

Determination 2005/20

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 18

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 applicants are the owners (referred to throughout this determination as the “owner”), and the other party is the territorial authority. The application arises from the refusal by the territorial authority to issue a code compliance certificate for a 3-year old major extension to an existing house (“the extension”) unless changes are made to its monolithic cladding system.

1.2 The question to be determined is whether reasonable grounds that the external wall cladding as installed (“the cladding”), which is applied to all of the upper floor and part of the lower floor walls of the extension, 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 Building Act or the building code.
- 1.6 The extension itself is described in paragraphs 2.1 to 2.4, and paragraph 8 sets out the Authority's final decision.

2 PROCEDURE

The building

- 2.1 The extension consists of both a single storey addition and a two storey addition to an existing brick veneered detached house situated on a level site, which is in a severe wind zone in terms of NZS 3604: 1999 "Timber framed buildings". The extension is of conventional light timber frame construction, built on concrete block foundation walls on the first floor timber framed floor. The new external walls of the upper floor and part of the external walls of the lower floor of the two-storey addition are sheathed with monolithic cladding. The balance of the new external ground floor walls to the two-storey extension and all the external walls of the single storey addition are brick veneered and plastered. The extension is of a fairly simple shape, but the main concrete-tiled pitched roofs have several complex valley and wall/roof junctions. A large timber-framed deck constructed entirely over living spaces extends around three elevations of the extension at the first floor level. The floor of the deck has a butyl rubber membrane covering laid over a fibre-cement substrate, and the membrane is in turn covered with tiles. The deck has timber-framed balustrades that line up with the face of the lower cladding or veneer. These balustrades are lined on their sloping tops and both faces with monolithic cladding. The eaves have 600mm wide projections.
- 2.2 The specification describes all interior (unexposed) timber to be TPAH1 treated. While the owner informed the expert engaged by the Authority that the external wall framing was H3 treated, the Authority has not received any further evidence as to what timber was actually used on the extension.
- 2.3 The wall cladding is what is described as monolithic cladding. As specified in its technical information (the manufacturer's instructions), it incorporates proprietary 4.5 mm thick fibre-cement rigid sheets fixed through the building wrap directly to the framing timbers and finished with a three coat proprietary plaster system. The system consists of a 10 mm thick base coat of low density cement-based insulating plaster, overlaid with a 1.5 mm thick fibreglass mesh reinforced plaster, with a further 1.5 mm thick layer of finishing plaster. An acrylic paint system is then applied. The manufacturer's instructions include details for flashings at various junctions, for movement joints, and require flashings at the heads, jambs, and sills of exterior joinery units such as windows. The instructions also require all the plaster products, reinforcing mesh, and PVC flashing components to be supplied directly to the plastering contractor by the manufacturer of the system.
- 2.4 The cladding applicator has provided a "Producer Statement", dated 1 August 2002, which identifies the cladding system used.

Sequence of events:

- 2.5 The territorial authority issued a building consent in 2001.
- 2.6 The territorial authority made various inspections during the course of construction, and on 28 August 2001, approved the plaster cladding inspection, and on 31 July 2001, approved the preline inspection.
- 2.7 The territorial authority issued an interim code compliance certificate on 23 April 2002, which did not specify the items to which it applied, but did have certain conditions attached. The items that related to the cladding were:
- Complete all exterior painting, landscaping, hardstanding finished ground levels 100mm below finished floor level to paving where plastered [or] brick veneer and 150mm to bare ground. Finished ground levels 150mm to paving where plastered onto [named product] on timber frame and 225mm to base ground.
- Rainhead is leaking onto wall surface and has no provision for overflow, top of rainhead is above deck level.
- 2.8 The territorial authority did not issue a Notice to Rectify as required by section 43(6) of the Act.
- 2.9 The owner applied for a determination on 29 June 2004.

3 THE SUBMISSIONS

- 3.1 The territorial authority did not make a submission. The owner supplied copies of:
- The construction plans and specifications;
 - The manufacturer's instructions;
 - The minutes of a 5 May 2004 site meeting;
 - The territorial authority's inspection sheet;
 - The code compliance certificate; and
 - The "Producer Statement" supplied by the cladding applicator.
- 3.2 The copies of other evidence were provided to each of the parties. Neither the owner nor the territorial authority made any further submissions in response to the submissions of the other party.

4 THE RELEVANT PROVISIONS OF THE BUILDING CODE

- 4.1 The dispute for determination is whether the territorial authority's decision to refuse to issue a code compliance certificate because it was not satisfied that the cladding complied with clauses B2.3.1 and E2.3.2 of the building code (First

Schedule, Building Regulations 1992) is correct. Those provisions of the building code provide:

Clause B2 DURABILITY

B2.3.1

Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:

- (a) The life of the building, being not less than 50 years, if:
 - (i) Those building elements (including floors, walls, and fixings) provide structural stability to the building, or
 - (ii) Those building elements are difficult to access or replace, or
 - (iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.
- (b) 15 years if:
 - (i) Those building elements (including the building envelope, exposed plumbing in the sub floor space, and in-built chimneys and flues) are moderately difficult to access or replace, or
 - (ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

Clause E2—EXTERNAL MOISTURE

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

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

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

4.2 There are no Acceptable Solutions that have been approved under section 49 of the Act that cover this cladding. The cladding is not accredited under section 59 of the Act. I am therefore of the opinion that the cladding system as installed can be considered to be an alternative solution.

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

- Some acceptable solutions cover the worst case, so that in less extreme cases they may be modified and the resulting alternative solution will still comply with the building code; and

- Usually, however, when there is non-compliance with one provision of an acceptable solution, it will be necessary to add some other provision to compensate for that in order to comply with the building code.

5 THE EXPERT'S REPORT

5.1 Because the information provided by the parties contained insufficient detail on how the building had been constructed, the Authority commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert furnished a report on the cladding. It noted that the plaster thickness met the manufacturer's requirements. Generally, the quality of the plaster surface is very good and the paintwork appears sound and evenly applied with no evidence of chalking, flaking, staining or of bare/over-applied patches. Taking into account the dimensions of the external walls, and that the specification for this system does not require vertical or horizontal control joints for such walls, there was no requirement for control joints. The expert also noted that there was a sufficient gap between the balcony deck and the base of the balustrade or main wall cladding. In addition to the main rainwater drains from the balcony, there were also 2 external drainage hoppers with overflow provisions. The one vertical junction between the cladding and the plastered brickwork occurred at a corner and there was no evidence of cracking at this location. The expert removed 6 areas of cladding to check on various details and also removed areas of cladding at 2 corners of one window. The Authority accepts that the results of these investigations are indicative of other remaining like locations. The expert also made the following comments regarding the cladding:

- There is no sealant or flashing to the horizontal joint at the first floor level between the backing sheets or between the backing sheets and the plastered brickwork below it. The polystyrene band is fitted below the joints and therefore does not provide any protection against water ingress through the joint. However, the expert notes that the installation of flashings and sealants are not specifically required by the manufacturer;
- There is a hairline crack in the first floor southwest corner cladding;
- There is insufficient ground clearance below the cladding at the left of the entrance and there is an elevated moisture readings at the bottom plate at this location;
- The exterior windows and doors have aluminium head flashings and pvc jamb and sill flashings. However, the head flashings do not extend the recommended 20mm minimum past the jamb facing. The jamb flashings are poorly jointed to the sill, do not meet the head flashings, and there is no silicone sealant at either of these junctions;
- The apron flashing/wall intersections at the spouting ends are poorly detailed and installed. There are no "kick out" fittings to the end of the flashings and the ends of fascia/spouting system are buried in the plaster;
- The 2 rainwater heads are fitted hard against the cladding and the paint finish is not continued behind one of these; and

- There are no metal cappings or saddle flashings to the top of deck balustrades, nor any evidence of a reinforcing membrane at these locations.
- 5.2 The expert took non-invasive moisture content readings of the external walls throughout the extension and found only one location with a high reading. The expert subsequently took 2 further invasive tests and obtained readings of 12.7% and 23.4%. The latter reading was taken at the corner stud to the left hand side of the entrance, where there is insufficient ground clearance below the cladding. 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. The territorial authority did not comment on the report. In a letter to the Department dated 17 February 2005, the owner listed items of remedial work that are intended to be carried out to meet some of the issues raised by the expert.

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 extensions can be minimised if good and effective design and construction practices are followed.
- 6.3 The installation of exterior cladding to manufacturer's specifications and to accepted good trade practice is an important but not the only requirement to ensure good weathertightness performance.
- 6.4 The next priority is to reduce the ability of moisture to get through the cladding by using design measures that minimise the effects of the rain impacting on the walls.
- 6.5 Important matters for consideration are:
- Data show a strong relationship between the width of the eaves and the incidence of wall leaks. An effective deflection mechanism, such as eaves greater than 600 mm wide, has been shown by Canadian data to manage more than 90% of rain incidence;
 - While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential, I believe that buildings in high and very high wind zones (as defined by NZS 3604) are likely to experience wind pressure differentials and thus a higher risk of water ingress;

- Taller buildings result in an effective increase in the catchment area of the wall. Available data suggests a clear correlation between higher number of storeys and an increased incidence of leaking;
- Complex roofs and overall envelope shapes where the roofs frequently intersect with the walls on upper floors create opportunities for leaks into the wall; and
- Recent data also shows that decks and balconies that are exposed in plan and/or cantilevered from the external walls are the most frequent location for water leaks.

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

- The structure should allow water that has penetrated the cladding to drain out as quickly as possible. It is believed that generally, a drainage cavity should be provided behind the outer cladding barrier in monolithic construction;
- The design of the outer walls should allow walls to dry to the outside once moisture penetrates the cladding and the moisture barrier. If walls do not dry, decay fungi can become established in as little as 3 months. Until scientific data on the optimum depth and configuration of the ventilation mechanism in New Zealand conditions is available, I 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 this extension:

- Has 600 mm, wide eaves projections that provide good protection to the cladding under them;
- Is in a severe wind zone;
- Is two storeys high;
- Has exterior windows and doors that have flashings installed to all perimeters, but there are incomplete junctions between the jamb flashings and the head or sill flashings;
- Has an overall envelope that is fairly simple in plan, but with roofs having complex hip and cladding/roof junctions;
- Has a large deck at first floor level that is built entirely over living spaces; and

- Has external walls that are constructed with timber treated to an H1 LOSP level, which is likely to decay if it absorbs and retains moisture.

Weathertightness performance

- 6.8 Generally, the cladding appears to have been installed according to good trade practice and to the manufacturer's instructions, but some junctions, edges, and insertions are not well constructed. These areas are:
- The cracking in the southwest corner cladding;
 - The insufficient ground clearance to the left of the entrance;
 - The lack of "kick outs" to the end of the apron flashings;
 - The buried ends of the fascia/spouting systems;
 - The rainwater heads being fixed hard against the cladding and the lack of paint finish behind one of these; and
 - The lack of adequate waterproofing to the deck balustrade tops and where the balustrades join the main wall cladding.
- 6.9 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting drainage and ventilation behind the cladding sheets, I find that there are compensating factors that assist the performance of the cladding in this particular case. These are:
- Generally, the cladding appears to have been installed according to good trade practice and to manufacturer's specifications; and
 - The extension has 600mm wide eaves projections.
- 6.10 I note that the expert has commented on the lack of sealant and flashings to the sheet joints of the backing sheets at the first floor level horizontal junction. The expert has also commented that the manufacturer does not specifically require these. There is also no significant cracking apparent in the plaster. Taking these two factors into account, together with the flexibility of the proprietary plaster coating that is applied over the backing sheets I am of the opinion that the sheet jointing in its present form is acceptable.
- 6.11 The expert has also commented on the flashing junctions to the exterior windows and doors. While the junctions do not fully comply with the manufacturer's recommendations, it is noted that the window heads are protected by wide eaves projections and the sill flashings have a significant fall away from the frame. In addition, there are no indications of moisture ingress at these locations. Accordingly, I accept that the flashings as installed adequately protect the cladding.
- 6.12 I accept that the horizontal joint between the cladding and the plastered brickwork below the inter-storey joint presents a greater risk of structural movement. However as there is a cavity behind the brick veneer at this location, I find that the present jointing system is also acceptable.

- 6.13 I note that one elevation of the extension demonstrates a low weathertightness risk rating, and three elevations of the extension demonstrate a medium 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 to one location at present. Consequently, I am not satisfied that the cladding system as installed complies with clause E2.3.2 of the building code.
- 7.2 I find that, because the faults that have been identified with this cladding occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.8 is likely to result in the building being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity
- 7.3 I note that effective maintenance of monolithic claddings is important to ensure ongoing compliance with clause B2 of the building code. That maintenance is the responsibility of the building owner. The code assumes that the normal maintenance necessary to ensure the durability of the cladding is carried out. For that reason clause B2.3.1 of the building code requires that the cladding be subject to “normal maintenance”. That term is not defined and I take the view that it must be given its ordinary and natural meaning in context. In other words, normal maintenance of the cladding means inspections and activities such as regular cleaning, re-painting, replacing sealants, and so on. I observe that the recoating of the cladding is an essential maintenance requirement in this particular instance. I recognise that a territorial authority does not have any statutory responsibility for the ongoing maintenance of a building. However, the maintenance programme adopted by the owner could be undertaken after consultation with the territorial authority, bearing in mind that the nature of the advice, and the basis on which it is provided to the owner, are for the territorial authority to decide.
- 7.4 I emphasise that each determination is conducted on a case-by-case basis. Accordingly, the fact that a particular cladding system has been established as being code compliant in relation to a particular building does not necessarily mean that the same cladding system will be code compliant in another situation.
- 7.5 I decline to incorporate any waiver or modification of the building code in its determination.

8 THE DECISION

- 8.1 In accordance with section 20 of the Building Act 1991 I determine that the cladding system as installed does not comply with clause E2.3.1 of the building code. There are also a number of items to be remedied to ensure that the extension remains weathertight and thus meets the durability requirement of the code.

Consequently, I find that the extension does not comply with clause B2, and confirm the territorial authority's decision to refuse to issue a code compliance certificate.

- 8.2 I find that rectification of the items outlined in paragraph 6.8 to the approval of the territorial authority, along with any other faults that may become apparent in the course of that work, is likely to result in the extension 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 extension up to compliance with the building code. It is not for me to decide directly how the defects are to be remedied and the cladding brought to compliance with the building code. That is a matter for the owner to propose and for the territorial authority to accept or reject, with either of the parties entitled to submit doubts or disputes to the Chief Executive for another determination.
- 8.4 Finally, I consider that the cladding on the building will require on-going maintenance to ensure its continuing building code compliance.

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

John Gardiner
Determinations Manager