Determination 2005/40

Refusal of a code compliance certificate for a building with a "monolithic" cladding system: House 34

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 applicants are the joint-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 9-year old alteration to an existing house ("the house") unless changes are made to its monolithic cladding system.

1.2 My task in this determination is to consider whether I am satisfied on reasonable grounds that the external cladding as installed ("the cladding"), which is applied to the external walls and columns of this house complies with the building code (see sections 18 and 20 of the Act). By "external 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 the decision.

2 PROCEDURE

The building

2.1 The resultant building, after the alteration of approximately 13 square metres in area, is a two-storey detached house situated on an sloping site, which is in a medium wind zone in terms of NZS 3604: 1999 "Timber framed buildings". The new external walls are of conventional light timber frame construction built on either new or existing piled timber floors, and sheathed with monolithic cladding. The house is of a fairly simple shape and the corrugated steel low-pitch roof has a inclined eaves rising to the roof edge at the higher level. There are wall junctions with the existing roofing elements. The eaves have 600 or 730mm wide projections (including the spouting projections) and the verges have 430mm wide projections. The aluminium external windows and doors are recessed into the cladding openings.

2.2 A timber-framed balcony is constructed outside the main wall line adjoining the upper bedroom. This is supported on 100x100mm posts that are surrounded with 200mm diameter plastered polystyrene casings and timber beams, and the floor is finished with tiles over a butyl-rubber membrane waterproofing system. The balcony has a timber-framed balustrade, which is clad with weatherboards on its outer face and with painted fibre-cement linings on its inner face. The top of the balustrade is capped with a plastered timber projecting capping and a timber handrail.

2.3 The specification calls for all wall framing to be H1 treated. However, I have not received any evidence to confirm what treatment, if any, has been applied to the external wall framing.

2.4 The cladding system is what is described as monolithic cladding. As specified in the manufacturer's data sheets ("the manufacturer's instructions"), the cladding to the walls of the house incorporates 60 mm thick expanded polystyrene (EPS) backing sheets fixed through the building wrap directly to the wall framing and finished with a reinforced sponge float finish plaster and a further paint system. The system has

been subject to an independent appraisal ("the appraisal"). The manufacturer's instructions include details for the heads, jambs and sills of exterior joinery units.

2.5 The plaster system supplier provided a "Producer Statement" dated 6 October 2003, covering the plaster system for a period of 15 years, and also an attached "Warranty for Coating-System" for the same period of time.

Sequence of events

2.6 The territorial authority issued a building consent on 24 November 1995.

2.7 The territorial authority carried out initial inspections during the course of construction and approved the "Preline Building Inspection" on 24 May 1996. The territorial authority carried out final inspections on 26 May 1994 and 10 June 1994. A specific weathertightness inspection was carried out on 10 June 2004. The cladding issues were also referred to the territorial authority's Code Compliance Certificate Resolution Committee.

2.8 On 10 June 2004, the plaster system supplier wrote to the owner, stating that the cladding installation was completed in May 1996. The supplier confirmed that the plasterer confirmed by the builder was a licensed practitioner for the system.

2.9 The territorial authority wrote to the owner on 21 June 2004, stating:

> We have received your request for a code compliance certificate (CCC) for a dwelling at the above address, we would advise the following:
>
> Before the council can issue a code compliance certificate, we must ensure that all building work meets the NZ Building Code requirements. In particular, the building code specifies that building work must remain durable for specific periods of time after the code compliance certificate is issued.
>
> You will be aware of the current weathertightness issues often reported in the media. These issues have highlighted the care that must be taken to establish that all building elements, but particularly cladding, is durable before any CCC can be issued.
>
> As your building is face fixed (monolithic)] construction with no cavities we are unable to verify that it fully complies with the Building Code requirements, manufacturer's details application (*sic*) at the time and that it will remain durable for the required period. Areas of concern/risk are:
>
> 1. Producer Statement and system or material warranties not available
> 2. Timber treatment of frames unknown
> 3. Cladding has some movement in places and is soft and delaminating
> 4. Columns have cladding in contact with ground (noted that some work is underway to rectify this)
> 5. High risk design – curved eaves, exposed rafter/cladding joints (potential leaky junctions)

> Visual inspection recently carried out by council has also revealed the following defects, which need remedying, however we advise that even when these defects are remedied to council's satisfaction, we consider the consent would still need to go to the Building industry Authority for determination.
>
> **Defects to be remedied and further inspection called for**
>
> 1. Cladding to be repaired according to manufacturer's specifications
> 2. Ground contact to be made complying – a minimum of 100mm required
> 3. Outstanding Field Memo [identifying number] to be cleared
>
> There has been recent information and knowledge that face sealed cladding systems without an adequate drainage and ventilation cavity will cause irrevocable damage to structural elements in the event of leakage and/or the effect of residual moisture.
>
> Council cannot be satisfied on reasonable grounds, that the cladding system as installed on the above building will meet the functional requirements of Clause E2 External Moisture of the New Zealand Building Code and is therefore unable to issue a code compliance certificate…

2.10 On 8 July 2004 the territorial authority noted, in a letter to the owner, that the final inspection showed that all work had been completed in accordance with the approved plans, with the exception of the "[e]xterior wall cladding, including cladding to ground clearance".

2.11 The territorial authority did not issue a Notice to Rectify as required under section 43(6) of the Act.

2.12 The owner applied for a determination on 12 September 2004.

3 THE SUBMISSIONS

3.1 The territorial authority made a submission in the form of a letter to the Authority dated 14 March 2005, which summarised the consent and inspection processes relating to the house. The territorial authority also noted that no specific cladding inspections had been undertaken for the external cladding system. The owner had been informed that, due to the type of monolithic cladding applied to the house, together with its attendant risk factors, the territorial authority was unable on reasonable grounds to accept the compliance of the cladding. The territorial authority noted that the matters of doubt were:

- 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.

3.2 The territorial authority supplied copies of:

- The consent documentation;
- The territorial authority's inspection documentation;
- The letter from the plaster system supplier of 10 June 2004; and
- The correspondence with the owner.

3.3 The owner wrote to the Authority on 15 September 2004, briefly summarising the events arising from the completion of the house up to the refusal of the territorial authority to issue a code compliance certificate. The owner requested the Authority to take into account that:

- The building work was 8 years old and there was no evidence of leaking or internal moisture;
- As the largest wall surface is sloping, an effective cavity has been formed, and while the wall is north facing, a wide eaves protects it;
- The remaining cladding at ground level is applied over the existing weatherboard and is also protected by an upstairs deck; and
- The 3 remaining upper level walls have relatively small areas and are protected by wide eaves.

3.4 The owner supplied copies of:

- The plans and specifications;
- The consent documentation; and
- The territorial authority's inspection documentation.

3.5 The copies of the submissions and other evidence were provided to each of the parties. Neither the owner nor the territorial authority made any further submissions in response to the submissions of the other party.

4 THE RELEVANT PROVISIONS OF THE BUILDING CODE

4.1 The dispute for determination is whether the territorial authority's decision to refuse to issue a code compliance certificate because it was not satisfied that the cladding complied with clauses B2.3.1 and E2.3.2 of the building code (First Schedule, Building Regulations 1992) is correct. Those provisions of the building code 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 sub floor space, and in-built chimneys and flues) are moderately difficult to access or replace, or

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

Clause E2—EXTERNAL MOISTURE

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

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

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

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

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

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

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

5 THE EXPERT'S REPORT

5.1 The Authority commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert inspected the building and furnished a report dated February 2005. It noted that the textured finish "appears to be satisfactory and commensurate with the approximate age of the property". The expert removed the plaster coating to reveal the window perimeter details at two locations, and noted that the windows lacked any flashings, and that sealant had been applied to the window/cladding junctions prior to the application of the textured coating. The expert was of the opinion that control joints were not required for a house with the dimensions of the one in question. The expert also made the following comments regarding the cladding:

- The recommended clearances are not achieved at some locations where the base of the wall cladding adjoins the balcony deck or the roofs;
- There is minor cracking evident in the cladding at some locations;
- There is an area of plaster delamination above a window on the north elevation that has timber blocking behind the plaster coating;
- Some screw fixings securing pipe and gutter brackets have not been sealed, and the loose fixings to the south elevation gutter may only have been fixed through the backing sheets and the textured coating, and
- At the high level balcony:
    - The junction between the balcony balustrade and the main wall cladding is inadequate,
    - There are gaps between the handrail capping and the cladding beneath it, and
    - The drainage outlet to the northeast corner is located above the butyl rubber gutter line.

5.2 The expert took non-invasive readings at the interior linings of the external walls throughout the house and no raised moisture levels were recorded. The expert also took invasive moisture readings and obtained the following high level results:

- 19.9%, 22%, 33%, 49%, and 99.9% at the internal cladding of the north facing deck balustrade; and
- 99.9% at a base of a column supporting the balcony;

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

5.3 The expert also noted that the while the balcony support columns are buried in the ground, the manufacturer's recommendations permit this, providing that the correct internal floor level in relation to the external ground level is maintained. In addition, the expert recommended that, due to weathering, the cladding be repainted with an appropriate paint system.

5.4 The expert supplied a copy of a letter from the cladding manufacturer dated 11 February 2005 that noted:

> Sill flashings were not made mandatory until December 1995 and jamb flashings October 1996. Both were available but on trial before these dates.

5.5 Copies of the expert's report were provided to each of the parties. The owner responded by letter on 12 March 2005, stating that as no heightened moisture readings were recorded around the windows after nearly 10 years since the cladding was installed, and as the windows were set high in the walls and were protected by a wide eave, the window flashings were not an issue. The owner also referred to the recommendation for an annual survey. With regard to the latter issue I have only addressed maintenance in general terms and have not made specific mention of an annual inspection requirement.

6 DISCUSSION

General

6.1 I have considered the submissions of the parties, the expert's report and the other evidence in this matter. The approach in determining whether building work complies with clauses B2.3.1 and E2.3.2, is to examine the design of the building, the surrounding environment, the design features that are intended to prevent the penetration of water, the cladding system, its installation, and the moisture tolerance of the external framing.

Weathertightness risk

6.2 Research data and experience, both internationally and locally, indicates that the impact of weathertightness problems in monolithic clad houses can be minimised if good and effective design and construction practices are followed.

6.3 The installation of exterior cladding to manufacturer's specifications and to accepted good trade practice is an important but not the only requirement to ensure good weathertightness performance.

6.4 The next priority is to reduce the ability of moisture to get through the cladding by using design measures that minimise the effects of the rain impacting on the walls.

6.5 Important matters for consideration are:

- Data show a strong relationship between the width of the eaves and the incidence of wall leaks. An effective deflection mechanism, such as eaves greater than 600 mm wide, has been shown by Canadian data to manage more than 90% of rain incidence;

- While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential I believe that buildings in high and very high wind zones (as defined by NZS 3604) are likely to experience wind pressure differentials and thus a higher risk of water ingress;

- Taller buildings result in an effective increase in the catchment area of the wall. Available data suggests a clear correlation between higher number of storeys and an increased incidence of leaking;

- Complex roofs and overall envelope shapes where the roofs frequently intersect with the walls on upper floors create opportunities for leaks into the wall; and

- Recent data also shows that decks and balconies that are exposed in plan and/or cantilevered from the external walls are the most frequent location for water leaks.

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

- The structure should allow water that has penetrated the cladding to drain out as quickly as possible. I believe that generally a drainage cavity should be provided behind the outer cladding barrier in monolithic construction;

- The design of the outer walls should allow walls to dry to the outside once moisture penetrates the cladding and the moisture barrier. If walls do not dry, decay fungi can become established in as little as 3 months. Until scientific data on the optimum depth and configuration of the ventilation mechanism in New Zealand conditions is available, I believe that the drainage cavity should be not less than 20 mm deep; and

- The external walls should have some degree of decay resistance or moisture tolerance to allow for situations when moisture circumvents the cladding and moisture barriers and moisture levels in the timber rise to more than 18%.

6.7 In relation to these characteristics, I find that this house:

- Has 600mm or 730mm overall wide eaves and 430mm wide verge projections that provide good to moderate cladding protection;

- Is in a medium wind zone;

- Is two storeys high;

- Has fully sealed exterior joinery units;

- Has an envelope that is fairly simple on plan, with a roof system having wall to roof junctions;
- Has one high-level balcony that is not constructed over a habitable space; and
- Has external walls that are likely to have been constructed with timber that provides little resistance to decay if it gets wet and cannot dry out.

Weathertightness performance

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

- The inadequate clearances at some locations where the base of the wall cladding adjoins the balcony deck or the roofs;
- The minor cracking evident in the cladding at some locations;
- The area of plaster delamination above a window on the north elevation;
- The unsealed screw fixings securing pipe and gutter brackets, and the loose fixings to the south elevation gutter, and
- At the high level balcony:
    - The inadequate junction between the balcony balustrade and the main wall cladding,
    - The gaps between the handrail capping and the cladding beneath it, and
    - The drainage outlet to the northeast corner being located above the butyl rubber gutter line.

6.9 I have noted the comments made by the owner, the expert, and the cladding manufacturer with regard to jamb and sill flashings to the external windows, and the expert's comments relating to the balcony support columns. I am of the opinion that, as the sill flashings were not a mandatory manufacturer's requirement and the recessed head detail as built can be considered as an appropriate alternative, that the pre-sealed window perimeters are acceptable, provided that they are subject to appropriate maintenance. In addition, I find that because of the lack of confirmation as to the treatment of the timber balcony support columns, together with the high moisture content recorded at their bases, that adequate ground clearance be provided to the column cladding at these locations.

6.10 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:

- The cladding appears to have been installed according to good trade practice;

- The moisture ingress is entirely related to the balcony balustrade and the support columns.

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

6.12 I note that two elevations of the house demonstrate a low weathertightness risk rating, and the remaining two elevations a medium 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, 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.

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 the area of the balcony at present. Consequently, I am not satisfied that the cladding system as installed 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 in the house will allow the ingress of moisture in the future, the house 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 this cladding occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.8, together with the column cladding clearances, 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. I note also that the expert has recommended that the cladding be repainted as a matter of urgency.

7.5 It is emphasised that each determination is conducted on a case-by-case basis. Accordingly, the fact that a particular cladding system has been established as being

code compliant in relation to a particular building does not necessarily mean that the same cladding system will be code compliant in another situation.

7.6 I decline to incorporate any waiver or modification of the building code in this determination.

8 THE DECISION

8.1 In accordance with section 20 of the Building Act 1991, I hereby determine that the cladding system as installed does not comply with clause E2 of the building code. There are also a number of items to be remedied to ensure that the house remains weathertight and thus meet the durability requirement of the code. Consequently, I find that the house does not comply with clause B2. Accordingly, I confirm the territorial authority's decision to refuse to issue a code compliance certificate.

8.2 I also find that rectification of the items outlined in paragraph 6.8, together with the column cladding clearances, to the approval of the territorial authority, along with any other faults that may become apparent in the course of that work, is likely to result in the house being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity.

8.3 I note that the territorial authority has not issued a Notice to Rectify. The territorial authority should do so and the owner is then obliged to bring the house up to compliance with the building code. It is not for me to decide directly how the defects are to be remedied and the cladding brought to compliance with the building code. That is a matter for the owner to propose and for the territorial authority to accept or reject, with either of the parties entitled to submit doubts or disputes to the Chief Executive for another determination.

8.4 Finally, I consider that the cladding will require on-going maintenance to ensure its continuing code compliance.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 31 March 2005.

John Gardiner
Determinations Manager