

Determination 2005/31

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 26

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

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

- 1.4 This determination refers to the former Authority:
- (a) When quoting from documents received in the course of the determination, and
 - (b) When referring to determinations made by the Authority before section 424 came into force.
- 1.5 In making my decision, I have not considered any other aspects of the Building Act or the building code.
- 1.6 The house itself is described in paragraphs 2.1 to 2.3, and paragraph 8 sets out my decision.

2 PROCEDURE

The building

- 2.1 The building is a single-storey detached house situated on a level site in a high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction on concrete ground floor slabs, and all the external walls, including both faces of those to the carport, are sheathed with monolithic cladding. The house is of a fairly complex shape, with low-pitch trough section steel roofing and butyl rubber edge gutters. The roofs have parapet wall surrounds that are monolithic clad on the both faces and the sloping top. The parapet internal face cladding is also fixed over battens that have gaps at the ends to assist drainage. Sawn timber members are bolted through the cladding above the external window and door openings.
- 2.2 No written evidence has been provided as to what treatment, if any, was applied to the exterior wall framing.
- 2.3 All of the new timber-framed external walls of the house that are the subject of this determination are clad with a stucco system that is described as monolithic cladding. In this instance it incorporates 4.5mm thick fibre-cement backing sheets fixed through the building wrap directly to the framing timbers, reinforcing wire mesh spaced off the backing, and a 20mm thickness of three-coat solid plaster with ochre colouring incorporated in the mix. The plaster in turn is finished with a masonry sealer application. I note, as do the territorial authority, that the plaster as applied differs from the alternatives described on the plans.

Sequence of events

- 2.4 The territorial authority issued a building consent on 5 August 2002. The consent made references that related to the cladding as follows:

A producer statement from the installer of the cladding system is to be submitted to Council prior to the issue of a code compliance certificate.

Exterior window and door joinery exposed to weather conditions should be flashed correctly to seal the windows from water penetration. Head flashings should be provided in all cases except where the joinery is hard up to the eaves and the head is covered by a frieze board or similar. Sealing with silicone rubber type sealants is not acceptable at window heads (NZ building code section E2).

- 2.5 The territorial authority carried out various inspections throughout the construction of the house.
- 2.6 Following a final inspection on 15 January 2004, the territorial authority noted that certain work had to be carried out before it could issue a code compliance certificate. With regard to the cladding, the issues were:
2. Lower ground levels where there is less than 200mm between the finished ground level and the floor or pave (*sic*) around those areas.
 3. Provide a producer statement from the plastering contractor confirming that he has sealed all the joints between the side and bottom flashings around the windows and detail the method used of sealing the bolts through the plaster above the windows supporting the timber bolted over the plaster.
 4. Include also in the producer statement the following:
 - (a) That the work has been carried out in accordance with the specifications provided when the change was made from [Named product] to stucco.
 5. Provide manufacturer's application material for [Named] masonry sealer and confirm that the required number of coats has been applied.
 6. Provide technical information confirming how it is intended to seal the old minor cracks in the stucco so that Council can be assured that the exterior cladding on the building will remain waterproof.
 7. Provide details from the manufacturer of the waterproofing material relating to the durability of the product and the frequency of application to maintain the weather tightness of the cladding.
- 2.7 The plasterer responded in a statement dated 20 February 2004, describing the products and processes used in applying the plaster and also attached a plastering specification.
- 2.8 On 2 June 2004, the territorial authority wrote to the owner, advising that it declined to issue a code compliance certificate, as the cladding system was monolithic, and the territorial authority was not satisfied, on reasonable grounds, that it would apply with clause E2. The territorial authority went on to state that, in its view, there were three methods available to achieve code compliance, and the issue of a code compliance certificate. In summary these were:
- Destructive testing /checking where the cladding or internal lining is removed to check the condition of the framing; or

- Removal of the cladding and replacement either with an alternative non-monolithic cladding, or a monolithic cladding with a suitable moisture management scheme; or
- Applying to the Authority for a Determination.

2.9 The owner applied for a determination on 21 June 2004.

3 THE SUBMISSIONS

3.1 The owner in a covering note stated that the house was completed by 31 January 2003, and upon applying for an inspection 1 year later, discovered that the building code had changed and the house was not code compliant with these new “specifications”.

3.2 The owner provided copies of:

- The building plans and specification;
- The building consent information;
- The territorial authority’s inspection records;
- The correspondence with the territorial authority;
- Some manufacturer's instructions;
- Details of the cladding at the walls and parapets; and
- The plasterer’s statement of 20 February 2004.

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

4 THE RELEVANT PROVISIONS OF THE BUILDING CODE

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

Clause B2—DURABILITY

B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:

- (a) The life of the building, being not less than 50 years, if:

- (i) Those building elements (including floors, walls, and fixings) provide structural stability to the building, or
 - (ii) Those building elements are difficult to access or replace, or
 - (iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.
- (b) 15 years if:
- (i) Those building elements (including the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace, or
 - (ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

Clause E2—EXTERNAL MOISTURE

- E2.1** The objective of this provision is to safeguard people from illness or injury, which could result from external moisture entering the building.
- E2.2** Buildings shall be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.
- E2.3.2** Roofs and exterior walls shall prevent the penetration of water that could cause undue dampness, or damage to building elements.

4.2 There are no Acceptable Solutions that have been approved under section 49 of the Act that cover this cladding. The 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, which in my view remain valid in this case, about acceptable solutions and alternative solutions

- Some acceptable solutions cover the worst case, so that in less extreme cases they may be modified and the resulting alternative solution will still comply with the building code.
- Usually, 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 in February 2005. It stated that the quality of the stucco finish is generally well done. The expert removed a small section of the plaster to examine a sill/jamb intersection of one window, and found that jamb and sill flashings are installed, and that the units are well sealed. I accept that these exposed details are likely to be representative of the remaining window and door flashings. The expert also cut away the plaster on the line of a crack in the back of the parapet wall. The expert's report made the following specific comments on the cladding:

- There are cracks in the parapet cladding, and fine hair cracks at some wall panels between the windows;
- The ends of the head flashings over the external windows and doors are buried in the cladding;
- The sill flashings of these units do not discharge to the outer face of the stucco;
- At some locations there is insufficient ground clearance to the base of the cladding above paving and garden areas;
- The ends of the wall and apron flashings lack stop ends or "kickouts"; and
- Some light fittings, clips, overflows, and rainwater heads require resealing.

5.2 The expert carried out a series of moisture tests to the interior of the house using a non-invasive meter. No internal elevated readings were obtained from these tests. The expert then took further invasive readings into the timber framing or power point recesses and obtained readings of between 6% and 17%. 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 and neither party responded.

6 DISCUSSION

General

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

Weathertightness risk

- 6.2 Recent research and experience, both internationally and locally, indicates that the impact of weathertightness problems in monolithic clad houses can be minimised if good and effective design and construction practices are followed.
- 6.3 The installation of exterior cladding to manufacturer's specifications and to accepted good trade practice is an important but not the only requirement to ensure good weathertightness performance.
- 6.4 The next priority is to reduce the ability of moisture to get through the cladding by using design measures that minimise the effects of the rain impacting on the walls:
- 6.5 In my opinion, the important matters for consideration are:
- Data show a strong relationship between the width of the eaves and the incidence of wall leaks. An effective deflection mechanism, such as eaves greater than 600 mm wide, has been shown by Canadian data to manage more than 90% of rain incidence;
 - While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential, it is believed that buildings in high and very high wind zones (as defined by NZS 3604) are likely to experience wind pressure differentials and thus a higher risk of water ingress;
 - Taller buildings result in an effective increase in the catchment area of the wall. Available data 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 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 no eaves or verge projections that would provide some cladding protection;
- Is built in a high wind zone;
- Is single-storey;
- Is generally complex in plan, with roofs having wall/roof junctions;
- Has exterior windows and doors that are fully flashed;
- Has no balconies or decks; and
- Has external walls that I accept 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 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 cracking in the parapet cladding and fine hair cracks at some wall panels between the windows;
- The buried ends of the head flashings over the external windows and doors;
- The sill flashings of these units not discharging to the outer face of the stucco;
- The insufficient ground clearance to the base of the cladding above paving and garden areas at some locations;
- The lack of stop ends or “kickouts” at the ends of the wall and apron flashings; and
- The defective resealing of some light fittings, clips, overflows and rainwater heads.

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 single storey;
- There are no balconies or decks;
- There is a cavity behind the cladding at the backs of the parapet walls; and
- There is no moisture evident at this time in the external wall cavities.

6.10 I consider that these factors adequately compensate for the lack, apart from the parapet walls, of a full 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 all elevations of the house demonstrate a medium weathertightness risk rating using the E2/AS1 risk matrix. The matrix is an assessment tool that is intended to be used at the time of application for consent, 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 actually built 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 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 will consequently 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 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 consequently 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 11 March 2005.

John Gardiner
Determinations Manager