner sought a code compliance certificate is not a reason for the territorial authority to refuse to issue it and the territorial authority inspected and approved all work prior to completion. The cladding is traditional, well proven, and an acceptable solution under the Act, and apart from some very localised identified faults, which will be remedied without delay, the standard is excellent.

5.7 The builder in a letter dated 1 February 2005 stated that the house was constructed to the best trade practice of the time and that quality trades-people were used in all areas.

## **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, I find that the house:

- Has apart from the veranda overhangs and the soffit of the recess adjoining the den, no eave or verge projections.
- Is in a high wind zone;

- Is single storey;
- Has exterior window and doors without jamb flashings, sill flashings, or sill trays;
- Has an overall envelope that is relatively complex on plan;
- Has no decks or balconies;
- Has two pergolas attached to the cladding; and
- Has external wall framing that is likely to be constructed of timber that is unlikely to resist the onset of decay if it absorbs and retains moisture.

### **Weathertightness performance**

- 6.8 I find that the monolithic cladding in general does not appear to have been installed according to good trade practice. As a result, there are a number of identified defects, set out in paragraph 5.1 and in the expert's report, which have contributed to the levels of moisture penetration already evident in locations in the external walls of the house. The main areas of concern are the lack of control joints, the evidence of cracking, insufficient ground clearance, inadequate pergola member attachments, the lack of, or inadequate, flashings, and the inadequately sealed penetrations. In addition, the external wall framing timber is in all likelihood not treated, and thus unable to delay the onset of decay if it gets wet. As reported by the expert, there is already visible evidence of wet timber wall framing.
- 6.9 In making this decision, I have carefully considered the architect's letter described in paragraph 5.6, which criticises the expert's report. However, I am of the opinion that as the architect's letter does not refute in detail the items of non-compliance listed by the expert in paragraph 5.1, I must reach the conclusion set out in paragraph 6.8. As regards the quality of the plaster itself, I would suggest that samples be removed from various locations and tested to establish its strength and density.
- 6.10 The architect has noted that the exterior concrete masonry garage wall may not require further weatherproofing. However, as there are ends of timber-framed walls abutting the concrete masonry, and are constructed on top of it, the question of adequate weatherproofing and ensuring that it occurs should also be considered.
- 6.11 Finally, I cannot accept, for the reasons set out in paragraph 4.2, that the cladding applied to this house is currently an Acceptable [Approved] Solution under the Act.
- 6.12 The lack of detailed design drawings mentioned by the territorial authority in paragraph 3.3 did not apparently cause the territorial authority to withhold the building consent. I conclude that it was left to the builders to design and construct such details as construction progressed, and to have to agree them agreed to by the territorial authority's inspector on site..
- 6.13 I note that all elevations of the buildings demonstrate a low weathertightness risk rating when calculated by 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 am satisfied that the performance of the monolithic cladding is inadequate because it has not been installed according to good trade practice. In particular, it demonstrates the key defects listed in paragraphs 5.1. I have also identified the presence of some known weathertightness risk factors in this design. The presence of the risk factors on their own is not necessarily a concern, but they have to be considered in combination with the significant faults identified in the cladding system. It is that combination of risk factors and faults that indicate that the structure does not have sufficient provisions that would compensate for the lack of a ventilated cavity. Consequently, I am not satisfied that the cladding system as installed complies with clause E2.3.2 of the building code.
- 7.2 In addition, 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 allowing the ingress of moisture, the house does not comply with the durability requirements of clause B2.
- 7.3 I find that because of the apparent complexity of the faults that have been identified with this cladding, I am unable to conclude, with the information available to me, that remediation of the identified faults, as opposed to partial or full recladding, could result in compliance with clauses B2 and E2. I consider that any final decisions on whether code compliance can be achieved by either remediation or recladding, or a combination of both, can only be made after a more thorough investigation of the cladding. This will require a careful analysis by an appropriately qualified expert as to the correct remedial option to be followed. Once that decision has been made, it should be submitted to the territorial authority for its comment and approval. If the territorial authority chooses to reject the proposal, then the owner is entitled to seek a further determination that will rule on whether the proposed remedial work will comply with the requirements of 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 In the circumstances, I decline to incorporate any waiver or modification of the building code in its determination.

## **8 THE DECISION**

8.1 In accordance with section 20 of the Act, I hereby determine that the monolithic cladding system as installed does not comply with clauses B2.3.1 and E2.3.1 of the building code and accordingly confirm the decision of the territorial authority to refuse to issue a code compliance certificate.

8.2 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.

8.3 Finally, I consider that continuing maintenance of the cladding will be required to ensure its continuing building code compliance.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 5 May 2005.

John Gardiner  
**Determinations Manager**