

Determination 2005/24

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 22

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 two joint-owners of the property (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 the external wall cladding as installed (“the cladding”), which is applied to all the external timber framed walls 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 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 two-storey detached house situated on a level site, which is in a high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction, built on concrete block foundation walls. All the timber framed external walls are sheathed with monolithic cladding. The house is of a fairly simple shape, but the metal tiled pitched roofs at two main levels have numerous valley, hip and wall to cladding junctions. The lower roof is extended to form a veranda to part of the northern elevation, and this is supported on beams and three 100 x 100mm posts sheathed with 200 x 200 polystyrene surrounds. The beams are extended to support the projecting upper floor bedroom 1 wardrobe. The upper floor projects 400mm over the main entrance and is supported on beams and two columns constructed as for those of the veranda. The top face of the projecting upper floor wall is extended to form a parapet wall at the higher roof level, and this is finished with a metal capping. Plastered polystyrene band with sloping tops have been planted on at the sills of the windows and similar bands are situated under the fascias and barges. There are no eaves or verge projections.
- 2.2 The owner has confirmed that untreated timber was used to construct the external wall framing.
- 2.3 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 7.5 mm thick fibre-cement backing sheets fixed through the building wrap directly to the wall framing and finished with a reinforced sponge float finish 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. I note that the type of fibre-cement backing sheet used for the cladding differs from that shown on the consented plans.
- 2.4 The plasterer provided a “Producer Statement”, dated 14 July 2004 covering the plaster system applied to the cladding. However, I note that this document refers to the original backing sheets and not to the substituted product.

Sequence of events

- 2.5 The territorial authority issued a building consent on 17 January 2001.
- 2.6 The territorial authority made various inspections during the course of construction, and on 30 September 2003 approved the preline inspection. The territorial authority undertook a final inspection on 13 July 2004, but the house did not pass this inspection. The territorial authority noted:

...Plaster on [Named product] with no cavity...and letter sent regarding cladding.

- 2.7 Following this inspection, the territorial authority wrote to the owner on 23 June 2004, identifying the matters requiring attention:

1. In regard to the monolithic cladding applied to your dwelling and barrier and not withstanding 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...

- 2.8 The territorial authority did not issue a Notice to Rectify as required by section 43(6) of the Act.
- 2.9 The owner applied for a determination on 28 July 2004.

3 THE SUBMISSIONS

- 3.1 Neither the territorial authority nor the owner made a submission. The owner supplied copies of:

- The construction plans; and
- The producer statement from the plasterer.

- 3.2 The territorial authority supplied copies of:

- The construction plans and specifications;
- The consent documentation;
- The territorial authority's inspection documents; and
- The correspondence with the owner.

- 3.3 Copies of the 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 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 furnished a report on the cladding. It noted that the plaster is of a consistent thickness and has been evenly applied. The exterior finish is of a generally good quality. The expert considered that the face fixed external windows and doors were appropriately flashed or sealed. The expert also made the following comments regarding the cladding:
- No vertical control joints are formed in the cladding at 3 locations as required by the manufacturer's recommendations;
 - There is minor cracking on the bands below the window sills;
 - The apron flashing at the left-hand side of the garage does not extend far enough to ensure that water is directed into the adjoining spouting, and the polystyrene band at this point is not plastered or painted;
 - The pipe penetrations through the cladding lack properly sealed flanges;
 - The electrical meter box lacks a flashing system and sealants; and
 - The electrical light fitting cables penetrating the cladding lack sealed conduits or ducts.
- 5.2 The expert also noted that a check should be made as to whether the backing sheet substitution has impaired the effectiveness of the house bracing.
- 5.3 The expert took non-invasive moisture content readings through the internal linings of the external walls throughout the house, and found no locations with high readings. The readings were between 10% and 16.6%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.
- 5.4 Copies of the expert's report were provided to each of the parties, and the owner did not respond. In a letter to the Department dated 4 February 2004, the territorial authority stated that following an inspection, it came to the conclusion that the sheets used for the bracing had been properly fixed. The territorial authority also produced a risk matrix that showed, in the opinion of the territorial authority, the house was a high-risk building.

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 extensions 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. 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 this house:

- Has no eaves or verge projections. Accordingly, apart from the veranda and the upper floor projections, there is no protection to the cladding in this respect;
- Is in a high wind zone;
- Is two storeys high;
- Has exterior windows and doors that are adequately flashed or sealed;
- Has an overall envelope that is fairly simple in plan, but with roofs having complex hip, valley, and roof to cladding junctions;
- Has no decks or balconies; and
- Has external walls that are constructed with untreated timber that is likely to 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 to the manufacturer's instructions, but some elements are not well constructed. These areas are:

- The lack of vertical control joints at 3 locations;
- The minor cracking on the bands below the window sills;
- The apron flashing at the left-hand side of the garage not extending far enough, and the lack of plaster and paint to the polystyrene band at this point;
- The lack of properly sealed flanges to the pipe penetrations through the cladding;
- The lack of a flashing system and sealants to the electrical meter box; and
- The lack of conduits and ducts to the electrical light fitting cables.

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 the manufacturer's specifications;
- The external windows and doors are adequately flashed or sealed;
- There are no decks or balconies; and
- The lower level roof spaces afford some ventilation to the upper wall framing.

6.10 I accept that the territorial authority is aware of the substituted backing sheets and accepts that the substituted material has bracing properties equivalent to those inherent in the originally specified backing sheets.

6.11 I note that all elevations of the house demonstrate a moderate 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 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 are likely to 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 should be able to remain weathertight and thus comply with both clauses E2 and B2.

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 Act, I determine that the cladding to 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 25 February 2005.

John Gardiner
Determinations Manager