

Determination: 2004/18

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 10

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, and the other party is a 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 cladding as installed (“the cladding”) on this house complies with the building code (see sections 18 and 20 of the Act). “External wall cladding as installed” in this context, means the components of the system (such as the backing material, the flashings, the joints, the plaster and/or the coatings) as well as the way the components have been installed and work together.
- 1.3 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 with a concrete ground floor on a level site. It has one deck, which is supported independent of the building at ground floor level. It is of conventional light timber frame construction and is of a relatively simple shape with some wall/roof intersections. Eaves overhangs are 600 mm and it is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The ground floor of the dwelling is clad in a mixture of brick veneer and monolithic cladding and the upper floor of the dwelling is entirely clad in monolithic cladding. Final site work and ground levels have not yet been completed.
- 2.2 Framing timbers used in the external framing are H3 treated.

- 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 other respective 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 joint and coating systems used on this building were one on those described in these instructions.
- 2.4 The texture coating applicator issued a "Coating Compliance Form" dated 26 April 2003.

Sequence of events

- 2.5 The territorial authority issued a building consent on 21 January 2003, which had a number of conditions attached to it. None of these conditions related to the cladding.
- 2.6 The territorial authority made various inspections in the course of construction, and the final inspection was carried out on the 14 December 2003.
- 2.7 The territorial authority issued a "Notice to Rectify No DP 23/1", dated 23 December 2004, which was signed, but did not give any specific details as to which items required rectification.
- 2.8 The owner applied for this determination on 30 January 2004.

3 THE SUBMISSIONS

- 3.1 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.

- 3.2 The owner made a submission, which included:

- The Notice to Rectify;
- Copies of the consent documentation;
- An invoice specifying that the external frame timber was LOSP H3 treated;
- Details of engineering work done on the property; and
- A "Coating Compliance Form" from the plasterer, which included a pre-installation and a final inspection, and confirmed that the following were to the required specification:

- a) Window and flashing sealing;
 - b) Ground clearance; and
 - c) Plaster thickness.
- 3.3 The Authority commissioned an independent expert to inspect and report on the cladding.
- 3.4 Copies of the submissions, the expert's report and other evidence were provided to each of the parties. Neither the territorial authority nor the owner made any further submissions on the expert's report.

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 code compliance certificate because it was not satisfied that the cladding complied with clauses 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. 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 and the report stated that the exterior finish of the cladding is generally of good quality except where noted otherwise, and that the plaster coating and painting is of good standard. The expert also noted the following faults during the inspection:

- There is no sub floor ventilation provided on Northern and Western walls;
 - There is limited ground clearance on the Southern side of the dwelling at the timber sub floor level;
 - Downpipes onto lower roof are not fitted with spreaders, which has resulted in concentrated discharge directly onto the roof, wetting the cladding;
 - There is no clearance between the decking and cladding, and the deck handrail is fixed directly to the cladding;
 - There are no seals behind downpipe brackets, or silicon to screw fixings that penetrate the cladding;
 - There is cracking in the cladding under a window on the upper floor;
 - The bottom edge of cladding is not sealed or painted on the upper or lower floor; and
 - The back face of exterior cladding not painted on lower floor.
- 5.2 The Authority is concerned that the territorial authority did not discover such basic faults during its inspections while the building was being constructed. In the case of this house, the inspection regime could have been better implemented. In particular, the lack of the sub-floor ventilation should have been identified in the final inspection report.

- 5.3 Moisture readings taken with a portable meter through internal wall linings varied between 8.6% and 16.4% and indicated that there was no undue moisture in the external walls. While a moisture reading of less than 18% does not indicate that the cladding is code compliant, it is indicative of the efficiency of the cladding in preventing moisture ingress to date.

6 THE AUTHORITY'S VIEW

General

- 6.1 The Authority has considered the submissions of the parties, the expert's report in this matter. The Authority's approach to 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 Recent New Zealand data and experience indicates that the impact of weathertightness problems in monolithic clad houses can be minimised if good design and construction practices are followed.
- 6.3 The installation of exterior cladding to manufacturers' 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 permeate the cladding by utilising design measures that minimise the effects of the rain impacting on the walls:

The main areas of concern 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 catchments 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.

6.5 Any 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%.

6.6 In relation to these characteristics, the Authority finds that this house:

- Is in a medium wind zone;
- Is constructed to two levels;
- Incorporates some complex wall/roof intersections but has an overall envelope that is simple in shape;
- Has eaves that are 600mm wide;
- Has one deck that is supported independently of the building;
- Has H3 treated timber framing in external walls; and
- Has face fixed cladding with no drainage cavity.

Weathertightness performance

6.7 Generally the cladding appears to have been installed according to good trade practice and to manufacturer's instructions. It can be considered to be reasonably effective in preventing the penetration of water. There are however defects that will, with time, allow the ingress of moisture behind the cladding. There are some defects in the way the cladding has been plastered at the bottom of the sheets and beneath the deck. The clearance between the cladding and the deck is inadequate, and not in accordance with the manufacturer's instructions. The drainage gap between the cladding and the timber deck is inadequate. Furthermore, the discharge of downpipes onto the lower roof and the fixing of the deck handrail will need to be addressed to ensure ongoing weathertightness.

6.8 The Authority notes that in some areas the plaster has been chipped off the PVC moulding, most likely as a result of subsequent construction work. Therefore, it recommends that the cladding be regularly inspected and repaired as required to maintain its weathertightness if damaged by impact.

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 in this particular case. These are:

- Generally, the cladding 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;
- There are flashings over the heads of the exterior joinery;
- The building has 600mm eaves that offer significant protection to the building.
- The external wall framing is H3 treated, affording an increased resistance to the effects of any moisture that may penetrate the cladding; and
- The moisture level readings do not indicate any undue moisture ingress behind the cladding at this time.

6.10 The Authority considers that these other provisions adequately compensate for the lack of a drainage cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.

6.11 The Authority also notes that the statement made by the territorial authority as set out in paragraph 3.1, appears to describe a policy on monolithic claddings. The Authority emphasises that the use of such a policy in circumstances such as this is contrary to the requirements of the Act. The Act requires that decisions on whether an alternative solution is code compliant have to be taken with due regard to the performance of the building (and any element of it) in its as built condition and environment. In other words, it requires the territorial authority to assess performance on a case-by case basis. In this instance, the territorial authority does not appear to have followed such a process.

7 CONCLUSION

7.1 The Authority accepts that the expert's report establishes that the cladding on this particular building complies in most respects with the manufacturer's instructions. At the time of this determination there is no evidence of external moisture entering the building and the Authority therefore considers that the cladding 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 life and that includes the requirement for the building to remain weathertight for its prescribed life. Because the cladding faults in this building are likely to allow the ingress of moisture in the future, the building will not achieve the durability requirements of B2. However 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 following items of rectification be competently carried out to ensure such compliance, even though the exterior framing is constructed in H3 treated timber with some resistance to decay:

- The ground clearance at the southern side of the dwelling is to be established in accordance with manufacture's instructions;
- Subfloor ventilation is to be provided on the Northern and Western walls;
- The concentrated discharge from the downpipes onto the lower roofs is to be remedied and the cladding is to be dried out;
- The clearance between decking and cladding is to be remedied in accordance with good trade practice and to the manufacturers specification. Any unprotected areas of cladding are to be coated;
- The deck handrail fixed directly to the cladding is to be reattached in a manner that will not allow moisture penetration;
- The downpipe brackets are to be reattached with screw fixing sealed;
- Cracking in the cladding under the window on the upper floor is to be repaired; and
- The bottom edge of the cladding on the upper and lower floor is to be sealed and painted.

7.3 The Authority also finds that this building will comply with the durability requirements of B2 when the cladding faults have been satisfactorily rectified. Even though the exterior framing is constructed in H3 treated timber, it is essential that all items of rectification are competently carried out to ensure such compliance. In addition, clause B2.3.1 of the building code requires "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.

7.4 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.

7.5 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 decide exactly how the cladding is to be 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 building is weathertight now and therefore 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 of the code. 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 ventilated cavity behind the fibre cement panels 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 7.2 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 this maintenance programme should be undertaken after consultation with the territorial authority.

Signed for and on behalf of the **Building Industry Authority** on 18 May 2004

John Ryan

Chief Executive