

Determination 2005/39

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 33

1 THE DISPUTE TO BE DETERMINED

- 1.1 This is a determination of a dispute referred to the Chief Executive of the Department of Building and Housing (“the Chief Executive”) under section 17 of the Building Act 1991 (“the Act”), as amended by section 424 of the Building Act 2004. The applicants are the joint-owners (referred to throughout this determination as the “owner”), and the other party is the territorial authority. The application arises from the refusal by the territorial authority to issue a code compliance certificate for a 2-year old house unless changes are made to its monolithic cladding system.
- 1.2 My task in this determination is to consider whether I am satisfied on reasonable grounds that the external cladding as installed (“the cladding”), which is applied to the external walls, beams and columns of this house complies with the building code (see sections 18 and 20 of the Act). By “external 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 2.3, and paragraph 8 sets out the decision.

2 PROCEDURE

The building

- 2.1 The building is a two-storey detached house situated on an level site, which is in a high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The external walls of conventional light timber frame construction are built on a proprietary concrete ground floor slab, and are sheathed with monolithic cladding. The house is of a fairly simple shape, with the concrete tiled pitched roofs at two main levels. The upper roof has hip and valley junctions, and the lower roofs, which are at 3 locations, have wall to roof junctions. The upper roof generally has 450mm (including the spouting) wide eaves projections and the lower roofs 200mm (including the spouting) wide eaves projections and 150mm wide verge projections. A flat roof, supported on monolithic-clad columns and beams, is constructed over the main entrance, and is clad with a liquid membrane waterproofing system. The roof has small oversailing parapet upstands that are monolithic clad on the top and the membrane is finished up to these. The supporting columns have thickened plinths at their bases.
- 2.2 A timber-framed balcony is constructed outside the main wall line adjoining the master bedroom. This is supported on monolithic-clad columns and beams as for the entry roof, and the deck is lined with tiles over a liquid membrane waterproofing system. The tiles are applied to the sides and top of the balcony perimeter upstands and a projecting monolithic-clad capping finishes the wall adjacent to the tiled upstand top. The balcony metal balustrade supports are set into the top of the tiled upstands. A large close-boarded deck is constructed below the base of the cladding at the ground floor level to two elevations of the house.
- 2.3 The timber used to construct the external wall framing is untreated against decay.
- 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 house incorporates 60 mm thick expanded polystyrene (EPS) backing sheets fixed through the building wrap directly to the wall framing and finished with a reinforced sponge float finish plaster and a further paint 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.

- 2.5 The plaster system supplier provided a “Producer Statement” dated 6 October 2003, covering the plaster system for a period of 15 years, and also an attached “Warranty for Coating-System” for the same period of time.

Sequence of events

- 2.6 The territorial authority issued a building consent on 18 April 2002, based on a certificate provided by a building certifier, dated 16 April 2002. A revised consent was issued in March 2003 covering amendments to the cladding, the balcony, and the pergola. The “Building Consent Requirements” made specific reference to the cladding and to the moisture content of the timber framing.
- 2.7 The building certifier carried out initial inspections during the course of construction. The inspections were then handed over to the territorial authority who made further inspections and approved the “Preline Building Inspection” on 19 August 2003, and the Postline/Bracing Inspection” on 22 August 2003. The territorial authority carried out a series of final inspections up to December 2003. Specific weathertightness inspections were carried out on 19 December 2003 and on 9 March 2004. The cladding issues were also referred to the territorial authority’s Code Compliance Certificate Resolution Committee.
- 2.8 The territorial authority wrote to the owner on 16 March 2004, stating:

With regard to the issue of a code compliance certificate (CCC) for a dwelling at the above address, we would advise the following:

Before the council can issue a code compliance certificate, we must ensure that all building work meets the NZ Building Code requirements. In particular, the building code specifies that building work must remain durable for specific periods of time after the code compliance certificate is issued.

You will be aware of the current weathertightness issues often reported in the media. These issues have highlighted the care that must be taken to establish that all building elements, but particularly cladding, is durable before any CCC can be issued.

As your building is face fixed (monolithic) construction with no cavities we are unable to verify that it fully complies with the Building Code requirements, manufacturer’s details application (*sic*) at the time and that it will remain durable for the required period. Visual examination has also revealed the following:

- No cladding inspections with amended plan
- No provision of cladding to paving clearance for one column

- Timber framing is into the ground
- No head flashing to garage door
- Seal around entrance roof overflow & soil pipe over laundry door to be painted
- Field Memorandum items 3, 11 and 12 still to be completed

There has been recent information and knowledge that face sealed cladding systems without 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 is therefore unable to issue a code compliance certificate...

- 2.9 As requested by the territorial authority, the owner engaged an advisor to provide a report, to establish whether the external wall framing complied with the requirements of the building code. The advisor inspected the property on 18 February 2003 and 22 February 2003, and noted that, at the time of the inspection, the house was fully roofed and the exterior walls were covered with the building wrap and the polystyrene backing. The framing had stood exposed for approximately 6 weeks without a roof. The consultants noted that the timber in question was kiln-dried and that it was spotted with a dark stain that had penetrated into the timber less than 0.5mm. The advisor cut away a piece from the worst stained member and forwarded to an independent testing organisation. The advisor also noted that some items of framing required rectifying. Based on the inspection and the independent testing, the advisor was of the opinion that, apart from some minor works, the framing members complied with the plans and with the building code as pertaining to timber structures.
- 2.10 The independent testing organisation in a letter to the advisor, dated 20 February 2003, noted that it had examined the timber sample forwarded to them and stated:
- Apart from surface mould and some sapstain, the timber is structurally sound with no indication of it being infected with decay fungi.
- 2.11 The territorial authority did not issue a Notice to Rectify as required under section 43(6) of the Act.
- 2.12 The owner applied for a determination on 10 August 2004.

3 THE SUBMISSIONS

- 3.1 The territorial authority made a submission in the form of a letter to the Authority dated 18 October 2004, which summarised the consent and inspection processes relating to the house. The territorial authority also noted that no specific cladding inspections had been undertaken for the external cladding system. The owner had been informed that, due to the type of monolithic cladding applied to the house,

together with its attendant risk factors, the territorial authority was unable on reasonable grounds to accept the compliance of the cladding. The territorial authority then listed the major risk issues as being:

- No specific cladding inspections during the installation process
- No provision of cladding to paving clearance for one column
- Timber framing is into the ground
- No confirmation about timber treatment
- Complex roof/wall junctions

The territorial authority noted that the matters of doubt were:

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

3.2 The territorial authority supplied copies of:

- The consent documentation;
- The territorial authority's and the building certifier's inspection documentation;
- The advisor's report on the timber framing;
- The independent testing organisation's report;
- Producer statements and warranties from the plaster systems supplier;
- The correspondence with the owner; and
- A set of photographs.

3.3 The owner wrote to the Authority on 2 September 2004, summarising the events arising from the completion of the house up to the request for a determination.

3.4 The owner supplied copies of:

- The plans and specifications;
- The consent documentation;
- The territorial authority's and the building certifier's inspection documentation;
- Various producer statements and warranties; and
- Some of the plaster system supplier's construction details.

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

4 THE RELEVANT PROVISIONS OF THE BUILDING CODE

- 4.1 The dispute for determination is whether the territorial authority's decision to refuse to issue a code compliance certificate because it was not satisfied that the cladding complied with clauses B2.3.1 and E2.3.2 of the building code (First Schedule, Building Regulations 1992) is correct. Those provisions of the building code 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 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 21 February 2005. It noted that generally the paint system appears to be good, but there are untidy features where the plaster is patch plastered. The expert removed the plaster coating to reveal the window flashing details at two locations, and noted that the windows were appropriately flashed at the heads, jambs and sills. The expert was of the opinion that control joints were not required for a house with the dimensions of the one in question. The expert also made the following comments regarding the cladding:

- At the high level balcony:
 - The deck tiling upstand is poorly finished under the main wall cladding and there are no flexible sealants at these locations,
 - There is no flexible sealant installed around the perimeter corners of the deck tiling, and the upstand tiles are lifting,
 - There is a crack at the external mitres of the plastered capping; and
 - The handrail supports are inadequately sealed where they pass through the tiled perimeter upstand.
- The recommended ground clearances are not achieved at some locations to the bases of the wall cladding and at the column plinths adjoining the decks;
- The ends of some apron flashings are not adequately sealed;
- Some penetrations through the cladding are inadequately sealed; and
- The base of the rainwater pipe above the garage, which discharges directly into a gutter drain, lacks a suitable spreader, and the roof junction at this location is

inadequately sealed.

5.2 The expert took non-invasive readings at the interior linings of the external walls throughout the house and only one high moisture reading was recorded. The expert also took invasive moisture readings and obtained the following 6 high level results:

- 19.0% (2) at a the main wall under the entry roof;
- 20.0% and 22% at the beam supporting the entry roof;
- 20.0% at a base of a column supporting the entry roof;
- 20.0% and 21% at the main wall under the balcony;
- 24%, 34%, and 40%(2) at the beam supporting the high-level balcony; and
- 40%+ at the bottom plate adjoining a garage doorjamb. The expert observed that at that location, the plate was wet and that there was mildew staining on the inner gibraltarboard wall lining.

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

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

6 DISCUSSION

General

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

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 house:

- Has 200mm or 450mm overall wide eaves or verge projections that provide only minor cladding protection;
- Is in a medium wind zone;

- Is two storeys high;
- Has fully flashed exterior joinery units;
- Has an envelope that is fairly simple on plan, with a roof system having hip, valley and wall to roof junctions;
- Has one high-level balcony that is not constructed over a habitable space;
- Has lower level roof spaces that afford some ventilation to the high level external wall framing; and
- Has external walls constructed with untreated timber that provides little resistance to decay if it gets wet and cannot dry out.

Weathertightness performance

6.8 I find that, generally, some aspects of the cladding appears to have been installed according to good trade practice and to the manufacturer's instructions, but some junctions, edges and penetrations are not well constructed. These areas are:

- At the high level balcony:
 - The poorly finished deck tiling upstand under the main wall cladding and the lack of flexible sealants at these locations,
 - The lack of flexible sealant installed around the perimeter corners of the deck tiling, and the lifting upstand tiles,
 - The crack at the external mitres of the plastered capping, and
 - The inadequately sealed handrail supports where they pass through the tiled perimeter upstand.
- The inadequate ground clearances at some locations at the bases of the wall cladding and at the column plinths adjoining the decks;
- The inadequately sealed ends of some apron flashings;
- Some inadequately sealed penetrations through the cladding; and
- The lack of a suitable spreader to of the rainwater pipe above the garage, and the inadequately sealed roof junction at this location.

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

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

- There are fully flashed exterior joinery units; and
- There are lower level roof spaces that afford some ventilation to the high level external wall framing.

6.10 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.

6.11 I note that one elevation of the house demonstrates a medium weathertightness risk rating, and the remaining elevations a high weathertightness risk rating, as calculated using the E2/AS1 risk matrix. The matrix is an assessment tool that is intended to be used at the time of application for consent, but must be supplemented at the time of issuing a code compliance certificate by careful inspection of the building as actually built.

7 CONCLUSION

7.1 I am satisfied that the current performance of the cladding is not adequate because it is allowing water penetration into the wall framing at several locations at present. Consequently, I am not satisfied that the cladding 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 will allow 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 6.8 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.

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 house remains weathertight and thus meet the durability requirement of the code. Consequently, I find that the house does not comply with clause B2. Accordingly, I confirm the territorial authority's decision to refuse to issue a code compliance certificate.

8.2 I also find that rectification of the items outlined in paragraph 6.8 to the approval of the territorial authority, along with any other faults that may become apparent in the course of that work, is likely to result in the house being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity.

8.3 I note that the territorial authority has not issued a Notice to Rectify. The territorial authority should do so and the owner is then obliged to bring the house up to compliance with the building code. It is not for me to decide directly how the defects are to be remedied and the cladding brought to compliance with the building code. That is a matter for the owner to propose and for the territorial authority to accept or reject, with either of the parties entitled to submit doubts or disputes to the Chief Executive for another determination.

8.4 Finally, I consider that the cladding will require on-going maintenance to ensure its continuing code compliance.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 21 March 2005.

John Gardiner

Determinations Manager