

# ***Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 41***

## **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 building owners (referred 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 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”), which is applied to the walls 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 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, with an attached single-storey garage, situated on a sloping and partly excavated site, which is in a low wind zone in terms of NZS 3604: 1999 “Timber framed buildings”. The house is of conventional light timber frame construction, built on a concrete block foundation wall. The external walls are sheathed with monolithic cladding. The house is of a relatively complex shape, with the pitched roofs set at varying levels with numerous hip junctions, valley gutters and wall to roof junctions. The house has an upper level timber-framed balcony built over a living space, with a membrane lining over plywood sarking, over which tiles have been laid. The balcony is open, with a timber framed balustrade to the front and one end and a corner column that projects above the balustrades. The sides and the sloping top of the timber-framed balustrades are faced with monolithic cladding, as is the 100 x 100 mm post, including its flat exposed top. The Authority notes that apart from the column, the pergola shown on the plans over the balcony has not yet been constructed. A chimney projects full

height from the wall, intersects with the high-level roof and has a short internal gutter at the higher roof junction . There are two projecting bay windows on the ground floor and two lower floor and four upper floor windows have projecting surrounds formed to be integral with the cladding, with three of these having semi-circular heads. The verges and gables generally have 150 mm wide projections and there is a 400 mm wide projection over the garage door.

- 2.2 The expert appointed by the Authority was able to access the interior of the chimney and observe a large sample of framing used in the house and established that the timber used in the construction of the external walls is not treated.
- 2.3 The cladding system is what is described as monolithic cladding. As specified in its manufacturer's June 1996 and 1997 data sheets ("the manufacturer's instructions") and a subsequent independent appraisal ("the 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 require pvc flashings to the jambs and sills of exterior joinery units. The sponge finished coating system used in this instance is one of those systems referred to in the independent appraisal. The Authority notes that the plans nominate a different supplier of the cladding than is indicated on the plans. The territorial authority has not commented on the change but have referred to the replacement material throughout their inspections.
- 2.4 The coating systems supplier issued a "Producer Statement", dated 11 November 2003, covering the cladding, for the 60 mm backing sheets, and a "Materials Components Guarantee", dated 7 November 2003, and a "Workmanship Guarantee", dated 11 November 2003, both covering the plasterwork. The guarantees contain qualifications that the proprietor will not accept responsibility for damage resulting from the use of untreated timber.

**Sequence of events:**

- 2.5 The territorial authority issued a building consent on 8 March 2002, None of the "Building Consent Requirements" attached to the consent referred to the cladding apart from noting the notice time for carrying out inspections.
- 2.6 The territorial authority made various inspections during the course of construction, and on 9 September 2002 approved the "Preline Building Inspection". The territorial authority issued three "Development Building Officers Field Memoranda" following inspections on 9 September 2002, 5 November 2003, and 16 December 2003, which listed items that were in contravention of the building code. The relevant items relating to the cladding were:

Please provide P53 certification from the [manufacturer] for the [Named] system and from the contractor.

Please plaster and paint the [cladding] at the end of spouting at rear of house.

Cover bare wood on soffit ends.

- 2.7 The territorial authority wrote to the owner on 16 December 2003, notifying the owner that existing properties using any type of monolithic cladding will

be reviewed on a case-by-case basis before determining whether a code compliance certificate could be issued.

- 2.8 On 5 May 2004, the territorial authority wrote to the owner pointing out that the territorial authority had to ensure that all building work had to meet the building code requirements. The letter stated:

We have received your request for a code compliance certificate (CCC) for a dwelling at the above address.

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 given 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 at the time and that it will remain durable for the required period. Visual inspection has also revealed

- 1) Complex junctions
- 2) High risk design
- 3) Deck/balcony over living spaces
- 4) Timber treatment of external wall frames unknown
- 5) Finished ground levels too high
- 6) Obvious repairs to cladding
- 7) Cracks to soffit/wall junction
- 8) Concerns over gable end/soffit cladding detail
- 9) No specific inspections to check flashings, weathertightness details

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 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

- 2.9 The owner wrote to the territorial authority on 26 April 2004, pointing out that a territorial authority inspector had re-inspected the house on 16 December 2003, and passed all the outstanding items that had been referred to in a previous inspection. However, the owner was informed at this time that the regulations had changed and that the code compliance certificate was withheld.

- 2.10 The territorial authority sent a further letter to the owner on 26 May 2004 stating that a further inspection had been undertaken by a senior inspector of the territorial authority and the decision conveyed in the 5 May 2004 letter still stood.
- 2.11 On 31 May 2004, the owner responded to the territorial authority's letter of 26 May 2004, setting out the history of the various inspections and exchange of correspondence. The owner also pointed out that most of the items raised by the territorial authority in their 5 May 2004 letter had previously been passed by the territorial authority.
- 2.12 The territorial authority did not issue a Notice to Rectify as required under section 43(6) of the Act.
- 2.13 The owner applied for a determination on 7 June 2004.

### **3 THE SUBMISSIONS**

- 3.1 In the "Matter of Doubt or Dispute" section of the application for a determination, the owner stated that these were the monolithic cladding and the 9 items referred to be the territorial authority in their letter of 5 May 2004. The builder also wrote to the Authority on 21 June 2004, stating that they had 30 years experience as builders, that the original specification was either adhered to or was upgraded, and that all maintenance has been undertaken.
- 3.2 The owner also provided copies of:
- The drawings and some specifications;
  - The building consent documentation;
  - The correspondence with the territorial authority;
  - The inspection records of the territorial authority;
  - The manufacturer's instructions for the cladding ;
  - The producer statements and guarantees; and
  - A set of photographs showing some aspects of the construction process and the building as it is at present.
- 3.3 The owner also supplied copies of:
- A letter dated 30 June 2004, from the designer of the house, which stated that the house was low risk, that the designer had witnessed the construction of the house and that he was impressed by the detail and work carried out by the builder; and
  - A letter dated 4 July 2004, from another builder, who considered that the house had been built in a professional manner and that he had regularly visited the house during and since construction and was not aware of any structural faults or leaks.
- 3.4 The territorial authority did not make 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 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. 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 inspected the building and furnished a report. It noted that no cracking was evident and the "final coat of the plaster is a 'sponge' finish done to a high standard". However, while the cladding was to "reasonably good practice", there were examples of inadequate carpentry work, especially where the gable ends are poorly finished. The expert noted that, in accordance with the appraisal carried out on the cladding system, no vertical or horizontal control joints were required for the walls of the dimensions found in the house. The expert cut away the cladding to expose a jamb sill intersection of one window and scraped away the plaster at the jamb of another window. These investigations showed that the exterior joinery units, with the exception of the round-top windows, can be taken to be fully flashed in accordance with the manufacturer's instructions. The expert also noted some concerns regarding the cladding:

- The round-top windows do not have head flashings, but the expert considered that the thickened trim was in accordance with the appraisal requirements and that the installation was currently watertight;
- Some ground clearances to the base of the cladding are inadequate;
- There are no "kick out" flashings to five apron flashings and the fascias at these positions have been fitted prior to the polystyrene and in two cases, the expert established that the fascias are buried at least 40 mm into the cladding;
- There are gaps at the gable end/soffit to cladding intersections, and the butted joints in the timber boarding at these junctions could allow water into the cladding;
- The balcony balustrade top is not to the correct slope, and there are no saddle flashings at the junction of the balustrade top with the house or column claddings; nor are there adequately sealed end junctions;
- The lead balcony drainage outlet is not properly sealed to the cladding and is set at a level that only allows surface water to escape. Any moisture soaking through the tile joints cannot drain away;
- The overflow to the balcony rainwater head is too high to be useful;
- The exposed plasterboard lining at the head of the garage door opening is exposed to the weather;
- Some pipework penetrations are not been properly sealed; and

- The chimney cap flashing does not cover the thickening applied to the cladding and is constructed in zinc plated mild steel.
- 5.2 The expert also took non-invasive moisture readings through the inner walls of the house, and apart from two locations, all readings were to an acceptable level. The locations with the higher readings were adjacent to the deck rainwater head and to an apron flashing on the north elevation. The expert took further invasive readings at these locations and recorded moisture readings of 22% and 40 % respectively. 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. Neither party made any further submission in response to the expert's report.

## 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 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 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 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 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 150 mm wide eaves projections that provide little protection to the cladding under them;
  - Is in a low wind zone;
  - Is two stories high;
  - Has fully flashed exterior joinery units, apart from the heads of the rounded windows, which are protected by planted-on cladding projections that prevent the accumulation of water;
  - Has an overall envelope that is relatively complex on plan, with roofs at various levels that have many roof and wall/roof intersections;
  - Has one balcony at the upper level, built over a living space;
  - Has grooves in the back face of the cladding which will facilitate drainage from behind the cladding, even though the cladding is face fixed; and
  - Has external walls constructed with untreated timber, which would not be effective in preventing 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 largely 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 are set out in paragraph 5.1
- 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 appraisal does 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 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 exterior joinery units are fully flashed;
  - The wall/roof junctions may provide some ventilation to the upper level wall frames; and
  - The moisture evident at this time is related to two identified areas only.
- 6.12 The Authority considers that these other provisions adequately compensate for the lack of a ventilated cavity and can allow the house to comply with the weathertightness and durability provisions of the building code.
- 6.13 The Authority believes that the grooves cut into the back of the backing panels could enable moisture that has come through the external cladding to drain away. The Authority, however, has not seen any evidence to conclude that the grooves provide adequate ventilation to allow the framing to dry out in all situations.
- 6.14 The Authority accepts the expert's view that the use of a thickened trim around the tops of the curved windows in lieu of a flashing will achieve the performance requirements of the code. However, the continued performance of the detail will require adequate maintenance to the trim to ensure its continued adhesion to the EIFS cladding.
- 6.15 The Authority finds that when assessed against the risk matrix incorporated in the Acceptable Solution E2/AS1, this house presents a risk of weathertightness failure that is moderate on two elevations and high on the other two elevations. 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 The Authority finds the expert's report establishes that, as at the time of this determination, there is evidence of external moisture entering the building. Accordingly the Authority finds that the cladding on this particular building does not comply with clause E2.
- 7.2 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 building to remain weathertight. Because the cladding faults in this building are likely to allow the ingress of moisture in the future, the building does not achieve the durability requirements of clause B2.
- 7.3 The Authority also 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 the cladding faults listed below have been satisfactorily rectified this house should be able to remain weathertight and thus comply with both clause E2 and B2. Those faults are:
- Inadequate ground clearances at the base of the cladding;
  - The absence of “kick outs” at the ends of the apron flashings and the embedding of the fascias;
  - The poorly constructed and unfinished timber-clad gable ends;
  - The inadequate slope and lack of saddle flashings to the balcony balustrade tops;
  - The defective rainwater head, including the lead outlet flashing;
  - Inadequate sealing to some pipework penetrations;
  - The ineffective chimney capping; and
  - The exposed plasterboard lining at the garage opening head.
- 7.4 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 the cladding to be subject to “normal maintenance”. That term is not defined, so 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, repainting, replacing sealants, and so on.
- 7.5 The Authority emphasises that each determination is conducted on a case-by-case basis. 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 The Authority declines to incorporate any waiver or modification of the building code in its determination.

## 8 THE AUTHORITY'S DECISION

- 8.1 In accordance with section 20 of the Building Act, the Authority determines that there is evidence of external moisture entering the building and, therefore, the cladding on this particular building does not comply with clause E2. Accordingly, it confirms the territorial authority's decision to refuse to issue the code compliance certificate.
- 8.2 The Authority finds that because of the compensating factors in this case, the lack of a drained cavity behind the cladding is not, on its own, sufficient grounds to withhold a code compliance certificate.
- 8.3 The Authority, therefore, finds that once the items of non-compliance that are listed in paragraph 7.3 are rectified to the approval of the territorial authority, together with any other instances of non-compliance that become apparent in the course of rectification, the cladding as installed on the house will comply with the building code, notwithstanding the lack of a drainage cavity.
- 8.4 The Authority notes that the territorial authority has not issued a Notice to Rectify. However, if the territorial authority chooses to do so, the owner is obliged to bring the house up to compliance with the building code. It is not for the Authority 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 Authority for another determination.
- 8.5 The Authority considers that the cladding will require on-going maintenance to ensure its continuing code compliance.

Signed for and on behalf of the **Building Industry Authority** on 1 October 2004.



**John Ryan**  
Chief Executive