

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 6

1 THE DISPUTE TO BE DETERMINED

- 1.1 This is a determination by the Building Industry Authority (“the Authority”) of a dispute referred to it under section 17 of the Building Act 1991 (“the Act”). The applicant is the owner, who is also the builder. 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 new house unless changes are made to its monolithic cladding system.
- 1.2 The Authority’s task in this determination is to consider whether it is satisfied on reasonable grounds that the external wall cladding as installed (“the cladding”) on this house complies with the building code (see sections 18 and 20 of the Act). By “external wall cladding as installed” we 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 The house itself described in paragraphs 2.1 to 2.3, and paragraph 8 sets out the Authority’s final decision.

2 PROCEDURE

The building.

- 2.1 The building is a two-storey detached house on a level site. It is of conventional light timber frame construction and is of a fairly complex shape, with eaves overhangs generally 300 mm wide. Two upper gable walls are finished with a metal barge board and project 60 mm. The cladding is installed at both levels but is combined with a brick veneer at the lower level. The house has several roof/wall junctions and one small flat roof over the front entrance. It is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”.
- 2.2 The framing in external walls is LOSP H1 plus treated timber.
- 2.3 The cladding system is known as a monolithic cladding system. As specified in its manufacturer’s July 1998 technical information manual (“the manufacturer’s instructions”), it incorporates fibre-cement backing sheets fixed through the building wrap directly to the framing timbers and finished with a choice of joint and coating systems. The manufacturer’s instructions include details for flashings at various junctions (but not all of the junctions actually present in the house). For the purposes of this determination, the

manufacturer of the fibre-cement sheets and the flashing kit is regarded as the manufacturer of the system, despite the fact that each of the joint and coating systems is itself proprietary to one of other manufacturers. The manufacturer's instructions identify the joint and coating systems by reference to those other manufacturers and their system brands but give no other information about them. The owner and the applicator both verify that the jointing system is one of those systems referred to in the manufacturer's instructions. However, the high build acrylic coating system used on this building is not one of those mentioned in the instructions.

2.4 The cladding applicator has issued a producer statement

Sequence of events:

2.5 The territorial authority issued a building consent on 9 June 1999.

2.6 The territorial authority made various inspections in the course of construction.

2.7 On 13 January 2004, the territorial authority issued "Notice to Rectify Building Work No: 1", which had attached a "Particulars of Contravention" that stated:

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 inspections: -

You are required to:

- Provide adequate ventilation to the monolithic cladding and into the wall frame space by means of either a ventilated cavity or alternative approved system; or
- Remove the monolithic cladding and replace with an approved cladding system and;
- Lodge with Council an application for and amended building consent and provide all necessary information that may be requested to allow this consent application to proceed."

In a letter attached to the Notice to Rectify, the territorial authority also stated in relation to its new policy that it:

- (a) will decline applications for building consents with monolithic cladding systems which do not have a cavity ventilation system.
- (b) may refuse to issue a consent or code compliance certificate for a system which does not have a cavity ventilation system and /or has not been subject to the more rigorous inspection system recently implemented by the Council.

The Authority notes that the territorial authority refers to the building as having a "cavity system". However, the cladding is face fixed to the framing, and accordingly, the Authority finds that there is no "cavity system" installed to the building in question.

2.8 The owner applied for this determination on 19 January 2004.

3 THE SUBMISSIONS

3.1 The owner provided:

- Copies of the manufacturer's instructions;
- The building consent documentation;
- The territorial authority inspection reports;
- Correspondence from the territorial authority, which, in general, related to its refusal to issue a code compliance certificate; and
- The 13 January 2004 Notice to Rectify.

3.2 The owner also

- Summarised the sequence of events leading up to the refusal of the territorial authority to issue a code compliance certificate and described certain elements that had been used in the building; and
- Provided a copy of the cladding applicator's producer statement.

3.3 The territorial authority was invited by the Authority to make a submission on the issues but declined to do so.

3.4 The Authority commissioned an independent expert to inspect and report on the cladding.

3.5 The copies of the submissions and other evidence were provided to each of the parties. Neither the applicant 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 E2.3.2 of the building code (First Schedule, Building Regulations 1992) is correct. Those provisions of the building code provide:

Clause E2—EXTERNAL MOISTURE

OBJECTIVE

E2.1 The objective of this provision is to safeguard people from illness or injury, which could result from external moisture entering the building.

FUNCTIONAL REQUIREMENT

E2.2 Buildings shall be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.

PERFORMANCE

...

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. The Authority is 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:
- 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, 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 to inspect and report on the cladding. The expert inspected the building on two occasions. In his report after the first inspection, the expert stated that the cladding and its coating system appear to have been finished to a high standard and in a tradesman like manner. Sheet joints were not detectable and there was no evidence of any cracking at any location.

5.2 During the second inspection, the expert carried out an invasive inspection around a window to verify elements of the building that were not able to be checked visually. From these tests the expert was able to verify that:

- The sheet joints were cut 200 mm from the window edges;
- A sealant strip had been placed at the back of the vertical control joint; and
- There was a head flashing to the banded projections to the windows.

The expert also confirmed that the as-built detail as supplied by the owner allowed for an efficient dispersal of any moisture that entered the heads of windows that were fixed between the brick claddings.

5.3 The expert also used a non-invasive moisture meter applied to the internal face of external walls to detect areas of moisture ingress. There was no detection of moisture beneath the plasterboard surface. While a lack of moisture does not of itself indicate that the cladding is code compliant, it is indicative of the efficiency of the cladding in preventing moisture ingress to date.

5.4 Copies of the expert's report were provided to each of the parties. The territorial authority did not comment on the report but the owner made the following comments on the initial report:

- The territorial authority's inspection reports verified that the correct mesh had been used;

- Window jambs had been set in an edge sealant and the gables had been sealed between the overhang and the wall;
- Foam seal had been applied to the base of the cladding at the foundation wall junction;
- All flashings have stopped ends and all windows had head flashings that overhung the jambs by 60 mm; and
- The jointing system and sealant applications were carried out in accordance with the manufacturer's instructions.

The owner also verified the type of paint finish that had been applied.

5.5 The owner also responded to the second report, stating:

Where there is brickwork, the aluminium window is actually hanging in the brick cavity away from the timber frame and any moisture is picked up in the tray shape of the extrusion and shed away towards the brick work at the bottom of the window.

The malthoid flashing around windows is approx. 200 mm wide and was specifically inspected by the [territorial authority] inspector while the brickwork was being laid.

The bricklayer, myself and the inspector [Named] met on site mid-January 2004 to carry out this inspection and it was passed as OK [Council] records will confirm this.

6 THE AUTHORITY'S VIEW

General

- 6.1 The Authority has considered the submissions of the parties, the expert's reports and the other evidence in this matter. The Authority's approach to determining whether building work complies with clauses 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 New Zealand data and experience 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 a fundamental requirement to ensure good weathertightness performance.
- 6.4 The next priority is to reduce the ability of moisture to get through the cladding by utilising design measures that minimise the effects of the rain impacting on the walls:
- 6.5 The main areas for consideration are:

- Data shows 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 incidents;
- While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential, the Authority believes that homes 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 to directly penetrate into the wall; and
- Recent data also shows that decks and balconies that are exposed in plan and/or cantilevered out 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 addressed by a combination of effective drainage, ventilation of the drainage cavity and moisture tolerance in the external wall framing timber. These factors being:

- The structure should allow water that has penetrated the cladding to drain out as quickly as possible. The Authority believes 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, the Authority believes 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 Authority finds that this house:

- Has eaves that are generally 300 mm wide and that are considered to be only moderately effective in shielding the cladding;
- Has a parapet on two of the upper walls that provides no shielding to the cladding.
- Is in a medium wind zone;
- Is constructed to two levels, with the cladding generally fixed at the upper level;
- Has several wall/roof intersections and has an overall envelope that is relatively complex in shape;
- Has no decks or balconies, but does have a small roof over the front entrance;

- Has flashings over the window heads;
- Has face-fixed cladding with no drainage cavity; and
- Has external walls constructed from LOSP H1 Plus-treated timber, which is a moderately effective treatment for delaying the onset of decay.

Weathertightness performance

- 6.8 The cladding appears to have been installed according to good trade practice and to manufacturer's instructions. It can be considered to be effective in preventing the penetration of water. There are no apparent defects that could impinge on ongoing weathertightness.
- 6.9 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, and thus inhibiting ventilation behind the cladding, the Authority finds that there are compensating factors that assist the performance of the cladding. These are:
- The cladding appears to have been carefully installed according to good trade practice and to manufacturer's specifications; The Authority particularly notes that the expert could not find any errors evident in the way that the external cladding has been installed, notwithstanding the use of a second, invasive examination of a window surround.
 - The LOSP H1 Plus treated timber wall framing; and
 - The moisture level readings do not indicate any undue moisture ingress behind the cladding at this time.
- 6.10 The Authority considers that the design of the house presents a low to medium risk of weathertightness failures. The complex roofline and the use of small eaves and, in 2 places, parapets, are primarily responsible for the increased risk. However the Authority also finds that the absence of internal moisture in the exterior walls, coupled with a lack of any visible flaws in the cladding installation adequate compensate for these risks and for the lack of a drainage cavity and allow the house to comply with the weathertightness provisions of the building code.

7 CONCLUSION

- 7.1 The Authority accepts that the expert's report establishes that:
- The cladding is well installed and has no apparent flaws;
 - The framing is dry; and
 - There is no evidence of external moisture entering the building

Accordingly, the Authority finds that the cladding on this particular building complies with clause E2.

- 7.2 The Authority emphasises 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.

8 THE AUTHORITY'S DECISION

- 8.1 In accordance with section 20 of the Building Act, the Authority determines that the cladding complies with clause E2. Accordingly, it reverses the territorial authority's decision to refuse to issue the code compliance certificate.
- 8.2 While the Authority has found the cladding to be code compliant, it considers that the cladding will require on-going maintenance to ensure compliance continues, and that this maintenance programme should be undertaken after consultation with the territorial authority.

Signed for and on behalf of the **Building Industry Authority**
on this 11th day of May 2004

John Ryan
Chief Executive