

Determination 2004/78

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 61

1 THE DISPUTE TO BE DETERMINED

- 1.1 This is a determination of a dispute referred to the Chief Executive of the Department of Building and Housing under section 17 of the Building Act 1991 as amended by section 424 of the Building Act 2004 (“the Act”). The applicant is one of the joint owners of the property (referred to throughout this determination as “the owner”), and the other party is the territorial authority. The application arises from the refusal by the territorial authority to issue a code compliance certificate for a 7-year old house unless changes are made to its monolithic cladding system.
- 1.2 The question to be determined is whether on reasonable grounds that the external wall cladding (“the cladding”), which is applied to the walls at the upper levels of this house, complies with the building code (see sections 18 and 20 of the Act). By “external wall cladding as installed” I mean the components of the system (such as the backing sheets, the flashings, the joints and the plaster and/or the coatings) as well as the way the components have been installed and work together.
- 1.3 This determination is made under the Building Act 1991 subject to section 424 of the Building Act 2004. That section came into force (“commenced”) on 30 November 2004, and its relevant provisions are:

“ . . . on and after the commencement of this section,—

“(a) a reference to the Authority in the Building Act 1991 must be read as a reference to the chief executive; and

“(b) the Building Act 1991 must be read with all necessary modifications to enable the chief executive to perform the functions and duties, and exercise the powers, of the Authority . . . ”

It should be noted that the new legislation does not amend the determination process set out under the 1991 Act, other than to transfer the power to make a determination from the Authority to the Chief Executive of the Department of Building and Housing.

- 1.4 This determination refers to the former Building Industry Authority (“the Authority”)
- (a) When quoting from documents received in the course of the determination, and

- (b) When referring to determinations made by the Authority before section 424 came into force.
- 1.5 In making my decision, I have not considered any other aspects of the Building Act or the building code.
- 1.6 The house itself is described in paragraphs 2.1 to 2.3, and paragraph 8 sets out my decision.

2 PROCEDURE

The building

- 2.1 The building equates to a two to three-storey high detached house, with floors set at 5 different levels, situated on an excavated landscaped sloping site, which is in a high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house has plastered concrete block external walls to the lower levels, with conventional light timber framed walls constructed on the timber-framed floors of the upper levels. The upper external walls of the house are sheathed with monolithic cladding. The house is of a fairly simple shape, but has a complex concrete tiled pitched roof system set at various levels with numerous hip, valley and wall to roof junctions. There is a large open two-level deck to one elevation at the first floor level, which is partially cantilevered and partially supported on timber beams and columns. A smaller balcony deck set into the roof at the upper floor level is predominantly built over a living space with a 600mm wide cantilevered projection over the external wall line. Both decks are timber framed, with the lower deck covered with gapped boarding, and the upper deck has a butyl rubber membrane fixed over a plywood substrate and the membrane is dressed into an internal gutter. The decks have timber-framed balustrades that are monolithic clad on the sloping top and both faces. A series of exterior timber framed platforms and steps are constructed at the lower levels around rear and side of the building. The eaves have 450 mm wide projections with the exception of one length at a lower level roof where the fascia is fixed directly to the cladding.
- 2.2 The specification calls for timber to be Boric treated and the owner has supplied invoices that verify that H1 Boric treated timber was supplied for the house wall framing.
- 2.3 The cladding system is what is described as monolithic cladding. As specified in the manufacturer’s data sheets (“the manufacturer’s instructions”), the cladding to the walls of the house incorporates 40 mm thick expanded polystyrene (EPS) backing sheets fixed through the building wrap directly to the wall framing and finished with a reinforced textured sponge float finish and a further paint system. The system has been subject to an independent appraisal (“the appraisal”). The manufacturer’s instructions include details for flashings at various junctions and require PVC flashings to the heads, jambs and sills of exterior joinery units. The jointing, sealing, sponge finished coating and painting system used in this instance is one of those systems referred to in the appraisal.
- 2.4 The installer supplied a “Producer Statement”, dated 17 July 2004 covering the entire cladding system. The cladding supplier issued a “Workmanship Guarantee” and a “Materials Components Guarantee”, both dated 2 June 2004, each of which contain the qualification that the proprietor will not accept responsibility for damage resulting from the use of untreated timber. I note that both guarantees refer to a “batten cavity system”, whereas the backing sheets in this instance are fixed directly to the framing.

Sequence of events

- 2.5 The territorial authority issued a building consent on 26 November 1996.
- 2.6 On 1 May 1997, the owner submitted revised drawings and calculations and notified the territorial authority that there was a change to the cladding.
- 2.7 The territorial authority made various inspections during the course of construction, and approved the “Preline Building Inspection” on 23 June 1997, and the “Post Line Inspection” on 7 July 1997. A “Final Building Inspection” was carried out on 15 January 2004. The territorial authority noted after the inspection that the cladding as installed differed from that on the consent documentation and that a further investigation may be required of the cantilevered deck joists through the cladding. The Authority has not received any advice on why there was the delay in carrying out the final inspection.
- 2.8 In a letter dated 21 January 2004, the owner stated that a galvanised flashing strip approximately 3.5 inches (90mm) wide had been installed along the whole length of the deck where it met the main building.
- 2.9 The territorial authority wrote to the owner on 12 March 2004, stating:

We have received your request for a code compliance certificate (CCC) for a dwelling at the above address

Before the council can issue a code compliance certificate, we must ensure that all building work meets the NZ Building Code requirements. In particular, the building code specifies that building work must remain durable for specific periods of time after the code compliance certificate is issued.

You will be aware of the current weathertightness issues often reported in the media. These issues have highlighted the care that must be taken to establish that all building elements, but particularly cladding, is durable before any CCC can be issued.

As your building is face fixed (monolithic) construction with no cavities we are unable to verify that it fully complies with the Building Code requirements, manufacturer's details application (*sic*) at the time and that it will remain durable for the required period.

There has been recent information and knowledge that face sealed cladding systems without an adequate drainage and ventilation cavity will cause irrevocable damage to structural elements in the event of leakage and/or the effect of residual moisture. Visual inspection has revealed the following-

- a) Change of cladding to approved plans
- b) No previous inspections for cladding undertaken
- c) Deck joists through/into cladding
- d) No evidence of saddle flashings at deck handrails to wall claddings

Council cannot be satisfied that the cladding system as installed on the above building will meet the functional requirements of Clause E2 External Moisture of the New Zealand Building Code and is therefore unable to issue a code compliance certificate...

- 2.10 The owner wrote to the territorial authority on 26 April 2004 and the comments are summarised as:

- On 1 May 1997, the owner had forwarded copies of documents to the territorial authority showing the change of cladding and the territorial authority had stamped these as “Amended Plans” and signed them as dated 30 May 1997. A bracing notation also confirmed this change;
- All territorial authority inspections were undertaken during construction; and
- The cladding manufacturer had inspected the property and the cladding, which had been installed 7 years previously, was found to be “watertight, sound and in order”.

I accept that the territorial authority was notified of, and approved the change to, the cladding system that was installed.

2.11 The owner also attached a copy of a letter dated 21 April 2004 from the cladding manufacturer responding to the above correspondence, which stated that:

- The plans had been amended to show the new cladding;
- The territorial authority did not require inspections of the cladding at the time of installation. However, the cladding had been installed by a “very competent licensed contractor”;
- The cantilevered joists were flashed appropriately;
- A saddle flashing to the handrail/wall junctions was never a requirement [at the time of construction], and routine maintenance would ensure that there was no cause for concern; and
- The cladding is in good condition, and as the territorial authority had stated that there have been no leaks, the cladding is performing the function for which it was intended.

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

2.13 The owner applied for a determination on 26 July 2004.

3 THE SUBMISSIONS

3.1 In a covering letter to its submission, dated 11 November 2004, the territorial authority set out a brief summary of its involvement with the construction of the house, and how the owner had been informed why a code compliance certificate could not be issued. The territorial authority also repeated the 4 specific issues raised in their letter to the owner of 12 March 2004, which were:

- a) Change of cladding to approved plans
- b) No previous inspections for cladding undertaken
- c) Deck joists through/into cladding
- d) No evidence of saddle flashings at deck handrails to wall claddings

The territorial authority went on to say:

It is noted that monolithic cladding systems are being continuously tested, improved and detailing revised. New knowledge indicates that monolithic systems should have a drainage cavity to perform its function meeting durability requirements of the Building Code. The issues such as high risk design, installation by licensed installers, selection of approved coating system, coating application by licensed applicators, quality control systems of suppliers, installers and applicators, specific independent inspections during installation have further complicated compliance verification process. New E2 document confirms the importance of the above issues.

In regards to this application for a determination, specifically in this case the matter of doubt are:

- Whether the installed cladding system complies with clauses B2.3.1 and E2.3.2 of the Building Code.
- Whether building elements, which have 5 and 15-year durability requirements comply with clause B2 of the building Code, considering the age of construction.

3.2 The territorial authority also supplied copies of:

- The plans and specifications;
- The consent documentation;
- The territorial authority's inspection documentation; and
- The correspondence with the owner.

3.3 In a covering letter dated 26 July 2004, the owner stated that:

- The house was constructed in 1997 and that the cladding was to the upper levels of the house only;
- The cladding manufacturer had inspected the cladding and confirmed that it was performing the function that it was intended;
- The boric treated timber used for the timber frames would give a measure of protection against decay; and
- The house had 425mm eaves, which provide additional protection to the structure from extreme weather conditions.

3.4 The owner also supplied copies of:

- The plans and specifications, including the amended documents;
- The consent documentation;
- The territorial authority's inspection documentation;
- The correspondence with the territorial authority;
- Invoices covering the supply of timber for the house;

- The cladding guarantees and producer statement; and
 - The cladding manufacturer's instructions and an independent cladding appraisal.
- 3.5 The copies of the submissions and other evidence were provided to each of the parties. Neither the owner nor the territorial authority made any further submissions in response to the submissions of the other party.

4 THE RELEVANT PROVISIONS OF THE BUILDING CODE

- 4.1 The dispute for determination is whether the territorial authority's decision to refuse to issue a code compliance certificate because it was not satisfied that the cladding complied with 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. I am therefore of the opinion that the cladding system as installed can be considered to be an alternative solution.

4.3 In several previous determinations, the Authority has made the following general observations about acceptable solutions and alternative solutions, which in my view remain valid:

- Some acceptable solutions cover the worst case, so that in less extreme cases they may be modified and the resulting alternative solution will still comply with the building code; and
- Usually, however, when there is non-compliance with one provision of an acceptable solution, it will be necessary to add some other provision to compensate for that in order to comply with the building code.

5 THE EXPERT'S REPORT

5.1 The Authority commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert inspected the building and furnished a report. It noted that the quality of the cladding itself is good, with the exception of some minor defects. However, the cladding did not appear to have been recoated since its installation in 1997. The dwelling did not require vertical or horizontal control joints. The expert observed that the head and sill flashings and the jamb details of the exterior windows and doors complied with the manufacturer's details [at the time of construction] and noted the low moisture readings obtained around these units. The expert also made the following comments regarding the cladding:

- There is cracking in the cladding where the lower deck balustrade meets the northeast wall cladding and also around the downpipe bracket fixings;
- Cracking is evident around the cantilevered joists that penetrate the cladding and these junctions are near to any water that flows from the deck above;
- The cladding on the southeast elevation is taken down onto the paving and lacks a Z-shaped flashing that would prevent moisture migrating from the ground;
- There is an area of unfinished cladding at the exterior of the bathroom wall on the southeast elevation. There is also no evidence of subsoil drainage or proper clearance of soil from this area;
- The eaves soffit outside the family room has moved causing a gap to form, and the wall/soffit/gutter junction at this location is not sealed at the gutter/wall junction;
- There are no saddle flashings installed where the deck balustrade tops meet the wall cladding. However, these were not a requirement at the time of installation and no moisture had been detected at these locations;
- There is no overflow provision for the upper deck, and the deck floor is at the same level as the adjacent internal floor;
- The downpipe bracket fixings that penetrate the cladding are not sealed; and
- The cladding is in need of recoating, as this has not been carried out over the past 7 years.

- 5.2 The expert also noted an existing safety issue relating to the stair linking the two levels of the lower deck, and recommended that the owner remove the hazard.
- 5.3 The expert took non-invasive readings at the interior of the external walls throughout the house, plus an additional 16 invasive moisture readings of the external walls and only one reading at 21.3% exceeded 18%. This reading was recorded below the gutter/wall junction adjacent to the family room. The invasive test did not repeat one prior raised internal reading, which the expert attributed to the meter being affected by adjacent metal. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.
- 5.4 Copies of the expert's report were provided to each of the parties.

6 DISCUSSION

General

- 6.1 I have considered the submissions of the parties, the expert's report and the other evidence in this matter. The approach in determining whether building work complies with 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 Research data and experience, both internationally and locally, indicates that the impact of weathertightness problems in monolithic clad houses can be minimised if good and effective design and construction practices are followed.
- 6.3 The installation of exterior cladding to manufacturer's specifications and to accepted good trade practice is an important but not the only requirement to ensure good weathertightness performance.
- 6.4 The next priority is to reduce the ability of moisture to get through the cladding by using design measures that minimise the effects of the rain impacting on the walls:
- 6.5 Important matters for consideration are:
- Data show a strong relationship between the width of the eaves and the incidence of wall leaks. An effective deflection mechanism, such as eaves greater than 600 mm wide, has been shown by Canadian data to manage more than 90% of rain incidence;
 - While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential, I believe that buildings in high and very high wind zones (as defined by NZS 3604) are likely to experience wind pressure differentials and thus a higher risk of water ingress;
 - Taller buildings result in an effective increase in the catchment area of the wall. Available data suggests a clear correlation between higher number of storeys and an increased incidence of leaking;

- Complex roofs and overall envelope shapes where the roofs frequently intersect with the walls on upper floors create opportunities for leaks into the wall; and
- Recent data also shows that decks and balconies that are exposed in plan and/or cantilevered from the external walls are the most frequent location for water leaks.

6.6 Any likely penetration of moisture through the cladding can then be countered by a combination of effective drainage, ventilation of the drainage cavity and moisture tolerance in the external wall framing timber. In particular:

- The structure should allow water that has penetrated the cladding to drain out as quickly as possible. It is believed that generally a drainage cavity should be provided behind the outer cladding barrier in monolithic construction;
- The design of the outer walls should allow walls to dry to the outside once moisture penetrates the cladding and the moisture barrier. If walls do not dry, decay fungi can become established in as little as 3 months. Until scientific data on the optimum depth and configuration of the ventilation mechanism in New Zealand conditions is available, I believe that the drainage cavity should be not less than 20 mm deep; and
- The external walls should have some degree of decay resistance or moisture tolerance to allow for situations when moisture circumvents the cladding and moisture barriers and moisture levels in the timber rise to more than 18%.

6.7 In relation to these characteristics, I find that this house:

- Has, apart from one length where the fascia is fixed directly to the cladding, 425 mm wide eaves projections that provide reasonable protection to the cladding under them;
- Is in a high wind zone;
- Is a maximum of three storeys high, but the cladding is fixed to the upper levels only;
- Has fully flashed exterior joinery units;
- Has an overall envelope that is fairly simple on plan, but with a complex roof system having numerous hip, valley and wall to roof junctions;
- Has two open decks, both partially cantilevered, with the upper deck partially built over a living space;
- Has external walls constructed with H1 Boric treated timber, which will delay the onset of decay if it absorbs and retains moisture; and
- Has cantilevered joists to the decks that are H3 treated, as confirmed by the invoices supplied by the owner

Weathertightness performance

6.8 Generally, the cladding appears to have been installed according to good trade practice and to the manufacturer's instructions, but some junctions, edges, and insertions are not well constructed. These areas are:

- The cracking to the cladding where the lower deck balustrade meets the northeast wall cladding, and also around the downpipe bracket fixings;
- The cracking evident around the cantilevered joists that penetrate the cladding and the inadequate sealing at these points;
- The lack of a Z-shaped flashing to the base of the cladding on the southeast elevation where the cladding taken down onto the paving;
- The area of unfinished cladding at the exterior of the bathroom wall on the southeast elevation, including the requirement for subsoil drainage and the removal of soil from this area;
- The gap to the eaves soffit outside the family room and unsealed gutter/wall junction at this location;
- The lack of an overflow provision for the upper deck;
- The lack of sealant at the downpipe bracket fixings; and
- The need to recoat the cladding.

6.9 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting drainage and ventilation behind the cladding sheets, I find that there are compensating factors that assist the performance of the cladding in this particular case. These are:

- Generally, the cladding appears to have been installed according to good trade practice and to manufacturer's specifications;
- The house has for the most part 425mm wide eaves projections; and
- The house has fully flashed exterior windows and doors.

6.10 The expert notes that saddle flashing were not required at the junction of the deck balustrade tops and wall cladding at the time of construction. However, as these junctions are in cantilevered situations, and therefore subject to structural movement, I consider that the integrity of these joints should be examined and saddle flashings installed if necessary.

6.11 I accept that the threshold detail at the base of the door leading to the upper balcony is adequate and will prevent the ingress of moisture from the deck provided the overflow is installed.

6.12 The territorial authority has claimed that it had not undertaken any previous inspections for the cladding. However, I note that, as set out in paragraph 2.7, the territorial authority carried out both "Preline" and "Postline" inspections.

6.13 I note that two elevations of the house demonstrate a low weathertightness risk rating, and two elevations of the house demonstrate a high weathertightness risk rating as calculated using the E2/AS1 risk matrix. The matrix is an assessment tool that is intended to be used at the time of application for consent, but must be supplemented at the time of issuing a code compliance certificate by careful inspection of the building as actually built.

- 6.14 While it is not subject to this determination, I recommend that the territorial authority investigate the safety issue raised by the expert in regard to the steps linking the two levels of the lower deck.

7 CONCLUSION

- 7.1 I am satisfied that the current performance of the cladding is not adequate because it is allowing water penetration into the wall framing to one location at present. Consequently, I am not satisfied that the cladding system as installed complies with clause E2.3.2 of the building code.
- 7.2 I find that, because the faults that have been identified with this cladding occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.8 is likely to result in the building being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity
- 7.3 I note that effective maintenance of monolithic claddings is important to ensure ongoing compliance with clause B2 of the building code. That maintenance is the responsibility of the building owner. The code assumes that the normal maintenance necessary to ensure the durability of the cladding is carried out. For that reason clause B2.3.1 of the building code requires that the cladding be subject to “normal maintenance”. That term is not defined and I take the view that it must be given its ordinary and natural meaning in context. In other words, normal maintenance of the cladding means inspections and activities such as regular cleaning, re-painting, replacing sealants, and so on. I note that the recoating of the cladding is an essential maintenance requirement in this particular instance. I recognise that a territorial authority does not have any statutory responsibility for the ongoing maintenance of a building. However, the maintenance programme adopted by the owner could be undertaken after consultation with the territorial authority, bearing in mind that the nature of the advice, and the basis on which it is provided to the owner, are for the territorial authority to decide.
- 7.4 I emphasise 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 I decline to incorporate any waiver or modification of the building code in its determination.

8 THE DECISION

- 8.1 In accordance with section 20 of the Building Act 1991 I hereby determine that the cladding system as installed does not comply with clause E2.3.1 of the building code. There are also a number of items to be remedied to ensure that the house remains weathertight and thus meets the durability requirement of the code. Consequently, I find that the house does not comply with clause B2. Accordingly, I confirm the territorial authority’s decision to refuse to issue a code compliance certificate.
- 8.2 I find that rectification of the items outlined in paragraph 6.8 to the approval of the territorial authority, along with any other faults that may become apparent in the course of

that work, is likely to result in the house being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity.

- 8.3 I note that the territorial authority has not issued a Notice to Rectify. The territorial authority should do so and the owner is then obliged to bring the house up to compliance with the building code. It is not for me to decide directly how the defects 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 Chief Executive for another determination.
- 8.4 Finally, I consider that the cladding on the building will require on-going maintenance to ensure its continuing building code compliance.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 16 December 2004 by John Gardiner, Determinations Manager

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