

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 12

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 was also the builder, 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 large extension to an existing 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 three-storey extension to an existing house on an undulating site. The new addition has three levels, the bottom of which is a basement garage. We shall refer to the two upper levels of the new structure as levels 1 and 2 and the basement level as level 0. The existing house forms part of level 1. Because of the varying levels of the site, access is gained to the house at two levels; at level 1 through the existing structure, and at level 0 through the new structure. It is built in a low to medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house itself is reasonably sheltered by the surrounding landscape. It has two decks at level 1, either supported on posts or cantilevered out from the main floor framing. One deck runs the full length of the north elevation and the other runs the full length of the south elevation. The deck returns along

part of the east elevation. The decks are covered by a 1.8m wide verandah. There is also one small balcony at level 2 on the eastern elevation, constructed within the roof framing over the existing structure. The house is of conventional light timber frame construction, with the external walls entirely sheathed in monolithic cladding. The cladding and roof framing of the existing house was removed as part of the work. The existing structure was reclad in the same monolithic cladding as the new structure, and a new lower pitch hip roof was added. The level 2 roof is constructed with a steeply pitched gable and the level 2 floor plan is built within the space created by the gable. The roof is sheathed in corrugated galvanised iron and incorporates a number of skylights. Notwithstanding the complexity of the interface between the old and new structures, the house is a relatively simple shape in plan with some wall/roof intersections. Eaves overhangs are 500 or 600 mm wide. The gable ends and two large dormer windows do not have any eaves but have fascia and metal barge cappings that overlap the cladding.

- 2.2 The invoice for the framing timbers used in the external walls indicates that they are treated to an H1 level. The Authority is advised that the timber supplier believes that the timber would have had an H1 boric treatment (which has some decay resistance) rather than an H1 LOSP (which has no decay resistance). The specification calls for timber that has been “pressure treated or treated to requirements of the Timber Preservation Authority specifications”. This specification is unclear, and the Authority has only anecdotal evidence of the actual level of treatment.
- 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. According to the owner, who was also the applicator, both the jointing system and the roller applied textured paint coating systems used on this building were described in these instructions.
- 2.4 The owner, who was also the builder, provided two producer statements, both of which were issued in his own name. One of these was for the backing and jointing systems, and the other for the two-coat waterproofing membrane and textured finish coating system.

Sequence of events

- 2.5 The territorial authority issued a building consent on 24 February 1998.
- 2.6 The territorial authority made various inspections in the course of construction, and a series of final inspections. The first inspection was made in March 1998 and the latest date of any inspection is given as September 2001.

2.7 On 16 February 2004, the territorial authority wrote to the owner requiring certain items to be completed or changed to comply with the building consent documents. None of the listed items related to the cladding. The letter also stated:

The Council in respect of this project cannot be satisfied that the Building Code requirements of Clause E12 (*sic*), external moisture and Clause B2, durability have been achieved for the following reasons:

- There has been a significant change to the exterior cladding from cedar weatherboards to a [Named] system. No approval was sought or given by Council;
- The [Named] plaster system is also reliant on correct installation and in particular reinforcement flashing installation and correct placement of shrinkage control joints. The Council was not given the opportunity to inspect any of these aspects.

2.8 The Owner confirmed that the change from cedar weatherboards to fibre cement cladding on levels 1 and 2 was made without seeking territorial authority approval for the change. Level 0, the area around the garage and workshop, was always specified as fibre cement monolithic cladding.

2.9 On 25 March 2004, the territorial authority wrote a further letter to the owner which said:

Further to our discussion in respect to a code compliance certificate I confirm that Council is not in a position to issue that certificate for the reasons stated in our letter dated 16 February 2004.

I am aware that this decision is of concern to you but I can only reiterate the options open to you which are:

- 1.Reclad the exterior of the dwelling to comply with the Building Code.
- 2.Make application to the Building Industry Authority for a determination.

If option 1 is your preferred choice I advise that a new building consent will be required.

If option 2 is chosen I strongly recommend that an independent professional report be obtained to support that application.

2.10 The territorial authority did not issue a Notice to Rectify as required under section 43(6) of the Act.

2.11 The owner applied for this determination on 26 March 2004.

3 THE SUBMISSIONS

3.1 The owner made a submission, in which it was acknowledged that he did not get approval from the territorial authority for the change to those areas shown on the consent documentation as having cedar weatherboards to monolithic cladding. The owner also stated;

- 45% of the exterior cladding is under cover by a 1.8 metre verandah and deck.

- 45% has a 600 mm eaves cover.
- The final 10% comprises the dormers with no eaves but the fascia and metal barges lap over the [Cladding]...
- I was told verbally but note it is not given in writing in their [the Council's] last letter, that they could still not issue the Code of Compliance, as the exterior cladding had already been installed for approximately 4 years of its life and they had to warranty it for 15 years, but did not mention any installation issues.
- Not at any stage, even when carrying out the final compliance check, has the Council inspected the exterior cladding system on the house.

The owner also provided the following supporting documentation

- Copies of the consent documentation;
- Copies of the territorial authority's letters of 16 February and 25 March 2004;
- Copies of the two producer statements described in paragraph 2.4;
- A copy of a report from a paint manufacturer dated 26 February 2004, that the coating system as claimed to be applied by the owner would provide a waterproof membrane if applied according to the manufacturer's instructions. As properly pointed out by the owner, this is not a "warranty";
- A copy of a fax from the backing sheet manufacturer dated 3 March 2004, stating that the sheets if installed as per the product technical literature and within its scope, would be covered under the product warranties applicable for 15 years.

3.2 The territorial authority made a submission that described the building and the inspections that the territorial authority had carried out. The territorial authority also stated that they were not advised of the cladding change. The territorial authority also set out its reasons for not issuing the code compliance certificate, which were:

- Owners failure to notify Council for the change in cladding resulting in Councils loss of opportunity to approve prior to installation.
- Council not given the opportunity to inspect critical aspects of exterior cladding including flashings, fixings and control joints.
- A significant period of time before the fibre cement sheets were sealed or coated.
- The exterior coating system being applied by the owner who is not a licensed applicator.
- Producer statements for installation of fibre cement sheets and exterior coating system written and signed by the owner.
- Letter from [Material supplier] does not confirm the installation of their product meets the installation requirements.
- Letter from [Paint supplier] assumes the coating complies with requirements. This assumption is based on information provided by the owner.

The territorial authority's submission concluded with:

- In summary, Council considers the building is classified as a medium to high risk through design and location.
- As a result of the above the Council cannot be satisfied on reasonable grounds that the building meets the Building Code in respect to Clause E2 Exterior Moisture and Clause B2 Durability.

3.3 The territorial authority also forwarded:

- A copy of the building consent application;
- Copies of site check sheets and final inspection summary;
- Copies of the owner's producer statements and the paint manufacturer's and backing sheet manufacturer's correspondence as set out in paragraph 3.1; and
- A series of 5 photographs showing the various external elevations of the building.

3.4 Copies of the submissions and other evidence were provided to each of the parties. Neither the territorial authority nor the owner made any further submissions on the submissions and evidence provided.

4 THE RELEVANT PROVISIONS OF THE BUILDING CODE

4.1 The dispute for determination is whether the territorial authority's decision is correct 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. 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 the report stated that the general standard of workmanship was quite high, relative to other houses inspected by the expert. "In general there appears to have been quite some thought [given] to the construction details and attention to the application of the materials". There is no visible cracking of any of the flush-stopped or sealant filled joints on any of the walls. The expert also noted the following faults during the inspection:

- There is a lack of proper seals between the jambs of the exposed windows and doors. In particular, sealant had been applied as a fillet to the edge of the jambs, rather than a full seal between the flange of the jamb and the fibre cement backing sheet. Many of the sills have not been sealed but this is according to the manufacturer's instructions. However the two sloping window sill frames have not been sealed and these present a risk of water ingress;
- There is a probable lack of jointing behind the gable end barge boards and there is a lack of effective sealing between these boards and the cladding;
- The spacing of the vertical control joints to some walls exceed the maximums set down in the manufacturer's instructions. However, the expert has confirmed that the presence of butyl strips behind all joints offers additional protection. Furthermore, there is no evidence of any cracking of the cladding;
- At one section of the north elevation there is no stopping to the cladding sheets beyond the corner, just a paint finish. However, the expert is of the opinion that as this

area of cladding is under cover, stopping is not required; at the western end of the northern wall the pipe penetrations have not been sealed.

- Clearance between cladding and ground levels varies from manufacturer’s instructions in places, but the clearances are considered to be acceptable in this situation.
- The bottom edge of the cladding is not sealed in a number of places, and
- The level 2 balcony built into the roof framing presents a significant weathertightness risk. The expert was unsure how far the butyl rubber membrane continues up the side of the wall under the cladding.

5.2 Moisture readings taken with a moisture meter through both the exterior and internal wall linings did not detect any signs of excessive moisture in the external walls. While a moisture reading of less than 18 percent does not indicate that the cladding is code compliant, it is indicative of the efficiency of the cladding in preventing moisture ingress to date. The expert also noted that the internal walls and ceilings did not show any signs of water leaks.

5.3 Copies of the expert’s report were forwarded to each of the parties. The owner did not comment on the report but the territorial authority raised one issue. This was in relation to the issue of the backing sheets’ durability. The territorial authority stated that:

Our major concern with this project has been the length of time the [Named] substrate was exposed to the elements prior to be[ing] sealed and coated

The territorial authority also referred to the manufacturer's instructions requiring the sheets to be jointed and coated within 3 months of erection and that the sheets were in fact left uncoated for a period of time well exceeding this requirement.

The Authority notes that this 3-month requirement relates to a later edition of the manufacturer's instructions than those that are relevant to this building and which have no such requirement.

5.4 The owner commented on the territorial authority’s response to the expert’s report. The owner claimed that the uncoated sheets were “jointed sealed and coated within the specified time period”. In addition, the owner considered that the fact the expert did not find any cracking or faults in the exterior coating system indicated that the jointing and coating of the cladding had been correctly carried out.

6 THE AUTHORITY’S VIEW

General

6.1 The Authority has considered the submissions of the parties and the expert’s report in this matter. The Authority’s approach to determining whether building work complies with clause 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 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 permeate the cladding by utilising design measures that minimise the effects of the rain impacting on the walls.

The main areas of concern 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 percent 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 three 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 percent.

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

- Is in a low to medium wind zone;
- Is constructed to three levels, with the third level constructed within the steeply pitched roof framing;
- Has an overall envelope that is simple in shape and incorporates some wall/roof intersections;
- Has 2 dormer windows that have no eaves as the fascias and barges lap directly over the cladding;
- Excluding the gable ends and dormer windows, half of the cladding is adjacent to the level 1 deck (which has an 1800 mm wide verandah over it) and the remainder is under eaves (at roof level) that are 500 or 600mm wide;
- Has two decks to two elevations and one return that are constructed integrally with the building;
- Has a small level 2 balcony constructed within the roof framing of the existing structure;
- Has H1 treated timber framing in external walls (which may be to an H1 Boric level); 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 manufacturers' 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. These include the lack of proper seals to the jambs and sills of exterior joinery, lack of jointing and seals at the cladding/ gable end barge board junctions, and sealing to some wall penetrations. All these items will need to be addressed to ensure ongoing weathertightness.

6.8 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:

- The cladding appears to have been generally installed according to good trade practice and to the manufacturer's specifications;
- Apart from the lack of eaves projections to the barges, the building does not display to any significant extent any of the weathertightness risk factors;
- There are flashings to the heads of the exterior joinery;

- The roofing over the decks provides an additional protective element to the cladding;
 - The use of an additional strip of butyl rubber behind the control joints; and
 - The moisture level readings do not indicate any undue moisture ingress behind the cladding at this time.
- 6.9 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.
- 6.10 The Authority notes the reasons, listed in 3.2, that the territorial authority gave for refusing to issue the code compliance certificate. It notes that none of the reasons relate to the observed performance of the cladding, and none of the reasons have been informed by a site inspection. The Authority emphasises that the use of such an approach 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.
- 6.11 The Authority also notes the potential consequences of an unrecorded change in cladding type. The change from cedar weatherboards to fibre cement monolithic cladding should have been accompanied by an amended building consent that addressed the additional construction details consequent on such a change. The Authority also notes that the construction drawings submitted in this case did not in any event contain adequate details for the cedar weatherboards, and it encourages territorial authorities to require adequate construction detail before issuing a consent.

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. This clause requires that a building continue to satisfy all the objectives of the code throughout its intended life, which 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 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.
- 7.3 The Authority finds that all the following items of rectification should be competently carried out to ensure such compliance:

- The exposed exterior joinery should be sealed between the joinery jamb flanges and fibre cement panels according to manufacturers instructions. Exposed joinery is defined as all joinery at level 2 and all joinery at levels 0 and 1 that is not shielded by the level 1 veranda. The sills of the two sloping windows at level 2 in particular must be sealed in an appropriate way, even though manufacturer’s instructions do not require sill flashings;
- The jointing in the cladding behind the gable end barge boards and the sealing between these boards and the cladding should be remediated;
- The pipe penetrations at the western end of the northern wall should be sealed;
- The underside of the fibre cement sheets at ground level should be sealed; and
- The level 2 balcony should be further examined to establish the integrity of the membrane covering. This should include the extent of the turn up under the cladding, the membrane jointing details at the corners, and the risk of damage to the surface of the membrane from foot traffic.

- 7.4 Even though the spacing of the vertical control joints to some walls exceeds the maximums set down in the manufacturer’s instructions, there are no apparent cracks in the cladding. The Authority finds that the use of a butyl rubber sealing strip is likely to increase the capability of the control joints to accept additional movement and therefore that the current control joint layout is code compliant.
- 7.5 The Authority has taken note of the territorial authority’s concerns regarding the length of time that had elapsed before the cladding had been coated. The Authority recognises that this is now a manufacturer's requirement and it has the effect of restricting moisture uptake into the backing sheet. However, this house has been completed for some years and, as observed by the expert, the final coating does not show any major deficiencies, nor is there any other evidence of damage to either the backing sheet or the cladding that could be attributed to excessive moisture. Accordingly, despite the reservations of the territorial authority, the Authority considers that the delay in coating is not a factor that has affected the compliancy of the coating.
- 7.6 The Authority also finds that this building will comply with the durability requirements of B2 when the cladding faults have been satisfactorily rectified. 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.
- 7.7 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.
- 7.8 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 into 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 7.3 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 11 June 2004

John Ryan
Chief Executive