

## *Determination 2005/41*

# *Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 35*

## **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 is the builder/owner (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 3-year old house, unless changes are made to its monolithic cladding system.
- 1.2 The question to be determined is whether there are reasonable grounds to believe that the external wall cladding as installed (“the cladding”), which is applied to the majority the external timber-framed walls and the pergola columns of the house, complies with the building code (see sections 18 and 20 of the Act). By “external wall cladding as installed” I mean the components of the system (such as the backing sheets, the flashings, the joints and the plaster and/or the coatings) as well as the way the components have been installed and work together.
- 1.3 This determination is made under the Building Act 1991 subject to section 424 of the Building Act 2004. That section came into force (“commenced”) on 30 November 2004, and its relevant provisions are:
- “ . . . on and after the commencement of this section,—
- “(a) a reference to the Authority in the Building Act 1991 must be read as a reference to the chief executive; and
  - “(b) the Building Act 1991 must be read with all necessary modifications to enable the chief executive to perform the functions and duties, and exercise the powers, of the Authority . . . ”

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

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

## **2 PROCEDURE**

### **The building**

- 2.1 The building is a two-storey ex show-home situated on an excavated sloping site, which is in a low wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The external walls of conventional light timber frame construction are built on concrete waffle-floor slabs, and are sheathed with monolithic cladding, with the exception of a schist veneer to the lower parts of the south and west elevation walls. A schist capping is laid on top of the veneered walls. The house is of a relatively simple shape, and the pitched roofs, which are set at varying levels, are clad with coated metal tiles, and generally consist of gable and hip designs. The lower level roofs have several wall to roof junctions. The eaves have 585mm wide projections, (including the spoutings) and the verges have 460mm projections, with the exception of the verge above bedroom 1, which has a 50mm projection.
- 2.2 A timber-framed monolithic clad chimney projects from one wall face and this is set through a lower-level roof. An arch is constructed under the pitched canopy roof over the main entrance and this is supported on two columns. The arch and columns are clad in a schist veneer. A timber-framed pergola, supported on three monolithic clad timber-framed columns is attached to the north elevation wall.
- 2.3 The owner has confirmed that the timber used in the construction of the external wall frames is untreated, and that the timber in the pergola support columns is H3 treated.
- 2.4 The majority of the timber-framed external walls of the house and the pergola support columns that are the subject of this determination are clad with a system that is described as monolithic cladding. In this instance it incorporates 7.5 mm thick fibre-cement backing sheets fixed through the building wrap directly to the framing timbers, and finished with a multi-coat textured finish. I note that, as referred to by the territorial authority, the installed cladding system differs from that shown on the consented plans.

- 2.5 The cladding manufacturer issued a warranty, commencing on 31 July 2001, covering the cladding system for a period of 15 years. The owner issued a producer statement, dated 6 April 2001, in respect of the installation and fixing of the cladding sheets.

### Sequence of events

- 2.6 The territorial authority issued a building consent on 8 December 2000. The “Conditions” attached to the consent noted that the territorial authority required notice for certain inspections, including the prelining, postlining and final inspections.
- 2.7 The territorial authority made various inspections and passed the preline building inspection on 6 August 2001, and the post line inspection on 20 August 2001. Final building inspections were carried out on 12 December 2003 and 10 February 2004. The territorial authority noted after the last inspection “cladding issues yet to be resolved”. An officer of the territorial authority noted on a “Weathertight Issues” document prepared on 23 February 2004, “I would strongly recommend that a CCC [code compliance certificate] be issued”.
- 2.8 The cladding supplier wrote to the owner on 15 January 2004, enclosing a warranty covering the cladding system for a period of 15 years. The warranty is conditional on on-going maintenance.
- 2.9 In a letter to the territorial authority dated 8 March 2004, the cladding supplier noted that the backing sheets were installed as per the technical information literature, and that the jointing and finishing system had been appraised by an independent appraisal organisation.
- 2.10 On 12 March 2004, the owner sent an e-mail to the territorial authority, stating that it was not possible to confirm the treatment, if any, of the wall framing timbers.
- 2.11 In a letter to the owner dated 16 March 2004, the territorial authority stated that it would be in a position to consider issuing a code compliance certificate provided that the level of timber treatment was confirmed, and that there was a registration of the warranty and maintenance programme on the certificate of title.
- 2.12 The territorial authority wrote to the owner on 8 April 2004, stating that after further discussion, the territorial authority were unable to issue a code compliance certificate.
- 2.13 In a letter dated 5 October 2004, the territorial authority advised that following a full weathertightness report inspection, it was still of the opinion that the consent (*sic*) should be forwarded to the Authority:

The weathertightness risk factors were identified as:

1. No drainage/ventilation cavity behind monolithic cladding
2. 2-storey high building

3. Roof/wall intersection design
4. Eaves width
5. Building envelope complexity
6. Timber framing to clad balustrade treatment unknown
7. Treatment of timber framing for pergola columns is unknown
8. No previous inspections of cladding
9. The sealing of penetrations for the fixing [of] downpipe clips, gas cylinder brackets and pergola unknown
10. The polystyrene midband appears well sealed along its top edge, but is also sealed along the bottom edge
11. The presence of a horizontal control joint at mid floor could not be confirmed, but presumably one has been provided behind midband
12. The pergola columns have flat tops, and as the framing treatment is unknown, pose some risk, albeit cosmetic only
13. Of those accessible, no proper kickouts had been provided at the bottom of side aprons, but with the type of flashing used, are probably not required
14. No knowledge of adequate chimney cap flashing
15. Appears to be no stop ends to curved window head flashing
16. The bottom edge of sheets not fully sealed
17. Butyl apron, right hand side of entry roof is holding water, just above kickout.

**Defects to be remedied and further inspection called for**

1. Provide as-built plans for change of cladding, pergola changes and minor changes to chimney areas.
2. Provide drainage holes at bottom of stone veneer, as per approved plans.
3. Height of unprotected ground below floor level to comply with NZ Building Code and NZS 3604: 1999.
4. Drainage gap for sill trays is blocked under some windows. Manufacturer's specifications are to be complied with.
5. Fence post west side is not to be fixed through cladding.
6. Trim off exposed building wrap.
7. Fill and seal unused screw holes and seal existing fixings to HWC.
8. The bottom course of roof tiles are (*sic*) not fully nailed off in some places.
9. Ensure [Named cladding] is sealed behind end of spouting, left hand side of garage.

10. Provide electrical certificate.
11. Provide PS3 for coating of [named cladding].

The territorial authority concluded:

However even with the listed defects remedied, Council cannot be satisfied on reasonable grounds, that the cladding system installed on this building will meet the functional requirements of the Approved Documents E2 External Moisture and B2 Durability, of the New Zealand Building Code and is therefore unable to issue a code compliance certificate...

- 2.14 On 12 October 2004 the owner wrote to the territorial authority, stating that the matters raised by the territorial authority in its letter of 5 October will be attended to. The owner also expressed surprise that the territorial authority had refused to issue a code compliance certificate
- 2.15 The territorial authority did not issue a Notice to Rectify as required by section 43(6) of the Act. I do not agree with the territorial authority's statement in its letter to the owner of 8 April 2004 that there was no requirement for the territorial authority to issue a Notice to Rectify.
- 2.16 The territorial authority applied for a determination on 27 October 2004.

### **3 THE SUBMISSIONS**

- 3.1 In a letter to the Authority dated 10 December 2004, the owner commented on the items raised by the territorial authority in its letter to the owner of 27 October 2004, noting that:

Regarding the weathertightness risk factors:

- The eaves width of 450mm in a sheltered location poses a minimal risk;
- The timber pergola column frames are H3.2 treated;
- All penetrations were sealed during installation;
- A horizontal control joint is installed;
- The tops of the pergola columns are sealed with a paint on waterproof membrane prior to texturing;
- The chimney cap is stainless steel and has a turn-down over the cladding, which is concealed by a cedar facing board; and
- The base sealing of the backing sheets has been rectified.

Regarding the list of defects:

- The owner did not get a consent amendment for the cladding change, but will forward documentation to the territorial authority in the near future; and
- The items numbered 2-9 (inclusive) in the territorial authority's letter of 5 October 2004 (see paragraph 2.13) have been rectified.

The owner described the type of cladding system used on the house, referred to the warranty and the territorial authority's comments of 23 February 2003 and its inspection timeline. The owner also confirmed that the timber framing used on the house is untreated and set out details of the persons involved in the construction of the house.

3.2 The owner supplied copies of:

- The correspondence with the territorial authority;
- A plan detailing the moisture readings that had been taken throughout the house; and
- The cladding system technical information and warranties.

3.3 The territorial authority made a submission in the form of a letter to the Authority, dated 27 October 2004. The submission described the sequence of events from the date of consent onwards and listed the weathertightness risk factors and defects set out in its letter of 5 October 2004 to the owner. It concluded with the following:

It is noted that monolithic cladding systems are being continuously tested, improved and detailing revised. New knowledge indicates that monolithic systems should have a drainage cavity to perform its function meeting durability requirements of the Building Code. The issues such as high risk design, installation by licensed installers, selection of approved coating system, coating application by licensed applicators, quality control systems of suppliers, installers and applicators, specific independent inspections during installation have further complicated compliance verification process. New E2 document confirms the importance of the above issues.

In regards to the application for a determination, specifically in this case the matters of doubt are:

- Whether the installed cladding system complies with clauses B2.3.1 and E2.3.2 of the Building Code.

3.4 The territorial authority supplied copies of:

- The plans and specifications;
- The building consent documentation;
- The territorial authority's inspection records;
- The correspondence with the owner; and

- The cladding system technical information, producer statements, and warranties.

3.5 The copies of other evidence were provided to each of the parties. Neither the owner nor the territorial authority made any further submissions in response to the submissions of the other party.

#### **4 THE RELEVANT PROVISIONS OF THE BUILDING CODE**

4.1 The dispute for determination is whether the territorial authority's decision to refuse to issue a code compliance certificate because it was not satisfied that the cladding complied with clauses B2.3.1 and E2.3.2 of the building code (First Schedule, Building Regulations 1992) is correct. Those provisions of the building code say:

##### **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 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 Department 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 2 March 2005. It noted that the coating is "smooth, even, uniform in colour, and well adhered" and that the plaster thickness of 3.5mm was adequate. The external windows and doors have metal head flashings. The expert removed portions of the cladding to examine the window flashings and identified sill flashings and sealants, which in the opinion of the expert were adequate. The expert also established through an intrusive inspection that a adequately constructed horizontal control joint had been installed. The expert made the following comments regarding the cladding:
- There were vertical hairline cracks at 3 corners and one horizontal hairline crack in the chimney cladding. The expert attributed these to a lack of a plastic corner mould at these locations;
  - The top of the pergola columns are flat instead of having a 15 degree slope;
  - The pergola posts penetrate the horizontal cap cladding and are only protected by sealant;
  - There is only a minimal clearance between the base of the cladding to the pergola column plinths and the paved areas;
  - There is no clearance between the fence post on the west elevation and the wall cladding;
  - There is no sealant to some of the downpipe bracket fixings;



- The joints of the schist veneer capping and at the ends of the veneer were not completely filled with mortar.

5.2 The expert took non-invasive readings at the interior of the external walls and all the readings were in the “safe” range. Further invasive readings were taken, and readings of 12.8%(2) and 16.6% were recorded. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure. The expert noted that the readings were taken during dry weather, but unlike this house, readings taken at the same time at other properties had recorded high readings.

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.

### Weathertightness risk

6.2 Research data and experience, both internationally and locally, indicates that the impact of weathertightness problems in monolithic clad houses can be minimised if good and effective design and construction practices are followed.

6.3 The installation of exterior cladding to manufacturer’s specifications and to accepted good trade practice is an important but not the only requirement to ensure good weathertightness performance.

6.4 The next priority is to reduce the ability of moisture to get through the cladding by using design measures that minimise the effects of the rain impacting on the walls:

6.5 Important matters for consideration are:

- Data show a strong relationship between the width of the eaves and the incidence of wall leaks. An effective deflection mechanism, such as eaves greater than 600 mm wide, has been shown by Canadian data to manage more than 90% of rain incidence;
- While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential I believe that buildings in high and very high wind zones (as defined by NZS 3604) are likely to experience wind pressure differentials and thus a higher risk of water ingress;

- Taller buildings result in an effective increase in the catchment area of the wall. Available data suggests a clear correlation between higher number of storeys and an increased incidence of leaking;
- Complex roofs and overall envelope shapes where the roofs frequently intersect with the walls on upper floors create opportunities for leaks into the wall; and
- Recent data also shows that decks and balconies that are exposed in plan and/or cantilevered from the external walls are the most frequent location for water leaks.

6.6 Any likely penetration of moisture through the cladding can then be countered by a combination of effective drainage, ventilation of the drainage cavity and moisture tolerance in the external wall framing timber. In particular:

- The structure should allow water that has penetrated the cladding to drain out as quickly as possible. I believe that generally a drainage cavity should be provided behind the outer cladding barrier in monolithic construction;
- The design of the outer walls should allow walls to dry to the outside once moisture penetrates the cladding and the moisture barrier. If walls do not dry, decay fungi can become established in as little as 3 months. Until scientific data on the optimum depth and configuration of the ventilation mechanism in New Zealand conditions is available, I believe that the drainage cavity should be not less than 20 mm deep; and
- The external walls should have some degree of decay resistance or moisture tolerance to allow for situations when moisture circumvents the cladding and moisture barriers and moisture levels in the timber rise to more than 18%.

6.7 In relation to these characteristics, I find that the house:

- Has 585mm wide eave projections (including the spouting) and generally 460mm wide verge projections that help protect the cladding below them;
- Is in a low wind zone;
- Is two-storeys high;
- Has exterior window and doors that are adequately flashed or sealed;
- Has an overall envelope that is relatively simple on plan, with roofs having hip and wall to roof junctions;
- Has no decks or balconies;
- Has one pergola; and

- Has external wall framing that is constructed of timber that is unlikely to resist the onset of decay if it absorbs and retains moisture.

### **Weathertightness performance**

6.8 Generally the cladding appears to have been installed according to good trade practice, and I consider it has been effective to date in preventing the penetration of water. There are, however, some defective areas of the house, which if not remedied, will eventually allow the ingress of moisture behind the cladding. These are set out below:

- The vertical hairline cracks at 3 corners and one horizontal hairline crack in the chimney cladding;
- The flat tops of the pergola columns;
- The penetration of the horizontal cap cladding by the pergola posts and the inadequate sealant protection at this location;
- The minimal clearance between the base of the cladding to the pergola column plinths and the paved areas;
- The lack of clearance between the fence post on the west elevation and the wall cladding;
- The lack of sealant to some of the downpipe bracket fixings;
- The incompletely mortared joints of the schist veneer capping and at the ends of the veneer.

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. These are:

- Generally, the cladding appears to have been installed according to good trade practice;
- The house is in a low wind zone;
- The 585 mm wide eaves and 460mm wide verge projections provide reasonable protection to the cladding below them;
- The exterior window and doors are adequately flashed or sealed;
- The house has an overall envelope that is relatively simple on plan;
- The lower level roof spaces afford some ventilation to the external wall framing above them;

- There are no decks or balconies; and
- There is no moisture evident at this time in the external wall cavities.

I consider that these factors adequately 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.

- 6.9 I note that two elevations of the house demonstrate a low weathertightness risk rating, and the remaining two elevations a medium 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, before the building work has begun and, consequently, before any assessment of the quality of the building work can be made. Poorly executed building work introduces a risk that cannot be taken into account in the consent stage, but must be taken into account when the building as constructed is assessed for the purposes of issuing a code compliance certificate.

## 7 CONCLUSION

- 7.1 I consider that the expert's report establishes there is no evidence of external moisture entering the house, and accordingly, that the monolithic cladding does comply with clause E2 at this time.
- 7.2 However, 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 consequently allow the ingress of moisture in the future, the house does not comply with the durability requirements of clause B2.
- 7.3 I also consider that because the faults in the house cladding occur in discrete areas, I am able to conclude that rectification of the identified faults is likely to bring the cladding into compliance with the code. Once the cladding faults listed in paragraph 6.8 have been satisfactorily rectified, this house is likely to result in the building being weathertight and in compliance with clauses E2 and B2, 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 I emphasise that each determination is conducted on a case-by-case basis. 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 Act, I determine that the house is weathertight now and therefore the cladding complies with clause E2. However, as there are a number of items to be remedied to ensure it remains weathertight and thus meet the durability requirements of the code, I find that the house does not comply with clause B2. Accordingly, I confirm the territorial authority's decision to refuse to issue the code compliance certificate.
- 8.2 I find that once the items of non-compliance that are listed in paragraph 6.8 are rectified to the approval of the territorial authority, together with any other instances of non-compliance that become apparent in the course of rectification, the cladding as installed on the house will comply with the building code, notwithstanding the lack of a drainage cavity.
- 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 31 March 2005.

John Gardiner  
**Determinations Manage**