

Determination 2006/13

Refusal of a code compliance certificate for a building with a “monolithic” cladding system at 51 Radiata Lane, Birkenhead, North Shore City

1 The dispute to be determined

- 1.1 This is a determination of a dispute under Part 3 Subpart 1 of the Building Act 2004 (“the Act”) made under authorisation by me, John Gardiner, Determinations Manager, Department of Building and Housing, for and on behalf of the Chief Executive of that Department. The applicant is one of the joint-owners, Mr Farley (“the owner”), and the other party is the North Shore City Council (“the territorial authority”). The application arises because no code compliance certificate was issued by the territorial authority for a 5-year-old house.
- 1.2 The question to be determined is whether I am satisfied on reasonable grounds that the monolithic wall cladding as installed to the external walls of the buildings (“the cladding”), complies with the Building Code (see sections 177 and 188 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 In making my decision, I have not considered any other aspects of the Act or the Building Code.

2 Procedure

2.1 The building

- 2.1.1 The building work consists of a two-storey house with a detached garage situated on a steeply sloped, and stepped site, which is in a high wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. Timber retaining walls, separated from the building by a small gap, have been used to raise surrounding ground levels to about 150 mm below ground floor level. Construction consists of a specifically engineered timber framed structure on driven timber piles. Aluminium windows and timber

doors are recessed into the 150 mm thick walls, which are clad in monolithic cladding - except for two areas of weatherboards used on the projecting stairwell and timber framed chimney walls. The house shape is fairly simple in plan and form, and has a 30° profiled metal gable roof over the upper level with plaster-topped parapets at both ends and no eaves.

- 2.1.2 The projecting stairwell and the ground floor bedroom projections have flat membrane roofs. The lower roof extends to form a canopy along the north elevation, and another small canopy links the house to the garage. There is a small recessed deck off the first floor family room, which has a membrane floor, plastered up stand and open metal balustrades.
- 2.1.3 The owner has submitted a copy of a letter and invoices from the timber supplier indicating that the 150 mm timber framing supplied was H3 treated. This is supported by notes in the territorial authority's inspection report. The expert commissioned by the Department to inspect the cladding ("the expert") noted that colour of the timber he was able to inspect indicated tanalised treatment. Based on this evidence, I consider that the external wall framing used on the house is H3 treated.
- 2.1.4 The cladding system to most of the house is what is described as monolithic cladding, and consists of 4.5 mm "Hardibacker" fibre cement backing sheets fixed directly to the framing over the building wrap, to which a 16 mm lightweight mesh-reinforced "Putz Technik" plaster system is applied. The coating is finished with a clear water-repellent sealer.
- 2.1.5 I note that all elevations of the building demonstrate a high weathertightness risk rating as calculated using the E2/AS1 risk matrix. Accordingly I consider this face fixed fibre-cement sheet and weatherboard cladding to be an alternative solution (refer to paragraph 4.2)
- 2.1.6 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 actually built is assessed for the purposes of issuing a code compliance certificate.

2.2 Sequence of events

- 2.2.1 The territorial authority issued a building consent on 21 December 1998, and made various inspections during the course of construction in 1999 and 2000, including prior to lining installation.
- 2.2.2 The owner's engineer inspected foundations and carried out post-lining inspections on behalf of the territorial authority; and provided a producer statement dated 14 November 2002, confirming that inspections were satisfactory with no variations from the building consent documents. The territorial authority carried out the final inspection on 6 November 2003, and the inspection record notes "waiting on final paperwork – rest all OK".

- 2.2.3 Following an application by the owner for a code compliance certificate, the territorial authority carried out a visual inspection on 22 June 2005, which noted “Probably a good job. Certainly given a lot of thought by a knowledgeable owner/builder.” In a letter to the owner dated 7 July 2005, the territorial authority stated that the Building Code required the durability of the cladding to be 15 years and that of the timber framing to be 50 years. The territorial authority also noted that the inspection process for monolithic claddings had changed since the time that the building consent for the house was processed.
- 2.2.4 The territorial authority also noted concerns regarding sub-floor ventilation and vapour barriers, the lack of local testing and knowledge of the plaster system used, and whether control joints were needed. The territorial authority listed certain weathertightness risk factors identified with the building, together with a list of defects and stated that, due to the uncertainties, risk factors and defects, it could not be satisfied on reasonable grounds that the cladding system complied with clauses E2 and B2 of the Building Code.
- 2.2.5 The territorial authority did not issue a Notice to Rectify as required under section 43(6) of the Building Act 1991.
- 2.2.6 The owner applied for a determination on 19 July 2005.

3 The submissions

- 3.1 In a letter accompanying the application, the owner set out the history of the project and described the difficulty of the site’s topography and soil conditions that lead to the choice of construction methods and cladding system used for the house. The owner noted all consent conditions had been met and, while he accepted the territorial authority’s responsibility to examine potential risks:

In this instance, having built the house for my own use and being in the building industry, I have taken all reasonable steps to meet building regulations operating at the time of the consent being issued.

- 3.2 The owner supplied copies of:
- building plans and specifications
 - consent documentation
 - correspondence with the territorial authority
 - engineering statements and calculations
 - invoices and a letter from the timber supplier
 - technical information on the plaster system

- various producer statements
- a set of photographs of the building

3.3 In a covering letter, the territorial authority set out a short summary of events and noted that the matters 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. Specifically roof cladding, deck membrane and internal wet areas.
- Whether the cladding requires a strip footing to support external walls, as per the approved plans. The footing was omitted during construction, without any application to Council for amendment.

3.4 The territorial authority supplied copies of:

- building plans and specifications
- consent documentation
- inspection records
- correspondence with the owner.

3.5 Copies of the submissions and other evidence were provided to each of the parties. Neither party made any further submissions in response to the submission of the other party.

3.6 In response to the draft determination sent to the parties, the territorial authority noted in a letter to the Department dated 14 December 2005 that the foundations of the house as built do not include a concrete strip footing as shown on the approved building consent documents. I have amended the draft as I consider appropriate.

3.7 In response to the draft determination sent to the parties the owner raised three matters regarding items listed in clause 6.1.3 of that draft, in a letter to the Department dated 19 December 2005. The first matter concerned drainage to the window sills. The owner suggested as only one sill had shown a raised moisture content in the vicinity, there was no general failure of the drainage system but merely a requirement for additional maintenance. The second concerned flashings to the tops of the plaster parapets, which the owner suggested were not required. The third matter concerned the vertical joints between the weatherboards and the solid plaster. The owner was concerned that the process of rectifying a perceived weakness could in fact create another problem, and thus not improve the compliance of the building with the Building Code.

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.
- 4.2 There are no Acceptable Solutions that have been approved under section 22 of the Act or section 49 of the Building Act 1991 that cover the monolithic cladding as installed on this house. The cladding is not currently certified under section 269 of the Act. I am, therefore of the opinion that the cladding system as installed must now be considered to be an alternative solution.
- 4.3 In several previous determinations, the Department 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 they may be modified in less extreme cases 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 expert inspected the claddings of the building on 29 and 30 August 2005 and furnished a report that was completed on 5 September 2005. The expert noted that the cladding showed no signs of visible cracking, apart from the roof to parapet wall junction on the southwest corner. The expert considered that no control joints were necessary, as walls do not exceed the 20 metres length or height, which is set by the manufacturer as the limit for this type of flexible lightweight plaster coating system, before a control joint is necessary.
- 5.2 The expert cut away small sections of the coating at the head to jamb and jamb to sill junctions of a window, and noted the presence of aluminium head flashings and uPVC jamb and sill flashings, with flashing junctions sealed with silicone sealant. The expert noted that, apart from the full-height windows, low moisture contents recorded under sills indicates that the flashing system appears to be performing adequately at present. I accept that the locations opened are typical of similar locations around the building.
- 5.3 The expert took non-invasive moisture readings at skirting level through interior linings, and noted elevated readings around the rear door. Approximately 70 further invasive moisture readings were taken through the cladding under windows, parapets and other risky areas, and the following unadjusted elevated readings were noted:

- 22% and 38% under the ground floor hall window on the west elevation
- more than 40% under the meter box and 32% under the gas water heater
- more than 40% at the south west corner of the parapet, above the deck column
- 28% in the deck column adjacent to the handrail fixing
- 19% below the scupper from the upper floor deck on the west elevation
- 34% and 38% beside the sill to the dining room doors on the east elevation
- four readings from 19% to 26% below the living room windows
- 24% at the bottom plate of the south-east corner of the retreat
- 20% in the bottom plate beside the living room door sidelight near the chimney
- 20% at one side of the doors to the ground floor bedroom
- 19% in the bottom plate beside the one of the entry door sidelights
- 26% at the bottom plate of the southwest corner of the laundry.

5.4 The expert noted that a reading of 24% in tanalith timber would be, after adjustment for timber type and treatment, indicate a moisture content of 21%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

5.5 The expert made the following specific comments on the cladding.

- The plaster coating butts up to window flanges, overlapping them by 5 mm to 15 mm, so preventing any moisture in the window from draining out.
- The timber doors have clear-finished flat timber doorsills with membrane flashing the undersides. The high moisture levels under the doorframes indicate water penetration.
- The sill of the aluminium door to the first floor deck does not overlap the deck membrane, although the door is fully sheltered under the deep roof overhang.
- The sloping timberhead above the stairwell windows is planted and sealed against the weatherboards without an over flashing and a gap is visible.
- The apron flashings at all roof-to-parapet junctions on the house and the garage lack kick-outs, the ends of gutters are buried in the plaster and there is heavy use of sealant. One of the four house corners has cracks in the plaster, moisture levels above 40% and signs of timber decay in the timber below.
- The gutters and fascias of the flat membrane roofs and canopies are buried in the plaster cladding, and there is no under lap of membrane at these areas. The

fascia board upstands are not overlapped by membrane, with the joint heavily reliant on sealant. On the entrance canopy roof, the fascia board is pulling away, and the cladding butts against the membrane at the wall junction.

- The small upper deck has an overflow scupper, which appears to be inadequately sealed as moisture levels below are elevated. The deck up stand has a flat plastered top. Balustrades are fixed at the ends only, with one fixing loose and high moisture content in the adjacent column. The deck has little fall and there are signs that water ponds under the membrane lap.
- A small section of the inter-cladding junction between plaster and weatherboard was cut out, and it was noted that there is no flashing underlying the corner.
- The meter box and gas hot water heater penetrations have no head flashings, and the meter box vision panel appears unsealed. There is water ponding in both units, with the water in the meter box flowing through the cable holes.
- The gap from the adjacent timber retaining walls allows for clearance from the adjacent soil. However, this gap is bridged by bevelled loose-laid pavers with the edge butting against the plaster cladding.
- The cladding beside the garage door is in contact with the ground. However, the garage is unlined.

5.6 Copies of the expert's report were provided to each of the parties. The owner agreed with the findings of the report. He also commented on aspects of the report, explaining what remedial work had been done and why a number of drainage details were installed. His conclusion as to what work was required reflected the report findings.

6 Discussion

6.1 General

6.1.1 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 and E2 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. The Building Industry Authority and the Department have described the weathertightness risk factors in previous determinations (Refer to Determination 2004/01 et al) relating to monolithic cladding, and I have taken these comments into account in this determination.

6.2 Weathertightness risk

6.2.1 In relation to these characteristics I find that the house:

- is built in a high wind zone
- is a maximum of two storeys high
- has an open timber deck at ground floor and an enclosed recessed deck at the first floor level
- is fairly simple in plan and form, but has two different cladding materials, parapets and some complex roof to wall junctions
- has no eave or verge projections
- has monolithic cladding which is fixed directly to the framing
- has external wall framing that is treated, so providing a good level of resistance to the onset of decay if the framing absorbs and retains moisture.

6.3 Weathertightness performance

6.3.1 Generally the cladding appears to have been installed according to good trade practice, but a large number of junctions, edges and penetrations are not well constructed. These areas are all as described in paragraph 5.4 and in the expert's report as being the:

- the raised moisture levels under one of the full-height windows
- flat sills and inadequate weatherproofing to the timber doors and the raised moisture levels beneath the door frames
- lack of adequate flashings to the planted timber head of the stairwell windows
- lack of adequate flashings to the plastered tops of parapets and the deck up stand
- inadequate weatherproofing of the lower ends of all parapets at the junction with the lower roof, resulting in significant water penetration in one corner
- lack of kick-outs to the ends of apron flashings at roof to parapet junctions
- burying of the ends of all gutters and fascias into the plaster coating
- inadequate weatherproofing of the scupper overflow from the deck
- lack of sealing to the loose balustrade fixing
- inadequate junction of the door sill with the deck membrane and the ponding of water under the membrane lap

- lack of flashings to inter-cladding junctions between plaster and weatherboards
- inadequate weatherproofing of the gas water heater and the meter box penetrations, resulting in considerable moisture penetration
- butting of the loose-laid pavers against the cladding at ground level.

- 6.3.2 I note the expert's comment on the lack of clearance at the garage doors, and accept that this is unlikely to cause problems as the area is well drained and the framing is unlined and able to dry, should it become wet.
- 6.3.3 I note the expert's comments on the decay resistance of the level of treatment used in the exterior walls of this house, but consider that the moisture levels recorded at over 18% indicate a lack of weathertightness which may affect more than just the framing.
- 6.3.4 I note the territorial authority's concerns in regard to sub floor ventilation and consider that, if the pavers butting against the cladding as outlined in paragraph 6.3.1 were to be separated from the cladding, the resulting gap should provide adequate ventilation to the sub floor space.
- 6.3.5 I note the territorial authority's comment on the question of control joints, but accept the expert's advice that these are not required for this type of flexible plaster system, which is similar to that used for EIFS cladding systems and may be expected to have similar limits as to areas without control joints. I also note that the cladding has been in place for some 5 years without any evidence of cracking in the main walls.
- 6.3.6 I note the owners' concern that the remediation work required to install back flashings to the join between the plaster and weatherboard claddings may do more harm than good by disturbing a join that appears to be currently weathertight. In this case I accept that, rather than install such flashings the owner could consider ensuring the durability of the join by installing some means of protective cover over it. Such an alternative to installing flashing would provide sufficient protection to the join to ensure compliance with the clauses E2 and B2 of the Building Code.
- 6.3.7 I note the owners concern regarding the provision of capping to the parapet walls but am of the view that such cappings are not only good practice but are also required to achieve compliance with clause B2 of the Building Code.
- 6.3.8 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting drainage and ventilation behind the cladding sheets, I have noted certain compensating factors that assist the performance of the cladding in this particular case.
- the cladding generally appears to have been installed to good trade practice
 - the external wall framing is treated to a level that provides good resistance to decay should the timber absorb and retain moisture.

- 6.3.9 I consider that these factors help compensate for the lack of a ventilated cavity and can assist the house to comply with the weathertightness and durability provisions of the Building Code.

7 Conclusion

- 7.1 I am satisfied that the current performance of the monolithic cladding is not adequate because it is allowing water penetration into the building at a number of locations at present. Consequently, I am not satisfied that the cladding system as installed on the building complies 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 on the building have already allowed the ingress of moisture or are likely to allow it in the future, the house does not comply with the durability requirements of clause B2.
- 7.3 Subject to further investigations that may identify other faults, I consider that, because the faults that have been identified with the cladding system occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.3.1 is likely to result in the building being weathertight and in compliance with clauses B2 and E2.
- 7.4 I note the territorial authority's comment on the lack of a strip footing, but accept the owner's advice, supported by the engineer's statement, that the foundations were constructed in accordance with the consent documents.
- 7.5 I note the territorial authority's concern regarding the age of construction, but consider that if the items outlined in paragraph 6.3.1 are rectified satisfactorily, and if the house continues to be well maintained, with moisture levels regularly monitored, the cladding is likely to meet the durability requirements of the Building Code.
- 7.6 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 Building 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. As the external wall framing is not treated, checking of its moisture content should be carried out as part of normal maintenance.

- 7.7 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.
- 7.8 As set out in paragraph 3.3, the territorial authority has concerns about the durability, and hence the compliance with the Building Code, of certain elements of the building, taking into consideration the completion date of the building in 1998. I am of the opinion that the territorial authority should amend the original building consent by making it subject to a waiver of the Building Code in accordance with section 67(1) of the Act to the effect that the durability of the elements listed in paragraph 3.3 is to be measured from the date of the substantial completion of the building instead of from the time of the issue of the code compliance certificate. The land information memorandum relating to this house should also be amended in line with the above. For the purpose of this determination, I am of the opinion that the term “substantial completion” of the building is achieved when the building is ready for occupation.

8 The decision

- 8.1 In accordance with section 188 of the Act, I hereby determine that the monolithic cladding system as installed does 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 Building 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 6.3.1, 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.
- 8.3 I determine that the territorial authority must accept the work included in the engineer’s producer statement referred to in paragraph 2.2.2 as confirmation that the work concerned complies with the Building Code.
- 8.4 I note that the territorial authority has not issued a notice to fix. A notice to fix should be issued that requires the owners 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 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.
- 8.5 I would suggest that the parties adopt the following process to meet the requirements of paragraph 8.4. Initially, the territorial authority should issue the notice to fix, listing all the items that the territorial authority considers to be non-compliant. The owner should then produce a response to this in the form of a technically robust

proposal, produced in conjunction with a competent and suitably qualified person, as to the rectification or otherwise of the specified issues. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.

- 8.6 I hereby determine that the territorial authority is to amend the original consent, issued in December 1998, to incorporate a waiver of clause B2 of the Building Code to the effect that the required durability periods for the building elements put in place in the course of work carried out under that consent are to be measured from the date of the substantial completion of the building and not from the date of the issue of a code compliance certificate. For the avoidance of doubt I determine that this waiver is not to be applied to elements that have been renewed or replaced since the original construction and for which little of the required durability period has elapsed at the time of this determination.
- 8.7 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 2 March 2006.

John Gardiner
Determinations Manager