

## *Determination 2005/26*

# ***Refusal of a code compliance certificate for a building with a “monolithic” cladding system”: House 24***

## **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 under section 17 of the Building Act 1991 as amended by section 424 of the Building Act 2004 (“the Act”). The applicant is the territorial authority and the other party is the current building owner. The original owner is now an affected party to this determination. The application arises from the refusal by the territorial authority to issue a code compliance certificate for a 4-year old third-floor addition to an existing commercial building (“the addition”) in regard to its:

- Monolithic cladding system;
- Balcony construction; and
- Bathroom floor waterproofing.

1.2 My task in this determination is to consider whether I am satisfied on reasonable grounds that the following elements of the addition comply with the building code (see sections 18 and 20 of the Act).

- The external wall cladding as installed (“the cladding”), which is applied to the external walls of the addition. 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;
- The open balconies; and
- The waterproofing applied under the bathroom floor tiling.

- 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 addition 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 work consists of a single-storey accommodation addition constructed on top of an existing two-storey commercial building situated on a site that is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The external walls of the addition are of conventional light timber frame construction built on timber-framed floors supported on a structural steel frame. The external walls are sheathed with monolithic cladding. The addition is of a fairly simple shape, with the single-pitch, long run, interlocking steel pitched roof entirely surrounded by parapet walls. The roof discharges onto a butyl rubber lined gutter, the position of which is cantilevered outside the line of the external walls. The face-fixed aluminium external windows and doors are externally sealed to the cladding.
- 2.2 The addition has three timber-framed open balconies. The largest of these adjoins two walls of bedroom 2 and is constructed over the existing structure. The two smaller balconies are cantilevered out from the face of the external wall adjacent to the living room and bedroom 1. The decks of the balconies have butyl rubber membrane coverings fixed over a plywood substrate. The balcony balustrades are timber-framed, with the exception of the fronts of the cantilevered balconies, which have glazed insert panels. The timber-framed balustrades are lined on both faces and the top with monolithic cladding. I note that the tiles over the balcony decks shown

on the consented plans have been omitted and the balcony balustrades (to the smaller balconies ??) changed from those previously detailed.

- 2.3 The specification calls for the wall framing to be “No 1 treated”. However, no evidence has been forwarded as to the treatment, if any, applied to the external wall framing.
- 2.4 The cladding system is what is described as monolithic cladding. As specified in the manufacturer’s data sheets (“the manufacturer’s instructions”), the cladding to the walls of the addition incorporates 7.5mm thick fibre-cement backing sheets fixed through the building wrap directly to the wall framing and finished with a reinforced textured plaster finish and a further waterproof membrane system. The system has been subject to an independent appraisal (“the appraisal”). The manufacturer’s instructions include details for flashings at various junctions and require PVC flashings to the heads, jambs and sills of exterior joinery units. I note that the cladding as installed differs from that shown on the consented plans. The territorial authority has noted this, and also that there were no amended details forwarded covering this change.
- 2.5 The plasterer provided a “Producer Statement ” dated 12 January 2004, which described both the textured finish and the waterproofing membrane applied over it. The tiling applicator provided a letter dated 3 December 2003, describing the backing and waterproofing under the bathroom tiles and the final edge coating. The painter provided an “Applicator Quality Assurance Checklist” dated 20 December 2002, relating to the waterproofing membrane applied over the textured finish.

### **Sequence of events**

- 2.6 The territorial authority issued a building consent on 30 May 2001.
- 2.7 The territorial authority made various inspections during the course of construction. I note that the territorial authority states that these took place between October 1997 and August 2001, but the commencing date is some 3 years prior to the issuing of the building consent. According to the territorial authority, a final inspection was not called for until 10 December 2003.
- 2.8 The territorial authority carried out a weathertightness visual check and subsequently wrote to the owner on 13 February 2004, stating:

We have received your request for a code compliance certificate (I) 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 I 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 and therefore will not be in a position to issue a code compliance certificate.

Our Senior Building Inspector, has fully reviewed the file and inspected the building as well and this review has also highlighted other serious issues relating to –

- 1) No inspections having been called for or inspection of the cladding installation.
- 2) Certification is required for Fire Protection Inspection Services for the installation of type 4 fire alarms.
- 3) Certificates required for methods, materials used for all deck area membrane/tankings.
- 4) Full amended As-Built plans required to incorporate all elevations and floor plan changes and additions.
- 5) Cladding issues – parapet design, no eaves, lack of flashings, no visual signs of any control joints, with visual evidence of some cracking...

2.9 The owner forwarded a report dated 23 October 2003, based on an inspection of the entire building. I note that report has no reference as to who carried out the inspection or wrote the report. Nor is the report signed. With regard to the cladding it is noted that the cladding in question “is showing signs of concern” The main areas of concern are the cracking on all elevations, the barrier top edges showing around 30% of moisture content, the lack of cappings and slope to the balcony barriers, and mould evident to one backing sheet off the main living area. The report also noticed concerns with the privacy fencing, the lack of flashings between the wall and parapet claddings, and finishing or sealing problems to the louvres, and the pipe and wiring penetrations through the cladding. The overall paint finish is also unsatisfactory and the backing sheets to the inside of the parapets are unpainted. The report also noted that the tiles in the main bathroom shower cubicle were showing signs of movement and that water tended to pond in the ensuite bathroom

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

2.11 The territorial authority applied for a determination on 24 August 2004. On 23 November 2004, the Authority was advised of the change in the ownership of the property

### **3 THE SUBMISSIONS**

3.1 The territorial authority made a submission in the form of a letter to the Authority dated 23 August 2004, which summarised the consent and inspection processes relating to the addition. The owner had been informed that, due to the type of monolithic cladding applied to the addition and its attendant risk factors, the territorial authority was unable on reasonable grounds to accept the compliance of the cladding. The territorial authority also listed risk factors and defects revealed during the inspection as:

1. There were no specific cladding inspections undertaken during construction period, for building wrap, flashings, board fixings, etc.
2. [Named cladding] direct fixed installed contrary to approved [Named cladding] shown on drawing number 4 of 6 (No amendment was applied for the changes prior to installation. Specification stated plastered [Named cladding or alternative] No further details were available at processing stage).
3. External timber frame – timber treatment unknown.
4. Three storey construction and exposed walls.
5. High risk design – enclosed cantilevered upper decks, exposed parapets, gable ends, complex roof/wall junctions.
6. Non-complying deck construction – flat top, no metal capping etc.
7. Lack of flashings.
8. No signs of any control joints.
9. Evidence of poor paint coating, some cracks on Harditex cladding joints.
10. Bathroom – unable to confirm compliance of waterproofing under tiled areas.

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 deck construction comply (sic) with E2 or B2 of the Building Code
- Whether the bathroom water proofing under tiled areas comply (sic) with E3 of the Building Code

3.2 The territorial authority supplied copies of:

- The plans and specifications;
- The consent documentation;
- Some of the territorial authority's inspection documentation;
- The various producer statements, letters and checklists; and
- The correspondence with the owner.

3.3 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 and balconies complied with clauses B2.3.1 and E2.3.2 of the building code, or that

the bathroom waterproofing complied with clause E3.2(c) (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.

**Clause E3—INTERNAL MOISTURE**

**E3.2 (c)** Buildings shall be constructed to avoid the likelihood of damage to building elements being caused by use of water.

4.2 There are no Acceptable Solutions that have been approved under section 49 of the Act that cover the 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 that was completed on 29 January 2005. It noted that the quality of finish is generally sound and the expert did not observe any areas where the coating is flaking, blistering or failing. The expert removed the plaster coating to reveal the window flashing and sealing details at one location. The expert was of the opinion that horizontal relief joints were not required for the addition. The expert noted that various remedial works had been carried out by the owner in accordance with some of the concerns raised by the territorial authority. The expert also made the following comments regarding the cladding, balconies and bathrooms:

### *The cladding*

- No vertical control joints are provided to those walls exceeding 5400 mm in length, contrary to the manufacturer's recommendations;
- There are some cracks at the corners of the cladding;
- The roof parapet wall backing sheets are not coated and are stained by the run-off water from the parapet capping. In addition, the jointers to some sheets of this cladding are located away from the sheet fixings and as a consequence the sheet bottom edges are unrestrained;
- The apron flashing at the east wall/existing roof abutment have a slight back fall to the wall, which results in ponding that will reduce the service life of the flashing;
- The overlap to the head flashings over the external windows and doors is less than that recommended by the manufacturer;
- There is no sealant or in-seal strip between the back of the external windows and doors and the cladding; and
- The balcony doors lack sill flashings.

### *The balconies*

- The joint layout of the north balustrade of the larger balcony is inappropriate and the flush joints are cracked at this location;
- There is an uneven finish to the east balustrade of the larger balcony;

- There is no clearance, sealant, or flashing at the base of the cladding to the north balustrade of the larger balcony where it abuts the existing parapet capping. It is also likely the bottom plate of this balustrade is nailed directly through the capping and that these penetrations are not sealed;
- The lack of tiles on the balcony decks means that there is no protection from foot traffic to the butyl rubber membranes;
- The membrane edge details under the glass balustrade panels of the cantilevered balcony decks lack metal angle supports;
- There is no evidence of a saddle flashing where the cantilevered balcony balustrades meet the main wall cladding; and
- The rainwater outlets to the larger balcony are set too high, resulting in ponding.

#### *The bathrooms*

- The inappropriate tile adhesive in the main bathroom has failed. However, there was no evidence that the waterproof membrane under the tiles is allowing water to leak; and
- The waterproof membrane under the ensuite shower enclosure is faulty at one corner.

5.2 The expert took non-invasive readings at the interior linings of the external walls throughout the addition and 4 readings in the “borderline” range were recorded. The expert also took invasive moisture readings at 8 selected locations and obtained the following elevated readings.

- 24.7% at the larger balcony balustrade bottom plate;
- 33.5% at a stud to the left of the ensuite shower;
- 44% at a living room cantilevered balcony balustrade stud; and
- 58% at a bedroom 1 cantilevered balcony balustrade stud.

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, E2.3.2 and E3.2 (c), 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 this addition:

- Apart from the cantilevered gutter line and the two cantilevered balconies has no eaves or verge projections that could afford some protection to the cladding,
- Is in a medium wind zone;
- Is at a third storey level;
- Has exterior joinery units that are not adequately sealed at the jambs;
- Has an envelope that is fairly simple on plan;
- Has three balconies, one of which is constructed over a commercial space, and the other two are cantilevered; 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 absorbs moisture and cannot dry out.

### **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 addition. The main areas of concern are the lack of control joints, the evidence of cracking, the uncoated and poorly jointed parapet linings, the lack adequate flashings and sealing to the exterior windows and doors, the balcony defects and the poor tile adhesion and suspect waterproofing to the ensuite shower. 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 I note that two elevations of the buildings demonstrate a medium weathertightness risk rating, and the remaining elevations demonstrate a high 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 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 addition to remain weathertight. Because the cladding and balcony faults in the addition are allowing the ingress of moisture, the addition does not comply with the durability requirements of clause B2.
- 7.3 I also find that the ingress of water through the ensuite shower enclosure waterproof membrane means that the building does not comply with the requirements of clause E3.
- 7.4 I find that because of the apparent complexity of the faults that have been identified with this cladding, balconies, and the ensuite shower, I am unable to conclude, with the information available to me, that remediation of the identified faults, as opposed to partial or full reinstatement, could result in compliance with clauses B2, E2, and E3. I consider that any final decisions on whether code compliance can be achieved by either remediation or reinstatement, or a combination of both, can only be made after a more thorough investigation of the issues in question. 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 B2, E2, and E3.
- 7.5 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.
- 7.6 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, together with the balconies, do not comply with clauses B2 and E2 of the building code. I also determine that the ensuite shower waterproofing does not comply with clause E3. Accordingly, I 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 addition 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, balconies and ensuite shower waterproofing brought to compliance with the building code. Those are matters 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 4 March 2005.

John Gardiner  
**Determinations Manager**