

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 22

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 of the property 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 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 monolithic wall cladding as installed (“the cladding”), and which is applied only to the upper storey of this house, complies with the building code (see sections 18 and 20 of the Act). By “monolithic 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 In making its decision, the Authority has not considered any other aspects of the Building Act or the building code.
- 1.4 The house itself is described in paragraphs 2.1 to 2.3, and paragraph 9 sets out the Authority’s final decision.

2 PROCEDURE

The building.

- 2.1 The building is a two-storey detached house situated on a slightly sloping site, which is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction on a concrete block foundation wall, which extends at varying heights above ground floor level. The ground floor is faced with a brick veneer and the upper floor is sheathed in a monolithic cladding. It is of a relatively simple shape and the upper cladding has a continuous base intersection with the lower level roof. The house has one raised deck at the ground level, with the outer edge supported on columns and the inner edge attached to the house. The roofs, which are set to a 20% pitch, are clad with interlocking concrete tiles without an underlay. There are small attached pitched roofs over the entry and the Lounge bay window. The eaves have 350 mm wide projections, with the spoutings giving additional cover.
- 2.2 The framing in external walls is noted on the consent drawings as being H3 treated timber. However, the expert was unable to verify if the installed framing had this level of

treatment. The Authority also observes that the territorial authority did not note any departure from the specified treatment in any of its documentation.

- 2.3 The cladding system is what is described as monolithic cladding. As specified in its manufacturer's 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. Both the jointing system and the coating system used in this instance are one of those systems referred to in the manufacturer's instructions. The coating in this instance is a trowelled two-coat sponge finished polymer-modified cement based plaster followed by 2 coats of 100% acrylic paint.
- 2.4 The manufacturer issued a "Material components Guarantee" covering the cladding.

Sequence of events:

- 2.5 The territorial authority issued a building consent on 17 March 2003. There were no conditions related to the cladding.
- 2.6 Officers of the territorial authority carried out a Plaster Exterior Cladding inspection on 27 June 2003. The "Field Sheet" relating to this inspection noted it has passed inspection but noted that a certificate was still required from a registered spray applicator. On the 27 February 2004, officers of the territorial authority carried out a Final CCC Building inspection, noting:

HARDITEX WITH OUT CAVITY NTR REQ'D CERT REQ'D FROM
REGISTERED APPLICATOR FOR HARDITEX

- 2.7 The territorial authority also issued a notice to rectify on the 27 February 2004. The attached particulars of contravention stated that the owner was to:
- Provide adequate ventilation to the monolithic cladding and into the wall frame space by means of either a ventilated cavity or alternate approved system; or
 - Remove the monolithic cladding and replace with an approved cladding system;

No specific details were given as to items that required rectification.

- 2.8 On 1 March 2004, the territorial authority wrote to the owner stating that further work needed to be completed before the file could be finalised.

It went on to state:

Reference attached letter re [Named] cladding system. Use of [Named] cladding without 20mm cavity system in place.

- 2.9 The Authority received the application for Determination on the 31 March 2004.

3 THE SUBMISSIONS

3.1 The owner provided copies of:

- The consent drawings and other building plans;
- The conditions of building consent and the territorial authority's inspection records, including final inspection;
- The notice to rectify; and
- The "Material Components Guarantee" from the Plasterer.

The owner later provided background to the circumstances of the final inspection on the property.

3.2 The territorial authority provided a written submission, which stated:

In the absence of the additional inspections implemented as a consequence of [the] changed inspection procedures, and in the absence of a cavity as a first line of defence, the Council does not believe that it is able to be satisfied on reasonable grounds that the cladding applied to this dwelling will achieve the functional requirements of Clause E.2.2, or the performance requirements of Clause E2.3.2, of the Building Code.

3.3 The copies of the submissions 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 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:

The life of the building, being not less than 50 years, if:

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.

15 years if:

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 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 (“the expert”) to inspect and report on the cladding. The expert inspected the building and furnished a report, which noted that there was no evidence of cracking in the cladding. The expert removed the plaster coating at one window jamb /head junction in an area of potential risk of moisture entry and the Authority is prepared to accept that this sample examination could typify the general standard of finish in other similar situations. The expert’s report made the following specific comments on the cladding:
- The lack of jamb flashings and foam plastic seal to exterior joinery is not in accordance with the consent drawings or the manufacturer's instructions, which both indicate such requirements; and
 - There is no sealant to the downpipe clip fixings.
- 5.2 The expert took moisture readings of the interior linings using a non-intrusive meter and obtained no readings in the “damp range. The expert also used an invasive type moisture meter at 5 cladding positions and 5 roof framing positions. The cladding readings ranged from 14.8% to 16.7% and the roof framing readings ranged from 13.9% to 19.1%. The expert referred to the advice that he had received from the meter manufacturer that readings in timber treated with water-based preservative may give readings that are 1% to 2 % higher than the actual moisture level. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure. An inspection of the roof space by the expert did not reveal any evidence of persistent leaks.
- 5.3 Copies of the expert’s report were provided to each of the parties. Neither the territorial authority nor the owner made any comment on the report.

6 THE AUTHORITY'S VIEW

General

- 6.1 The Authority has considered the submissions of the parties, the expert's report and the other evidence in this matter. The Authority's 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 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 using design measures that minimise the effects of the rain impacting on the walls:
- 6.5 Important matters for consideration are that:
- 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 incidence;
 - 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 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. 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, with one minor exception, 350 mm wide eaves that, taking into account the additional spouting projection of 125 mm, reasonably protect the cladding;
- Is in a medium wind zone;
- Is two storey;
- Has head and sill flashings to the exterior joinery units;
- Has continuous wall/roof intersections at the base of the cladding;
- Has an overall envelope that is relatively simple on plan;
- Has one deck which is adjacent to the brick veneer;
- Has no drainage cavity where the cladding is face fixed; and
- Has external walls specified to be framed up from H3 treated timber, which would be effective in delaying the onset of decay.

Weathertightness performance

6.8 Apart from the defects, which are set out in paragraph 5.1, and that are likely with time to allow the ingress of moisture behind the cladding, the cladding appears to have been installed according to good trade practice and to manufacturer's instructions. It can, therefore, be considered to be reasonably effective in preventing the penetration of water.

6.9 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting ventilation behind the cladding sheets, the Authority finds that there are compensating provisions that assist the performance of the cladding. These are:

- Apart from the faults identified by the expert, the cladding generally appears to have been installed according to good trade practice and to manufacturer's specifications;
- The building does not display to any significant extent any of the weathertightness risk factors; 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 this house presents a low risk of weathertightness failure. The simple building envelope and roof design and the presence of eaves and head and sill flashings to the exterior joinery units are such that face fixed cladding can meet the requirements of clauses B2 and E2 without requiring a cavity.

7 CONCLUSION

- 7.1 The Authority accepts that the expert's report establishes that the cladding complies in most respects with the manufacturer's instructions. As there is no evidence of external moisture entering the building, the Authority finds that the cladding on this particular building complies with clause E2.
- 7.2 While the building does not show any signs of water ingress at the present time, this building will also have to comply with the durability requirements of clause B2. B2 requires that a building continue to satisfy all the objectives of the code throughout its effective life, and that includes the requirement for the building to remain weathertight. Because the cladding faults in this building are likely to allow the ingress of moisture in the future, the building does not achieve the durability requirements of clause B2.
- 7.3 The Authority also finds that when the cladding faults have been satisfactorily rectified this house should be able to remain weathertight and will thus comply with clause B2. It is essential that all the required items of rectification which are detailed specifically in paragraph 5.1, be competently carried out to ensure such compliance.
- 7.4 Clause B2.3.1 of the building code requires the cladding be subject to "normal maintenance". That term is not defined, so that the Authority takes the view that it must be given its ordinary and natural meaning in context. In other words, normal maintenance of the cladding means such inspections and activities such as regular cleaning, re-painting, replacing sealants, and so on.
- 7.5 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.
- 7.6 The Authority declines to incorporate any waiver or modification of the building code in its determination.

8 WHAT IS TO BE DONE?

- 8.1 It is not for the Authority to dictate how the defects listed in paragraph 5.1 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 Authority for another determination.

9 THE AUTHORITY'S DECISION

- 9.1 In accordance with section 20 of the Building Act, the Authority determines 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, the Authority finds that the house does not comply with clause B2. Accordingly, it confirms the territorial authority's decision to refuse to issue the code compliance certificate.
- 9.2 The Authority finds that because of the compensating factors in this case, the lack of a drained cavity behind the cladding is not, on its own, sufficient grounds to withhold a code compliance certificate.
- 9.3 The Authority, therefore, finds that once the items of non-compliance that are listed in paragraph 5.1 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.
- 9.4 The Authority considers 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.

Signed for and on behalf of the **Building Industry Authority** on 26 July 2004.



John Ryan
Chief Executive