

## *Determination 2005/63*

# *Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 55*

## **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 applicants are the 3 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 2-year old house unless changes are made to its monolithic cladding system.

1.2 The main ground floor external walls of the building are faced with a brick veneer. The remainder of the building’s external walls, including the infill panels over the ground floor windows, are clad with a monolithic system. My task in this determination is to consider whether it is satisfied on reasonable grounds that only the monolithic cladding as installed (“the cladding”) on this house complies with the building code (see sections 18 and 20 of the Act). By “wall cladding as installed” we mean the components of the system (such as the backing sheets, the flashings, the joints and the plaster and/or the coatings) as well as the way the components have been installed and work together.

1.3 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 2.3, and paragraph 9 sets out the decision.

## **2 PROCEDURE**

### **The building**

- 2.1 The building is a two-storey detached house on a level excavated site that is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. It is of conventional light timber frame construction and is a relatively simple shape. The house has two balconies, one of which is constructed over a living space and an elevated external walkway. There are wall/roof intersections where the base of the cladding adjoins a small area of roofing beneath it. The house has a brick veneer to the lower level, plus monolithic cladding installed over the ground floor windows. The upper high level of the main building and the balcony and walkway balustrades are clad with a monolithic system. The building has 500 mm wide eaves projections.
- 2.2 The framing in external walls is H1+, LOSP treated timber.
- 2.3 As described in paragraph 2.1, certain areas of the external walls of the building are clad with what is described as monolithic cladding. As specified in its manufacturer’s July 1998 technical information manual (“the manufacturer’s instructions”), it incorporates fibre-cement backing sheets fixed through the building wrap directly to the framing timbers and finished with a choice of joint and coating systems. With the exception of the window infill panels where they are 4 mm thick, the backing sheets are 7.5 mm thick. The manufacturer’s instructions include details for flashings at various junctions (but not all of the junctions actually present in the house). For the purposes of this determination, the manufacturer of the fibre-cement sheets and the flashing kit is regarded as the manufacturer of the system, despite the fact that each of the joint and coating systems is itself proprietary to one of other manufacturers. The manufacturer’s instructions identify the joint and coating systems by reference to

those other manufacturers and their system brands but give no other information about them. I note that the owner is the applicator of the jointing and coating systems.

### **Sequence of events**

- 2.4 The territorial authority issued a building consent on 29 January 2002.
- 2.5 The territorial authority made various inspections in the course of construction and passed both the pre-plaster and the plastering inspections. A meeting was held on site on 5 December 2003 and according to the owner, the territorial authority advised the owner to remove the cladding and put a cavity system in place.
- 2.6 On 8 June 2004, the territorial authority issued a Notice to Rectify as required by section 43(6). The “Particulars of Contravention” attached to the Notice to Rectify noted that
1. The following items have not been installed per the manufactures [sic] specifications
    - Control joints at a maximum of 5.4 metres vertically are required. Control joints have not been installed.
    - Horizontal surfaces are to be formed with sufficient fall to prevent water from ponding on them. The deck barriers have flat horizontal surfaces. Furthermore the textured finish coat is poorly applied and in the case of the rear access ramp the pvc corner moulding is exposed.
    - The junction between the window head flashing and bottom edge of the cladding is to be either:
      - Left unsealed with a 5mm gap or
      - If sealed the bottom of the edge sheet must be back sealed. A continuous 6mm x 10mm in seal strip must also be used to seal the back edge of the sheet.

As the junction in a number of areas has been sealed, council must satisfy itself that the above mentioned seals have been installed.

    - The junction between the bottom edge of the window joinery and the wall cladding is to have a sill flashing installed and the junction is to remain open. This junction has been sealed and no sill flashing appears to have been installed.
    - The exposed edges of the sheet must be painted to stop any moisture wicking. This has not been achieved in a number of areas. Especially the small area between the roofs which has no jointing, sealing or applied texture finished coat.
    - NOTE: Generally the textured finish is uneven and in some places so poorly applied as to be hardly visible, a finished topcoat of the paint system is also uneven in its application.
  2. The following items have not been installed per the acceptable solutions of the building code, (no alternative solutions have been applied for)
    - The distance between finished floor level and finished paving of 150mm has not been achieved.
    - Two outlets are required to internal gutters/decks. The overflow acting as the second outlet is close to if not level with the inside floor level, being 70 mm from the finished deck level to the bottom of the overflow.

3. The following items have not been installed per accepted trade practice
  - At the junction between horizontal surfaces (i.e. top of barrier) and a vertical surface (i.e. house) wall flashings are required. In the case of the deck barrier/house junction council cannot be satisfied that flashings have been installed.
  - A minimum clearance of 50mm is required between the cladding and adjacent surfaces. There is minimal clearance between the roof and wall claddings in a number of areas.
  - Penetrations through the cladding system shall be as waterproof as the cladding itself. There are a number of penetrations through the cladding that should be protected with rubber flanges and silicon, and in the case of the satellite dish fixing bracket, telecom point of entry box, downpipe brackets flashings and copper pipe penetration, flashings have not been installed.
4. Ventilated cavity system
  - The Council has recently received information which shows that monolithic cladding systems without a drainage plane/cavity, provision for adequate ventilation, drainage and vapour dissipation will, in the likelihood of leakage and/or the effects of residual moisture, cause irrevocable damage to the structural elements of the building.

The territorial authority also noted:

The Council cannot be satisfied that the cladding system meets the performance requirements of Clauses B1 Structure, B2 Durability, E2 External Moisture, E3 Internal Moisture, G4 Ventilation and H1 Energy Efficiency Provisions of the Building Code...Accordingly, the works do not comply with the requirements of Clause E2.3.5 and E2.3.6 of the New Zealand Building Code 1992 (the "Code")

And that the owner was required to:

1. Provide adequate ventilation to the monolithic cladding and into the wall frame space by means of either a ventilated cavity or alternative approved system, and ensuring all issues related to the above are resolved.
2. Lodge with the council an application, within 28 days from the date of this notice, for an amended building consent, and provide all necessary information that may be requested to allow this consent application to be processed, alternatively.
3. Confirm to council, within 28 days from the date of this notice, your intention to apply to the Building Industry Authority for a determination in accordance with the Building Act 1991
4. Lodge with council "as built" plans of the building works undertaken that are not as per the approved building consent plans, within 28 days from the date of this notice. Please note that a building consent cannot be issued retrospectively for the work competed for which a building consent was not approved.

2.7 The owner applied for this determination on 10 December 2003.

### **3 THE SUBMISSIONS**

3.1 The owner in a covering letter stated that:

During the inspection [of the house] prior to 05/12/03 we were advised that everything is approved and was given the go ahead. After the go ahead we put [on] the boards and did the plastering and painting.

Once these tasks were done then at the next inspection at 05/12/03 we were advised that the board needs to be taken out and cavity system to be put in. When the inspector was questioned he advised that this rule just came in affect just a day before.(04/12/03)

The owner also provided copies of:

- The plans and specifications;
- The building consent, and the territorial authority's inspection records and check lists;
- A letter from the timber supplier dated 24 March 2004, stating that they "have manufactured the external frames supplied to the above address [the building in question] from H1+, LOSP treated kiln dried radiata timber";
- Invoices for various materials used in the building; and
- A covering letter in which the owner stated:

The invoices from the [Coating manufacturer] enclosed states the material used to plaster the walls. I, [one owner's name] operate a plastering company under [Named company] and I certify that all the plastering work was done according to New Zealand standard.

- 3.2 The territorial authority did not make a submission. However, the territorial authority wrote to the Authority on 10 May 2004 and pointed out the owner's refusal to allow it to inspect the building. The territorial authority also supplied copies of the Notice to Rectify and the "Particulars of Contravention", together with photographs illustrating areas of contravention.
- 3.5 The copies of the submissions and other evidence were provided to each of the parties. Neither the applicant 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 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, 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 to inspect and report on the cladding. The expert inspected the building and furnished a report, which stated that the exterior cladding has not been particularly well jointed and texture coated. The texture coating is uneven and non-existent in some places. Paint coverage is

reasonable but not of a standard that would ensure long-term weather proofness and durability. The expert also noted the following specific faults during the inspection:

- The texture coating is variously thin or non-existent to some areas of balustrade tops and appears thin to other isolated areas of wall cladding;
- The narrow strip of wall cladding between the higher and lower level roofs to the western elevation is not jointed, nor texture coated and is also unpainted in one area;
- There was a lack sealing strips and jointing tapes to observed cladding joints and in some cases the jointing compound separated easily from the cladding;
- The required vertical control joints were not provided to the northern and eastern walls;
- The cladding over the ground floor windows generally had either an inadequate overhang or no overhang at all;
- The required 6 mm gap had not been formed between the back of the backing sheet and the deck membrane in some areas;
- There were no sill flashings installed, despite the territorial authority having noted that they had been installed, and while there were no gaps in some areas, there was a very large gap between the joinery sill flange and the cladding on the western elevation;
- The coating was finished hard against the joinery unit head flashing in some instances;
- The ends of the head flashings and the jamb flanges of some joinery units had not been sealed and some flanges had neither sealant or compressible foam behind them;
- The tops of the balcony parapets do not have a sufficient degree of slope, are poorly finished and lack protective membranes. There is some cracking to the balustrades to the rear elevated walkway;
- There are no saddle flashings to the balustrade/main wall junctions and the three balustrade post penetrations lack waterproofing;
- The texture coating is not extended behind the downpipes; and
- The fixings to the satellite dish aerial have not been sealed nor have the holes left when the dish was re-positioned.

The expert concluded that cladding and ancillary features of the house “are likely to allow moisture penetration to, and accumulation within, wall cavities”.

- 5.2 The expert also used a non-invasive type moisture meter applied through the exterior cladding to detect areas of moisture ingress. The moisture readings in these areas were not elevated except at each end of the main section of the balustrade. The expert undertook further invasive testing at these two locations and obtained moisture readings of 20% and 21%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure. The 20% and 21% levels are significant, as the house was only completed in November 2003
- 5.3 Copies of the expert's report were provided to each of the parties. Neither the territorial authority nor the owner made any comment on the report

## **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 clause 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 New Zealand data and experience 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 a fundamental requirement to ensure good weathertightness performance.
- 6.4 The next priority is to reduce the ability of moisture to get through the cladding by utilising design measures that minimise the effects of the rain impacting on the walls.
- 6.5 The main areas for consideration are:
- Data shows a strong relationship between the width of the eaves and the incidence of wall leaks. An effective deflection mechanism, such as eaves greater than 600 mm wide, has been shown by Canadian data to manage more than 90% of rain incidents;
  - While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential, it is believed that homes in high and very high wind zones (as defined by NZS 3604) are likely to experience wind pressure differentials and thus a higher risk of water ingress;



- Taller buildings result in an effective increase in the catchment area of the wall. Available data suggests a clear correlation between higher number of storeys and an increased incidence of leaking;
- Complex roofs and overall envelope shapes where the roofs frequently intersect with the walls on upper floors create opportunities for leaks to directly penetrate into the wall; and
- Recent data also shows that decks and balconies that are exposed in plan and/or cantilevered out 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 addressed by a combination of effective drainage, ventilation of the drainage cavity and moisture tolerance in the external wall framing timber. These factors being:

- 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 consider 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 eaves projections 500 mm wide which are reasonably effective in shielding the cladding. However, some window heads do not have this eaves protection;
- Is in a medium wind zone;
- Is constructed to two levels with the cladding generally at the upper level only;
- Has one wall/roof intersection;
- Has an overall envelope that is relatively simple on plan;
- Has 2 balconies one of which is constructed entirely over a living space;
- Has no drainage cavity where the cladding is face fixed; and

- Has external walls constructed from HI+, LOSP treated timber, which is reasonably effective in delaying the onset of decay.

### **Weathertightness performance**

6.8 The cladding in some respects does not appear to have been installed according to good trade practice and to the manufacturer's instructions. As a result, there are some defects that could contribute to the penetration of water. These include:

- The texture coating is of variable quality, being uneven, thin or non-existent in some areas;
- The narrow strip of wall cladding between the higher and lower level roofs to the western elevation is not jointed or texture coated and is unpainted in one area;
- The lack of sealing strips and jointing tapes to some joints and the separation of the jointing compound from the cladding;
- The lack of control joints to the northern and eastern walls;
- The inadequate overhang or no overhang at all to the cladding over the ground floor windows;
- The lack of a gap between the back of the backing sheet and the deck membrane;
- The coating finished hard against some joinery unit head flashings;
- The lack of sealants to the ends of the head flashings and to the jamb flanges of some joinery units and the lack of sealant or compressible foam to some flanges;
- The inadequate slope, poor finish, and lack of protective membranes to the tops of the balcony parapets and the cracking of the walkway balustrade walls;
- The level of the balcony outlet, which as pointed out by the territorial authority coincides with the internal floor level of the building;
- The lack of saddle flashings to the balustrade/main wall junctions and the absence of waterproofing to the three balustrade post penetrations;
- The current and past fixings to the satellite dish aerial have not been sealed; and
- The paint finish is not to a standard that would achieve long-term weatherproofness and durability.

6.9 I consider that the design of this house presents a relatively low risk of weathertightness failure, despite the workmanship problems pointed out by the

expert. The simple building envelope and roof design, and the presence of eaves are such that face fixed cladding can meet the requirements of clauses B2 and E2 without requiring a cavity.

## **7 CONCLUSION**

- 7.1 I accept that the expert's report establishes that the cladding complies in most respects with the manufacturer's instructions. Apart from the area in the vicinity of the balcony, there is no other evidence of external moisture entering the building. Accordingly, with this exception I find that the cladding on this particular building complies with clause E2.
- 7.2 While the building as a whole does not show any signs of water ingress at the present time, these areas of the building will also have to comply with the durability requirements of clause B2. B2 requires that a building continue to satisfy all the objectives of the code throughout its effective life, and that includes the requirement for the building to remain weathertight. Because the cladding faults in this building are likely to allow the ingress of moisture in the future, the building does not achieve the durability requirements of clause B2.
- 7.3 I also find that when the other cladding faults have been satisfactorily rectified, and in particular the textured coating, this house should be able to remain weathertight and will thus comply with clause B2. It is essential that all the required items of rectification set out below, and which are detailed specifically in paragraph 6.8, be competently carried out to ensure such compliance.
- 7.4 Clause B2.3.1 of the building code requires the cladding be subject to "normal maintenance". That term is not defined, so 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 such inspections and activities such as regular cleaning, re-painting, replacing sealants, and so on.
- 7.5 I am also concerned that the ramp was not part of the original consent documentation. This is an item that poses a real danger to any person using it if it is not fully code compliant. Accordingly, it is suggested that the ramp as constructed be checked by the territorial authority for compliance with all the relevant clauses of the building code and that the territorial authority takes all necessary steps to address in terms of the Act and the building code, the issues arising from this non-consented building work.
- 7.6 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.
- 7.7 I decline to incorporate any waiver or modification of the building code in its determination.

## **8 WHAT IS TO BE DONE?**

- 8.1 It is not for me to decide directly how the defects listed in paragraph 5.1 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.

## **9 THE DECISION**

- 9.1 In accordance with section 20 of the Building Act, the I hereby determine that the house, with the exception of the balcony area is weathertight now and therefore the cladding, with this noted exception, complies with clause E2. However, as set out in paragraph 6.8, 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.
- 9.2 I also find that because of the compensating factors in this case, the lack of a drained cavity behind the cladding is not, on its own, sufficient grounds to withhold a code compliance certificate.
- 9.3 I therefore 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.
- 9.4 I consider that the cladding will require on-going maintenance to ensure its continuing code compliance, and that this maintenance programme should be undertaken after consultation with the territorial authority.

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

John Gardiner  
**Determinations Manager**