Determination 2004/48

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 by the Building Industry Authority ("the Authority") of a dispute referred to it under section 17 of the Building Act 1991 ("the Act"). The applicants are the owner of the property (referred to throughout this document as "the owner") and the other party is the territorial authority. The building certifier was included as another party for the purposes of this Determination. 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 external wall cladding as installed ("the cladding"), and which is applied to the walls and external columns of this house, complies with the building code (see sections 18 and 20 of the Act). By "external wall cladding as installed" we 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 its decision, the Authority has not considered any other aspects of the Building Act or the building code.

1.4 The house itself is described in paragraphs 2.1 to 2.3, and paragraph 8 sets out the Authority's final decision.

2 PROCEDURE

The building.

2.1 The building is a two-storey detached house situated on a sloping site, which has been excavated to form a building platform. The ground floor is partially excavated into the sloping ground, with a masonry retaining wall forming the external wall to the floor along 2 adjacent sides. The house is of a simple shape and is in a high wind zone in terms of NZS 3604: 1999 "Timber framed buildings". The house is of conventional light timber frame construction on a concrete block foundation wall of varying heights. The external framing is sheathed in a monolithic cladding, as are the external columns around 100 x 100 mm timber posts. The house has two balconies at the first floor level. The smaller of these is on the northern elevation, and is supported on beams and two full height columns that continue up to support a high level roof. The larger deck returns around the northern and western elevations and is supported on beams and four columns, two of which are full

height and support a timber beam and rafter pergola with the remaining two extended up to form balustrade supports. Neither balcony is constructed over a habitable space. The balconies are either lined with a water based acrylic copolymer two-coat membrane on plywood decking with tiles laid over the membrane or have narrowly slatted teak timbers laid over supporting joists. A timber deck supported on timber piles embedded in concrete adjoins the larger balcony on the western elevation and returns to a small length of the south elevation. A second independent pergola is situated on the northern elevation and consists of two columns with timber beams and rafters over, up to the first floor level. Except for one small bay on the southern elevation, which has no eaves, the eaves have 300 mm wide projections.

2.2 The framing in the external walls has been verified by the timber supplier in a letter to the Authority, dated 20 February 2004, as being H3 LOSP treated timber.

2.3 The cladding system is what is described as monolithic cladding. As specified in its manufacturer's June 1996 data sheets ("the manufacturer's instructions") and a subsequent independent appraisal, it incorporates 60 mm thick expanded polystyrene (EPS) backing sheets fixed through the building wrap directly to the framing timbers and finished with textured sponge float plaster and paint systems. The backing sheets incorporate grooves cut into the back face of the sheets to allow drainage of moisture from behind the cladding. The manufacturer's instructions include details for flashings at various junctions, and the October 1997 data sheet updates requires pvc flashings to the jambs and sills of exterior joinery units The coating system used in this instance is one of those systems referred to in the independent appraisal. The Authority notes that the cladding system used differs from that indicated on the consent plans, and that the territorial authority had no record of an amended plan application being lodged or approved for this change.

2.4 The cladding manufacturer issued a "Materials Components Guarantee" in relation to the cladding and the cladding applicator issued a Producer Statement and a "Workmanship Guarantee" in respect of the cladding.

Sequence of events:

2.5 The territorial authority issued a building consent on 28 September 2001, based on a certificate provided by a building certifier.

2.6 The building certifier made various inspections during the course of construction, and approved the pre-lining building inspection on 3 April 2003. The building certifier approved a final building inspection on 7 November 2003. The building certifier issued an interim code compliance certificate, dated 7 January 2004, and forwarded this to the territorial authority. This certificate stated

> This is:
>
> An interim code compliance certificate in respect of part only of the building work under the above building consent as specified below:
>
> All Building work, but excluding outer wall cladding.

2.7 On 13 February 2004, the territorial authority wrote to the owner noting the change of cladding referred to in paragraph 2.3. In relation to the code compliance certificate issued by the building certifier, the territorial authority noted:

> 3) The Job Card provided by [the building certifier] could seem to indicate that there was sufficient time for you to have been made aware of the issues with regard to the certification/scope of [the building certifier] and that therefore there was no impediment to Council being requested to undertake the required external cladding.
>
> 4) A visual inspection at this time cannot possibly identify any underlying problems that might be.
>
> 5) Recent information and new knowledge of face sealed cladding systems would indicate that without an adequate drainage and ventilation cavity, in the event of leakage and/or moisture irrevocable damage can occur to structural elements.
>
> 6) Council cannot be satisfied that the cladding system as installed on this building project will meet the functional requirements of clause E2 External Moisture of the New Zealand Code.
>
> In light of the information held on file and the comments listed above, Council is not in a position to issue the Code Compliance Certificate for this project.

2.8 The territorial authority did not issue a notice to rectify as required under section 43(6) of the Act.

2.9 The owner applied for a determination on 29 January 2004.

3 THE SUBMISSIONS

3.1 The owner attached a note entitled "Matter of Doubt or Dispute" to their application, which described how the building certifier was engaged on the building and noted that the cladding manufacturer had informed the owner that it was an "acceptable system" at the time of installation. The owner also stated:

> [The building certifier] undertook all inspections and were asked to site to inspect exterior cladding. At the time they informed us that all we needed was a producer statement (see Producer Statement in attachments) from the registered installer.
>
> All information required for the Code of Compliance (*sic*) was supplied to [the building certifier] by November 2003. At this time we were not notified by [the building certifier] that the exterior cladding was not an approved solution.
>
> In January 2004 we were advised code of compliance (*sic*) has been declined based on E2/AS1 of the building code. [The building certifier] take[s] no responsibility for this and advise it is our issue to resolve. .

3.2 The owner also provided copies of:

- The drawings;
- The building consent documentation;
- Invoices from the building certifier;

- The guarantees and producer statement described in paragraph 2.4; and
- Copies of correspondence from the territorial authority; and

3.3 The territorial authority wrote a covering letter to some attachments dated 13 July 2004 to the Authority. The attachments were:

- A copy of the territorial authority's letter to the owner dated 13 February 2004; and
- Copies of building consent documents and correspondence.

3.4 The building certifier did not provide a submission.

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 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 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. 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 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 inspected the building and furnished a report, which noted that the exterior finish is generally of good quality. However, there is some minor damage where the plaster has chipped or cracked. The plaster coating appears to have been applied in accordance with good trade practice and both the plaster coating and painting is of a good standard except where noted. The expert established that there were pvc flashings to the heads, jambs and sills of the exterior joinery units and the base of the sheet cladding has been housed into a pvc moulding. These are all as required the manufacturer's instructions. The expert also stated that vertical or horizontal joints were not required in the cladding for this particular house. The expert's report made the following specific comments on the cladding:

- There is no paint behind the spouting where it is adjacent to the wall cladding at the front entry;
- The apron flashing not properly formed at this spouting;
- The stringers supporting the pergolas are face fixed to cladding and no air-gap or packing has been provided at these areas;
- The beams supporting the front edge of pergolas are buried in the plaster coating;
- There is minor cracking to the external corners of the columns;
- The upstands supporting the balcony balustrade have inadequate slopes and there is no clearance between the upstands and the cladding;
- The balustrade fixings penetrate both the waterproof membrane and the cladding;
- Overflows from the balconies are undersized, and have not been installed in a manner to ensure that water can not penetrate the cladding;
- Water is not draining freely from the balcony off the lounge as the balcony appears to have inadequate falls;
- The plaster coating has not been "belled" to provide a drip edge, and as a consequence, moisture droplets are hanging off the bottom edge of the cladding at the balconies;
- There is some surface cracking to the cladding around the post supporting the balcony at the western corner of the lounge;
- There is some minor damage to the cladding which requires maintenance;
- There is no air-gap between the timber decking and the cladding;
- No clearance has been provided between the cladding or the fascia and the upstand of the canopy roof, and the plaster to the external angle at this position is cracked;

- The cladding is buried in the paving on the right hand side of the garage and buried in the garden on the left hand side of the front entrance;
- The downpipe bracket screw fixings are not sealed and the brackets were not removed before the texture coating was applied;
- Pipes and electrical fittings have not been properly sleeved or sealed where they pass through the cladding; and
- There are no flashings fitted around the meter box.

5.2 The expert also noted that one column had been buried in the paving and it was unknown if the required capillary break had been provided. However, as the timber post was H5 treated and the cladding was only decorative and can easily be replaced, the column base was not considered to be an issue.

5.3 The expert took moisture readings of the external wall cavities using a non-intrusive meter through the internal wall linings around the skirting line and under joinery units. A total of 21 readings were taken and ranged between 8.3% and 16.8%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

5.4 The expert also forwarded copies of:

- A letter from the timber framing supplier stating that the timber for the exterior walls of the building was H3 LOSP treated;
- The manufacturer's instructions for the waterproofing membrane, and an independent technical opinion regarding this membrane;
- The manufacturer's instructions and an independent appraisal for the cladding;
- The warranties and producer statement described in paragraph 2.4;
- The interim code compliance certificate supplied by the building certifier; and
- The building certifier's "Job Card" relating to the inspections carried out on the house;

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

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 in 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 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 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 incidence;

- 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:

- Has 300 mm wide eaves that provide only minimal protection to the cladding;
- Is in a high wind zone;
- Is two stories high;
- Has flashings to the heads, jambs and sills of the exterior joinery units;
- Has an overall envelope that is simple on plan;
- Has elevated balconies that are not constructed over a habitable space, and an adjoining timber deck;
- Has two pergolas, one of which is isolated and the other is integral with a balcony;
- Has grooves in the back face of the cladding which will facilitate drainage from behind the cladding, even though they cladding is face fixed; and
- Has external walls constructed with H3 LOSP treated timber, which is effective in delaying the onset of decay.

Weathertightness performance

6.8 Generally the cladding appears to have been installed according to good trade practice and to the manufacturer's instructions. It has been effective to date in preventing the penetration of water. There are, however, defects as set out in paragraph 5.1, which if not remedied, will eventually allow the ingress of moisture behind the cladding.

6.9 The Authority considers on the basis of the expert's report that the cladding demonstrates a number of discrete faults in the way the details are constructed. Those faults relate primarily to the way the balconies have been built, the way that the pergolas have been attached to the house without proper flashings, and generally the way that the plaster coating terminates alongside other building elements.

6.10 The Authority accepts the expert's opinion that vertical and horizontal joints are not required in the cladding. The Authority notes that the manufacturer's instructions do not require joints in walls of the dimensions that are present in this house and considers that this EIFS cladding panel size will achieve the performance required by clause E2.

6.11 The Authority does not accept that the performance of the cladding to the column buried in the paving is likely to be acceptable. It considers that this sort of detail requires specific design if the cladding is to terminate below the level of the paving. It does not accept that the use of H5 timber in the column, even if that is the treatment that is present, is sufficient compensatory provision in this case.

6.12 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting ventilation behind the cladding sheets, the Authority finds that there are compensating provisions 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;
- The system of grooves in the back face of the cladding will allow moisture to drain away;
- The building demonstrates a low to moderate weathertightness risk in terms of the E2/AS1 risk matrix;
- The external frames are treated to an H3 level;
- The exterior joinery units are fully flashed; and
- There is no moisture evident at this time in the external wall cavities.

6.13 The Authority considers that these other provisions adequately compensate for the lack of a ventilated drainage cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.

7 CONCLUSION

7.1 The Authority accepts that the expert's report establishes that the cladding complies in most respects with the manufacturer's instructions. In addition, as there is no evidence of external moisture entering the building, the Authority finds that the cladding on this particular building complies with clause E2.

7.2 The cladding must also comply with clause B2 on durability. B2 requires that a building continue to satisfy all the objectives of the code throughout its effective life, and that includes the requirement for the building to remain weathertight. Because the cladding faults are likely to allow the ingress of moisture in the future, this house does not achieve the durability requirements of clause B2.

7.3 The Authority finds that because the faults in this cladding occur in discrete areas, it is able to conclude that rectification of the identified faults is likely to bring the cladding into compliance with the code. Once these faults have been satisfactorily rectified the house should be able to remain weathertight and will, therefore, comply with clauses E2 and B2. The Authority also finds that because of the compensating factors in this case, the lack of a ventilated cavity behind the cladding is not, on its own, sufficient grounds to withhold a code compliance certificate.

7.4 It is essential that all the required items of rectification, which are detailed specifically in paragraph 5.1, and qualified below, be competently carried out to ensure such compliance.

7.5 The Authority believes that the grooves cut into the back of these panels should be able to drain away moisture that has come through the external cladding. However it also concludes that there is no evidence that the grooves provide adequate ventilation to allow the framing to dry out in all situations. In this determination therefore the Authority has discounted the possibility of any viable ventilation mechanism operating as a result of the grooves in the cladding.

7.6 The Authority finds that the column base detail is not compliant even if the column timbers are treated to an H5 level and that either manufacturer's recommendations on clearances should be reinstated or that the detail be subject to specific design.

7.7 The Authority finds that because the timber deck is slatted and thus allows surface water to drain away underneath, and the plaster is continuous behind the deck timbers, the lack of a gap between deck timbers and the cladding is not, in itself, a reason for the cladding to be non compliant.

7.8 The Authority notes the importance of the owner's responsibility for ongoing maintenance to the cladding. The code assumes that normal maintenance necessary to ensure the durability of the cladding, is carried out and thus clause B2.3.1 of the building code requires that the cladding be subject to "normal maintenance". That term is not defined, so that the Authority takes 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.

7.9 The Authority emphasises 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.

7.10 The Authority declines to incorporate any waiver or modification of the building code in its determination.

7.11 The Authority notes that in this case, the certifier was not authorised to approve the cladding used on this house and that the territorial authority was not asked to inspect the cladding during construction, as it should have been. If that advice had been given, and the territorial authority had inspected the cladding, it would have been able to draw its own conclusions on code compliance, and thus avoid the need for this Determination.

8 THE AUTHORITY'S DECISION

8.1 In accordance with section 20 of the Building Act, the Authority determines that the house, it is weathertight now and, therefore, the cladding complies with clause E2**.** However, as there are a number of items to be remedied to ensure it remains weathertight and thus meet the durability requirements of the code, the Authority finds that the house does not comply with clause B2. Accordingly, it confirms the territorial authority's decision to refuse to issue the code compliance certificate.

8.2 The Authority, therefore, finds that once the items of non-compliance that are listed in paragraph 5.1 and qualified in paragraphs 7.6 and 7.7 are rectified to the approval of the territorial authority, along with any other faults that may become apparent in the course of that work, the cladding as installed will comply with the building code, notwithstanding the lack of a ventilated cavity.

8.3 If the territorial authority chooses to issue a Notice to Rectify, the owner is obliged to bring the house into compliance with the building code. It is not for the Authority to dictate how the defects listed in paragraph 5.1 are to be remedied. How that is done 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

8.4 The Authority considers that the cladding on will require on-going maintenance to ensure its continuing code compliance, and that this maintenance programme should be undertaken after consultation with the territorial authority.

Signed for and on behalf of the **Building Industry Authority** on 13 September 2004.

John Ryan
Chief Executive