

Determination 2005/32

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 27

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 3-year old alteration and extension to an existing house (“the house”) unless changes are made to its monolithic cladding system.
- 1.2 The question to be determined is whether on reasonable grounds that the external wall cladding as installed (“the cladding”), which is applied to 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 2.3, and paragraph 8 sets out my decision.

2 PROCEDURE

The building

- 2.1 The building work comprises major alterations and additions to an existing single-storey detached house situated on a level site, which is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction, built on new or existing concrete floors. All the new timber framed external walls are sheathed with monolithic cladding as are the existing profiled fibre-cement sheet clad walls. The existing brick veneer walls are stucco plastered. The resulting house is of a fairly simple shape, and the corrugated longrun low-pitched roof has several wall to roof junctions. The aluminium windows and doors are recessed, with aluminium head flashings over the openings. Two gap-boarded decks are built adjacent to the lounge and the master bedroom, and a small landing and associated steps is constructed outside bedroom 2. The eaves have 600mm or 1070mm wide projections, and the verges have 600mm wide projections.
- 2.2 The owner has confirmed that untreated timber was used to construct the new external wall framing.
- 2.3 All of the new and the existing profiled fibre-cement sheet clad 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, stainless steel reinforcing mesh spaced off the backing, and a 20mm thickness of solid plaster. The plaster in turn is finished with a paint system. The original brick veneer is directly plastered and painted to match the remaining cladding.
- 2.4 The plasterer provided a “Producer Statement” dated 11 February 2005 in respect of the stucco plaster applied to the house. The builder provided a “Producer Statement – Construction Review” dated 10 December 2003, which declared that the solid plaster

system used on the house was applied strictly to an appraisal organisation's approval sheet. The builder also certified in a document dated December 2003 that the painting system was applied in accordance with the manufacturer's specification.

Sequence of events

- 2.5 The territorial authority issued a building consent on 18 September 2001, based on a certificate issued by a building certifier, dated 5 September 2001. In the Scope of Building Certifiers Engagement document attached to the certificate the certifier expressly stated that field inspections after the interior wall linings were fixed were excluded from the certifier's scope of engagement and would be carried out by the territorial authority.
- 2.6 The building certifier made various inspections during the course of construction, and passed the preline and plaster substrate inspections, but did not carry out a final inspection.
- 2.7 On 22 November 2002, the territorial authority wrote to the owner noting that as the building certifier was no longer able to continue certifying building work, the building certifier had passed on to the territorial authority the inspection records of the building project. The owner was to contact the territorial authority prior to requesting the next inspection.
- 2.8 The territorial authority carried out a further final inspection on 10 December 2003. The relevant "Field Inspection Record" noted that the building was not approved and stated: "no inspections for solid plaster, no cavity builder and owner informed".
- 2.9 The owner wrote to the territorial authority on 5 January 2004, stating that the house was not one that fell within the area of "suspect constructions". In particular, the building had ample eaves projections and there were no balustrade or deck perforations in the cladding. All the inspections, except the final one, had been completed by early 2002 and confirmed that the work complied with the terms of the consent. "Reputable local builders" constructed the project, and it had been "undertaken with all reasonable care, diligence and attention to quality standards, in terms of the relevant building consent".
- 2.10 The territorial authority wrote to the owner on 25 February 2004, stating:

I can advise that an inspection carried out on 10 December 2003 identified that the monolithic stucco cladding applied to the additions to your dwelling has been fixed in such a way that would not now be approved as acceptable to meet the provisions of the Building Code 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 (including as in your case, appropriate drainage) may not meet the requirements of Clauses B2 and E2 of the NZ Building Code.

Council needs to be assured that your monolithic stucco cladding meets the requirements of the NZ Building Code before a final building code compliance certificate can be issued...

- 2.11 Further correspondence passed between the parties from 4 March 2004 to 17 June 2004, setting out the sequence of events and arguing the merits of the issues as the parties saw them. The owner also claimed that the builder had received confirmation from the territorial authority that the cladding system was satisfactory.
- 2.12 The territorial authority did not issue a Notice to Rectify as required by section 43(6) of the Act.
- 2.13 The owner applied for a determination on 7 September 2004.

3 THE SUBMISSIONS

3.1 The owner in a letter to the Authority dated 7 September 2004 gave a summary of the events leading up to this determination. The owner also noted that, in the owner's opinion, the 5 aspects to be taken into account when considering whether a code compliance certificate on reasonable grounds, as set out in an earlier Authority publication, were relevant in this case. The owner also listed the weathertightness risk factors that applied to the house: These are summarised as:

- No parapets used;
- Generous eaves projections;
- Orthodox and uncomplicated design;
- Single-level building with adjacent weather protection;
- No balconies or decks;
- No cavities; and
- The use of untreated timber.

3.2 The owner supplied copies of:

- The plans and specifications;
- The consent documentation;
- The plasterer's producer statement and other producer statements and guarantees;
- The coating compliance form from the coating's supplier;
- The building certifier's and territorial authority's inspections forms;
- The correspondence from the territorial authority and the building certifier;
- Various manufacturers' literature;

- A set of photographs; and
- Further comments under a covering letter to the Authority dated 18 October 2004, on the application of the stucco plaster and the timeframe for applying the paint coatings.

3.3 In an undated letter to the Authority, the builders described the cladding, and set out the experience of themselves, the plasterer and the builder's manager. The builder stated that care was taken in all aspects of the cladding installation and that the painter's work was done well.

3.4 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 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 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; 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 that was completed on 1 February 2005. It noted that generally the finished plaster looks in good condition and the final coat of sponge-finished plaster was carried out to a high standard. The general impression was of reasonable trade practice in terms of the cladding. The expert also made the following comments regarding the cladding:

- No vertical control joints are formed in the cladding where it adjoins the solid plaster brick veneer;
- The base of the cladding is not plastered nor painted under the decks, and the decks are hard up against the cladding;
- There is minor cracking in the plaster at 3 locations;

- There are no sill or jamb flashings installed to the external windows and doors;
 - There are no weep holes to the base of the plaster on the brick veneer; and
 - There is limited ventilation to the sub floor areas.
- 5.2 The expert also noted that the end caps to the roof ridges needed to be sealed off, and that some of the deck flashings have not been installed correctly. However, there was no evidence of leaking or damage being caused by these factors.
- 5.3 The expert took non-invasive moisture content readings through the internal linings of the external walls throughout the house, and found only 2 locations with slightly elevated 20% readings. Further external penetration moisture readings were also taken at several locations and a corrected reading of 18.8% was obtained at one location. 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. The owner responded with a letter dated 21 February 2005. The owner noted that:
- The backing sheets were not applied over the existing brick veneer but was to the existing shadowline cladding;
 - Access to the sub floor was through an access door under one of the decks;
 - The plasterer had now provided a producer statement;
 - As stucco plaster and waterproof membrane was applied to the existing brickwork this would remove the need for weepholes; and
 - Detail B of the report did not show the paint system lapping onto the aluminium facings from the stucco and over the sealant.

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 600mm or 1040mm wide eaves projections, and 600mm wide verge projections. These provide good to excellent protection to the cladding;
- Is in a medium wind zone;
- Is single storey;
- Has exterior windows and doors that have only head flashings;
- Has an overall envelope that is fairly simple in plan, but has roof forms that are quite complex;
- Has one small and two main decks; and
- Has external walls that are constructed with 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 are:

- The lack of vertical control joints where the cladding adjoins the solid plaster brick veneer;
- The lack of vertical control joints in the exterior wall between the lounge and the deck;
- The lack of plaster or paint to the base of the cladding under the decks, and the decks being hard up against the cladding;
- The minor cracking in the plaster at 3 locations;
- The lack of sill or jamb flashings to the external windows and doors;
- The lack of weep holes to the base of the plaster on the brick veneer; and
- The limited ventilation to the sub floor areas.

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;
- While the wall between the lounge and the deck does not have the control joints the wall length might dictate, any movement cracks in the cladding are

likely to occur above the sliding doors and be well sheltered by the overhanging eaves;

- The house is single storey; and
- There are adequate eaves and verge projections.

6.10 I would also suggest that the roofing deficiencies recorded by the expert be investigated and appropriate remedial work be carried out to ensure continuing code compliance.

6.11 I note that all elevations of the house 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, 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 am satisfied that the current performance of the cladding is not adequate because it is allowing water penetration into the wall framing in at least two locations at present. Consequently, I am not satisfied that the cladding systems as installed comply 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, it does not comply with the durability requirements of clause B2.3.1 of the building code.

7.3 I consider that, because the faults that have been identified with the cladding systems occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.8 and to the roof 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 systems as installed do 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 requirements 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, and to the roof to the approval of the territorial authority, along with any other faults that may become apparent in the course of that work, will consequently 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 11 March 2005.

John Gardiner
Determinations Manager