

Determination 2005/68

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 58

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 (“the Act”) as amended by section 424 of the Building Act 2004. The applicant is the building 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 4-year old house unless changes are made to its monolithic cladding systems.
- 1.2 The question to be determined is whether on reasonable grounds the monolithic wall cladding as installed to the timber-framed external walls and columns of the house (“the cladding”), complies with the building code (see sections 18 and 20 of the Act). By “the monolithic 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 2.4, and paragraph 8 sets out my decision.

2 PROCEDURE

The building

- 2.1 The building is a two-storey detached house situated on an excavated sloping site in a low wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The external walls of the house are of conventional light timber frame construction built on concrete block foundation walls and sheathed with monolithic cladding. The house is of a fairly simple shape, with the pitched roofs situated at two main levels and covered with fibreglass asphalt shingles laid over a plywood substrate. There are no eaves or verge projections, with the exception of the roof area over the garage door entrance where the verge is either 300mm or 1200mm wide. Each end of this roof area is supported on a monolithic clad column. The recessed balcony also has a partial 1200mm wide roof projection over it. All the soffits of these projections are monolithic clad. The aluminium joinery is generally face fixed over the cladding and there are plastered polystyrene planted projections to some window perimeters. A monolithic-clad chimney passes through one of the lower level roofs.
- 2.2 A timber-framed partially enclosed balcony is constructed over a habitable space at the first floor level adjacent to the family/dining room and bedroom 1. This has a tiled deck over a flexible membrane, and timber-framed balustrades that are monolithic clad on both faces and have a timber capping to the top.
- 2.3 The owner has confirmed that the external wall framing is untreated and claims that the timber posts to the encased columns are H 5 treated.
- 2.4 The walls and columns of the building are clad with what is described as monolithic cladding. The cladding is a particular proprietary product, installed in accordance with the manufacturer’s instructions (“the instructions”), which include details of the heads, jambs, sills, trims and corners. As detailed in the instructions, it incorporates 7.5 mm fibre cement backing sheets fixed through building wrap directly to framing timbers, and finished with a proprietary textured coating system, followed by an

appropriate painting system. The systems have been subject to an appraisal by an independent testing organisation.

Sequence of events

- 2.5 The territorial authority issued a building consent on 15 August 2000. No conditions relating to the cladding were attached to this consent.
- 2.6 The territorial authority carried out a site cladding inspection on 20 May 2004, and in a letter to the owner dated 27 May 2004, regretted that the building may not comply with the building code in a number of respects. The territorial authority attached a Notice to Rectify also dated 27 May 2004 to this letter, together with a set of photographs illustrating items of non-compliance. The “Particulars of Contravention” attached to the Notice to Rectify noted:

A site inspection of the above property carried out on the 20 May 2004 revealed that the exterior cladding of the new building constructed at the above address is a monolithic cladding system [Named system] with no provision for ventilation of the wall space. Furthermore the exterior claddings have been installed otherwise than in accordance with, the manufacturer's specifications, the acceptable solutions of the building code and accepted trade practices as detailed below.

1. The following have not been installed per the manufacturer's specifications
 - All aluminium joinery units shall have proprietary flashings installed around the full perimeter of the openings (head, jamb and sill). Jamb and sill flashings have not been installed to all joinery units in accordance with the technical manual
2. The following items have not been installed per the acceptable solutions of the building code, (no alternative solutions have been applied for)
 - Buildings shall have claddings that are waterproof. All flashings shall be fitted in such a way as to direct water away from the building and prevent ingress of moisture. This has not been achieved.
 - Two outlets are required to internal gutters/decks. The cross-sectional area of the outlets shall be no less than the cross-sectional area of the downpipes serving the gutter/deck. The minimum internal diameter permitted is 63mm. The overflow outlet for the deck of the master bedroom has not been installed.
3. The following items have not been installed per accepted trade practice
 - A minimum clearance of 50mm is required between the cladding and adjacent surfaces. There is minimal clearance between the junction of the roof and wall claddings.
 - Penetrations through the cladding system shall be as waterproof as the cladding itself. Penetrations should be protected with rubber flanges and silicon[e], in the case of the meter box flashings have not been installed.
4. Ventilated cavity system

- The Council has recently received information which shows that monolithic cladding systems without a drainage plane/cavity, provision for adequate ventilation, drainage and vapour dissipation will, in the likelihood of leakage and/or the effects of residual moisture, cause irrevocable damage to the structural elements of the building.

The Council cannot be satisfied that the above building meets the performance requirements of Clauses B1 Structure, B2 Durability, E2 External Moisture, E3 Internal Moisture, G4 Ventilation and H1 Energy Efficiency Provisions of the Building Code...This is in breach of Sections 7(1), of the Building Act 1991...

Also that the owner was required to:

1. Provide adequate ventilation to the monolithic cladding and into the wall frame space by means of either a ventilated cavity or alternative approved system, and ensuring all issues related to the above are resolved.
2. Lodge with the council an application, within 28 days from the date of this notice, for an amended building consent, and provide all necessary information that may be requested to allow this consent application to be processed, alternatively.
3. Confirm to council, within 28 days from the date of this notice, your intention to apply to the Building Industry Authority for a determination in accordance with the Building Act 1991
4. Install a storm water overflow to the deck in addition to the existing deck drain. All sealed decks shall have a minimum of two outlets.

2.7 The owner applied for a determination on 20 September 2004.

3 THE SUBMISSIONS

3.1 The owner provided copies of the building plans.

3.2 In a covering letter to the Authority dated 28 October 2004, the territorial authority noted:

Particulars of Contravention

As detailed in the NTR the areas of contravention relate to six clauses of the Building Code, namely:

- B1 structure,
- B2 durability,
- E2 external moisture,
- H3 internal moisture,
- G3 ventilation, and

- H1 energy efficiency.

Specific construction defects may be grouped into the following areas:

- Ground clearances
- Control joints
- Flashings, and
- Insufficient means for dissipation of water where the water passes through the exterior cladding.

3.3 The territorial authority also forwarded copies of:

- The plans and specifications;
- The consent documentation;
- The Notice to Rectify; and
- The correspondence with the owner.

3.4 Copies of the submissions and other evidence were provided to each of the parties.

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. The relevant provisions of the building code say:

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 subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace, or

(ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

Clause E2—EXTERNAL MOISTURE

E2.1 The objective of this provision is to safeguard people from illness or injury, which could result from external moisture entering the building.

E2.2 Buildings shall be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.

E2.3.2 Roofs and exterior walls shall prevent the penetration of water that could cause undue dampness, or damage to building elements.

4.2 There are no Acceptable Solutions 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.
- 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 Department commissioned an independent expert (“the expert”) to inspect and report on the cladding. The expert inspected the building and furnished a report that was completed on 4 March 2005. The expert noted that the final coat of plaster was carried out to a consistently high standard. The general impression was of “good trade practice in terms of the plastering”, and that considerable care had been taken in its application. The expert removed a small section of the textured finish at one window to examine the sealants. While no sill flashings had been installed, the expert noted that they were not a mandatory manufacturer's instruction at the time of consent. In addition, there are planted plastered polystyrene projections at most external joinery locations. The expert was of the opinion that horizontal control joints

are not required for a house of these dimensions. The expert's report made the following specific comments on the cladding.

- There is an absence of vertical control joints as set out in the manufacturer's recommendations, to the east and south walls;
- There is no saddle flashing installed at the top of the concrete block wall that adjoins the cladding at one end of the east elevation, and the sealant has cracked open at this junction;
- There are locations where there is either no clearance or insufficient clearance between the base of the cladding and the ground or paving;
- There is insufficient clearance where the base of the cladding adjoins the apron flashings;
- There are no kick outs to the ends of the flashing over the curved head of the dining room French doors;
- The ends of the bay window head flashings pose a problem where they nearly intersect;
- There are no saddle flashings installed where the balcony balustrades adjoin the wall cladding, and a crack has opened up between the balustrade capping and the cladding below it;
- The balcony outlet is inadequately sealed and there is no deck overflow installed;
- Nails are penetrating the cladding where the fascia and gutter are sandwiched adjacent to the chimney; and
- The earth wire penetration through the cladding is inadequately sealed.

5.2 The expert carried out a series of non-invasive moisture tests at the interior and exterior of the external walls. Further invasive readings were made and the following higher moisture readings were recorded:

- 18%, 21% and 24% at the north elevation, and two of these locations had indications that the timber was "soft"
- 19%, and 20%(2) at the north elevation deck area, and one of these locations had indications that the timber was "soft", and another that the timber was "mush".

Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

5.3 Copies of the expert's report were provided to each of the parties and both accepted the report.

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 Recent research 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 I consider that the 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, it is believed 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 suggest 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 consider 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 the house:

- Apart from two locations, has no eaves or verge projections that could provide protection to the lower cladding;
- Is built in a low wind zone;
- Is two storeys high;
- Is relatively simple on plan;
- Has a balcony at the first-floor level that is constructed over a habitable space;
- Has external windows and door that have aluminium head flashings, and adequately sealed jambs and sills; and
- Has untreated external wall framing that is unlikely to resist the onset of decay if it absorbs and retains moisture.

Weathertightness performance

6.8 Generally the cladding appears to have been installed according to good trade practice, but some junctions, edges, and penetrations are not well constructed. These areas are all as described in paragraph 5.1 and in the expert's report as being:

- The absence of vertical control joints to the east and south walls;
- The lack of saddle flashings to the top of the concrete block wall that adjoins the cladding at one end of the east elevation, and the cracked sealant at this junction;
- The insufficient clearance between the base of the cladding and the ground or paving at some locations;
- The insufficient clearance where the base of the cladding adjoins the apron flashings;

- The lack of kick outs to the ends of the flashing over the curved head of the dining room French doors;
- The problems posed by the ends of the bay window head flashings where they nearly intersect;
- The lack of saddle flashings where the balcony balustrades adjoin the wall cladding, and the crack that has opened up between the balustrade capping and the cladding below it;
- The inadequately sealed balcony outlet, and the lack of an overflow from the deck;
- The nails penetrating the cladding where the fascia and gutter are sandwiched adjacent to the chimney; and
- The inadequately sealed earth wire penetrating 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;
- The house is relatively simple on plan, and is situated in a low wind zone;
- The external windows and door have aluminium head flashings and adequately sealed jambs and sills; and
- The low level roof areas provide some ventilation to the upper wall framing.

I consider that these factors compensate for the lack of a full drainage and ventilation cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.

6.10 I note that all elevations of the house demonstrate a moderate weathertightness risk rating 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, before the building work has begun and, consequently, before any assessment of the quality of the building work can be made. Poorly executed building work introduces a risk that cannot be taken into account in the consent stage, but must be taken into account when the building as constructed is assessed for the purposes of issuing a code compliance certificate.

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 systems as installed comply with clause E2 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 allow the ingress of moisture, it does not comply with the durability requirements of clause B2 of the building code.
- 7.3 I consider that, because the faults that have been identified with the cladding systems 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.
- 7.4 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 systems as installed do not comply with clause E2 of the building code. There are a number of items to be remedied to ensure that the house becomes and remains weathertight and thus meets the durability requirements 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 issued a Notice to Rectify requiring provision for adequate ventilation, drainage and vapour dissipation. Under the Act, a Notice to Rectify can require the owner to bring the house into compliance with the building code. The Authority has already found in a previous determination (2000/1) that the Notice to Rectify cannot specify how that compliance can be achieved. A new Notice should be issued that requires the owner to bring the cladding into compliance with the building code, without specifying the features that are required to be incorporated. It is not for me to dictate how the defects described in paragraphs 6.8 are to be remedied. How that is done 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 6 May 2005.

John Gardiner
Determinations Manager