

## *Determination 2005/55*

# *Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 47*

## **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 applicant is the owner 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 house unless changes are made to its monolithic cladding system.
- 1.2 The question to be determined is whether on reasonable grounds the external wall cladding (“the cladding”), which is applied to the walls 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 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 steeply sloping site in a moderate wind zone in terms of NZS 3604. Construction is conventional light timber frame, with driven timber pile foundations, open sub-floor space, face-fixed aluminium windows and a corrugated steel roof over timber roof trusses. The house shape is a simple rectangular form, with a 22.5° hipped roof and 460 mm eaves, excluding gutters, over all walls. Exterior walls are clad in monolithic cladding.

Timber decks extend the full lengths of the west and east walls. Both decks are timber framed with floors of spaced timber boards. The larger deck on the west elevation is supported on diagonal timber braces from the timber piles below, and has an open timber balustrade with timber top rails and spaced timber balusters.

- 2.2 Although noted in a detail as “boric treated green frame generally”, I have not received any evidence, by means of invoices or other documentation, as to the framing timber purchased for the house construction.
- 2.3 The cladding to exterior walls is what is described as monolithic cladding. As specified in its technical information of June 1998 (“the manufacturer’s instructions”), it incorporates fibre cement sheets fixed through the building wrap directly to the framing timbers and finished with a jointing, textured coating and painting system. The manufacturer’s instructions include details for flashings at various junctions, and refer to (but do not specify) the sealants, jointing systems and coatings, and state that they all have to be provided by a single supplier. For the purposes of this determination, the manufacturer of the jointing and coating system is regarded as the manufacturer of this cladding system; despite the fact that the fibre cement backing sheets are proprietary to another manufacturer. All coating products and the associated components are supplied by the manufacturer. There is no reference made to requirements for the final paint coating system. An independent

organisation carried out an appraisal of the cladding system in 1995 (although the certificate was withdrawn in July 2004).

- 2.4 I have not received any evidence as to whether the jointing and coating system is one that is approved by the manufacturer of the fibre cement backing sheets. There is no “Producer Statement” or “Warranty” for the coating system, although the installer has offered to supply a producer statement if requested.

### Sequence of events

- 2.5 The territorial authority issued the building consent number ABA 99005354 on 17 December 1999. None of the “Conditions of Building Consent” attached to the consent referred to the cladding.
- 2.6 The territorial authority made various inspections during the course of construction, as confirmed by the “Field sheet for 99005354”, including a “Pre-line Building” on 15 January 2002 and a “Gibnail” on 9 April 2002
- 2.7 I have received no evidence that the territorial authority carried out any inspections from May 2002 until January 2004. A final building inspection, “Final CCC Building” was carried out on 7 May 2004, which noted that several items required attention. The items related to the cladding were:

Bottom edge to exterior cladding to go to min 30 mm below floor joists to provide drip edge. Flashing reqd....

NTR to come – cladding requires 20 mm cavity.

- 2.8 The territorial authority issued a “Notice to Rectify Building Work No: 11/05/GT01” (undated). Attached to the Notice to Rectify was a “Particulars of Contravention” dated 12 May 2004, which confirmed the items covered in the final building inspection. The territorial authority carried out a further final building inspection on 5 August 2004, which noted “failed”.

- 2.9 The territorial authority issued a further Notice to Rectify (No: 02/02 GT) on 6 August 2004. Attached to this Notice to Rectify was a “Particulars of Contravention” which noted that:

Monolithic cladding systems without a 20 mm cavity, provision for adequate ventilation, drainage, and vapour dissipation will, in the event of leakage and/or the effect of residual moisture, cause irrecoverable damage to the structural elements of the building.

As you have used a cavity system that has not had the required system of inspections:-

You are required to:

- Remove the monolithic cladding and replace with an approved cladding system which has been subjected to the Council’s recently adopted inspection system.
- Lodge with Council an application for an amended building consent, and provide all necessary information that may be requested to allow this consent application to be processed.

The territorial authority also noted that:

Should you wish to dispute the Council's decision to refuse the issue of a code compliance certificate for the matters relating to the monolithic cladding system, you may make an application to the Building Authority for a determination....

2.10 The owner applied for this determination on 14 September 2004.

### 3 THE SUBMISSIONS

3.1 The owner did not supply a covering letter or separate statement, noting under "Matter of doubt or dispute":

Final notice of compliance on [the monolithic cladding] cladded house.

The owner also supplied copies of:

- The plans and specifications;
- The consent documentation;
- The territorial authority's inspection documentation; and
- The Notice to Rectify with the attached "Particulars of Contravention" (dated 6 August 2004).

3.2 The territorial authority acknowledged the application for this determination on 22 September 2004, and in covering letter stated that:

Council makes this submission:

- (a) Building consent 99005354 was issued on 17<sup>th</sup> December 1999 by this Council for the erection of a dwelling clad with [monolithic] cladding.
- (b) The work was undertaken during the period June 2000 to August 2004;
- (c) Construction of the cladding was not the subject of the changed inspection procedures implemented by this Council as a consequence of the Weathertightness Homes Resolution Service adjudication involving [name of owners in adjudication];
- (d) In the absence of the additional inspections implemented as a consequence of those changed inspection procedures, and in the absence of a cavity as a first line of defence, the Council does not believe it is able to be satisfied, on reasonable grounds, that the cladding applied to this dwelling will achieve the functional requirements of Clause E2.2, or the performance requirements of Clause E2.3.2, of the Building Code...

The territorial authority also supplied copies of:

- The building consent documentation;
- The building inspection records; and
- The first Notice to Rectify with the attached "Particulars of Contravention" (dated 12 May 2004).

- 3.3 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 clause 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 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:

- 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, noting that there appeared to be no significant variations from the consent drawings.

The expert took non-invasive moisture readings throughout the house – through interior linings and the exterior cladding of external walls. All readings were found to be at an acceptable level, with readings ranging from 10.4% to 13.5%. As all readings indicated low levels of moisture within the external walls, no invasive moisture tests were considered necessary. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

Due to visible cracks at a number of cladding joints, the expert also cut away a small section of cladding in order to examine the joint system.

The expert's report made the following specific comments on the cladding:

- The aluminium joinery is face-fixed with metal head flashings installed in accordance with the manufacturer's instructions. However, the manufacturer's instructions require that jambs are sealed with infill strips or a continuous bead of sealant applied under the flange prior to window installation. There appears to be no continuous seals behind the jamb flanges, and no sill flashing under the sill flanges as recommended in the manufacturer's instructions.
- There are no control joints in the cladding. The manufacturer's instructions specify that control joints are to be provided at 5.4 metre centres from corners. This limit has been exceeded on all four walls, and there are a number of joint cracks with associated deterioration of the textured coating evident on the cladding.
- From examination of the joint at the area cut out, it is not possible to establish whether the jointing system, including the joint tape, is in accordance with the

manufacturer's instructions. The joints appear to be of poor quality, and it is not known whether the system and products used are included in those authorised in the manufacturer's instructions.

- On the north and south walls, 'Z' flashings have been installed at the junction of the cladding and the boundary joists. However, there is a section of flashing on the south wall where the upstand does not extend up behind the cladding.

5.2 The expert concluded that, while there was no evidence of moisture ingress, there were several areas which, while performing adequately to date, did not demonstrate good trade practice and were of concern in the longer term. These were:

- The lack of sealant behind window jamb flanges;
- The lack of an underlying sill flashing to the window sill flanges;
- The lack of control joints in the cladding on all walls;
- The cracking of the coating at the backing sheet joints; and
- The lack of cladding cover over the upstand to the 'Z' flashing on the south elevation.

5.3 Copies of the expert's report were provided to each of the parties.

5.4 The owner responded to some of the points made in the expert's report, and the comments may be summarised as follows:

- Sealant was used behind all window flanges before installation, with more applied after the windows were in place;
- A builder has advised that the gap showing between the bottom of the window jamb and the cladding is probably due to movement and this gap has now been sealed;
- The 'Z' flashings were installed on the instruction of the territorial authority after the cladding was completed, causing slight damage to the joint and coating at the bottom of the cladding;
- The 'Z' flashings were installed with the upstands extending up behind the cladding and were inspected and passed by the territorial authority; and
- The plasterer advises that the tape used at the joints is fibreglass and is not inferior.

## 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 clause 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 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 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 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 this house:

- Has eave projections to all walls that are greater than 450 mm wide which provide moderate protection to the cladding beneath them.
- Is in a moderate wind zone;
- Is a maximum of one storey high, with an open sub-floor space below;
- Has exterior windows and doors with head flashings;
- Has an overall envelope that is very simple in plan and form;
- Has two decks, constructed over open sub-floor spaces, which have free-draining floor surfaces;
- Has monolithic cladding which is fixed directly to the framing with no drainage cavity; and
- Has external walls which are constructed from untreated timber, which provides no resistance to decay if it gets wet and cannot dry out.

### **Weathertightness performance**

6.8 I consider that, while in most respects the cladding appears to have been installed according to good trade practice and to the manufacturer's instructions, this does not apply to a number of areas.

6.9 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, are likely to eventually allow the ingress of moisture behind the cladding. These are set out below:

- The inadequate sealing at the window jambs;

- The lack of underlying sill flashings to the window sills;
- The lack of vertical control joints in all walls;
- The cracking at the joints of the cladding; and
- The inadequacy of the base “Z” flashing to the south elevation.

6.10 Notwithstanding the fact that the cladding is 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 480 mm wide overall eaves projections that will give some protection to the cladding;
- The walls are one storey in height and are over an open sub-floor space;
- The house has a very simple rectangular shape with a simple hipped roof; and
- There is no moisture evident at this time in the external wall cavities.

6.11 I consider that these factors adequately compensate for the lack of a drained and ventilated cavity, and can allow the house to comply with the weathertightness and durability provisions of the building code.

6.12 I note the expert’s concerns in regard to the possible inadequacy of the jointing system, and suggest that the territorial authority investigates this further to ensure that the products and jointing system used on this house are in accordance with the manufacturer’s instructions.

6.13 I note that all elevations of the house demonstrate a low weathertightness risk, 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 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 6.9 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 found 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 my 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 6.9 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 ventilated cavity.

- 8.3 The territorial authority has issued two Notices to Rectify requiring a number of items to be rectified. Under the Act, a Notice to Rectify can require the owner to bring the house into compliance with the building code. The Authority has already found in a previous determination (2000/1) that the Notice to Rectify cannot specify how that compliance can be achieved. A new Notice should be issued that requires the owner to bring the cladding into compliance with the building code, without specifying the features that are required to be incorporated. It is not for the Authority to dictate how the defects listed in paragraph 6.9 are to be remedied. How that is done 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 Authority for another determination.
- 8.4 Finally, I consider that the cladding on the building will require on-going maintenance to ensure its continuing building code compliance.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 28 April 2005.

John Gardiner  
**Determinations Manager**