

Determination 2005/02

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 1

1 THE DISPUTE TO BE DETERMINED

1.1 This is a determination of a dispute referred to the Chief Executive of the Department of Building and Housing (“the Chief Executive”) under section 17 of the Building Act 1991 as amended by section 424 of the Building Act 2004 (“the Act”). The applicants are the 2 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 that the external wall cladding as installed (“the cladding”), which is applied to the majority of the walls, and the column and deck posts of this 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 Act or the building code.
- 1.6 The house itself is described in paragraphs 2.1 to 2.3, and paragraph 8 sets out the decision.

2 PROCEDURE

The building

- 2.1 The building is a two-storey detached house, plus a basement garage, situated on an excavated sloping site, which is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The external walls, including two short lengths adjoining the block walls of the garage, are generally of conventional light timber frame construction built on concrete block foundation and basement walls. The timber-framed walls are sheathed with monolithic cladding, apart from panels of cedar weatherboards generally installed around windows. The house is of a fairly simple shape, with pitched roofs at two main levels that have numerous hips, valleys, and wall to roof junctions. The first floor front elevation wall oversails the garage wall by 400mm and the second floor bedroom 2 has a 250 deep offset set into the lower roof. A timber framed gap-boarded deck, supported on monolithic clad timber posts and a monolithic clad steel corner roof support column is fixed to the house on the front elevation. The posts are carried up to form balusters and a metal balustrade is fixed between the posts and to the house. A set of two sails secured to the house and to a set of timber beams and columns forms a pergola to one elevation. A full height external monolithic clad chimney is inset into the upper roof. The eaves and verges have 300 mm wide projections, with the exception of a 3000mm length where the fascia is fixed directly to the cladding. The eaves gutters give an additional 130mm of projection.
- 2.2 The owner has confirmed that untreated timber was used for the external wall framing.
- 2.3 As specified in its manufacturer’s data sheets (“the manufacturer’s instructions”) and a subsequent independent appraisal, the monolithic cladding applied to the house incorporates 60 mm thick expanded polystyrene (EPS) backing sheets fixed through the building wrap directly to the framing timbers and finished with a multi-coat, fibreglass mesh reinforced polymer modified cement plaster system. Incorporated in the system are a series of purpose made plastic extrusions that reinforce and waterproof the corners, edges and joinery unit surrounds. I note that the supplier of the cladding applied to the house is different from the one noted on the consent plans. However, the territorial authority has not made an issue of this change.
- 2.4 The plaster manufacturer provided a “Material Component Guarantee”, dated 14 June 2004. The plastering contractor supplied a “Producer Statement - Construction”, with an issue date of 17 November 2002, covering the entire cladding system, and stating, “ all proprietary products have been installed in accordance with the requirements of the NZ Building Code and Manufacturer's Specifications for the above property”.

Sequence of events

- 2.5 The territorial authority issued a building consent on 14 February 2002, and construction commenced in March 2002.

2.6 The territorial authority made various inspections during the course of construction, and approved the “Preline Building Inspection” on 3 July 2002, and the “Post Line/Bracing Inspection”, apart from some bracing requirements, on 9 July 2003. A “Final Building Inspection” was carried out on 28 March 2003 and was rechecked on 31 October 2003. The relevant associated cladding items on the “Building Officers Field Memorandum” dated 14 November 2003 were:

Your site is in the sea spray zone. The deck is part of the Building Consent, and must be built to comply with the NZ Building Code. Stainless steel fixings are required.

[Named product] is to be kept clear of [ground] and pavings or Producer Statement req'd from manufacturer/ installer..

2.7 The builder wrote a series of undated letters to the territorial authority in which the rectification of the ground clearances was explained. The builder also noted that the polystyrene component of the cladding cannot absorb water and that the plastic membrane placed at the bottom of the sheets together with the frames overhanging the slab by 10mm ensured weathertightness. An air cavity was also created that deterred any capillary action. The builder also noted that the deck joist hangers were clearly visible through the decking, as were the fixings.

2.8 On 8 November 2003, the owner faxed the territorial authority, attaching drawings showing how the ground clearance issue was proposed to be rectified.

2.9 On 17 December 2003, the territorial authority sent a fax to the owner that had an explanatory letter attached, and which included these statements:

Your proposed system to provide cladding to ground clearance is acceptable with the 200mm height increased to 225mm...

The drain will need to be connected to the stormwater system, via a silt trap...

2.10 The territorial authority carried out a further final building check on 14 May 2004 and noted, “No cavity provided to cladding”. A “Weathertightness Issues” document of the same date noted that the “house is in good condition with no cracks or signs of movement.

2.11 The territorial authority wrote to the owner on 1 June 2004, stating:

We have received your request for a code compliance certificate (CCC) for a dwelling at the above address

Before the council can issue a code compliance certificate, we must ensure that all building work meets the NZ Building Code requirements. In particular, the building code specifies that building work must remain durable for specific periods of time after the code compliance certificate is issued.

You will be aware of the current weathertightness issues often reported in the media. These issues have highlighted the care that must be taken to establish that all building elements, but particularly cladding, is durable before any CCC can be issued.

As your building is face fixed (monolithic) construction with no cavities we are unable to verify that it fully complies with the Building Code requirements, manufacturer’s details application (*sic*) at the time and that it will remain durable for the required period. Visual inspection has revealed the following:

- 1) Timber framing treatment of external wall frames unknown
- 2) Ground clearances in front each side of garage non complying
- 3) Sail cloth brackets screwed into cladding
- 4) High risk features including exposed two storey walls

There has been recent information and knowledge that face sealed cladding systems without an adequate drainage and ventilation cavity will cause irrevocable damage to structural elements in the event of leakage and/or the effect of residual moisture.

Council cannot be satisfied that the cladding system as installed on the above building will meet the functional requirements of Clause E2 External Moisture of the New Zealand Building Code and is therefore unable to issue a code compliance certificate.

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

3 THE SUBMISSIONS

- 3.1 Under a covering letter to its submission, dated 12 August 2004, the territorial authority supplied copies of:
- The consent documentation;
 - The specification;
 - The territorial authority's inspection documentation;
 - The correspondence with the owner and the builder;
 - The plastering contractor's "Producer Statement - Construction"; and
 - A set of photographs illustrating certain aspects of the house.
- 3.2 In a covering letter dated 28 July 2004, the owner outlined the facts leading up to this determination, described the construction of the building, and in response to the 4 issues raised by the territorial authority in its letter of 1 June 2004, stated:
- The timber used in the external walls was untreated;
 - The sail cloth brackets are screwed "through" the cladding, have been sealed and their installation has been guaranteed by the installer;
 - The owner has rectified the ground clearances below the cladding, including the installation of grated drains; and
 - A maintenance "weekend" took place every four months, including checks for moisture ingress.

- 3.3 The owner also supplied copies of:
- The plans and specifications;
 - The consent documentation;
 - The territorial authority's inspection documentation;
 - The correspondence with the territorial authority;
 - The cladding manufacturer's instructions and an independent appraisal;
 - The plaster manufacturer's "Material Component Guarantee", and the plastering contractor's "Producer Statement - Construction";
 - An undated letter from the pergola sail installer that described the wall to sail fixings and the installer's experience;
 - An undated letter from the builder, which is described in paragraph 3.4;
 - A letter from the designer, dated 20 June 2004, which is described in paragraph 3.5; and
 - Documentation from the supplier of the treatment-free framing.
- 3.4 The letter from the builder stated that he personally oversaw the entire construction paying careful attention to the aspects of weathertightness, especially with regard to flashings and the junctions between the two different claddings. Subcontractors had been advised that their work was to be to a high standard. The builder observed that there were no visible signs of moisture entering the house over the 2 years since construction, and stated that he would remedy any discovered non-compliant items. A drawing showing the jointing between the 2 different claddings was also attached to the letter.
- 3.5 The letter from the designer noted that there was no evidence of water ingress into the house, that the wind zone was medium, and that there were generally 300mm wide eaves projections plus the attached gutter widths. The designer stated that the upper storey overhang protected the short lengths of lower monolithic cladding and that the removal of some of the driveway would alleviate the ground clearance problems at these locations. The territorial authority had not provided any specific remedy or explanation as to how the pergola sails should be fixed. The designer considered that the fact that the building was constructed without a cavity and that untreated timber had been used did not mean that the house was not code compliant, nor had the territorial authority raised these issues at the consent stage. The owners had advised the designer about the change of the installed monolithic cladding from that consented to, and the designer considered that if the cladding had been installed correctly, it should be code compliant.
- 3.6 The 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 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 about acceptable solutions and alternative solutions, which in my view remain valid in this case.

- Some acceptable solutions cover the worst case, so that in less extreme cases they may be modified and the resulting alternative solution will still comply with the building code; and

- Usually, however, when there is non-compliance with one provision of an acceptable solution, it will be necessary to add some other provision to compensate for that in order to comply with the building code.

5 THE EXPERT'S REPORT

5.1 The Authority commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert inspected the building and furnished a report. It noted that the "general quality of surface finish was consistent with its age, defect free and of an expectant standard to meet durability standards. However, local areas were observed where the colour finish was thin, some patching over the garage door was apparent and the texture was uneven in places". The expert did not observe any cracks in the main wall cladding. The junctions between the monolithic and weatherboard linings were constructed in a workmanlike manner. The windows and doors are recessed 50mm behind the face of the cladding and have metal head flashings and plastic jamb and sill flashings. There is no apparent damage to the cladding where the pergola sail was fixed to the wall. The plaster coating at sill/jamb junction of a randomly selected window was cut away by the expert to expose the flashings. I accept that this example is likely to be representative of the remaining flashings. The expert also made the following comments regarding the cladding:

- The southern wall of the lounge/bedroom 4 requires a vertical control joint to meet the manufacturer's recommendations;
- There is insufficient ground clearance to the base of the cladding at the rear of the house;
- The 3000mm length of sealed butt joint between the flush fascia board and the cladding gives inadequate protection to the top of the wall;
- The sill flashings of the windows and doors do not extend the required 20mm past the jambs and as the jamb flashings are cut short, there is no connection to the sill flashing, nor is there any sealant or a corner soaker flashing;
- The timber decking abuts the cladding in some places and this restricts the drainage of water away from the cladding; and
- The apron flashings at the chimney/roof junction have no formed end terminations, one is face fixed, and there is inadequate clearance to the base of the cladding. There is also a crack in the coating at this location, and the pvc bottom channel is exposed.

The expert also noted that a post-formed concrete drainage channel with a slat timber grating has been formed to part of the west elevation and all of the northern elevation of the house. This has been formed to address the concerns of the territorial authority with regard to ground clearances and appears to be functioning correctly.

5.2 The expert took non-invasive readings at the interior linings of the external walls throughout the house and no readings in the "damp" range were obtained. The expert also took 2 invasive moisture readings at the short lengths of wall adjoining the garage door and the readings were 12.6% and 13.1%. 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. The territorial authority responded by facsimile on 15 December 2004, stating that the jamb/sill junction detail applicable at the time the house was constructed required a corner soaker, and that the manufacturer agreed that they had not been installed in this house. The territorial authority also forwarded correspondence from the organisation that had appraised the cladding, which stated that the requirement for control joints in this type of installed cladding had been amended from 6 metre wall lengths to 15 to 20 metre wall lengths. I note that this appraisal was published after the consent for this house was issued.
- 5.4 The owner commented on the report in a letter to the Department dated 15 December 2004. This noted that the cladding manufacturer had confirmed that soakers were required at the jamb/sill junctions in the form of a 20mm x 20mm PVC angle and that this had not been installed. The owner also attached a copy of a letter from the appraisal organisation noting the change for control joints as set out in paragraph 5.3.

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.

Weather-tightness risk

- 6.2 Research data and experience, both internationally and locally, indicates that the impact of weather-tightness 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 weather-tightness performance.
- 6.4 The next priority is to reduce the ability of moisture to get through the cladding by using design measures that minimise the effects of the rain impacting on the walls:
- 6.5 Important matters for consideration are:
- Data show a strong relationship between the width of the eaves and the incidence of wall leaks. An effective deflection mechanism, such as eaves greater than 600 mm wide, has been shown by Canadian data to manage more than 90% of rain incidence;
 - While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential I believe that buildings in high and

very high wind zones (as defined by NZS 3604) are likely to experience wind pressure differentials and thus a higher risk of water ingress;

- Taller buildings result in an effective increase in the catchment area of the wall. Available data suggests a clear correlation between higher number of storeys and an increased incidence of leaking;
- Complex roofs and overall envelope shapes where the roofs frequently intersect with the walls on upper floors create opportunities for leaks into the wall; and
- Recent data also shows that decks and balconies that are exposed in plan and/or cantilevered from the external walls are the most frequent location for water leaks.

6.6 Any likely penetration of moisture through the cladding can then be countered by a combination of effective drainage, ventilation of the drainage cavity and moisture tolerance in the external wall framing timber. In particular:

- The structure should allow water that has penetrated the cladding to drain out as quickly as possible. I believe that generally a drainage cavity should be provided behind the outer cladding barrier in monolithic construction;
- The design of the outer walls should allow walls to dry to the outside once moisture penetrates the cladding and the moisture barrier. If walls do not dry, decay fungi can become established in as little as 3 months. Until scientific data on the optimum depth and configuration of the ventilation mechanism in New Zealand conditions is available, I believe that the drainage cavity should be not less than 20 mm deep; and
- The external walls should have some degree of decay resistance or moisture tolerance to allow for situations when moisture circumvents the cladding and moisture barriers and moisture levels in the timber rise to more than 18%.

6.7 In relation to these characteristics, the I find that this house:

- Has, apart from one 3000mm eaves length, a total of 430 mm wide eaves projections and 300mm wide verge projections that provide some protection to the cladding under them. The upper storey also oversails the lower floor to one elevation;
- Is in a medium wind zone;
- Is two storeys high, with a basement garage under;
- Has exterior joinery units which are fully flashed, but with inadequate jamb/sill flashing junctions;
- Has an overall envelope that is fairly simple on plan, but with a roof system having numerous hip and valley junctions and some wall to roof junctions;
- Has timber deck at the first floor level and a 2-sail covered pergola; and
- Has external walls constructed with untreated timber, which provides no resistance to decay if it gets wet and cannot dry out.

Weathertightness performance

- 6.8 Generally the cladding appears to have been installed according to good trade practice and to the manufacturer's instructions, and I consider that the cladding has been effective to date in preventing the penetration of water. There are, however, some defective areas, which if not remedied, will eventually allow the ingress of moisture behind the cladding. These are set out below:
- The insufficient ground clearance to the base of the cladding at the rear of the house;
 - The inadequate protection to the top of the wall at the 3000mm length of sealed butt joint between the flush fascia board and the cladding;
 - The inadequate sill/jamb junctions to the external doors and windows;
 - The timber decking abutting the cladding in some places;
 - The unsatisfactory apron flashings and wall cladding to flashing junctions to the chimney where it adjoins the roofing; and
 - The making good of the surface finish to an acceptable standard.
- 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, and notwithstanding the deficiencies that have been identified, the cladding appears to have been installed according to good trade practice and to manufacturer's specifications;
 - The house has 430mm wide overall eaves projections that will give some protection to the cladding, and the upper storey oversails the lower floor on one elevation;
 - The lower roof/upper wall junctions provide some ventilation to the external 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 of a 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 the expert considers that the drainage channel constructed to the west and north elevations to address the territorial authority concerns, provides adequate protection to the base of the cladding at these locations. I suggest that the territorial authority fully investigate these channels to ensure that they work efficiently so that the base of the cladding is appropriately protected from the ingress of water.
- 6.12 While the expert has not commented on the monolithic clad columns and deck posts, I consider that these too should be examined by the territorial authority to establish their continuing durability and structural stability.

- 6.13 Based on the information provided by the organisation that carried out the independent appraisal regarding the increase in wall lengths that require control joints (described in paragraph 5.3), I accept that cladding vertical control joints in the cladding are not required to any of the walls of the house.
- 6.14 The territorial authority has raised concerns about the pergola sail fixings at the walls. However, based on the information provided by the installer and the observations made by the expert, I am prepared to accept that these fixings are performing adequately.
- 6.15 I note that two elevations of the house demonstrate a medium weathertightness risk rating and that two elevations of the house demonstrate a high 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 find the expert's report establishes that there is no evidence of external moisture entering the building. Accordingly, I find that the cladding on this building at this time does comply with clause E2.
- 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 this building 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 find that because the faults in this 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. I recognise that a territorial authority does not have any statutory responsibility for the ongoing maintenance of a building. However, the maintenance programme adopted by the owner could be undertaken after consultation with the territorial authority, bearing in mind that the nature of the advice, and the basis on which it is provided to the owner, are for the territorial authority to decide.
- 7.5 It is emphasised 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 also 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 21 January 2005.

John Gardiner
Determinations Manager