

## *Determination 2005/89*

# *Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 79*

## **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 joint building owners acting through a consultant (referred to as “the owner” throughout this determination), 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 2-year old apartment block (“the apartments”), unless changes are made to its monolithic cladding systems.
- 1.2 The question to be determined is whether on reasonable grounds the monolithic wall cladding as installed to all the timber-framed external walls of the house (“the cladding”), complies with the building code (see sections 18 and 20 of the Act). By “the monolithic wall cladding as installed” I mean the components of the system (such as the backing sheets, the flashings, the joints and the plaster and/or the coatings) as well as the way the components have been installed and work together.
- 1.3 This determination is made under the Building Act 1991, subject to section 424 of the Building Act 2004. That section came into force (“commenced”) on 30 November 2004, and its relevant provisions are:
- “ . . . on and after the commencement of this section,—
- “(a) a reference to the Authority in the Building Act 1991 must be read as a reference to the chief executive; and
- “(b) the Building Act 1991 must be read with all necessary modifications to enable the chief executive to perform the functions and duties, and exercise the powers, of the Authority . . . ”

It should be noted that the new legislation does not amend the determination process set out under the 1991 Act, other than to transfer the power to make a determination from the Building Industry Authority (“the Authority”) to the Chief Executive.

- 1.4 This determination refers to the former Authority.
  - (a) When quoting from documents received in the course of the determination, and
  - (b) When referring to determinations made by the Authority before section 424 came into force.
- 1.5 In making my decision, I have not considered any other aspects of the Act or the building code.
- 1.6 The house itself is described in paragraphs 2.1 to 2.4, and paragraph 8 sets out my decision.

## **2 PROCEDURE**

### **The building**

- 2.1 The building is a four-storey apartment block containing a complete apartment on the first, second and third floors, with parking provided on the ground floor. The ground floor is single storey for part of its area. The apartments are situated on a level site in a medium to high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The structure of the building is basically concrete columns and beams with intermediate double tee proprietary floor slabs. Each apartment has precast concrete walls to the full length of the south elevation and to part of the length of the north elevation. The remainder of the external apartment walls are of conventional light timber frame construction and are sheathed with monolithic cladding.
- 2.2 The apartments are of a relatively simple shape with a steel purlin supported upper roof lined with a fibre reinforced torch-on waterproofing membrane over construction plywood sarking. This roof has either precast or monolithic clad timber-framed perimeter walls and is drained through a wide internal integral gutter that discharges into a sump at one end and into a rainwater head at the other end. The roof is pierced by the elevator shaft extension and a chimney, both of which are formed from monolithic clad timber-framed walls. The roof over the single-storey ground floor extension is covered with trapezoidal profile steel roofing supported by steel purlins. The gutters to each side of this roof are formed from the waterproofing membrane as described for the main roof. The first and second floors and the roof have a light well set into one elevation. The floors to each apartment are extended to form external decks to both the east and west elevations and these are tiled over a waterproofing membrane. The balustrades to the balconies are either toughened glass, or timber framed with monolithic cladding to the sloping top and both sides. The timber-framed balustrade to the level 1 west deck also has a metal capping. I note that the consented plans show toughened glass balustrades throughout the building. A glazed awning supported on steel beams is fixed to the concrete first floor beam on the west elevation.

- 2.3 The owner has produced invoices to show that the timber used to construct the external walls was H3 treated.
- 2.4 The building is clad with what is described as monolithic cladding. The cladding is a particular proprietary product, installed in accordance with the manufacturer's instructions, which include flashings to heads, jambs, sills, trims and corners. As detailed in that manufacturer's instructions ("the instructions"), it incorporates 40 mm thick expanded polystyrene (EPS) backing sheets fixed through building wrap directly to framing timbers and finished with a proprietary fibreglass mesh reinforced polymer-modified cement plaster system supplied by the manufacturer of the backing sheet system. The system has been subject to an appraisal certificate from an independent testing organisation. I note that the cladding as applied to the apartments differs from that shown on the consented plans and that the territorial authority has referred to this amendment in its correspondence with the owner.
- 2.5 The supplier of the cladding system provided an undated "NZ Building Code Compliance Statement", which stated that the cladding complies with the 15-year requirements of B2, has been independently appraised, and when coated with a specified product, will also comply with the spread of flame performance requirements of the building code.

### **Sequence of events**

- 2.6 The territorial authority issued a building consent on 22 July 2002, based on a certificate provided by a building certifier.
- 2.7 Work commenced in June 2002, and on 6 December 2002, the building certifier withdrew from certifying the project and handed the relevant files over to the territorial authority.
- 2.8 From this time, the territorial authority carried out various inspections during the course of the completion of the house, and passed the "Proprietary Plaster System" inspection on 16 April 2003, and the final inspection on 4 November 2003.
- 2.9 In a letter dated 17 December 2003, the territorial authority requested certain information from the owner, including a requirement that the owner was to confirm that the type and construction of the monolithic cladding incorporated a vented cavity. The owner was also to supply a producer statement for the cladding.
- 2.10 The owner responded by letter on 14 January 2004, and with regard to the cladding, described the type of system that was installed and that it had been approved by an independent testing organisation. The owner noted that the system used mechanical flashings around windows and that it had been applied to H3 treated timber. The parapets had been double flashed with a torch-applied bituminous membrane and covered with a pre-painted metal flashing. The owner also stated that the territorial authority had inspected the backing sheets and the flashings prior to the application of the coating system. The whole system was again inspected and passed in a final inspection on 4 November 2003.

2.11 The territorial authority carried out a site inspection on 28 June 2004 and in a letter to the owner dated 6 August 2004, regretted that the building may not comply with the building code in a number of respects. The territorial authority attached a Notice to Rectify dated 8 April 2004 to this letter, together with a set of photographs illustrating items of non-compliance. The “Particulars of Contravention” attached to the Notice to Rectify noted:

A site inspection of [the] property carried out on the 28 June 2004 revealed that the exterior cladding is plaster application on polystyrene sheeting and masonry blocks at the above address and is a monolithic cladding system (Plaster finish on [Named] sheeting]) with no provision for ventilation of the wall space, and furthermore there are changes to the building consent, the exterior claddings have been installed otherwise than in accordance with the manufacturers specification, acceptable solutions of the building code and accepted trade practices as detailed below.

1 Changes to the building consent

- There has been a change in the cladding from the approved building consent plans which nominated “solid plaster” to polystyrene backed plaster system. This change required an amended building consent.

2. The following have not been installed per the manufacturer's specifications

- The building has not been designed or constructed within the scope of NZS 3604 and as such requires the cladding to be designed in accordance with NZS 4203. As the council has approved no amendment to the building consent, council has no evidence that the cladding complies with this standard.

3. The following items have not been installed per the acceptable solutions of the building code, (no alternative solutions have been applied for)

- Two outlets are required to internal gutters/decks. The cross-sectional area of the outlets shall be no less than the cross-sectional area of the downpipes serving the gutter/deck. The minimum internal diameter permitted is 63mm.
- 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.

4. 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) flashing is required. At the deck barrier/house junction has no flashing installed (*sic*).
- All flashings are to be installed in such a way as to direct water away from the building, and prevent ingress of moisture. The ridge flashing should be returned behind the claddings not be reliant on.
- A minimum clearance of 50mm is required between the cladding and adjacent surfaces. There is minimal clearance between the roof and wall claddings.

- 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.

5 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 Council cannot be satisfied that the above building 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...This is in breach of Sections 7(1), of the Building Act 1991...

Also 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

2.12 The owner obtained a report, dated 18 May 2004, from a firm of engineering consultants (“ the consultants”). In this report the consultants noted that during construction the exterior cladding had been changed from that shown in the consent documentation. The consultants had undertaken a structural check of the timber framing and was of the opinion that it complied with the requirements of NZS 4203: 1992. The consultants noted that the external timber-framed walls were non-load bearing and were constructed with H3 LOSP treated timber. In addition, these walls complied with table 8.4 of NZS 3604: 1999 for a high wind zone.

2.13 On 26 May 2004, the cladding supplier wrote to the owner confirming that the cladding applicator was an approved applicator, and that as a staff member had observed a flexible flashing tape being installed at the balustrade to wall junctions, the supplier considered that the junctions complied with the intent of the new E2/AS1.

2.14 The owner applied for a determination on 26 May 2004.

### **3 THE SUBMISSIONS**

3.1 The owner attached an “Addendum” to the determination application setting out the background to the dispute. The owner also responded to the “Particulars of Contravention” detailed in the Notice to Rectify, which is summarised as follows:

- The consented plans nominated a monolithic cladding system, not the “solid plaster” alleged by the territorial authority. The owner stated that an inspector from the territorial authority was advised of the cladding amendment, and on 16 April 2003 had agreed that it was a suitable alternative. In addition; all aspects of the external cladding were passed after the final inspection of 4 November 2003;
- As regards the territorial authority’s assertion that the building had not been designed within the scope of NZS 3604 or in accordance with NZS 4203, the owner noted that the cladding had been applied strictly in accordance with the manufacturer's specifications. The consultants had confirmed that the cladding complied with NZS 4203;
- There were two 75mm as-built drains to each of the first floor decks and one 75mm as-built drain to each of the second and third floor decks. In addition, at least one overflow has been installed on every deck;
- All window joinery has a sill flashing and where the gap between the flashing and the cladding has been filled with plaster, this can easily be removed;
- Flexible flashing tape has been installed between the polystyrene and the plaster at all horizontal/vertical junctions and this complies with the manufacturer's instructions;
- As the roof was installed after the cladding was in place, the ridge flashing abuts the roofing. The roofer installed an apron flashing at the entire roof/wall junction prior to the installation of the roofing and the cladding, and this will deflect any moisture between the ridge flashing and the cladding;
- With regard to the cladding base clearance issue, the owner noted that the decks were sheltered, the membrane extends a minimum of 150mm up behind the cladding, the cladding has a foot flashing, the timber framing is H3 treated, and there is adequate deck drainage;
- The owner considered that the penetrations through the cladding were adequately sealed, including the hose tap, which had now been flanged and sealed; and
- The cladding had been independently appraised, had been applied by an approved applicator onto H3 treated timber non-structural walls, and the substrate, flashings, and the whole cladding system had been inspected and approved by a territorial authority inspector.

In conclusion, the owner believed that the cladding complied with the requirements of the building code.

3.2 The owner also provided copies of:

- The building plans;
- The Notice to Rectify;
- The inspection records from the building certifier and the territorial authority;
- The correspondence with the territorial authority, the building certifier and cladding system supplier;
- The consultant's report of 18 May 2004;
- The cladding system supplier's compliance certificate statement; and
- Some of the cladding system supplier's details.

3.3 The territorial authority forwarded a lengthy submission. The bulk of the submission was a general comment on monolithic cladding, although some of the material related to this particular extension, and stated that:

- The principle design and current construction methods for the wall assembly do not provide for ventilation or an effective drainage plane. In the event of moisture ingress from a failure of any of the claddings deflection methods water will enter and accumulate in the wall framing hereby breaching (*sic*) E2 and B2 of the Building Act.
- Secondly the building materials in the wall assembly will be inadequate in the inevitable event of moisture ingress as there has been no allowance for the consequence of failure of the system components or the system as a whole. This relates to the timber framing and the plasterboard linings. The failure to keep water out will wet the timber frame and as there is no drying mechanism designed in the walls construction conditions will exist in the wall likely to cause the timber to degrade and be incapable of lasting 50 years as required by the Building Act.
- The third failure of the cladding system is that it is inadequately designed to allow for the expected movement associated with timber frame construction, and thereby cracks will form and sealants tear letting water in.
- The fourth failure is that work in excess of normal maintenance will be required to keep the EFIS cladding system and wall elements of sufficient low moisture content to prevent accumulation of water and prevent decay. The home owner has no ability to determine ongoing compliance with E2 and consequently will not be aware of the eventual failure of B2.
- [The territorial authority] points out that there are already numerous defects in the cladding envelop that have been already been attempted to be passed off as compliant even with the extensive publicity around the leaky building problem. Council is of the opinion that the building is in contravention of the Building Act and its notices to rectify are valid.

- 3.4 The submission also included a copy of the Notice to Rectify, and a set of photographs, illustrating some of the territorial authority's concerns.
- 3.5 The territorial authority felt that it must refuse to issue a code compliance certificate on the grounds that there was insufficient scientific evidence on the performance of these building elements.
- 3.6 In a subsequent letter to the Authority dated 19 July 2004, the territorial authority elaborated on its original submission and stated that its areas of concern were those itemised in the Notice to Rectify and then listed them in detail. The territorial authority, using the risk matrix contained in the revised Acceptable Solution E2/AS1, calculated the weathertightness risk to the house to be high. Apart from further generalised comments, the territorial authority commented on the owner's "Addendum" submission. In summary, these comments were:
- The territorial authority acknowledged that the cladding was textured monolithic, not solid plaster. However, an amendment to the building consent was required for the changed cladding and the territorial authority had not had the opportunity to assess the system that had been applied. The change from one system to another without a consent amendment was sufficient grounds not to issue a code compliance certificate;
  - The requirement for the building to comply with NZS 3604 or NZS 4203 is a requirement of the consented cladding, and not the cladding as applied;
  - As the territorial authority has not received any documentation from the building certifier as to the balcony outlets, it was unable to confirm that the building certifier had approved them as an Alternative Solution. The territorial authority pointed out that as the building certifier's approval only allowed the building certifier to operate within the acceptable solutions of the building code, even if documentation had been supplied, the territorial authority could not accept it;
  - If the owner rectified the gap between the bottom of the sill flashings and the cladding, the territorial authority would no longer consider this to be an issue;
  - The territorial authority were unable to confirm whether flashings had been installed at the horizontal/vertical cladding junctions, and queried where they discharged to and how they prevented water from entering the wall/roof space? The territorial authority disputed whether that these types of flashings complied with the intent of E2/AS1. The territorial authority argued that compliance with the manufacturer's specifications is paramount to achieving weathertightness;
  - The territorial authority was unable to confirm that rubber flanges had been installed at the handrail fixings and pointed out that the vent outlet sealant was of an unknown quality. Furthermore, as the vents were not easily accessible, it was unlikely that adequate inspection or maintenance would be undertaken in respect of these;



- The territorial authority had concerns with the internal build up of water vapour; and
- As an additional issue, the territorial authority could not confirm that the appraisal requirements as to control joints had been met.

3.7 Copies of the submissions and other evidence were provided to each of the parties.

3.8 In a letter to the Department dated 12 May 2005, the territorial authority commented on aspects of the Draft Determination. In particular, the territorial authority is concerned that paragraphs 6.10 and 8.2 indicate a scope of work required to make the house code compliant. The territorial authority claims that this is not part of the determination.

#### **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. The relevant 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 ("the expert") to inspect and report on the cladding. The expert inspected the building and furnished a report dated December 2004. The expert removed a small section of the plaster around one window to examine the flashings, and found that appropriate flashings and sealants are present. I accept that this exposed detail is likely to be representative of the remaining window and door flashings. The expert's report made the following specific comments on the cladding.

- There is an absence of control joints, and these are a particularly important requirement where the cladding meets the concrete structure;
- There is cracking in the cladding to the chimney above the main roof;
- There is inadequate clearance between the base of the cladding and the finished deck surface. However, the expert did not consider this to be a problem, provided that the gap is not allowed to become blocked;
- There are inadequate junctions between the deck balustrade cladding and the adjoining concrete or cladding surfaces at various locations, with evidence of cracking at these junctions;
- There is a minimal height difference between the balustrade bottom plate and the end top surface of the concrete beam at the level 2 and 3 west decks;

- The monolithic clad tops of the deck balustrades lack an adequate fall, there is no evidence of a high build coating at these locations, and there is a lack, or a failure, of a waterproofing membrane, with cracking evident at the corner intersections;
- The metal capping to the level 1 west deck is only butted up to the plastered concrete column, and any flashing tape at this junction would only serve a limited function;
- The column formed in the level 1 west deck balustrade is inadequately capped;
- There is inadequate sealing of building elements that pass through the top of the deck balustrades;
- There is inadequate sealing to various items, including the vent grilles, the infinity water system enclosure, the air conditioning service pipes, and the water tap on the level 3 deck; and
- With regard to the main roof:
  - There is a heavy reliance on sealants,
  - The parapet caps at the flue housing have not been turned up and the interface is sealant reliant,
  - The parapet cappings are fixed through the top and most have sealant applied over,
  - The parapet cappings at the roof corners and adjacent to the raised lift shaft on the south side sits flush with the waterproofing surface, and it is unclear how adequately this detail has been adequately weathered, and
  - A support arm to the satellite dish has been fixed directly through the horizontal waterproofing surface.

5.2 The expert carried out a series of moisture tests of the exterior cladding, and the higher readings were as follows:

- A reading of 18 % at the junction between the timber-framed balustrade and the wall cladding on the level 2 east deck;
- Readings of 19% and 20% at the junctions between the timber-framed balustrade and the concrete columns on the level 1 east deck;
- Readings of 19%, 20%, and 21% at the internal face of the balustrade on the level 3 east deck;
- Two reading of 20% at the junction between the timber-framed balustrade and the wall cladding, and to the top of the balustrade on the level 3 east deck;
- Readings 20% and 21% at two windows on the level 1 west deck;

- Readings of 20% and 31% at the junctions between the timber-framed balustrade and the concrete columns on the level 2 east deck;
- A reading of 28 % at the junction between the timber-framed balustrade and the concrete column on the level 1 west deck; and
- Readings of 30 % and 59% at the top of the timber-framed balustrade to the level 2 east deck.

Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

5.3 The expert also noted that the apron flashing behind the lower roof ridge flashing was in place and that there was no evidence of leaking directly below this detail.

5.4 Copies of the expert's report were provided to each of the parties. The owner responded by letter to the Department on 18 January 2005, and the comments can be summaries as being:

- The attached invoices from the timber supplier showed that H# timber had been used for the external wall framing;
- The owner suggested that a coloured steel capping be fixed to the top of the deck balustrades and suitably chased into and sealed at any vertical surface junction;
- All the ventilation ducts have been sealed with a silicone sealer at the cladding junctions prior to fitting the grille, which itself has flange that insets into the duct. The owner suggested that these locations be the subject of a regular annual review, with the replacement of the sealant as necessary; and
- The roof membrane used was a superior product in regard to performance than was the butyl-rubber membrane indicated on the consent plans. The membrane was so applied as to provide 150mm high upstands under the cladding and the steel capping is a secondary flashing. The silicone sealant was applied as a third line of defence against possible moisture penetration. .

## **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 Recent research 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 I consider that the 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, it is believed 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 suggest 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. It is believed 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, I find: that the apartments:

- Have no eaves and verge projections that could provide some protection to the lower cladding;
- Are built in a medium to high wind zone;
- Are four storeys high;
- Are basically simple on plan, having roofs at two levels;
- Have two decks at each upper level that are not constructed over living spaces;
- Have fully flashed windows and doors; and
- Have external wall framing that is constructed with H3 LOPS treated timber that is likely to resist the onset of decay if it absorbs and retains moisture.

### **Weathertightness performance**

6.8 I have carefully considered the principal points in the territorial authority's main submission (and outlined in paragraph 3.3).

6.9 The territorial authority's general submission effectively questions the technical basis of a number of the benchmarks for assessing the likely code compliant performance of timber-framed construction in New Zealand and proposes that an alternative (and more conservative) benchmark be used to assess likely building code compliance for monolithically-clad buildings within its jurisdiction. The Authority considered and commented on these issues in determination no 2004/41. In essence, the Authority determined that the performance of building elements as installed in a house should be based on code compliance benchmarks established in the new external moisture acceptable solution E2/AS1, together with observations of the current state of the building, and not on the higher performance levels suggested by the territorial authority. Accordingly, I have followed the Authority's approach in this determination.

6.10 Generally the cladding appears to have been installed according to good trade practice, but some junctions, edges, and penetrations are not well constructed. These areas are:

- The absence of control joints, particularly where the cladding meets the concrete structure;

- The cracking in the cladding to the chimney above the main roof;
- The inadequate clearances between the base of the cladding and the finished deck surface;
- The inadequate junctions between the deck balustrade cladding and the adjoining concrete or cladding surfaces at various locations;
- The minimal height difference between the balustrade bottom plate and the top end surface of the concrete beam at the levels 2 and 3 west decks;
- The lack of an adequate fall to the monolithic clad tops of the deck balustrades, and the lack or failure of a waterproofing membrane at these locations;
- The butted junction of the metal capping to the level 1 west deck up to the plastered concrete column;
- The inadequately capped column formed in the level 1 west deck balustrade;
- The inadequate sealing of building elements that pass through the top of the deck balustrades;
- The inadequate sealing to various items, including the vent grilles, the infinity water system enclosure, the air conditioning service pipes, and the water tap on the level 3 deck; and
- The various main roof problems, including the heavy reliance on sealants, the inadequate details relating to the parapet cappings and the direct fixing of a support arm to the satellite.

6.11 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting drainage and ventilation behind the cladding sheets, I find that there are compensating factors that assist the performance of the cladding in this particular case. These are:

- Generally, the cladding appears to have been installed according to good trade practice;
- The windows and external doors are fully flashed;
- The framing timbers used in the construction of the external walls is likely to be H3 LOSP treated; and
- The moisture evident at this time relates almost entirely to the deck balustrades.

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

- 6.13 The expert has confirmed that an apron flashing is in place beneath the end of the lower roof ridge capping and that there is no evidence of leakage at this location. Accordingly, I accept that this detail provides adequate weathertightness protection.
- 6.14 I also accept that the drainage and overflow details to the decks are sufficient to provide adequate disposal of rainwater from the decks.
- 6.15 I note that all elevations of the apartments demonstrate a high weathertightness risk rating 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 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 house to remain weathertight. Because the cladding faults in the house are allowing the ingress of moisture in the future, the house does not comply with the durability requirements of clause B2. of the building code.
- 7.3 I consider that, because the faults that have been identified with this cladding occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.10 is likely to result in the building being weathertight and in compliance with clauses B2 and E2, 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.



7.7 In response to the territorial authority's letter to the Department of 12 May 2005, I consider that I am entitled to determine whether proposed building work complies with the code, and in fact I have done so in this case. However, the question of whether the work has been properly completed and is code compliant requires careful inspection. I do not believe in this case that the territorial authority's inspections meet this standard. I note that the territorial authority's inspection described in a "Final Checklist" dated 4 November 2003 passed the following items in respect of the exterior of the building:

- Floor clearance from ground level
- Cladding clearance from ground level
- Secondary flow path
- Cladding Painted
- Window scribes
- Flashings
- Control joints

7.8 In addition, none of the items that required attention after this final inspection related to the exterior cladding.

7.9 The Notice to Rectify issued on 8 April 2004 listed Particulars of Contravention that included:

- Ground clearances
- Flashings

7.10 The Notice also stated that there had been a change from the consented cladding, which was nominated as "solid plaster". I note that the plans supplied to the Department describe the plaster as "textured", and the actual change is from fibre-cement backing sheets to polystyrene backing sheets.

7.11 I am disturbed to note that these obvious building defects and departure from the consented plans were not discovered during the December 2003 final inspection. They are also issues that are unrelated to the question of a cavity that the territorial authority has raised. Furthermore, the expert has noted other omissions, such as the lack of control joints and the flat tops to the deck balustrades, which are not covered by the Notice to Rectify. It can be seen that the expert's report provides the comprehensive description of the building's outstanding shortcomings that should have been detected before or at the final inspection process and incorporated in the Notice to Rectify.

## **8 THE DECISION**

- 8.1 In accordance with section 20 of the Building Act 1991, I hereby determine that the cladding system as installed does not comply with clause E2 of the building code. There are also a number of items to be remedied to ensure that the apartments remain weathertight and thus meet the durability requirement of the code. Consequently, I find that the apartments do 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 6.10 to the approval of the territorial authority, along with any other faults that may become apparent in the course of that work, is likely to result in the apartments 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 issued a Notice to Rectify requiring provision for adequate ventilation, drainage and vapour dissipation. Under the Act, a Notice to Rectify can require the owner to bring the apartments into compliance with the building code. The Authority has already found in a previous determination (2000/1) that the Notice to Rectify cannot specify how that compliance can be achieved. A new Notice should be issued that requires the owner to bring the cladding into compliance with the building code, without specifying the features that are required to be incorporated. It is not for me to dictate how the defects described in paragraph 6.10 are to be remedied. How that is done 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 15 June 2005.

John Gardiner  
**Determinations Manager**