



## Determination 2012/018

### The code-compliance of a deck added to a house at 30A Hertford Street, Blockhouse Bay, Auckland



#### 1. The matters to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004<sup>1</sup> (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing (“the Department”), for and on behalf of the Chief Executive of that Department. The applicant is the owner, S Patel (“the applicant”) and the other party is Auckland Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.
- 1.2 This determination arises from the decision of the authority to issue a site instruction for additions and alterations to a house because it was not satisfied that the building work complied with certain clauses<sup>2</sup> of the Building Code (First Schedule, Building Regulations 1992). The authority’s concerns included the weathertightness of a tiled deck, taking account of the slope to the deck.
- 1.3 The matter to be determined<sup>3</sup> is therefore whether the subject deck as constructed complies with the Building Code. In deciding this matter, I must consider whether the tiled deck as installed on the building (“the deck floor”) complies with Clause E2 External Moisture and Clause B2 Durability of the Building Code. The deck floor includes the components of the system (such as the membrane, the plywood substrate

<sup>1</sup> The Building Act, Building Code, compliance documents, past determinations and guidance documents issued by the Department are all available at [www.dbh.govt.nz](http://www.dbh.govt.nz) or by contacting the Department on 0800 242 243.

<sup>2</sup> In this determination, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

<sup>3</sup> Under section 177(1)(a) of the Act

and the deck tiles) as well as the way the components have been installed and work together.

#### **1.4 Matters outside this determination**

- 1.4.1 Although the site instruction also listed other items requiring attention, these have been, or are in the process of being resolved between the parties. I have received no evidence relating to a dispute about any other matters related to this building.
- 1.4.2 The applicant has restricted the application to those items in the site instruction which relate to the deck. This determination is therefore limited to the weathertightness of the upper deck to the southwest internal corner.
- 1.5 In making my decision, I have considered the submissions of the parties, the report of the expert commissioned by the Department to advise on this dispute (“the expert”) and the other evidence in this matter.

## **2. The building work**

- 2.1 The building work is part of extensive additions and alterations to a detached house, which is two-storeys-high in part and is situated on a gently sloping site in a low wind zone for the purposes of NZS 3604<sup>4</sup>.
- 2.2 Construction of the altered house is generally conventional light timber frame, with concrete foundations and floor slab, weatherboard claddings, aluminium windows and profiled metal roofing. The expert’s report assumes that the main entry door faces south, and this determination follows that convention.
- 2.3 The original house was completed in 1999 and issued with a code compliance certificate dated 27 September 1999. The original house was a simple L-shape with a partial upper level and a single-storey wing to the south providing a double garage. The walls were clad in horizontal bevel-backed timber weatherboards fixed through the building wrap directly to the framing. Given construction in 1999, I consider the original framing to be untreated.

#### **2.4 The 2009 additions and alterations**

- 2.4.1 The walls of the 2009 additions are clad in horizontal bevel-backed timber weatherboards to match the original walls, with the boards fixed through 20mm timber battens and the building wrap to the framing.
- 2.4.2 The 2009 building work involved extensive additions and alterations, which:
- extended a living area to the west
  - added a new entry foyer to the southwest internal corner
  - added a wardrobe and ensuite to a ground floor bedroom
  - added a single garage space to the south wing
  - added a first floor west wing, to provide two bedrooms and a bathroom

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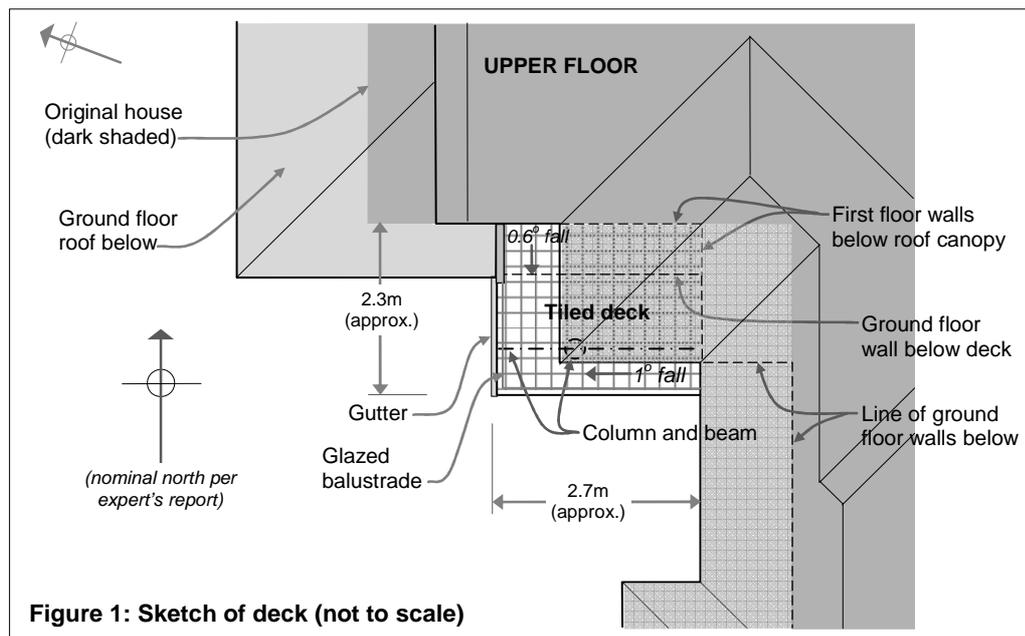
<sup>4</sup> New Zealand Standard NZS 3604:1999 Timber Framed Buildings

- added two new decks; one above the new south garage and the other to the southwest internal corner (which is the subject of this determination).

2.4.3 The 2008 drawings call for wall framing to be H1.2 and deck framing to be H3.1. Given this and the date of construction in 2009, I consider that the framing in the alterations is likely to be treated to a level that will provide resistance to fungal decay.

## 2.5 The subject deck

2.5.1 The deck considered in this determination is to the southwest internal corner of the altered upper floor, above the new main entry as shown in Figure 1:



2.5.2 A strip of about 700mm of the 6m<sup>2</sup> deck sits above the ground floor living area. The remaining deck floor is supported by a column and boxed beam, with a small cantilever along the south. The column extends to support a roof projection, which covers about half of the deck area. Glazed balustrade posts are side-fixed to the south edge, with a west post side-fixed to a part-height clad wing wall.

2.5.3 The deck floor has tiles over a membrane on a plywood substrate, which slopes at 1° towards a gutter at the western edge, with a 0.6° cross slope. The applicator's producer statement does not specify the thickness or brand of the particular membrane, stating only that it is 'EPDM'<sup>5</sup>.

## 2.6 The deck floor

2.6.1 The deck membrane is a single-ply EPDM flexible synthetic rubber sheet adhered to 17mm H3.2 CCA treated plywood. I have taken the specific product used for this deck to be the EPDM membrane appraised by BRANZ<sup>6</sup>.

<sup>5</sup> Ethylene Propylene Diene Monomer

<sup>6</sup> The membrane installer is a licensed applicator of this particular product, which is the only EPDM membrane appraised by BRANZ.

2.6.2 That BRANZ appraisal<sup>7</sup> is still current and states that the membrane will comply with Clauses E2 and B2, when ‘installed in accordance with this Appraisal and the Technical Literature’ according to the conditions described in the certificate. These conditions include:

- buildings to be within the scope of E2/AS1, with timber framed decks
- decks to be a maximum area of 40m<sup>2</sup>
- plywood substrates to be treated to H3.2 (CCA treated)
- deck falls to be a minimum of 1:60 (1°), with no ponding and allowance for deflection and settlement of the substrate built into the substrate
- where subject to heavy use or risk of damage, the membrane must be protected by ‘decking, pavers or by other suitable means.’
- membrane to be installed by trained applicators approved by the manufacturer, in accordance with the manufacturer’s technical literature
- no maintenance of the membrane is normally required provided ‘significant substrate movement does not occur’.

2.6.3 Other relevant information available from a variety of sources include that:

- EPDM membranes are available in wide rolls, allowing decks of, for example, a width of 2.7m to be covered with no joints in the membrane
- EPDM membranes are incompatible with the alkaline nature of Portland cement making such tile adhesives unusable, and adhesives used for bonding tiles to EPDM must be specifically formulated for use on an impermeable surface.

2.6.4 The membrane installer has provided a producer statement dated 6 October 2010, which confirmed the membrane as ‘EPDM to deck area’ and provided a ‘warranty for 5 years workmanship from completion of work and 15 years product’.

2.6.5 The tiler’s undated statement specified and guaranteed a liquid-applied waterproofing system, which I take to apply only to the interior tiled areas. That statement is therefore irrelevant for tiling over the sheet membrane on this deck.

### **3. Background**

3.1 The authority issued building consent No. BLD 20082085801 on 7 November 2008 under the Building Act 2004, and carried out various inspections during construction.

3.2 The consent documents called for a specific 1.5mm PVC membrane sheet, with welded joints and no tiles adhered to the membrane. The installed membrane was EPDM (as outlined in paragraph 2.6.1). I have seen no amendment to the building consent for the change in membrane.

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<sup>7</sup> BRANZ Appraisal Certificate No. 307 (2005)

### **3.3 The final inspections**

3.3.1 The authority carried out the first final inspection of the alterations on 19 July 2010 and issued a site instruction on the same date, which identified a number of outstanding matters, including:

Deck membrane does not have 1° fall, has cladding hard down on membrane, has balustrade fixed through the membrane...

3.3.2 The authority later re-inspected the alterations on 29 April and 25 October 2011, with the record of the latter noting 'issues are deck falls & w/boards tight to deck tiles'. A site instruction was issued on 25 October 2011, which identified a number of outstanding matters, including:

1<sup>st</sup> floor deck falls 0.4°. Needs determination.

Note: Drawing S6 first floor plan shows deck falls required as 2°.

3.4 The Department received an application for a determination on 16 November 2011.

## **4. The submissions**

### **4.1 The applicant's submission**

4.1.1 In a covering letter dated 6 November 2011, the applicant explained his understanding of the situation, noting that the original builder had not installed the deck to the fall shown in the drawings but had since left the country and a second builder had tried to 'sort out this deck problem'.

4.1.2 The applicant forwarded copies of:

- the membrane installer's producer statement dated 6 October 2010
- the tiler's statement (which applies to the internal tiled areas only).

4.1.3 The authority made no submission in response but forwarded a CD-Rom, entitled 'Property File', which contained some documents pertinent to this determination including:

- the building consent, with the consent drawings and specifications for the additions and alterations
- the building consent, with the drawings of the original house
- the inspection records.

4.2 A draft determination was issued to the parties for comment on 7 February 2012. Both parties accepted the draft without further comment.

## **5. The expert's report**

5.1 As mentioned in paragraph 1.5, I engaged an independent expert to assist. The expert is a registered architect and a member of the New Zealand Institute of Architects. He inspected the deck on 19 January 2012; providing a report dated 23

January 2012, which noted that the scope of his inspection was limited to the one deck only, and was based on visual inspection and non-invasive moisture testing.

- 5.2 Although he did not inspect the whole house, the expert noted the following variations from the consent drawings from the area of his inspection:
- No new staircase was built, with the original staircase retained.
  - The deck plan shape was constructed as a rectangle rather than curved.
  - The deck slope is about 1°, in lieu of the 2° shown in the drawings.
  - The deck slopes to an external gutter instead of a deck outlet.
- 5.3 The expert described the construction of the deck, noting that
- about half of the deck is beneath a projecting roof
  - at the north wall, the membrane is dressed over a curb and behind the cladding
  - a metal gutter extends along the west, with a capping over the south edge
  - metal balustrade posts are side-fixed to the south edge, with the west post side-fixed to the end of the west wing wall and tiles cut around the base.
- 5.4 The expert measured the deck floor slope, noting that it sloped 1° towards the external gutter, with 0.6° cross slope to drain the floor adjacent to the part-height wing wall to the west. The expert poured a bucket of water over the tiled floor, noting the water drained away to the gutter without any sign of ponding.
- 5.5 The expert could see no evidence of moisture penetration on the underside of the deck soffit and non-invasive moisture readings of the deck framing, taken on the underside of the soffit lining were 'low and uniform'. The expert also noted that, while the tiling prevented regular inspection of the membrane, it would be possible to install inspection hatches in the deck soffit to allow visual inspection and moisture readings of the deck framing.
- 5.6 Commenting specifically on the deck, the expert noted that:
- the weatherboards to the east wall and the west wing wall butt against the deck tiles, with grout applied to the junctions, preventing drainage from the wall cavity and allowing moisture to wick into the boards
  - the low metal capping over the curb at the south edge allows moisture to track over the underlying membrane, with the membrane to fascia junction unable to be confirmed.
- 5.7 The expert noted that although he was unable to confirm the adequacy of underlying membrane junctions some assurance is provided by the EPDM membrane having been installed by an experienced roofer who is also a licensed building practitioner.
- 5.8 The expert's report was forwarded to the parties on 25 January 2012.

## 6. Weathertightness

6.1 The evaluation of building work for compliance with the Building Code and the risk factors considered in regards to weathertightness have been described in numerous previous determinations (for example, Determination 2004/1).

### 6.2 Weathertightness risk

6.2.1 This particular deck has the following environmental and design features, which influence its weathertightness risk profile:

#### Increasing risk

- although simple in plan, the deck includes complex junctions and features
- the deck is situated partly above the ground floor living area
- the original walls have weatherboard cladding fixed directly to the framing
- the original external wall framing is not treated to a level that provides resistance to decay if it absorbs and retains moisture

#### Decreasing risk

- the deck is in a low wind zone
- most of the deck to wall junctions are sheltered under a roof overhang
- the new walls have weatherboard cladding fixed through a drained cavity
- the new external wall and deck framing is treated to a level that provides resistance to decay if it absorbs and retains moisture.

6.2.2 Using the E2/AS1 risk matrix to evaluate these features, the deck is assessed as having a moderate weathertightness risk rating.

### 6.3 Weathertightness performance

6.3.1 In the case of the subject deck, I make the following observations:

<b>BRANZ Appraisal Certificate No. 307 (2005)</b> (see paragraph 2.6.2 for conditions)	<b>The underlying membrane</b>
Buildings to be within the scope of E2/AS1, with timber framed decks	The house is within the scope of E2/AS1, and the deck is timber framed.
Decks to be a maximum area of 40m <sup>2</sup>	At 6m <sup>2</sup> the deck is very small.
Deck falls to be a minimum of 1:60 (1°), with gutters at 1:100 (0.6°).	The actual deck fall is 1°, with a cross fall of 0.6° and the expert's test showed no sign of ponding (see paragraph 5.4).
Membrane to be protected from damage if subject to heavy use or risk of damage	The deck is not subject to heavy use, so does not need added protection over the membrane.
Membrane to be over treated plywood substrates	The plywood substrate is specified as construction ply and was inspected during construction.
Membrane to be installed by trained approved applicators in accordance with the manufacturer's technical literature	The applicator is approved by the membrane manufacturer (see paragraph 2.6.1).

When completed, the membrane is expected to have a serviceable life of at least 20 years.	The manufacturer warrants the membrane product for a period of 20 years. The installer warrants workmanship for 5 years and product for 15 years (refer footnote 6).
Membrane will not require maintenance provided significant substrate movement does not occur.	Drawings call for deck joists at 400mm centres, with a maximum unsupported span of about 1.2m, so significant substrate movement is unlikely.
<b>Manufacturer's information</b>	
The EPDM membrane is available in 3m wide rolls	The deck dimensions are 2.3m x 2.7m, so the membrane is unlikely to have joints under the tiles.
No reference to whether membrane may be tiled.	Tiles are directly adhered to this deck membrane.
<b>Other relevant information</b>	
EPDM membranes are incompatible with the alkaline nature of Portland cement, making those tile adhesives unusable.	The tiler has not warranted the tiling to this deck and has provided no information as to the specific tile adhesive used, as his statement refers only to the internal wet area tiling (see paragraph 2.6.5).
Adhesives used for bonding tiles to EPDM must be specifically formulated for use on an impermeable membrane.	The membrane supplier has not accepted the deck tiling or provided information on what, if any, tile adhesive may be used for this EPDM membrane.

6.3.2 Based on the above observations, I am satisfied that the deck membrane, including the deck slope, has generally been installed to the membrane manufacturer's instructions in accordance with the conditions in the appraisal.

6.3.3 However, on the evidence available to me, I am not satisfied that the deck tiling has been installed to the membrane manufacturer's instructions in accordance with published good tiling practice. Taking account of the expert's report, I conclude that investigation and/or remedial work is necessary in respect of:

- confirmation by the tile installer of the adhesive used for the deck tiles
- the lack of clearances between tiles and weatherboards
- investigation of the adequacy of the as-built detail at the membrane to fascia junction under the south capping.

## 6.4 Weathertightness conclusion

6.4.1 I consider the expert's report establishes that the current performance of the deck is adequate because there is no evidence of moisture penetration into the timber framing at present. Consequently, I am satisfied that the subject deck complies with Clause E2 of the Building Code.

6.4.2 However, the deck is also required to comply with the durability requirements of Clause B2, which 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 deck to remain weathertight. Because cladding faults and the possible effects of an incompatible tile adhesive may allow the ingress of moisture in the future, the building work may not comply with the durability requirements of Clause B2.

6.4.3 Due to uncertainties surrounding the compatibility of the tile adhesive with the EPDM membrane, I am unable to conclude whether the subject deck can be made code-compliant.

- 6.4.4 Should those uncertainties be satisfactorily resolved, then I consider that satisfactory investigation and/or rectification of the remaining cladding defects outlined in paragraph 6.3.3 will result in the subject deck being brought into compliance with Clauses B2 and E2 of the Building Code.

## **7. What is to be done now?**

- 7.1 The authority should issue a notice to fix that requires the owner to bring the deck into compliance with the Building Code. I also note that the deck above the garage addition will have the same membrane and tiling as the subject deck and I draw this to the authority's attention.
- 7.2 The notice should include the investigations and defects identified in paragraph 6.3.3 along with any other matters identified by the authority, but not specifying how those defects are to be fixed. It is not for the notice to fix to specify how the defects are to be remedied and the building brought to compliance with the Building Code. That is a matter for the owner to propose and for the authority to accept or reject.
- 7.3 I suggest that the applicant then produce a response to the notice to fix in the form of a detailed proposal, produced in conjunction with a competent and suitably qualified person, as to the investigation and rectification or otherwise of the specified matters. Any outstanding items of disagreement can be referred to the Chief Executive for a further binding determination.

## **8. The decision**

- 8.1 In accordance with section 188 of the Act, I hereby determine that the tiled deck to the southwest internal corner of the altered upper floor does not comply with Clause B2 of the Building Code insofar as it relates to Clause E2.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 9 March 2012.

John Gardiner  
**Manager Determinations**