

Determination 2006/03

Refusal of a code compliance certificate for a building with a “monolithic” cladding system at 13 Clifton Road, Takapuna, 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 applicants are the owners, Mr and Mrs Smith (“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 this 2-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 building (“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 very large house, with a detached garage and carport, situated in a very high wind zone for the purposes of NZS 3604. The site is long and narrow with a number of large established trees, and slopes gently to the northeast from the road to a sea cliff. An open walkway, with a flat stepped roof, parapets and monolithic clad columns, connects the garage building to the house. The house is two storeys high, except for a number of single-storey ground floor projections, and

comprises two separate structures connected by a two-storey hall structure that has a semi-circular stairwell at one end. A swimming pool on the northeast boundary occupies the U-shape formed by the hallway and house structures. Construction is generally conventional light timber frame, except for several specifically engineered elements, with concrete slabs, and concrete block foundations, retaining walls, and garage boundary walls. Window and door joinery is timber, with a large number of timber bi-fold doors. The house shape is complex, with monolithic wall, column and beam cladding, and a mix of flat membrane and sloping clay tile roofs. The northeast house structure has upper clay tile hip roofs at 25° pitch, with the southwest and hallway structures having flat membrane upper roofs. Lower roof lean-tos are at a pitch of 17.5°, and there are a number of canopies over patios and decks. Eaves projections generally vary from gutter width only to 300 mm wide, and there are no verge projections. A framed “chimney” penetrates the lower eaves on the northwest living room wall.

- 2.1.2 There are two enclosed upper level decks that have a mixture of monolithic-clad barriers and metal balustrades fixed to upstands. An enclosed deck is recessed into the roofline on the northeast elevation, with the tiled membrane floor sited partly above living areas. This deck is fully sheltered beneath a flat canopy roof. Where the covered walkway meets the house structure, a deck extends along the southwest elevation, supported by monolithic clad columns that extend up to the projecting roof above.
- 2.1.3 The owner maintains that the framing timber used in the house and garage is H3 treated. The expert commissioned by the Department to inspect the cladding (“the expert”) noted that the colour of accessible wall framing supported this, and sent a sample taken from the house to a technologist, who provided evidence confirming that the sample was treated with Alkaline copper quaternary (ACQ) to H3.2. Based on this evidence, I accept that the exterior wall framing is H3 treated timber.
- 2.1.4 The two main cladding systems applied to the exterior walls are what is described as monolithic cladding and are “Thermaclad” systems consisting of polystyrene backing sheets fixed directly to the framing over the building wrap, to which a “Ezytex” sponge finish plaster system has been applied. The plaster is finished with a flexible acrylic paint system. The garage uses 40 mm backing sheets, while the house has 60 mm, with vertical grooves formed in the back of the polystyrene sheets. A third cladding system uses a limited amount of “Harditex” cladding used on walkway parapets, deck barriers, clad columns, and part of the garage. This consists of 7.5 mm thick fibre cement sheets fixed through the building wrap to the framing, and finished with an applied textured coating system.
- 2.1.5 Plaster Systems Ltd provided “Producer Statements” dated 7 March 2003, for the “Thermaclad” systems used on the house and garage. It also provided 15-year “Materials Components Guarantees” and a 5-year “Workmanship Guarantees”, all dated 14 June 2004, relating to the “Thermaclad” and “Ezytex” systems. All guarantees carried exclusion clauses, whereby Plaster Systems Ltd did not accept responsibility for consequential damage of any kind to any building component that occurs as a result of the use of untreated timber.

- 2.1.6 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 the face-fixed polystyrene and fibre-cement sheet claddings used on this building to be an alternative solution (refer to paragraph 4.2).
- 2.1.7 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 17 December 2001, based on a building certificate issued on 26 October 2001 by Approved Building Certifiers Ltd (“the building certifier”). The scope of engagement attached to the building certificate noted no exclusions.
- 2.2.2 The building certifier made various inspections during the course of construction, including prior to lining installation and following lining installation. The final inspections appear to have taken place on 10 November 2003, and the inspection summary notes these as “approved”. The building certifier issued a code compliance certificate dated 20 April 2004, which noted that it was an “interim code compliance certificate” as it excluded the external cladding.
- 2.2.3 The territorial authority wrote to the owner on 27 April 2004, explaining that a further final inspection was required as the building certifier was unable to approve the external cladding due to it being:
- ...an Alternative Solution. As Council did not undertake any inspections of the installed cladding system it is unable to be satisfied on reasonable grounds that the installed cladding system complies with the NZ Building Code and therefore cannot issue the Code Compliance Certificate.
- 2.2.4 Following some further correspondence with the owner, the territorial authority carried out a visual inspection on 2 December 2004, which identified risk factors and some defects.
- 2.2.5 The territorial authority wrote to the owner on 21 June 2005, explaining 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. The territorial authority listed certain weathertightness risk factors identified with the building, together with a list of defects and stated that, due to the 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.
- 2.2.6 The territorial authority did not issue a Notice to Rectify as required under section 43(6) of the Building Act 1991.

2.2.7 The owner applied for a determination on 4 July 2005.

3. The submissions

3.1 In a covering letter to the Department, the owner described some of the background to the dispute, and noted that:

In planning the house construction, we took all due care, aware from our years in the construction business and also being part owners of a timber treatment and processing plant at the time, of the looming leaking house crisis.

3.2 The owner went on to include the following points in regard to the risk factors and defects raised by the territorial authority in the letter of 21 June 2005.

- The house was built prior to the risk criteria of E2/AS1 applying.
- All sills have been lined with butynol, which cannot be seen.
- An aboveground capillary break is installed to stop water drawing up the walls.
- The walkway parapet is outside, and is not an enclosed part of the house.
- All fixings through the cladding are sealed with silicone.
- The identified defects are minor issues related to uncoated polystyrene.

3.3 The owner concluded by noting that:

...Council is unwilling to issue a Code of Compliance for this property because they did not do the initial inspections. They want an independent, higher authority to make a recommendation on which they can act.

3.4 The owner forwarded copies of:

- the building plans
- the building certifier's inspection summary
- the building certifier's interim code compliance certificate
- the letter dated 21 June 2005 from the territorial authority
- the producer statements and warranties in regard to the cladding.

3.5 The territorial authority made a submission in the form of a letter to the Department dated 18 August 2005, which summarised the consent and inspection processes relating to the building, explained the changed inspection procedures now implemented by the territorial authority, and noted that:

In regard to this application for a determination, the matters of doubt are:

- Whether the installed cladding system complies with clauses B2.3.1 and E2.3.2 of the Building Code.

3.6 The territorial authority forwarded copies of:

- some of the consent documentation
- the territorial authority's weathertightness inspection report
- the correspondence with the owner.

3.7 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.

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 experts report

5.1 The Department engaged an expert to inspect the house and provide a report.

5.2 The expert inspected the claddings of the building on 15 September 2005 and furnished a report that was completed on 21 September 2005. The expert noted the quantity of leaf debris from the large trees on the site. The expert noted that the cladding generally appeared of a good standard, with little evidence of cracking, and that the wall areas present in this house are of dimensions that do not require control

joints in order to comply with the manufacturer's instructions. The expert removed two small sections of plaster 50 mm below the floor slab level on the southeast and northwest sides of the house, and noted that the uPVC anti-capillary section appeared to be installed in accordance with the manufacturer's recommendations.

- 5.3 The expert noted that the timber windows and doors have been recessed within the wall depth, with copper head flashings and concealed uPVC flashings. The expert removed small sections of the plaster coating at the head and sill to jamb junctions, and noted that the inner edges of uPVC jamb and sill flashings appear to terminate in rebates cut into the timber joinery frame. The expert noted that a sealant junction had been used between the jamb and sill flashings in lieu of corner soakers. The expert lifted a section of carpet at the sill of a bi-fold door, and noted that the frame is recessed into the concrete slab, but was unable to access the flashing under the flat timber sill. I accept that the locations opened up in this way are typical of similar locations around the house.
- 5.4 The expert took non-invasive moisture readings through interior linings of the house and garage and noted no elevated readings. However, rusted carpet fixings were noted to the left of the master bedroom door to the deck, and beneath the window to the left of the gas fire in the living room. Approximately 80 further invasive moisture readings were taken through the exterior claddings and 45 elevated readings (uncorrected for timber treatment) were noted, including:

Northeast elevation

- 26%, 2 at 23%, 2 at 22%, 3 at 21%, at various locations along upstands, barriers, built-in planter walls and column bases of the master bedroom deck
- more than 40% and 2 at 34 % in the canopy beam beneath the deck upstand
- 24% at the base of the column under the family room canopy
- 26% at the base of the column under the living room canopy

Northwest elevation

- 21% and 22% under jambs of the window to the right of the chimney structure
- 28% under the pipe through the chimney structure to the living room gas fire
- 38% at the base of the column under the living room canopy

Southeast elevation

- 20% and 24% under jambs of the bi-fold doors to the hall structure
- 22% at the base of the column under the dining room canopy
- 21% under both jambs of the dining room bi-fold doors
- 21% and 22% at the column and barrier of the master bedroom deck

- 21% under the jamb of the master bedroom window

Southwest elevation (deck over house entry)

- 5 at 26%, 23% and 2 at 22%, at various locations along the upstands and beams of the deck over the front entry
- 3 at 32%, 21%, 2 at 20%, at the base of columns under the front entry deck

Covered walkway

- 20% and 22% at boundary rafters of the walkway parapets

Garage

- 2 at 23% at the base of columns under the front entry canopy
- 23% at the wall to the right of the carport
- 20% at the base of the wall adjacent to the walkway

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

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

- Although the base of the EIFS cladding is buried in the ground on the southeast and northwest walls, uPVC anti-capillary sections used on these walls, in accordance with the manufacturer's instructions, appear to be preventing moisture penetration into the framing. However, there is no base flashing at ground level to protect the bare polystyrene.
- The base of most clad columns is in contact with paving, and moisture levels are high in most cases.
- Clearances from the bottom of the cladding to deck floors are not in accordance with the manufacturer's instructions, but the floor to wall junctions are well sheltered under canopies.
- There are other locations with inadequate cladding clearance, but these are well sheltered under canopies and show no evidence of moisture penetration.
- The fascia and verge tiles are buried in the cladding above the north east living room bi-fold doors, and a reading of over 40% was recorded below.
- There are a number of other locations where fascias or gutters penetrate the wall cladding.
- The bottom of apron flashings lack kickouts at a number of locations, and have unsealed gaps or are poorly sealed.

- Junctions between the sloping tiled roofs and flat membrane are poorly sealed.
- At several locations, the bottom of valley gutters allow water to drain under the bottom course of tiles, where leaf debris can build up and block water flow.
- The northeast deck has drainage and overflow pipes draining into an adjacent gutter, which is sealed against the cladding with no stop end. A reading of 34% was recorded below the junction.
- There are a number of unsealed gaps in the roof side of the parapet cappings to the covered walkway and visible mildew staining on the ceiling below, with moisture readings of 22% recorded.
- There is a crack in the plaster coating under the sill of the northwest hallway bi-fold doors, with a moisture reading of 24% recorded. There is another crack along the same wall, although no elevated moisture.
- Metal balustrades are fixed through the top of deck upstands, most of which have inadequate fall. High moisture contents were recorded in upstands, beams and columns.
- Two of the southwest deck columns have decorative plinths topped with flat copper cappings, through which timber posts penetrate. The other deck two columns each have two cutouts, with no fall to the bottom of the holes. High moisture readings were recorded at the base of three of these columns.
- Small shower waste outlets have been used as deck outlets, and appear to be inadequately sized (particularly in regard to the quantity of leaf debris observed). In the southwest deck, two outlets are concealed in column cut-outs, with the pipe discharging onto the ground level paving below. High moisture readings were recorded at the base of these columns.
- The gas pipe penetration through the chimney cladding of the living room is unsealed, and the gas heater vents have no top flashing. A moisture reading of 28% was recorded below these penetrations.
- The membrane to the flat roof areas is bubbling in some areas.

5.7 Copies of the expert's report were provided to each of the parties.

5.8 In a letter to the Department dated 11 November 2005, the owner commented on a number of descriptions and other items covered in the expert's report.

- The suspect roof to wall junction is an isolated fault, rather than systematic.
- Areas with lower floor clearances are well drained to cesspits.
- The house was built prior to the risk criteria of E2/AS1 applying, and the Act requires reference only to regulations applying at the time of construction.

- All wall and skillion roof framing is H3.2 treated timber, and can endure 30% moisture content levels.
- Fibre cement sheets have used only in a few isolated locations.
- Corrosion of carpet fixings in the main bedroom was a result of wind-blown rain driving through the timber doors during a recent storm.
- Corrosion of carpet fixings near the chimney was a result of the late installation of flashings, and the area is now dry.
- There are only several suspect areas on the north weather-exposed side and at the bottom of fibre cement clad columns.

5.9 The owner concluded that the expert's report misrepresented the house in a negative way without highlighting work done to weatherproof some difficult areas:

...we can see some areas that may need some remedial work, but would point out that for the size and style of the house, the system is working.

5.10 Copies of a draft determination were provided to each of the parties.

5.11 In a letter to the Department dated 3 December 2005, the owner discussed the matter of using the moisture readings recorded in the expert's report as an indication of performance when the readings had not been adjusted to take into account the particular type of timber treatment used for the framing. The owner concluded that:

We now find it hard to see how this property can be properly assessed on the basis of this report, when the first impression would appear seriously inaccurate, based on a report that has not applied a basic scientific principle when the corrective factor is so large.

5.12 Further investigation and consultation by the Department confirmed that the ACQ-treated timber used in the framing of this house is likely to have a significant effect on the readings noted in paragraph 5.4. Although corrected values for the particular type of moisture meter used by the expert were unavailable, values available for a similar type of meter allow elevated moisture readings to be estimated as follows:

- 18% to 21% along upstands of the master bedroom deck
- 26% to more than 30% in the canopy beam beneath the deck upstand
- 19% at the base of the column under the family room canopy
- 20% at the base of the column under the living room canopy
- 22% under the pipe through the chimney structure to the living room gas fire
- 29% at the base of the column under the living room canopy
- 19% under jambs of the bi-fold doors to the hall structure

- 18% to 21% at various locations along the upstands and beams of the deck over the front entry
- 25% at the base of columns under the front entry deck

Garage

- 18% at the base of columns under the front entry canopy
- 18% at the wall to the right of the carport

5.13 In an email to the Department dated 18 January 2006 the owner advised that some remedial work highlighted in the expert's report was being undertaken. The work was described as "straight forward issues arising out of the [expert's] report which [the owner] deemed needed to be done and which could be done so without any contention". Nine items were listed.

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 very high wind zone
- is a maximum of two storeys high
- has two enclosed decks with monolithic clad barriers and upstands, one of which is situated above living areas
- has canopies or deep roof projections that shelter the enclosed decks and most of the ground floor bi-fold doors
- is complex in plan and form, with many complex roof and roof to wall junctions

- has eaves projections of 330 mm over some walls and no projections over others
- has monolithic cladding which is fixed directly to the framing
- has external wall framing that is treated, so providing a good 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 reasonable trade practice, but some junctions, edges, penetrations and decorative features are not well constructed. These areas are all as described in paragraph 5.6 and in the expert's report as being the:

- lack of base flashings and unsealed bottom edges of the cladding
- lack of cladding clearance at the base of columns
- burying of gutters, fascias and some verge tiles into the cladding
- lack of kick-outs, and inadequate weatherproofing to the ends of apron flashings at roof to wall junctions
- poorly sealed roof junctions of sloping tiles with flat membrane roof areas
- overlapping of lower tiles onto the bottom of valley flashings
- lack of a stop end to the gutter taking drainage from the north east deck
- unsealed gaps to the walkway roof parapet cappings
- cracks to the cladding in the north west hallway wall
- outer edges of both decks, in regard to weathertightness of upstands, barriers, handrail fixings, deck columns and beams, including the lack of fall to the tops of upstands, barriers, and column plinths and to the bottom of column cutouts
- inadequately sized deck drainage outlets and concealed outlets within two of the north east deck columns
- lack of sealing of the gas pipe penetration through the chimney cladding
- bubbling of the flat roof membranes.

6.3.2 I note the expert's comments on the anti-capillary section along the southeast and northwest walls, and accept that this is in accordance with the manufacturer's instructions and appears to be preventing moisture penetration into the framing. I consider that the ground clearance is adequate in the walls where the extra protection of this section has been installed.

- 6.3.3 I note that the estimated corrected moisture content readings, while reducing the number of locations at which moisture is present and the extent of that moisture, indicates excessive moisture is still present in the building at certain locations.
- 6.3.4 I note the expert's comments on the lack of cladding clearance to deck and ground level paving (where there is no anti-capillary section), and accept that these areas are drained and well protected by canopies above. I consider that the clearance is adequate in these circumstances.
- 6.3.5 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 reasonable trade practice
 - the house has deep canopies or roof projections over the decks and most bi-fold doors, which provide good protection to the cladding areas below them
 - the house has eaves projections over some walls that provide some protection to the cladding areas below them
 - the external wall framing is treated to a level that provides good resistance to the onset of decay if the framing absorbs and retains moisture
- 6.3.6 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, and noting the number of slightly elevated moisture readings that warrant further investigation, 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 problem

areas identified 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 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 checking, cleaning, re-painting, replacing sealants, and so on.
- 7.5 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.
- 7.6 In these circumstances, I decline to incorporate any waiver or modification of the Building Code in this determination.

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 Subject to further investigations into the reasons for the large number of slightly elevated moisture readings, I also find that rectification of the problem areas identified 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 note that the territorial authority has not issued a Notice to Rectify. 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.
- 8.4 I would suggest that the parties adopt the following process to meet the requirements of paragraph 8.3. 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.

- 8.5 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 26 January 2006.

John Gardiner
Determinations Manager