

Determination 2005/01

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

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 applicant is the building 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 three separate extensions and additions to an existing house (“the extensions”), unless changes are made to their monolithic cladding systems.

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 certain areas of each of the buildings, 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 my final decision.

2 PROCEDURE

The building work

2.1 The building work consists of 3 separate extensions or alterations (“the extensions”) to an existing detached house, which was built in 1995, situated on a level site that is in a high to very high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The extensions consist of:

- A two-storey high garage, living space and mezzanine loft, constructed in 1997, which infills a space between two existing buildings, (“the garage”);
- A swimming pool and a single-storey sauna/changing-room block constructed in 1999 (“the sauna”); and
- A single storey conservatory addition to the existing house constructed in 2003 (“the conservatory”).

2.2 All the extensions are of conventional light timber frame construction, with “long run” copper pitched roofs and copper spoutings. The eaves projections are generally 800mm wide, plus the projecting 125mm wide gutters. The verge projections to the garage and sauna are 250mm wide and those to the conservatory are 800mm wide. The external doors and windows are of aluminium with integral condensation channels. The building details are:

The garage:

Has a concrete ground floor slab and blockwork foundation walls, and the external walls are a combination of cedar bevel-backed weatherboards and monolithic cladding. Apart from the exposed end wall, the monolithic cladding is basically to two narrow wall panels. The building is of a relatively simple shape, and a loft extends through the main roof with valley junctions where its pitched roof abuts the main roof. There are flashed junctions where the new roofing meets the original wall cladding.

The sauna:

Which is of similar construction to the garage, is of a simple rectangular shape and adjoins an existing timber retaining wall. A shaped copper flashing conceals the junction between the building and the retaining wall.

The conservatory:

Has a suspended concrete slab and the external walls are all lined with cedar bevel-backed weatherboards, with the exception of one lower section of wall that is monolithic clad. The building is of a simple shape and the roof is jointed to the existing roof with valley gutters. The building has a stone veneered chimney that passes through the roof. The existing timber boarded deck adjoins one weatherboard-clad elevation of the building.

- 2.3 The documentation does not indicate whether the external wall framing has been treated. I have not received any further evidence as to what timber was actually used on the extension.
- 2.4 Some of the new timber-framed external walls of the extensions that are the subject of this determination are clad with a stucco system that is described as monolithic cladding. In this instance it incorporates fibre-cement backing sheets fixed through the building wrap directly to the framing timbers, stainless steel reinforcing mesh spaced off the backing, and a 30 to 35mm thickness of three coat “roughcast” textured finished solid plaster. The plaster in turn is finished with a paint system. No information has been given as to what jointing, plaster and paint systems were applied to the extensions.
- 2.5 The plasterer has provided a “Producer Statement”, dated 8 May 2004, covering the stucco plaster to the extensions.

Sequence of events

- 2.6 The territorial authority issued 3 building consents as follows:
- For the garage and office on 9 October 1997;
 - For the pool and sauna on 30 July 1999; and
 - For the conservatory on 9 January 2003, with an amended plan approved on 27 February 2003.
- 2.7 The territorial authority made various inspections during the course of construction, and approved the preline inspections as follows:
- For the garage on 7 November 1997 and 17 December 1997;
 - For the pool and sauna on 4 June 1999; and
 - For the conservatory on 1 May 2003.
- 2.8 Final building inspections were carried out on the extensions on 2 April 2004, and none of the buildings were deemed to comply with the building code.
- 2.9 Following this inspection, the territorial authority wrote 3 letters to the owner on 8 April 2004, in respect of each of the 3 buildings, identifying the matters requiring attention. Each of the letters contained the following:

In regard to the monolithic cladding applied to your dwelling, and notwithstanding the approval in your building consented plans and specifications, recent information has indicated that monolithic claddings that do not have appropriate

drainage, adequate ground clearance, reinforcing, control joints, and external joinery weather flashings will, in the event of leakage and /or residual moisture, cause irrevocable damage to the structural elements of the building. Doubt has arisen to the extent that monolithic claddings that do not have all of these features may not meet the requirements of Clauses B2 and E2 of the NZ Building Code.

As the monolithic cladding system fixed to your building has been individually assessed as being such a cladding, Council needs to be assured that it meets the requirements of the NZ Building Code before a final building code compliance certificate can be issued. If you made an application to the Building Industry Authority for a determination on this issue under Section 17 of the Building Act 1991, it would decide the matter...

The following comments specifically related to the garage addition:

1. Asphalt level too high, has come up under solid plaster.
2. Cap gable end rafter plumbcut.

The following comments specifically related to the pool area:

- 1 Provide modified cross-section showing conc nib for bottom plate.

- 2.10 The territorial authority did not issue a Notice to Rectify as required by section 43(6) of the Act.
- 2.11 The owner applied for a determination on 16 June 2004.

3 THE SUBMISSIONS

- 3.1 The territorial authority did not make a submission. The owner, in a letter to the Authority, dated 7 June 2004, described the cladding system used and where it had been applied. The owner noted that the same contractor who had carried out the work on the original house applied the solid plaster and that the plaster had performed exceptionally well and there had not been any cracking or moisture problems. The owner followed up with a second letter, dated 14 July 2004, which reiterated some of the previous comments and noted that the territorial authority had not issued a Notice to Rectify.
- 3.2 The owner supplied copies of:
 - The plans and specifications;
 - The backing sheet manufacturer's instructions;
 - The correspondence from the territorial authority;
 - The code compliance certificate for the original house;
 - The territorial authority's inspection sheets;
 - The "Producer Statement" supplied by the plasterer; and
 - A set of photographs showing various aspects of the extension.

- 3.3 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 provide:

Clause B2 DURABILITY

B2.3.1

Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:

- (a) The life of the building, being not less than 50 years, if:
 - (i) Those building elements (including floors, walls, and fixings) provide structural stability to the building, or
 - (ii) Those building elements are difficult to access or replace, or
 - (iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.
- (b) 15 years if:
 - (i) Those building elements (including the building envelope, exposed plumbing in the sub floor space, and in-built chimneys and flues) are moderately difficult to access or replace, or
 - (ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

Clause E2—EXTERNAL MOISTURE

E2.1 The objective of this provision is to safeguard people from illness or injury, which could result from external moisture entering the building.

E2.2 Buildings shall be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.

E2.3.2 Roofs and exterior walls shall prevent the penetration of water that could cause undue dampness, or damage to building elements.

- 4.2 There are no Acceptable Solutions that have been approved under section 49 of the Act that cover this cladding. The current Acceptable Solution, E2/AS1, allows for solid plaster systems with fibre cement backing sheets, but requires that they be fixed on battens to create a 20mm cavity between the sheet and the framing. The previous acceptable solution E2/AS1, which was in force when this consent was issued, allowed for mesh reinforced solid plaster to be applied to fibre cement backing sheets that were face fixed to the framing. The cladding is not currently accredited under section 59 of

the Act. I am, therefore of the opinion that the cladding system as installed must now be considered to be an alternative solution.

4.3 In several previous determinations, the Authority has made the following general observations about acceptable solutions and alternative solutions, which in my view remain valid in this case:

- 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, 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. It noted that the final coat of the plaster is a "roughcast" finish of a high standard. Apart from some exceptions, the general impression was that the cladding met good trade practice. The expert cut away a section of the cladding at the jamb/sill junction of an exterior window adjoining a stucco plaster/weatherboard junction. I am prepared to accept that the evidence provided by this investigation is typical of similar locations to the extensions. The expert also made the following comments regarding the cladding:

- The southwest facing wall of the garage requires a vertical control joint;
- The cladding to the garage does not have the required depth of overlap over the foundation wall;
- There is insufficient ground clearance to the base of the cladding of the garage and the sauna, and in some cases the cladding is buried by either asphalt or concrete paving, with no capillary break having been formed at these locations;
- There are neither jamb or sill flashings to the exterior doors and windows, nor any sill trays;
- There are no flashings or sealants at the vertical junctions between the stucco and weatherboard claddings, and the scribe covering the ends of the weather boards does not go over the stucco;
- The exposed plasterboard lining at the garage door requires protection from external moisture;
- The base of the apron flashings to the garage do not have proper "kickouts" provided to them; and
- Some of the penetrations of the cladding are inadequately sealed.

5.2 The expert took non-invasive readings at the interior of the external walls under both sides of every window, alongside all external doors, and at areas identified as high risk. Elevated readings were obtained at 5 locations as follows:

- Readings ranging from 18% to 22% at the garage door jambs;
- A reading of 22% to the sill of the western elevation conservatory window;
- A reading of 22.8% to the bottom plate of the garage wall; and
- A reading of 24.0% to sill of the changing room window and the wall beneath.

No invasive moisture readings were obtained. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

5.2 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, the I find that the extensions:

- Have 925 total mm wide eaves projections and some 800 mm wide verge projections that provide reasonable protection to the cladding under them;
- Are in a high to very high wind zone;
- Are, apart from part of the garage that is two storeys high, single storey;
- Have exterior window and doors that have head flashings, but no jamb or sill flashings nor sill trays;
- Have overall envelopes that are fairly simple on plan, but the garage and conservatory roofs have hip and valley junctions and the garage has some wall to roof junctions; and
- Has external walls constructed with what I accept is untreated timber, which does not provide any resistance to decay if it gets wet and cannot dry out.

Weather-tightness performance

6.8 I find that generally, 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. I note:

- The lack of a vertical control joint in the southwest facing wall of the garage;
- The inadequate overlap of the garage cladding over the foundation wall;
- The insufficient ground clearance to the base of the cladding of the garage and the sauna, and the buried cladding in the asphalt or concrete paving lacking a capillary break;
- The lack of jamb or sill flashings and sill trays to the exterior doors and windows;
- The lack of flashings or sealants at the vertical junctions between the stucco and weatherboard claddings;
- The lack of external weather protection to the exposed plasterboard lining at the garage door;
- The lack of proper “kickouts to the base of the apron flashings to the garage; and
- The inadequate sealing to some of the penetrations through the cladding.

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 and to good trade practice; and
- The extensions have no balconies or decks adjoining the monolithic cladding.

6.10 I note that all elevations of the extensions demonstrate a low 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 of all the buildings at present. Consequently, I am not satisfied that the cladding system as installed complies with clause E2.3.2 of the building code.

7.2 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.

7.3 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. I recognise that a territorial authority does not have any statutory responsibility for the ongoing maintenance of a building. However, the maintenance programme adopted by the owner could be undertaken after consultation with the territorial authority, bearing in mind that the nature of the advice, and the basis on which it is provided to the owner, are for the territorial authority to decide.

- 7.4 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.
- 7.5 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 E2.3.1 of the building code. There are also a number of items to be remedied to ensure that the extensions are weathertight and thus meet the durability requirement of the code. Consequently, I find that the extensions 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 6.8 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 extensions becoming 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 14 January 2005 by John Gardiner, Determinations Manager.

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