

*Determination 2004/77****Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 60*****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 external wall cladding as installed (“the cladding”) on 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 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 two-storey detached house situated on a sloping, partially excavated, site in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings. The building is of conventional light timber frame construction and is of a relatively simple L-shape in plan. It has interlocking bituminous felt shingle clad roofs with complex intersections. There is a portico to the main entrance supported on two columns with a membrane-lined flat roof attached to the building. There is a pergola over the living room windows comprised of two columns, a connecting beam and rafters secured to the beam and through the cladding. There are numerous wall/roof intersections with butyl-rubber flashings where the lower-level roofs adjoin the cladding. There are no eaves overhangs and the bargeboards, which have associated metal flashings, and the gutter fascias, are fixed directly to the cladding.
- 2.2 Based on the receipts for timber purchased for the construction, the Authority accepts that the framing in the external walls is H1 Boric treated timber.
- 2.3 The building, including the portico and pergola columns, is clad with what is described as monolithic cladding. As detailed in the manufacturer's instructions (“the instructions”), it incorporates 40 mm thick expanded polystyrene (EPS) backing sheets fixed through

building wrap directly to framing timbers and finished with a three-coat fibreglass mesh reinforced lime-cement plaster. The instructions describe the sealing and plaster application and finishing. They also refer to the requirement that flashings are required to heads, jambs and sills to openings. The plaster has been finished with an external acrylic textured paint system, which varies from the system approved by the manufacturer. While stating that the paint system used would reduce the vapour permeability of the cladding system, the manufacturer advised that he did not expect the performance of the plaster to be affected, but noted that the coating would have to be recoated sooner than the recommended system.

- 2.4 The Authority notes that the raised timber decking shown on the consent drawings has been replaced by an area of ground supported paving and an internal gutter has been omitted. The Authority is not aware of any documentation that refers to these changes.
- 2.5 The coating system manufacturer issued a “Warranty for Coating-System” and the plasterer issued a “Workmanship Guarantee” in relation to the coating application.

#### **Sequence of events:**

- 2.6 The territorial authority issued a building consent on 18 July 2002 and there was a reference on the face of the document that:

Monolithic claddings to the exterior of buildings require regular inspection and maintenance to ensure the integrity of the surface is maintained to prevent entry of water into the underlying materials.

There were also certain conditions attached to this consent and one of these stated:

The Contractor is to supply at start of job the relevant specification and on completion of the fixing and finishing of the Polystyrene cladding the relevant Producer Statements covering the said product and its application.

The Authority notes that “Plaster Installation Details” for awning windows were attached to the consent documentation. However, the details do not match the cladding system shown on the consent plans.

- 2.7 The territorial authority made various inspections in the course of construction. On 28 April 2003, a plaster check was carried out and the plaster system was passed, apart from a note saying “pay more attention to beam fixing and sealing to east pergola”. On 12 January 2004 the territorial authority carried out a final inspection and there was a requirement to seal all timber penetrations. There was also a note stating “Monolithic Claddings”. A final re-inspection was carried out and the only comments on the “Final Check List” were “Items completed” and “Monolithic cladding observed”.
- 2.8 The territorial authority wrote to the owner on 13 February 2004, stating that it had carried out a further inspection of the building and that the building might not comply with the building code in a number of respects. The territorial authority went on to say “recent information showed that buildings using monolithic cladding without a cavity are particularly susceptible to weather tightness problems”. Also that “the Council cannot be satisfied that the cladding system as installed on the above building meets the Functional requirements of Clause E2 External Moisture of the Building Code...”
- 2.9 A Notice to Rectify was attached to the 13 February 2004 letter. Its accompanying “Particulars of Contravention” notice stated:
- You are required to:
- Provide adequate ventilation to the monolithic cladding and into the wall frame space by means of either a ventilated cavity or alternative approved system, and ensuring all issues relating to the above are resolved.

- Lodge with Council an application for an amended building consent and provide all necessary information that may be requested to allow this consent application to proceed.

2.10 The territorial authority also detailed items that it considered not to have been installed in accordance with the building code acceptable solutions and accepted trade practices, as follows:

1. The following items have not been installed per the manufacturer's instructions:
  - The exterior cladding is to finish a minimum 100mm above paved surfaces or 175 above unprotected ground. These clearances have not been achieved.
  - A 6mm gap (horizontally) is required between the back of the cladding and the foundation wall. This has not been achieved.
  - The minimum finished floor level to finished ground level is 150mm to paved surfaces and 225mm to unpaved surfaces. This clearance has not been achieved.
  - Plaster coatings are to be taken up behind fascia boards. The fascia boards have been installed prior to the plaster system.
2. The following have not been installed per the acceptable solutions of the building code (no alternative solutions have been applied for):
  - The distance between the finished floor level and finished paving of 150mm has not been achieved.
  - Buildings shall have claddings that are waterproof. There are areas where recent repairs to the cladding have been undertaken that have not been completed.
  - Two outlets are required to gutters. The front entry gutter has only one stormwater outlet where two are required.
3. The following items have not been installed per accepted trade practice
  - A minimum clearance of 50mm is required between the cladding and adjacent surfaces. There is a minimal clearance between the roof and wall claddings.
  - Penetrations through the cladding system shall be as waterproof as the cladding itself. There are a number of penetrations through the cladding that should be protected with rubber flanges and silicon, and in the case of the meter box flashings have not been installed.
4. Ventilated cavity system:
  - Monolithic cladding systems without a 20 mm cavity, provision for adequate ventilation, drainage, and vapour dissipation will, in the event of leakage and/or the effect of residual moisture, cause irrecoverable damage to the structural elements of the building.

2.11 The owner applied for this determination on 30 February 2004.

### **3 THE SUBMISSIONS**

3.1 The owner provided a submission that described the history of the territorial authority's inspections of the building and noted that after the inspection of 18 December 2003 the cladding penetrations were sealed. The owner queried why the defects had not been pointed out during the two final inspections and stated that to provide a ventilated cavity, the existing cladding would have to be removed.

3.2 The owner also provided copies of:

- The consent drawings of the building, which also included specification notes written on them;

- The building consent;
  - The territorial authority’s inspection records and check lists;
  - The notice to rectify with its attached “Particulars of Contravention” and photographs taken by the territorial authority;
  - The territorial authority’s letter of 13 February 2004; and
  - The “Warranty for Coating Systems” and the “Workmanship Guarantee referred to in clause 2.5.
- 3.3 The territorial authority forwarded a lengthy submission. The bulk of the submission was a general comment on face fixed monolithic cladding and related to fibre cement, stucco and EIFS systems, and the main points can be summarised as follows:
- Face fixed monolithic cladding has no ability to dry out in the absence of a cavity and therefore decay can occur as a result of high humidity arising from daily heating and cooling cycles, even when there is no moisture ingress from outside;
  - Moisture in timber may have a negative effect on timber strength and durability and nails will have less gripping power. The territorial authority concluded that the timber used in this house was therefore unsuitable;
  - Because fibre cement sheets and timber bottom plates can reach high moisture levels in the absence of any external leaks, they will have a reduced effectiveness as bracing elements when the design calls for that function;
  - Paint systems over stucco plaster are inadequate because of the plaster’s higher alkalinity while it is drying. This effects the integrity of the finished coat and increases the overall permeability of the coating; and
  - Building papers differ in the way that they allow moisture to pass through them, and that differing performance may affect the ability of monolithic walls to dry out.
- 3.4 The specific comment on this house included the Notice to Rectify and an “Exterior Cladding/Site Risk analysis” check sheet on the details of the cladding completed by the territorial authority inspectors.
- 3.5 The submission also included a set of photographs showing the areas of concern outlined in the Notice to Rectify.
- 3.6 The territorial authority's submission effectively questions the technical basis of a number of the benchmarks for assessing the likely code compliant performance of timber-framed construction in New Zealand contained within the new acceptable solution covering timber treatment (B2/AS1) and the draft acceptable solution on external moisture (E2/AS1), which covers weathertightness detailing, and proposes that an alternative (and more conservative) benchmark be used to assess likely building code compliance for monolithically-clad buildings within its jurisdiction.
- 3.7 In its initial submission, the territorial authority concluded by stating that it must refuse to issue a code compliance certificate on the grounds that there was insufficient scientific evidence that the performance of these building elements met the requirements of the Building Code.
- 3.8 The territorial authority elaborated on their original submission in a letter to the Authority dated 11 June 2004. In this letter the territorial authority clarified their original submission by stating that their areas of concern with this house were those itemised in the Notice to Rectify. In the letter, the territorial authority also stated that they had changed their mind on acceptable weathertightness risk and now disagree with the use of

a low risk category in the new E2/AS1 acceptable solution which is shortly to come into force. The letter also included the territorial authority's assessment that the weathertightness risk of this house was high. The Authority notes that in reaching that decision, the territorial authority has used one of 2 alternative risk assessment methods that were issued with the consultation documents on E2/AS1. This method was not adopted in the final acceptable solution.

- 3.9 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 parties.

#### **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 that have been approved under section 49 of the Act that 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 quality of surface finish and standard details is "generally good". However, many of the non-standard details had been "poorly conceived and executed". In addition to a visual inspection of the external joinery head and sill flashings, the expert also cut away the plaster coating at one sill/jamb junction. This revealed that the plastic jamb and sill flashings were in place and sealant was applied at the junction between the two as required by the instructions. The expert was uncertain as to whether the glass fibre mesh used was equivalent to that recommended by

the manufacturer. The expert noted the presence of the appropriate flashings at the head of all windows. The expert's report made the following specific comments on the as-built cladding details:

- In some areas, the bottom flashing of the cladding was partially sealed to the slab edge with adhesive and there was thus no clearance for drainage from the building wrap;
- Some of the flashing details around one section of sloping glass above the kitchen appeared to be unsatisfactory as there is:
  - A large gap between the flashing and window frame at the head which had been partially filled with silicone and which appeared to be vulnerable to driving rain,
  - There is no upstand at the bottom of the sloping jamb flashing on the left hand side and the rain water runoff in this area would be directed into the cladding, and
  - The flashing stops short of the cladding at the bottom of the sloping jamb flashing on the right hand side, such that runoff may be directed behind the plaster;
- At the cladding above the garage/house junction;
  - The flashing stop provides a potential route for water to leak behind the cladding, and
  - The feature joint runs into the gutter and flashing and provides various unsealed joints where rainwater might reach the back of the cladding;
- There are four areas where the bottom of the cladding is at or below ground level;
- The pergola rafters penetrate the plaster of the cladding and the penetration is not sealed;
- At the entrance canopy roof:
  - There was a single roof outlet with an overflow from the hopper but no overflow from the roof,
  - The capping was near horizontal where it returns to meet the upper floor wall,
  - The capping had a PVC extrusion at its top outer edge, the plaster system mesh had not been carried over the corner and the plaster was cracked at the edge of the canopy coping,
  - The clearance between roof level and underside of capping was 40mm at the high point of the roof, and
  - The detail at the bottom of the cladding did not correspond with the manufactures detail as the cladding projected only 10mm inside the line of the membrane;
- The junction between the retaining wall and the garage was not sealed and the top of the wall was finished with a thin cement plaster capping and these details are likely to enable moisture to reach the wall framing.

5.2 The expert also used a non-invasive moisture meter applied to the internal face of external walls to detect areas of moisture ingress. There were no readings in this instance in the "damp range". The expert also took further readings using an invasive moisture

meter and obtained readings varying from 11.9% to 24.1% averaging 17.1% over the 12 readings. The high moisture readings were all recorded in various parts of the bottom plate of the garage framing. The expert attributed that to the lack of ground clearance to the garage cladding and to the lack of an appropriate seal between the masonry retaining wall along one side of the garage and the adjoining cladding. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

- 5.3 The expert also observed that water was leaking behind the cladding at the bottom of the wall beneath the stop above the garage/house junction. This area had produced the highest reading of 24.1% and the expert attributed this to an incorrect flashing stop.
- 5.4 The expert noted that he did not observe any control joints in the structure and that the manufacturer's instructions included details of such joints but no criteria for their use.
- 5.5 The expert did not comment on whether the fascia boards had been attached to the cladding prior to the plaster, as submitted by the territorial authority.
- 5.6 The expert noted that the pergola beams had been attached directly to a timber fixing plate bearer within the plane of the wall, that the plaster had been applied after the beam had been fixed and that there was no cap flashing over the joint.
- 5.7 Copies of the expert's report were provided to each of the parties. The territorial authority responded by a letter dated 29 June 2004 and stated that it generally agreed with the report and voiced concerns regarding the rectification process. The territorial authority noted the high moisture readings that had been recorded and challenged the expert's view that the cladding could achieve compliance without significant research.
- 5.8 The owner responded in a letter dated 1 July 2004 that he was prepared to carry out the suggested rectification work. However, the owner noted "Making a cavity behind the cladding is not possible without removing the existing cladding".

## **6 THE HEARING**

- 6.1 The owner requested a formal hearing, which was held before a committee of the Authority ("the Tribunal"), duly appointed to act for and on behalf of the Authority in respect of this tribunal. The owner and the territorial authority spoke and called evidence at the hearing.
- 6.2 The owner made a written submission for the hearing, dated 27 October 2004. At the hearing, the owner presented an undated monolithic cladding report from an architect engaged by the owner to examine the faults outlined in the expert's report, together with a set of photographs showing items of rectification that had been carried out. The report addressed some of the rectification issues in general terms, but did not provide any detail drawings as to how such remediation was to be carried out.

The main points raised by the owner are as follows:

- The polystyrene was fixed to the framing in April 2003 and was passed by the territorial authority's inspectors. The items required to be rectified by the final territorial authority inspection were attended to. However, as there was no cavity present, the territorial authority would not issue a code compliance certificate. If the

owner had been warned in 2002 of the changed territorial authority policy requiring cavities, the owner would have installed one;

- The architect's report suggested that certain remedial work be carried out and this had been done. These items were an overflow outlet to the entrance canopy, the sealing of the pergola rafters at the cladding, amendments to the kitchen window joints and flashings and the sealing of the gas bayonet. The architect also recommended lowering the unpaved ground. The report stated that while the east elevation clearances were inadequate, if the concrete paving at this elevation was appropriately sealed, this would compensate for the low clearance. The architect also observed that the high moisture content in the bottom plates at the garage/house junction was caused by an adjoining blocked cesspit, which resulted in the area flooding in heavy rain;
- The owner had proceeded to carry out the remedial items described in the architect's report, but no evidence was produced before the Tribunal to confirm that the architect provided detailed drawings. The owner did not seek the approval of the territorial authority, nor has the territorial authority inspected the work. The owner was willing to discuss these issues with the territorial authority; and
- The owner wished to be satisfied that if all the remedial work is carried out, the territorial authority will accept that the house is code compliant despite the lack of a cavity.

6.3 The main points raised by the territorial authority in response to the owner's submission, were as follows:

- The question was whether the house complied with the building code. In this respect, recent developments in the area of weathertightness had increased the knowledge now available to the territorial authority and accordingly, the territorial authority has changed its approach;
- The territorial authority was also concerned that remedial work had been carried out without any reference to, or input from, the territorial authority;
- The building faults highlighted by the territorial authority had in general been supported by the expert's report; and
- The territorial authority now accepted that the Notice to Rectify could be re-issued

6.4 In response to questions from the Authority members, the territorial authority:

- Still held the opinion that the house will leak at some stage;
- Considered that it was necessary to "get the moisture out of the walls and the drying in";
- Did not consider that it was its role to provide advice as to the maintenance process; but it was not averse to discussing general maintenance issues with the owner;
- Considered that, in accordance with the design approach it had taken, even if all the non-compliant items were to be rectified, it would still have a problem with the



house, as none of the issues concerning, deflection, drainage, drying and had been addressed;

- Considered that the fact that the framing to the external walls was H1 Boric treated might assist the decay problem, however this treatment was not up to that required at the present time; and
- Confirmed that it had approved some monolithic clad houses that did not include a cavity and took into account a variety of information when making such decisions.

6.5 At the hearing, two of the three joint-owners attended and the territorial authority was represented by one of its officers. Three staff members of the Authority were also in attendance. Evidence from those present enabled the Authority to amplify or correct various matters of fact that were not adequately identified in the draft.

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## **7 THE AUTHORITY'S VIEW**

### **General**

7.1 The Authority has considered the submissions of the parties, the expert's report and the other evidence, including that presented at the hearing, 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**

7.2 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.

7.3 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.

7.4 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:

7.5 The main areas 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 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.
- 7.6 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%.
- 7.7 In relation to these characteristics, the Authority finds that this house:
- Has no eave overhangs, and, therefore, no effective way of shielding the cladding;
  - Is in a medium wind zone;
  - Is constructed to two levels;
  - Has numerous wall/roof intersections, a complex roof structure and thus has an overall envelope that is complex;
  - Has a flat roof to the portico at the main entrance;
  - Has no decks or balconies;
  - Has a pergola directly fixed to the building with no moisture protection to the joint;
  - Has face-fixed cladding with no drainage cavity; and
  - Has external walls that are constructed from H1 Boric-treated timber, which provide some initial protection from decay.

#### **Weathertightness performance**

- 7.8 The Authority finds that the cladding in general appears to have been installed according to good trade practice, but some junctions, edges, and intersections are not well constructed. The areas of concern are set out in paragraph 5.1 and in general terms relate to:
- The lack of an appropriate gap between cladding and the concrete ground floor slab in some parts of the building.

- The lack of appropriate flashings between the retaining wall and the garage framing,
  - The faulty flashing details at the wall/roof junctions
- 7.9 The Authority accepts that the flooding attributed to the blocked sump adjacent to the garage area could have contributed to the high moisture reading obtained by the expert in this area. In addition, from the information provided, it appears that the ground level can be easily lowered. The Authority therefore requires the ground level at this location to be reduced and the sump amended accordingly, including ensuring that it is protected from future blockages.
- 7.10 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, thus inhibiting drainage and ventilation behind the cladding sheets, the Authority finds that there are compensating factors that assist the performance of the cladding in this particular case. These are:
- Generally, the cladding appears to have been installed according to good trade practice and to manufacturer's specifications;
  - The house has no decks or balconies; and
  - The house has external walls that are constructed from H1 Boric-treated timber, which provides some initial protection from decay
- 7.11 The Authority considers that these factors adequately 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.
- 7.12 The Authority finds that much of the territorial authority's main submission (refer to section 3.3) is not relevant to this house. However the Authority has identified that the territorial authority's views on the compliance of elements of this house are influenced by a belief that there is insufficient scientific research into the overall performance of monolithic claddings constructed without a cavity and until that is available, these claddings cannot be considered compliant with clauses B2 and E2 of the code.
- 7.13 In response, the Authority:
- accepts that the performance of many of the materials questioned in the territorial authority's submission has been established through successful use in practise, but
  - acknowledges that the building science surrounding such successful use is not so well known, or established, and
  - considers that, in the absence of peer reviewed scientific research evidence to the contrary, approval for the use of these materials should be based on their established performance in building work in New Zealand, with an additional margin of safety to reflect known uncertainties.

Consequently, the acceptable solution covering timber treatment (B2/AS1) and the acceptable solution on external moisture (E2/AS1), which covers weathertightness detailing, both rely on established building science as well as observed field performance of the building systems and elements in order to establish code compliant details for local use. Both these documents have been reviewed by appropriately qualified parties with experience across the building industry, and have been subject to the public consultation process as required by Section 49 of the Act.

- 7.14 The Authority has carefully reviewed the general aspects of the territorial authority's submission, alongside the benchmark provision it has already established to evaluate the anticipated overall performance of monolithically clad buildings in New Zealand. It has

determined that the performance of building elements as now installed in this house should be based on the abovementioned code compliance benchmarks together with observations of the current state of the building, and not on the higher (albeit more conservative) performance levels suggested in the territorial authority's submission.

- 7.15 The distinction does need to be made between the reliance on comparison with benchmarks when assessing a consent application for as yet unbuilt work and the assessment of a completed work for code compliance purposes when the actual performance of the building can be established. Use of the risk matrix in this situation will also be of lesser significance.
- 7.16 In other words, the Authority believes, based on the evidence currently available to it, that if the territorial authority's submission on the likely performance of fibre cement-based systems constructed without a cavity was soundly based, it would expect to see a far greater prevalence of failure in external walls of buildings with face-fixed monolithic claddings that were not subject to external moisture ingress than in fact has been the case. Having said that, the Authority has noted the territorial authority's concerns and will ensure that theoretical investigations of the type referred to in the territorial authority's submission are incorporated into any future development of the Authority's wide work on durability and weathertightness.
- 7.17 The Authority has reviewed the defects listed in the Notice to Rectify and repeated in the territorial authority's letter of 11 June. Items 1 to 3 of the 11 June letter are consistent with the faults listed in the experts report. However in this case the Authority disagrees with the territorial authority's conclusion in item 4 that "monolithic cladding systems without a cavity, provision for adequate ventilation, drainage, and vapour dissipation will, in the likelihood of leakage and/or the effects of residual moisture, cause irrevocable damage to the structural elements of the building." The Authority disagrees with this view for the reasons set out above, and finds that the lack of a drained and ventilated cavity, in itself, is not a reason for non-compliance.
- 7.18 The Authority notes that the risk assessment method used by the territorial authority in its June 11 letter is based on a matrix that was discarded after the public consultation on the draft E2/AS1 and recommends that the territorial authority uses the risk assessment methodology contained in the final E2/AS
- 7.19 The Authority notes that the territorial authority no longer agrees with the risk assessment approach used in E2/AS1, and in particular, with the fact that some monolithic claddings can be constructed to E2/AS1 without use of a cavity in low risk situations. This is notwithstanding the fact that this document has been reviewed by appropriately qualified parties with broad experience across the building industry, and has been subject to the public consultation process as required by Section 49 of the Act. By virtue of this process, the details contained in E2/AS1 provide a means of compliance with E2.
- 7.20 The owner informed the Authority during the hearing that remedial work had been undertaken, or was in the process of being carried out. While the Authority understands the owner's interest in promptly addressing these defects, it is concerned that the rectification has been undertaken without the territorial authority being notified. While there is no confirmation that the territorial authority would have responded at the time, the Authority is pleased to note the assurance from the territorial authority that it will now engage in a dialogue with the owner concerning the rectification items. This is an approach that the Authority recommends in these circumstances. Accordingly, as the territorial authority has not verified or inspected the current remedial work, this, and any

further rectification work, must be carried out in full consultation with the territorial authority.

## **8 CONCLUSION**

- 8.1 The Authority is satisfied that the performance of the cladding has been reduced because it is currently allowing water penetration into the wall framing at one location. Consequently, the Authority is not satisfied that the cladding system as installed complies with clause E2.3.2 of the building code.
- 8.2 The Authority finds that, because the faults that have been identified with this cladding occur in discrete areas, it is able to conclude that satisfactory rectification of the items outlined in paragraphs 7.8 and 7.9 is likely to result in the building being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity
- 8.3 The Authority is also aware that the owner has carried out some remedial work. However, the Authority has based its decision on the state of the house prior to this rectification, despite the fact that this work may have improved the weathertightness of the house.
- 8.4 The Authority notes 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 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.
- 8.5 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.
- 8.6 The Authority declines to incorporate any waiver or modification of the building code in its determination.

## **9 THE AUTHORITY’S DECISION**

- 9.1 In accordance with section 20 of the Building Act 1991 the Authority hereby determines that the cladding system as installed does not comply with clause E2.3.1 of the building code. There are also a number of items to be remedied to ensure that the building remains weathertight and thus meet the durability requirement of the code. Consequently the Authority finds that the house does not comply with clause B2. Accordingly, it confirms the territorial authority’s decision to refuse to issue a code compliance certificate.

- 9.2 The Authority finds that rectification of the items outlined in paragraphs 7.8 and 7.9 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 building being weathertight and in compliance with clauses B2 and E2, notwithstanding the lack of a ventilated cavity.
- 9.3 The Authority notes that the territorial authority has issued a Notice to Rectify requiring provision for adequate ventilation, drainage and vapour dissipation. Under the Act, a Notice to Rectify can require the owner to bring the house into compliance with the building code. The Authority has already found in a previous determination (2000/1) that the Notice to Rectify cannot specify how that compliance can be achieved. A new Notice should be issued that requires the owner to bring the cladding into compliance with the building code, without specifying the features that are required to be incorporated. It is not for the Authority to dictate how the defects described in paragraph 7.8 and 7.9 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.
- 9.4 The Authority considers that the cladding on the building will require on-going maintenance to ensure its continuing building code compliance.

Signed for and on behalf of the **Building Industry Authority** on 29 November 2004.

**John Ryan**  
Chief Executive