

Determination 2005/22

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 20

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 (“the Chief Executive”) under section 17 of the Building Act 1991 as amended by section 424 of the Building Act 2004 (“the Act”). The applicant is 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 My task in this determination is to consider whether I am satisfied on reasonable grounds that the external wall cladding as installed (“the cladding”), which is applied to the external walls, beams and columns 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 Building Industry Authority (“the Authority”) to the Chief Executive.

- 1.4 This determination refers to the former 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 Act or the building code.
- 1.6 The house itself is described in paragraphs 2.1 to 2.5, and paragraph 8 sets out the decision.

2 PROCEDURE

The building

- 2.1 The building is a two-storey detached house situated on an excavated sloping site, which is in a high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The external walls of conventional light timber frame construction are built on timber-framed floors with the exception of those on the concrete ground floor slab of the garage. The timber-framed external walls are sheathed with monolithic cladding. The house is of a fairly complex shape, with the long-run steel pitched roofs at varying levels having hip, valley, and wall to roof junctions. A timber framed roof flat roof is constructed over part of bedroom 1 and continues over the upper floor bathrooms. These roofs are covered with a butyl rubber membrane that is also formed into integral gutters and raised edge finishes. A similar roof is constructed to form a semi-circular canopy, which has low monolithic-clad parapet walls at the edge perimeters. The aluminium external windows and doors are recessed into the cladding reveals. There are also monolithic-clad garden and support walls at various locations. Apart from some short lengths of 450mm projection on the west elevation, there are no eave or verges projections.
- 2.2 A large timber framed close boarded deck is constructed at the ground floor level on the north and east elevations of the house. Another timber framed deck at first floor level above the lower deck on the north elevation of the house supported on monolithic clad columns and shaped beams. This deck has a ceramic tile finish over a butyl rubber membrane covering fixed to a plywood substrate. The upper deck balustrades are timber-framed and lined on both faces and the top with monolithic cladding and a tubular steel handrail is fixed through the top and sides of the balustrade.
- 2.3 The specification calls for all enclosed non-heart timbers to be “diffusion treated by Boron process”. However, no evidence has been forwarded as to the treatment, if any, applied to the external wall framing.

- 2.4 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 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.
- 2.5 The cladding system supplier provided a "Materials Components Guarantee" dated 4 August 2004, covering the cladding materials for a period of 15 years.

Sequence of events

- 2.6 The territorial authority issued a building consent on 30 September 1996.
- 2.7 The territorial authority made various inspections during the course of construction, and approved both the "Preline Building Inspection" and the Postline/Bracing Inspection" on 18 March 1997. A "Final Building Inspection" was passed on 28 November 1997 and the territorial authority noted on its "Field Inspection Sheet" that the house was "OK for CCC". However, due to the non-payment of two inspection fees by the original owner, a code compliance certificate was not issued.
- 2.8 The territorial authority carried out a weathertightness visual check on 19 February 2004 and subsequently wrote to the owner on 27 February 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. A visual Inspection carried out on 19 February 2004 has revealed a number of defects including:

- Unknown cladding system without cavity on a complex
- Cladding buried in some areas
- Handrail in deck area fixed [fixed] to the top of the barrier
- Minor cracks to deck barrier
- No head flashing to joinery

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

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 ...

- 2.9 The owner engaged a firm of engineers and surveyors (“the consultants”) to inspect the property and confirm that the house is safe and sanitary. The consultants carried out such an inspection on 18 May 2004 and subsequently wrote to the territorial authority on 25 May 2004. The consultants advised that in their opinion the building was safe and sanitary and fully complied with the consent. The consultants noted that the territorial authority had undertaken the necessary inspections during construction, the only reason for not issuing the code compliance certificate was due to the original owner not paying a \$100 fee to the territorial authority. The consultants urged the territorial authority to issue a code compliance certificate.
- 2.9 The territorial authority did not issue a Notice to Rectify as required under section 43(6) of the Act.
- 2.10 The owner applied for a determination on 20 August 2004.

3 THE SUBMISSIONS

- 3.1 The territorial authority made a submission in the form of a letter to the Authority dated 15 October 2004, which summarised the consent and inspection processes relating to the house. The territorial authority also noted that no specific cladding inspections had been undertaken for building wrap, flashings, board fixings, etc. The territorial authority then listed the major risk issues set out in their letter to the owner of 19 February 2004. The owner had been informed that, due to the type of monolithic cladding applied to the house and its attendant risk factors, the territorial authority was unable on reasonable grounds to accept the compliance of the cladding.
- 3.2 The territorial authority supplied copies of:
- The plans and specifications;
 - The consent documentation;
 - The territorial authority’s inspection documentation; and
 - The correspondence with the owner.
- 3.3 The owners wrote to the Authority on 20 August 2004 stating that even though they paid the outstanding \$100, the territorial authority still refused to issue a code compliance certificate. The owner also commented on the issues raised by the territorial authority in its letter of 27 February 2004 as follows:

- The cladding manufacturer had inspected the house and had reissued their warranty;
- The cladding is no longer buried;
- The territorial authority inspector had been consulted and changes had been made to the handrail;
- The minor cracks in the deck barrier had been fixed; and
- Head flashings were in place over the exterior joinery as confirmed by the cladding manufacturer.

The owner noted that the inspection by the consultants had confirmed that the house was safe and sanitary. The owner also supplied a copy of the cladding supplier's producer statement and also an undated letter from supplier. The letter stated that while the window head detail is no longer relevant, it was valid at the time and there were no reported cases of it failing. The supplier had no concerns with the detail and will stand by all the relevant warranties.

- 3.4 The copies of the submission 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, which in my view remain valid in this case, 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; and
- Usually 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 dated 18 January 2005. It noted that the "the quality of finish was generally good. The plaster finish was smooth. The coating was uniform, well adhered and [the expert] could not see any evidence of discolouring". The expert removed the plaster coating to reveal the window flashing details at one location, and noted that the windows were appropriately flashed at the jambs and sills. The expert noted that there were no head flashings to the external windows and doors. However, as the recessed head reveal had an 8 degree slope that formed a drip edge to the outside, this would prevent run-off from the cladding tracking back to the window or door head. If the frames were adequately sealed water would be channelled to, and be discharged from, the sill drainage channel. The expert was of the opinion that control joints were not required for a house with the dimensions of the one in question. The expert also made the following comments regarding the cladding:

- There are small cracks in the cladding at some locations;

- The tops of the canopy parapet and the upper deck balustrade are flat and so do not comply with the manufacturer's recommendations;
- The recommended ground clearances are not achieved at some locations to the base of the cladding and where the cladding adjoined the decks;
- Some penetrations through the cladding are inadequately sealed;
- There is a membrane defect at the outlet or membrane up stand of the canopy roof; and
- The discharge details at the rainwater head at the bedroom 1 flat roof are likely to be defective.

5.2 The expert took non-invasive readings at the interior linings of the external walls throughout the house and readings in the "borderline" and "damp" ranges were recorded. The expert also took invasive moisture readings and obtained the following 6 high level results:

- 19.4% at a stud adjacent to the study door;
- 30.4% at a bottom plate in bedroom 1 and 100% at a bottom plate in the ground floor bathroom. The expert considers that these high readings can be attributed to leakage at the rainwater head to the bedroom 1 flat roof;
- 24% at a bottom plate in bedroom 2 and 100% at a stud adjacent to the garage door. The expert attributes these high readings to defects in the canopy outlet or membrane upstand; and
- 64% at the skirting in the bedroom 1 bathroom, which the expert attributes to leakage from the shower.

Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure. The expert also noted swelling in some of the skirting in bedroom 1 and the dining area to the upper deck. There was also a dark stain around a light in the kitchen, suggesting a leak at some time from the roof above.

5.3 Based on the high moisture readings adjacent to bedroom 1 and the study, the expert considers that there could be defects in the sealing of the joinery at these locations and/or in the deck membrane upstands.

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. I believe 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:

- Apart from small areas, has no eaves or verge projections that would provide cladding protection;
- Is in a high wind zone;
- Is two storeys high;
- Has exterior joinery units that are only flashed at the jambs and sills;
- Has an envelope that is fairly complex on plan, with a roof system having hip, valley and wall to roof junctions;
- Has two large decks at the first floor and ground levels; and
- Has external walls constructed with what I accept, in the absence of evidence to the contrary, is timber that provides little resistance to decay if it gets wet and cannot dry out.

Weather-tightness performance

6.8 I find that, generally, some aspects of the cladding appears to have been installed according to good trade practice and to the manufacturer's instructions, but some junctions, edges and penetrations are not well constructed. These areas are:

- The small cracks in the plaster face at some locations;
- The flat tops to the canopy parapet and the balustrade to the upper deck;
- The locations where the recommended ground clearances at the base of the cladding and where the cladding adjoins the decks, have not been achieved;
- The penetrations through the cladding that are inadequately sealed;
- The membrane defect at the outlet or in the membrane upstand of the canopy;
- The defective discharge details at the rainwater head at the bedroom 1 flat roof; and
- The possible defects in the sealing of the joinery at bedroom 1 and the study and/or in the deck membrane up stands at these locations.

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 is the compensating factor that the cladding appears to have been installed according to good trade practice and this assists the performance of the cladding in this particular case.

- 6.10 I consider that this factor adequately compensates for the lack of a drainage and ventilation cavity, and can allow the house to comply with the weathertightness and durability provisions of the building code.
- 6.11 I also accept the expert's opinion that there is no requirement to provide control joints in the cladding, and that the formation of the cladding over the external windows and doors compensate for the lack of bead flashings. Based on the evidence provided, I do not accept the claim set out in the owner's letter of 20 August 2004 that there are head flashings over the joinery.
- 6.12 I note that one elevation of the house demonstrates a low weathertightness risk rating, and the remaining elevations 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.

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 at several locations 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 In addition, the building is also required to comply with the durability requirements of clause B2. Clause B2 requires that a building continues to satisfy all the objectives of the building code throughout its effective life, and that includes the requirement for the house to remain weathertight. Because the cladding faults in the house will allow the ingress of moisture in the future, the house does not comply with the durability requirements of clause B2.3.1. of the building code.
- 7.3 I consider 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 B2.3.1 and E2.3.1, notwithstanding the lack of a ventilated cavity.
- 7.4 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.
- 7.5 It is emphasised 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 I decline to incorporate any waiver or modification of the building code in this 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 of the building code. There are also a number of items to be remedied to ensure that the house remains weathertight and thus meet 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 also 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 will require on-going maintenance to ensure its continuing code compliance.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 25 February 2005.

John Gardiner

Determinations Manager