Determination 2004/31

Refusal of a code compliance certificate for a building with a "monolithic" cladding system: House 21

1 THE DISPUTE TO BE DETERMINED

1.1 This is a determination by the Building Industry Authority ("the Authority") of a dispute referred to it under section 17 of the Building Act 1991 ("the Act"). The applicant is 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 new house unless changes are made to its monolithic cladding system.

1.2 The Authority's task in this determination is to consider whether it is satisfied on reasonable grounds that the monolithic wall cladding as installed ("the cladding"), and which is applied to only part of the exterior walls and columns to this house, complies with the building code (see sections 18 and 20 of the Act). By "monolithic wall cladding as installed" we mean the components of the system (such as the backing sheets, the flashings, the joints and the coatings) as well as the way the components have been installed and work together.

1.3 In making its decision, the Authority has not considered any other aspects of the Building Act or the building code.

1.4 The house itself described in paragraphs 2.1 to 2.4, and paragraph 9 sets out the Authority's final decision.

2 PROCEDURE

The building.

2.1 The building is a single-storey detached house situated on a level section in a wind zone in terms of NZS 3604: 1999 "Timber framed buildings" that is rated on the consent as "Very High" but estimated as "Low" by the Authority's expert. The building is of conventional light timber frame construction and approximately 55% of the external walls and the top halves of the 2 entry columns are sheathed in a monolithic cladding. The remainder of the external walls and the lower parts of the entry columns are faced with a brick veneer. The building is of a complex shape, which gives a roof form that has numerous intersections and a total of eight varying length parapet walls. The steeper pitched areas of the roof are covered with pressed metal tiles and the large flat roof at the centre of the building is clad with a synthetic rubber membrane and accommodates a large skylight and chimney. The majority of the eaves are 450 mm wide; apart from one 3.6 metre length that has eaves 150 mm wide. The eaves are wider at the front entrance

area and at two areas totalling 6 metres in length, the parapet walls, and the head of the bay window there are no eaves projections.

2.2 The framing in the external walls is specified to be H1 Boric treated timber. However, neither the territorial authority, nor any of the experts involved has verified this.

2.3 The cladding that is the subject of this Determination is what is described as monolithic cladding. As detailed in the manufacturer's technical information ("the instructions"), dated May 1998, it incorporates 40 mm thick expanded polystyrene (EPS) backing sheets fixed through building wrap directly to framing timbers and finished with a selection of nominated coating systems. The instructions describe the jointing sealing and plaster application and finishing. They also state that flashings are required to heads, jambs and sills to openings. The "Coating-Compliance Form" provided by the manufacturer verified that the sealing and coating were both one of those approved in the instructions. The expert appointed by the Authority has pointed out that the time scale for completing the cladding work was between April 1998 and June 1998, and these times were prior to the date that the final published instructions were available to the system's applicators.

2.4 The Authority notes that the cladding as installed is different from that shown on the consent documentation and that the 200 mm wide roof over the bay window is covered with monolithic cladding instead of the consented synthetic rubber membrane roofing. The Authority is aware that the territorial authority raised the question of the cladding change in a letter described in paragraph 2.10. However, the matter was not referred to in the inspection documentation that has been provided. In addition, the "Conditions of Building Consent" stated that metal head flashings were required over all exterior joinery and the Authority notes that this condition has not been complied with.

2.5 The applicator wrote to the owner on 24 March 2004, detailing the experience of the company and stating that "a [Named] system was used on your property and all system procedures were followed in applying the texture coatings and finish as per instructions".

Sequence of events:

2.6 The territorial authority issued a building consent on 7 December 1997 and the attached "Conditions of Building Consent" listed certain conditions, two of which related to the cladding, as follows:

> Metal head flashings required over all exterior joinery; and
>
> …this building is located within the Very High Wind Zone…

2.7 The territorial authority made various inspections in the course of construction and on 20 August 1998 carried out a final inspection. The "Plaster and Bricks" section was ticked as being checked on the "Final Inspections" form. However a "Notification of Inspection" of the same date, noted that "no head flashings appear to be fitted where plastered". When the owner purchased the partly completed building in August 1998, the exterior of the building had been completed.

2.8 When it was brought to the owner's attention in 2001 that there were some questionable aspects relating to the cladding, the owner engaged a consultant to examine and report on the cladding. This report set out the areas of the cladding that the owner's expert considered were faulty. The report concluded that the cladding did not comply with the standards normally associated with a named system. In particular the workmanship of the textured coating displayed to the north and west sides of the house was not to acceptable trade practice. In respect of this report, the Authority notes that the named cladding

system mentioned in it differs from the system described by both the applicator and the Authority's expert.

2.9 According to the owner, the builder was requested by the owner in late 2001 to carry out the remedial work listed by the consultant. A copy of the consultant's report was forwarded to the territorial authority and the owner also expressed concern as to why the noted defects had not been noticed during the territorial authority's inspections. The territorial authority responded by stating that there had been no application for a code compliance certificate, that the plaster to the cladding was different from that which had been consented to and that items noted in its inspections had not been resolved.

2.10 The territorial authority wrote to the owner on 13 June 2002, stating that the territorial authority had no record of any change or amendment indicating the change in cladding. It also noted that:

> Council had requested further work be carried out and additional information be provided (including a texture coating warranty) before it could issue a Code Compliance Certificate.
>
> To date none of that information has been provided and consequently our records indicate that no Code Compliance Certificate has been issued.

2.11 The owner engaged a second consultant to mediate with the builder and cladding subcontractor and after a meeting between the parties in July 2002 remedial work commenced. By March 2003, some of the work had been completed. Following a joint inspection of the building by the owner's second consultant and the territorial authority, the territorial authority wrote to the owner on 19 March 2003, summarising the outstanding items to be rectified to allow the code compliance certificate to be issued. In this letter, the territorial authority again noted that "no head flashings appear to be fitted when plastered".

2.12 On 4 December 2003, the owner wrote to the territorial authority requesting a code compliance certificate and also provided warranties. The territorial authority responded on 22 December 2003, stating that given the current situation regarding weathertight issues, it could not issue a code compliance certificate. In addition, the territorial authority was in a position that it could no longer "rely on producer statements or warranties for monolithic claddings to ensure compliance with the building code".

2.13 On 22 March 2004, the territorial authority wrote to the owner to say that the only impediment to the issue of a code compliance certificate was the exterior polystyrene cladding system.

2.14 The territorial authority did not issue a Notice to Rectify as required by section 43(6).

2.15 The owner commissioned a report from the owner's second consultant, which was dated 10 May 2004, and that set out a description of the building and some of the background leading to the current situation. In general the report stated:

- The painted plasterboard is in good condition with only one minor crack evident;
- With minor exceptions, including the lack of sealing to the end of a parapet flashing, the remedial work requested by the territorial authority had been carried out;

- There are no head flashings installed;
- Some loose stop end beads require fixing and a bead needs to be fixed to one area;
- The end of a second parapet flashing is unsealed; and
- The cladding needed to be inspected quarterly and re-painted and resealed at 4-7 year intervals.

The owner's second consultant also took some moisture readings of which only one exceeded 18%. This reading, using a intrusive meter, was 20%

2.16 The owner applied for this determination on 24 May 2004.

3 THE SUBMISSIONS

3.1 The owner provided both a background to the Determination Request and a detailed submission. The submission set out relevant details of the design and construction. In particular, the owner noted that the finish to the exterior joinery was an acceptable detail at the time of construction, that it was considered that control joints were not required in this instance and that, according to the applicator, the surface preparation and plaster finish was in accordance with the manufacturer's requirements. The owner also stated that the applicator checked the sealing around all windows when carrying out remedial work and that some minor additional sealing was carried out as a precautionary measure. The owner concluded:

> There is no visible evidence of internal leaks or moisture ingress, this is confirmed by the moisture meter checks as part of the [second consultant's] report.
>
> There was no evidence of moisture ingress when small sections of the cladding were removed as part of the repairs to detailing of the roof flashings behind the two protruding gables during 2003.

3.2 The owner also provided copies of:

- The consent drawings and specifications of the building;
- The building consent;
- The territorial authority's inspection records and check lists;
- The reports from the two consultants engaged by the owner;
- The letter from the cladding applicator;
- The "Coating Compliance Form" from the cladding manufacturer;
- The territorial authority's letters of 13 June 2002, 19 March 2003, 22 December 2003 and 22 March 2004; and
- Photographs showing as-built details and the remedial work that was undertaken.

3.3 The territorial authority made a submission dated 4 June 2004, which accepted that the owner had rectified the majority of the work set out in owner's second consultant's report. However, the territorial authority still had concerns as regards:

1. The lack of proprietary flashings around windows and doors.

2. Item 5.0 of the [second consultant's] report clearly identified that "the workmanship of the textured coating displayed on the north and west sides of the house are unacceptable trade practice".

The territorial authority concluded by saying that as it did not specifically inspect the cladding it could not be satisfied on reasonable grounds that the cladding meet the building code.

3.4 Copies of the submissions, and other evidence were provided to each of the parties. Neither the applicant, 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 on the grounds that it was not satisfied that the cladding complied with clause E2.3.2 of the building code (First Schedule, Building Regulations 1992) is correct. Those provisions of the building code provide:

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 current Acceptable Solutions, approved under section 49 of the Act, which cover this cladding. The cladding is not currently accredited under section 59 of the Act. The Authority is 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:

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

- Usually, 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 The Authority commissioned an independent expert ("the expert") to inspect and report on the cladding. The expert stated that the cladding was not a recognised proprietary system and was not the system that the applicator claimed it to be. The expert removed some areas of plaster to examine the finish between door or window jambs and is of the opinion that these areas would be indicative of the finish to other similar situations. The expert's report made the following specific comments on the as-built cladding details:

- At the rear of the house the fascia appears to have been installed prior to the plastering and the latter may not extend up under the fascia and, in addition, at the end of the fascia a section of cladding is not plastered and the fascia is lacking a PVC "shoe";
- None of the exterior joinery has head flashings and instead the polythene has been rebated to overlap the frame top flanges and the window jambs with the plaster returned onto the frames;
- The plaster is butted up to the jambs of the doors and windows and the sealant is either ineffective or absent;
- The window sills have very small sealant beads, these are not well adhered to the widow frames, and the polystyrene and plaster were wet;
- The repairs that have been carried out to the apron flashings have not been effective and it was not apparent that the ends of the tile upturns had been sealed behind the flashings;
- There are no PVC shoes where the base of the column cladding adjoins the brickwork below and there is a loose PVC shoe flashing to one flashing section; and
- The polystyrene is scalloped out and replastered to accommodate one downpipe.

The expert also noted that there had been changes to the manufacturer's instructions since the cladding was completed, including the introduction of flashings to the exterior joinery and a requirement for a waterproofing membrane under the final coating over the tops of parapets.

5.2 The expert also used a moisture meter applied to the internal face of external walls to detect areas of moisture ingress. There was only one place where a possible increase in moisture was detected. The expert also took further readings on the outside surface of the cladding and at 4 locations excessive moisture was recorded. Further intrusive readings were taken at a trimmer stud and a sill trimmer and readings of 18.5% and 27.5 % were recorded. A final intrusive reading of a bottom plate registered 13%. Moisture levels above 18% recorded after the cladding is in place generally indicate that external moisture is entering the structure. The expert also stated that the excess moisture levels recorded at the ends of the parapet walls could be moisture in the polystyrene and plaster from before the repairs to the parapets were carried out and which had not yet dried out. However, another alternative theory was that there were still leaks occurring in these areas.

5.3 Copies of the expert's report were provided to each of the parties. While there was no response from the territorial authority, the owner forwarded a letter, which stated that the contents of the report had been noted and that the owner was waiting to see what areas of remedial work the Authority identifies in this Determination.

6 THE AUTHORITY'S VIEW

General

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

Weathertightness risk

6.2 Recent New Zealand data and experience 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 a fundamental 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 The most important matters to consider are that:

- Data shows 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 incidents;
- While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential, the Authority believes that homes 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 to directly penetrate 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. The Authority believes 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, the Authority believes 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, the Authority finds that this house:

- Generally has 450 mm wide eave overhangs. However, some short lengths of the building, the parapet walls and the head of the bay window do not have eaves and, therefore, no effective way of shielding the cladding;

- Is in a low wind zone (In this respect, the Authority is aware of the "very high" zoning stated in the consent. However, as the territorial authority did not comment on the report of the Authority's expert, which describes a "low" zoning, the Authority has accepted the opinion of the expert);

- Is single storey;

- Has no decks or balconies;

- Has an overall envelope that is relatively complex in shape and, as a consequence, a roof with numerous intersections;

- Has no flashings to the heads of the exterior joinery;

- Has some parapets that are not flashed;

- Has a flat roof situated at the centre of the roofing system;

- Has face-fixed cladding with no drainage cavity; and

- Has external walls that are likely to have been constructed from H1 Boric-treated timber, which provides some initial protection from decay.

Weathertightness performance

6.8 The Authority finds that the cladding in general does not appear to have been installed according to good trade practice and to the manufacturer's instructions. As a result, there are numerous defects, which are set out in paragraph 5.1 and that could contribute to the penetration of the moisture that is already evident. The Authority also notes the expert's observation that the cladding is not the system claimed by the applicator.

6.9 The Authority finds that the design and construction of this building lacks those compensating factors that can assist in preventing moisture from entering the building, and even if it has H1Boric-treated timber in the external walls, that in itself is not sufficient to counter the faults set out in paragraph 5.1.

7 CONCLUSION

7.1 The Authority finds that as at the time of this determination there is evidence of external moisture entering the building, and, therefore, the cladding on this particular building does not comply with clause E2.

7.2 In the circumstances, the Authority declines to incorporate any waiver or modification of the building code in its determination.

8 WHAT IS TO BE DONE?

8.1 It is not for the Authority to decide how the cladding is to be 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 Authority for another determination.

8.2 The Authority suggests that the Council and the owner together examine options that could improve the performance of the cladding. Clearly the faults in the cladding will need to be rectified to maintain the weathertightness of the building. The owner may decide to remove and reinstate some or all of the exterior cladding, and reapply for a code compliance certificate. If the owner does not wish to apply for a code compliance certificate, we would strongly recommend that the faults be rectified and that an agreed regular monitoring and maintenance programme be put in place to extend the life of the building by identifying and rectifying new leaks before they cause other damage. If the territorial authority issues a notice to rectify requiring that the cladding be made compliant, the owner is required to rectify the building work not done in accordance with the code.

9 THE AUTHORITY'S DECISION

9.1 In accordance with section 20 of the Building Act, the Authority determines that the cladding as installed does not comply with clause E2.3.2 of the building code. Accordingly, it confirms the territorial authority's decision to refuse to issue the code compliance certificate.

Signed for and on behalf of the **Building Industry Authority**
on 02 July 2004

John Ryan
Chief Executive