

Determination 2005/73

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 63

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 one of the 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 10-year old house unless changes are made to its monolithic cladding system.
- 1.2 The question to be determined is whether on reasonable grounds the monolithic wall cladding as installed to the timber-framed external walls of the house (“the cladding”), complies with the building code (see sections 18 and 20 of the Act). By “the 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 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 moderate wind zone in terms of NZS 3604. Construction of the house is conventional light timber frame, with concrete block foundations and a concrete slab. All windows are aluminium, and about a third of the walls are clad in cedar weatherboards with the remaining walls in monolithic cladding. The house is a reasonably simple “L” shape, with the 25° roof made up of a series of simple gables, hips and valleys and clad in concrete tiles. A flat-roofed canopy, clad in butyl rubber membrane, extends from the corner of the “L” shape over a timber deck. This canopy has a 900 mm high curved monolithic-clad fascia, which passes through the eaves of the main roof. Verge projections are 300 mm at gable ends and eave projections are 430 mm or greater, except for a 5000 mm length where the gutter is fixed against the cladding. There is a timber pergola attached to this wall beneath the gutter.
- 2.2 I have not received any written evidence on the treatment, if any, of the timber purchased for the house construction. However, as noted in paragraph 5.3, the specification calls for compliance with 1990 standards that call for the wall framing timber to be H1 boric treated.
- 2.3 The cladding is a monolithic cladding system described as stucco over a solid backing. The cladding consists of fibre cement sheets fixed through the building wrap directly to the framing timbers, and covered by a slip layer of building paper, metal-reinforced 18 mm thick solid plaster and a flexible paint coating. Although not available for this particular cladding system, manufacturer’s instructions for a similar cladding system were issued in March 1995, the year following the construction of this house. An independent organisation carried out an appraisal of that cladding system in 1995 (although the appraisal certificate was voluntarily withdrawn in July 2004). For the purposes of this determination, the manufacturer of the plaster and

coating system is regarded as the manufacturer of the cladding system; despite the fact that the fibre cement backing sheets are proprietary to another manufacturer.

- 2.4 There is no evidence of warranties or “Producer Statements” for the cladding system.

Sequence of events

- 2.5 The territorial authority issued a building consent on 30 December 1993. No conditions relating to the cladding were attached to this consent.
- 2.6 The territorial authority made various inspections during the course of construction, including prior to lining installation and following lining installation, with the last inspection of plumbing and drainage undertaken on 24 May 1994.
- 2.7 The original owners moved into the house, and applied for a Code of Compliance Certificate (CCC) in 2004 when the house was offered for sale.
- 2.8 The territorial authority carried out a final inspection on 3 June 2004, which noted that all outstanding plumbing and drainage items were satisfactory, but that:
- No Code Compliance Certificate will be issued due to the age of the consent and no cavity having been provided behind the plaster exterior sheathing.
- 2.9 The territorial authority did not issue a Notice to Rectify as required under section 43(6) of the Act.
- 2.10 The original owner applied for a determination on 20 August 2004, noting that an agreement for sale and purchase of the house had been entered into with a settlement date of 14 October 2004.
- 2.11 The current owner wrote to the Authority on 24 August 2004 stating:
- Please note that as of 14 October 2004 we will take possession of the above dwelling. The current owners, [named original owners], have made an Application for a Determination regarding [the territorial authority’s] refusal to issue a Code of Compliance Certificate.
- Please accept this letter as confirmation of our desire to complete this Application should it not be resolved by the sale date.

3 THE SUBMISSIONS

- 3.1 The original owner, in a statement accompanying the application for a determination explained the situation of the sale and described the house, noting that it had been built for them in 1994, and went on to say:
- When we attempted to sell the property initially the LIM report revealed that a Certificate of Compliance [*sic*] had never been issued for the property. A subsequent inspection by [the territorial authority] also revealed some other deficiencies (a copy of this report is also attached). These deficiencies have been remedied to the Council’s satisfaction apart from, obviously, the reference to the Code of Compliance Certificate.
- The purchasers of the property, [named present owners], have been made aware of the deficiencies identified by council but still want to proceed with

the purchase. As a condition of the sale we, as current owners, have been required to commence the application for the Code of Compliance Certificate and they will in turn see this through if we are unable to complete the process prior to sale.

3.2 The original owner also forwarded copies of;

- The building plans and contract documentation;
- The inspection report completed prior to sale;
- A letter from the builder; and
- The correspondence with the territorial authority.

3.3 The inspection report of 5 May 2004 was prepared by the original owner's expert (the consultant) prior to the sale of the house. The consultant described the condition of the house, and made a number of recommendations. In regard to the wall cladding, the consultant included the following specific comments on the wall cladding:

- There was minimal cracking but this should be monitored and the minor existing cracks should be repaired immediately;
- It was recommended that a flashing be installed to the canopy parapet (a curved stainless steel capping is now installed);
- The flashings around the house were in reasonable order but all seals should be monitored;
- The exterior paintwork needed to be upgraded (which has since been done);
- There were elevated moisture readings around the bottom plates of the garage, almost certainly due to capillary infiltration because the plaster claddings extend down to ground level;
- There were slightly elevated moisture readings under the window sill of bedroom 2, and the window needed to be resealed; and
- It was recommended that seals around windows and doors be checked at regular intervals to ensure that problems are rectified quickly (all windows have since been resealed).

3.4 In a covering letter to the Authority dated 23 November 2004, the territorial authority noted:

After assessment of the above consent for a "Code Compliance Certificate" (CCC) Council are unable to ascertain within reasonable grounds that some building work including cladding comply with relevant clauses of the building code.

A short summary of events is as follows.

- [The territorial authority] issued building consent BG 3469 in January 1994 for a new dwelling at the above address.

- Standard council inspections such as preline, postline and final inspections were undertaken during the period February 1994 to May 1994. A final inspection was not called for until 03 June 2004.
- No inspections were recorded for solid plaster external cladding without a cavity. Face fixed cladding systems without cavities were under scrutiny by council at the time and an additional visual inspection was undertaken to address cladding aspects.
- As per the council requirement at the time, the owners were informed through field memorandum 4914963 June 2004, that due to type of monolithic cladding installed, council was unable to be satisfied on reasonable grounds that the dwelling complies with clauses E2 and B2 of the building code.
- There was no specific weathertightness *[sic]* undertaken for this job.

The territorial authority then went on to say:

It is noted that monolithic cladding systems are being continuously tested, improved and detailing revised. New knowledge indicates that monolithic systems should have a drainage cavity to perform its function meeting durability requirements of the Building Code. The issues such as high risk design, installation by licensed installers, selection of approved coating system, coating application by licensed applicators, quality control systems of suppliers, installers and applicators, specific independent inspections during installation have further complicated compliance verification process. New E2 document confirms the importance of the above issues.

The other major concern is the age of construction. The work covered by this consent is already 10 years old. We are unable to be satisfied on reasonable grounds that all building elements comply with durability requirements as per B2 of the building code.

It is expected that this determination will address the age issue of building elements, which have 5 and 15-year durability requirements as required by the code.

3.5 The territorial authority also forwarded copies of:

- The building consent documentation;
- The building inspection records; and
- The correspondence with the owner.

3.6 Copies of the submissions and other evidence were provided to each of the parties. Neither the owner nor the territorial authority made any further submissions in response to the submission 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. The relevant 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 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 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.
- 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 inspected the building and furnished a report that was completed on 5 April 2005. The expert noted that the quality of the stucco surface finish was generally good with the paint film uniform and in good condition. The plaster was continuous behind down pipes and plumbing. The expert noted that windows have aluminium head flashings, with the side projections covered over by the stucco plaster.

The expert removed a small section of the stucco at the jamb to sill junctions of one window to examine the flashings, and noted that no sill or jamb flashings had been installed and the window frame was sealed with a sealant that extends from the aluminium window flange to the back of the cladding. All windows had been recently resealed at the window flange to stucco junction.

- 5.2 The expert took non-invasive moisture readings at the bottom of interior linings of exterior walls throughout the house. Two readings indicated high moisture contents. A moisture level of 24.6% was recorded adjacent to a full height window in the living room, and a moisture content of 63% was recorded in the garage framing behind the meter box. No other readings indicated elevated moisture levels. One reading was taken below a bedroom window through a hole drilled through the cladding. This indicated a moisture level of 16.3%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

The expert made the following specific comments on the cladding:

- There is a fine crack at the jamb to sill junction of southwest window in the master bedroom. However, no elevated moisture levels were recorded in this area, with the moisture level recorded as 16.3%;
- While a reading of 24.6% was recorded adjacent to the south-east window of the living room, this window had been recently resealed at the perimeter junction of the aluminium window flange with the stucco and the elevated moisture content may indicate residual moisture;
- The meter box on the garage wall is missing the two vision panels in the door, allowing rain to enter the box and to drain into the wall framing below. This is considered to be the likely cause of the very high moisture content of 63% recorded in the framing in this area;
- While the main roof has simple, well-constructed valley flashings, the fascia of the canopy penetrates the eaves leading to junctions between the gutter and the stucco fascia. In both cases, the metal gutter fascia of the main roof penetrates the plaster of the canopy fascia and the junction is sealed with sealant. The base apron flashing at these junctions also rely on sealant for weathertightness;
- The canopy fascia is curved, with the parapet capped with a recently installed stainless steel flashing. The membrane to the canopy roof does not extend up under this capping, leaving exposed stucco plaster vulnerable to water entry;

- There are no control joints in the cladding, although the maximum length of wall is 6400 mm;
- The stucco cladding is taken down over the concrete foundation wall to below ground or paving level, and cracks in the plaster are apparent along the line of the interior floor level in a number of areas;
- Clearances from ground and paving to the finished floor level are greater than 130 mm, except at the garage door where the clearance is 30 mm. However, the paving has adequate falls and there is no indication of moisture entry;
- There is a timber pergola over the recessed side door, with fixings that penetrate the stucco. At these junctions the roof has no eaves, with protection provided only by the 120 mm gutter above; and
- The ends of the pergola support beam are embedded in the stucco, although these junctions are protected by the eaves above.

5.3 I noted in paragraph 2.2 that I have seen no written evidence regarding the treatment of timber used in this house. However the specification calls for compliance with NZS 3604: 1990, which in turn is referenced to NZS 3602: 1990. The latter required that framing timber be boracic treated.

5.4 Copies of the expert's report were provided to each of the parties and both accepted the report.

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 I consider that 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 suggest 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 the house:

- Has verge projections of 300 mm and eave projections that are greater than 550 mm (including gutters) over most walls, which provide moderate protection to the cladding beneath them;
- Is built in a moderate wind zone;

- Is a maximum of one storey high;
- Has an overall envelope that is reasonably simple in plan and form;
- Has a canopy that intersects with the main roof and incorporates several complex junctions;
- Has one free-draining timber deck at ground level;
- Has external windows and doors that have aluminium head flashings and adequately sealed jambs, but which have no sill trays;
- Has monolithic cladding which is fixed directly to the framing with no drainage cavity; and
- Has external wall framing that, on the basis of the specification, is likely to be H1 boracic treated which may decay but would not resist the onset of decay if the framing absorbs and retains moisture.

Weathertightness performance

6.8 Generally the cladding appears to have been installed according to good trade practice, but some junctions and penetrations are not well constructed. These areas are all as described in paragraph 5.1 and in the expert's report as being:

- The fine cracking under the sill to jamb junctions of some windows;
- The lack of adequate sill flashings to direct water away from the wall framing;
- The openings in the meter box door that allow water penetration into the meter box and then into the wall framing;
- The embedding of the metal fascia into the plaster and the reliance on sealant for weatherproofing the intersection of the canopy fascia with the main roof;
- The lack of cover of the stainless steel capping and the exposed stucco plaster on the roof side of the curved canopy parapet; and
- The insufficient clearance between the base of the stucco plaster and the ground or paving, with the cladding base embedded into the ground, and the cracked stucco at floor slab level.

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, is relatively simple in plan and has a roof with 550 mm overall eave projections, and 300 mm verge projections, that will give some protection to the walls;
- The external windows and doors have aluminium head flashings and adequately sealed jambs and sills; and
- Apart from the localised area outlined in paragraph 5.2, there is no evidence of moisture penetration into, or accumulation within, the external wall cavities.

I consider that these factors compensate for the lack of a full drainage and ventilation cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.

6.10 I note the expert's comments regarding:

- the insufficient clearance from paving to finished floor level at the garage door, but accept that this area is well-drained, which is likely to protect against moisture penetration into the wall framing;
- the lack of control joints to the cladding in this house, which has four areas with wall lengths between 4 and 5 metres, and one at 6.2 metres. Experience with this type of cladding indicates that this type of reinforced plaster layer, given the configuration of wall shapes and relatively small wall areas, is sufficiently strong and flexible to prevent cracking in the walls in this instance. I therefore consider that control joints are not necessary for this low-risk house;
- the fixings of the timber pergola that penetrate the cladding, but consider that the shelter provided by the gutter directly above will protect against moisture penetration; and
- the ends of the pergola beam embedded into the plaster and accept that these junctions are sheltered by the eaves, which will protect against moisture penetration into the wall framing.

6.11 I acknowledge the territorial authority's concern regarding the age of the house but consider that if the items outlined in paragraph 6.8 are rectified satisfactorily, and if the house continues to be well maintained, the cladding is likely to meet the durability requirements of the building code.

6.12 I note that all elevations of the house demonstrate a low 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 constructed 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 at several locations at present. Consequently, I am not satisfied that the cladding system as installed complies with clause E2 of the building code.
- 7.2 In addition, the building is also required to comply with the durability requirements of clause B2. Clause B2 requires that a building continues to satisfy all the objectives of the building code throughout its effective life, and that includes the requirement for the house to remain weathertight. Because the cladding faults in this building currently allow, or are likely to allow in the future, the ingress of moisture, the house does not comply with the durability requirements of clause B2.
- 7.3 I consider that, because the faults that have been identified with the cladding system occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.8 is likely to result in the building being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity.
- 7.4 I note that effective maintenance of monolithic claddings is important to ensure ongoing compliance with clause B2 of the building code. That maintenance is the responsibility of the building owner. The code assumes that the normal maintenance necessary to ensure the durability of the cladding is carried out. For that reason clause B2.3.1 of the building code requires that the cladding be subject to “normal maintenance”. That term is not defined and I take the view that it must be given its ordinary and natural meaning in context. In other words, normal maintenance of the cladding means inspections and activities such as regular cleaning, re-painting, replacing sealants, and so on.
- 7.5 It is emphasised that each determination is conducted on a case-by-case basis. Accordingly, the fact that a particular cladding system has been established as being code compliant in relation to a particular building does not necessarily mean that the same cladding system will be code compliant in another situation.
- 7.6 I decline to incorporate any waiver or modification of the building code in this determination.

8 THE DECISION

- 8.1 In accordance with section 20 of the Building Act 1991, I hereby determine that the cladding systems as installed do not comply with clause E2 of the building code. There are a number of items to be remedied to ensure that the house becomes and remains weathertight and thus meets 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, to the approval of the territorial authority, along with any other faults that may become apparent in the course of that work, is likely to result in the house being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity.
- 8.3 I note that the territorial authority has not issued a Notice to Rectify. The territorial authority should do so and the owner is then obliged to bring the house up to compliance with the building code. It is not for me to decide directly how the defects are to be remedied and the cladding brought to compliance with the building code. That is a matter for the owner to propose and for the territorial authority to accept or reject, with either of the parties entitled to submit doubts or disputes to the Chief Executive for another determination.
- 8.4 Finally, I consider that the cladding will require on-going maintenance to ensure its continuing code compliance, and that this maintenance programme should be undertaken after consultation with the territorial authority. This is particularly important, as the cladding has now been in place for some 10 years or so.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 19 May 2005.

John Gardiner
Determinations Manager