

## *Determination 2005/30*

# *Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 25*

### **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 party are the two joint owners (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 9-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 claddings as installed (“the claddings”), which are applied to the external walls and columns of the house comply with the building code (see sections 18 and 20 of the Act). By “external wall claddings as installed” I mean the components of the systems (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 2.4, and paragraph 8 sets out the decision.

## **2 PROCEDURE**

### **The building**

- 2.1 The building work, comprising a two-storey house with the floors set at varying levels and an integral basement garage, is situated on an excavated slightly sloping site, which is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The external walls of the house are of conventional light timber frame construction and built on either concrete block foundation walls or piled timber-framed floors. The external walls are sheathed with monolithic cladding. The house is of a relatively complex shape, and the butyl rubber clad high-level roof has parapets to three sides and drains to a box gutter. I note that the consented plans show a long-run steel low pitch roof at this level. The external faces of the parapets are packed out 200 mm and the tops, back edges, and the packed out soffit are all monolithic clad. The lower pitched concrete tiled roofs are at various levels, with several hip, valley, and wall to roof junctions. The aluminium external windows and doors are recessed into the cladding openings. There are no eaves and verge projections to the house. However, there are upper floor projections adjoining the family room and lounge, and a tiled portico is constructed over the main entrance. The family room projection and the portico are supported on monolithic clad timber columns.
- 2.2 A timber framed close-boarded deck with attached steps is constructed at the northeast elevation of the house. A tiled concrete landing and attached steps provides access to the main entrance. Two open balconies are constructed at the ground and upper levels. These have butyl rubber deck coverings and timber framed balustrades that have monolithic cladding to their flat tops and both faces. Tubular metal handrails are fixed through the tops of the balustrades.
- 2.3 The owner has supplied invoices showing that the wall framing was H1 treated. The owner claims that this was a Boric level treatment.
- 2.4 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

- 2.5 The territorial authority issued a building consent on 6 January 1995.
- 2.6 The territorial authority made various inspections during the course of construction, and approved the “Preline Building Inspection” on 13 July 1995. A “Final Building Inspection” was undertaken on 2 November 1998, and the territorial authority noted in a “Memorandum” that four items required rectification. None of these items related to the cladding. A further “Final Building Inspection” was undertaken on 3 December 2003 and the territorial authority noted in a “Memorandum”, that due to the age of the dwelling, an inspection and report by an approved advisor was required.
- 2.7 The owner in an email to the territorial authority on 4 December 2003 noted that no time limit was given by the territorial authority to complete the four outstanding items listed in 1998. The owner had since completed all the listed rectification work, and as the remainder of the building work had been inspected and passed in 1998, a code compliance certificate should now be issued.
- 2.8 The territorial authority responded by letter on 22 December 2003. The territorial authority noted that a significant time had elapsed from the time of issuing the consent up to the last inspection. Since that time the issues relating to weathertightness had emerged, and the territorial authority had been advised that it had to take all necessary steps to ensure that buildings were code compliant. As the territorial authority lacked the expertise to assess the relevant cladding issues, it was seeking the assistance of suitably qualified assessors to carry out this work.
- 2.9 The owner in a letter to the territorial authority dated 10 February 2004, repeated the issues raised in the owner’s letter of 5 December 2003. The owner also noted that the territorial authority had not engaged the services of the assessor referred to in its letter of 22 December 2003.
- 2.10 The territorial authority carried out a weathertightness visual inspection on 17 February 2004 and subsequently wrote to the owner on 23 February 2004, stating:

Further to our letter of 13 February 2004, we would advise that the Code Compliance Certificate Team have assessed your property and we advise as follows.

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.

There has been recent information and knowledge that face sealed cladding systems without an 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.

The Council are no longer in a position to accept reports from [Named organisation] accredited advisers to check compliance as indicated as being acceptable in {Named official's} letter to you of 22 December 2003.

A visual Inspection undertaken by [the territorial authority] on 17 February 2004 revealed some concerns on the cladding system, including surface cracking, wrong fixing of handrail, cladding imbedded in tiles.

Due top the above reasons, the Council would not be able to issue a code compliance certificate for this consent...

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 6 August 2004.

### **3 THE SUBMISSIONS**

3.1 The territorial authority made a submission in the form of a letter to the Authority dated 2 August 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 the external cladding system. 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. The major risk issues and concerns raised by the territorial authority were:

1. External timber frame – applicant of the consent claims that timber is treated and double building paper is used in cladding
2. Solid plaster cladding without cavity
3. High risk design due to sealed decks above habitable spaces, parapet construction, complex roof/wall junctions, flat roof, exposed walls, high wind zone, internal gutters and 3 storey timber frame construction
4. Top fixing of handrail to deck barrier
5. Non complying cladding ground clearance
6. No horizontal control joints (some vertical joints)
7. Cracks in cladding

The territorial authority listed the matters of doubt as being:

- Whether the installed cladding systems comply with clauses B2.3.1 and E2.3.2 of the Building Code.
- Whether the building elements, which have 5 & 10 year durability requirements comply with clause B2 of the Building Code, considering the age of construction.

3.2 The territorial authority supplied copies of:

- The consent documentation;

- The territorial authority's inspection documentation;
- The correspondence with the owner; and
- A set of photographs.

3.3 In a letter to the Authority dated 10 August 2004, the owner described the previous territorial authority inspections and noted that there were no weathertightness problems evident despite the age of the house. The owner made specific comments, which are summarised as:

- All timber is H1 or H3 Boric treated;
- The H3 treated deck stringer is below floor level and independent of the house;
- A butyl-rubber membrane goes from the gutter or roof right over the under flashed parapets;
- Aluminium head flashings had now been installed over the garage door opening;
- Handrails have been fitted as per standard practice and are silicone sealed;
- While the base of the cladding is into the ground, it is onto blockwork; and.
- The removal of the gibraltar board in the garage revealed that there were no leaks, water or decay.

3.4 The owner supplied copies of:

- Invoices from the timber supplier; and
- A set of photographs.

3.5 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 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 Department commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert inspected the building and furnished a report dated November 2004. It noted that the cladding and coating were observed to form a "continuous weathertight surface behind all obstructions". The cladding was free from cracks, and as it had recently been re-coated there was no evidence of the cracking that had been previously referred to by the territorial authority following its previous inspection. The expert considered that the cladding did not require horizontal control joints. The expert removed the plaster coating to reveal the window flashing details at one location, and noted that the window had jamb flashings. The expert also made the following comments regarding the cladding:

- To comply with accepted trade practice, additional vertical control joints should be provided to the south and east elevation wall cladding;
- There is no allowance for moisture to egress from behind the base of the cladding where it overlaps the foundation walls;
- The tops of the parapet walls and balcony balustrades lack a slope and the metal handrail supports penetrate the tops of the balustrades;
- There are no sill flashings to the external windows and doors to guide moisture out from behind the jamb flashings;
- There are no gaps between the head flashings over the external windows and doors and the cladding; and
- The fibre cement strips under the doors accessing the balconies are not painted and are deteriorating.

5.2 The expert took non-invasive readings at the interior linings of the external walls throughout the house and no raised moisture levels were recorded. The expert also took invasive moisture readings around window and door openings and obtained the higher level results of 18.2%, 21.2%, 22.3%, 22.8%, 28.2%, 30.4%, 32.8%, and 59.9%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

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

## 6 DISCUSSION

### General

6.1 I have considered the submissions of the parties, the expert's report and the other evidence in this matter. The approach in determining whether building work complies with clauses B2.3.1 and E2.3.2, is to examine the design of the building, the surrounding environment, the design features that are intended to prevent the penetration of water, the cladding system, its installation, and the moisture tolerance of the external framing.

## Weather-tightness risk

- 6.2 Research data and experience, both internationally and locally, indicates that the impact of weather-tightness 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 weather-tightness 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

- Lacks eaves and verge projections that could protect the cladding;
- Is in a medium wind zone;
- Is generally two stories high;
- Has exterior joinery units that lack sill flashings;
- Has an envelope that is relatively complex on plan, with the lower roofs having hip, valley, and wall to roof junctions;
- Has two lower level decks and two upper level open balconies; and
- Has external walls constructed with what I accept is timber that provides some 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 lack of vertical control joints to the south and east elevation wall claddings;
- The lack of any allowance for moisture to egress from behind the base of the cladding where it overlaps the foundation walls;
- The lack of a slope to the tops of the parapet walls and balcony balustrades, and the metal handrail supports penetrating the tops of the balustrades;
- The lack of sill flashings to the external windows and doors;
- The lack of a gap between the head flashing over the external windows and doors and the cladding; and
- The unpainted and deteriorating fibre cement strips under the doors accessing the balconies.

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:

- The cladding appears to have been generally installed according to good trade practice;

- The lower roof areas provide some ventilation to the external walls above them; and
  - The external walls are constructed with treated timber that provides some resistance to decay if it gets wet and cannot dry out
- 6.10 I consider that these factors 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 horizontal control joints in the cladding. The configuration of the walls means that there is no continuous vertical dimension matching or exceeding the 4000 mm limit that would trigger the need for a control joint.
- 6.12 I note that there is no additional covering material over the butyl rubber clad balcony decks that would afford protection against damage arising from foot traffic outdoor furniture and the like.
- 6.13 I note that two elevations of the house demonstrate a medium weathertightness risk rating, and the remaining elevations a high 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 am satisfied that the current performance of the cladding is not adequate because it is allowing water penetration into the wall framing at several locations at present. Consequently, I am not satisfied that the cladding systems as installed comply 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 will allow the ingress of moisture in the future, it does not comply with the durability requirements of clause B2.3.1 of the building code.
- 7.3 I consider that, because the faults that have been identified with the cladding systems occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.8 will consequently result in the building being weathertight and in compliance with clauses B2.3.1 and E2.3.1, notwithstanding the lack of a ventilated cavity
- 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 Building Act 1991, I hereby determine that the cladding systems as installed do not comply with clause E2 of the building code. There are also a number of items to be remedied to ensure that the house remains weathertight and thus meet the durability requirements of the code. Consequently, I find that the house does not comply with clause B2. Accordingly, I confirm the territorial authority's decision to refuse to issue a code compliance certificate.
- 8.2 I also find that rectification of the items outlined in paragraph 6.8 to the approval of the territorial authority, along with any other faults that may become apparent in the course of that work, will consequently result in the house being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity.
- 8.3 I note that the territorial authority has not issued a Notice to Rectify. The territorial authority should do so and the owner is then obliged to bring the house up to compliance with the building code. It is not for me to decide directly how the defects are to be remedied and the cladding brought to compliance with the building code. That is a matter for the owner to propose and for the territorial authority to accept or reject, with either of the parties entitled to submit doubts or disputes to the Chief Executive for another determination.
- 8.4 Finally, I consider that the cladding will require on-going maintenance to ensure its continuing code compliance.

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

John Gardiner  
**Determinations Manager**