



Determination 2015/033

Regarding the compliance of repairs proposed for the tile roof of a 7-year-old house at 6 Shadbolt Lane, Rolleston

1. The matters to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“the current Act”) made under due authorisation by me, John Gardiner, Manager Determinations and Assurance, Ministry of Business, Innovation and Employment (“the Ministry”), for and on behalf of the Chief Executive of the Ministry.

1.2 The parties to the determination are:

- the owners of the house, P and M Allen (“the applicants”)
- Selwyn District Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.
- the licensed building practitioner for the proposed repairs (“the builder”).

1.3 This determination arises from a dispute regarding the proposed method of installing seals as part of repairs to the roof of a 7-year-old house because the authority was not satisfied that the proposed method would comply with certain clauses² of the Building Code (First Schedule, Building Regulations 1992). The authority’s concerns about compliance relate to the weathertightness and durability of repairs proposed to the valley gutters.

1.4 The matter to be determined³ is whether the proposed method of installing compressible seal strips (“the seals”) beneath the concrete roof tiles at the valley gutters will comply with Clause B2 Durability and Clause E2 External moisture of the Building Code.

1.5 Matters outside this determination

1.5.1 The application for this determination is limited to the compliance of the proposed system of installing the seals as outlined in paragraph 4.5.2 and this determination is therefore limited to the matter in paragraph 1.3 and does not consider in detail the remaining gutter repairs.

1.5.2 The authority issued a building consent (No. BC132770) in February 2014 for remedial work to resolve various deficiencies in the roof. This determination does not consider other building work or other repairs covered by that building consent.

¹ The Building Act, Building Code, compliance documents, past determinations and guidance documents issued by the Ministry are all available at www.building.govt.nz or by contacting the Ministry on 0800 242 243.

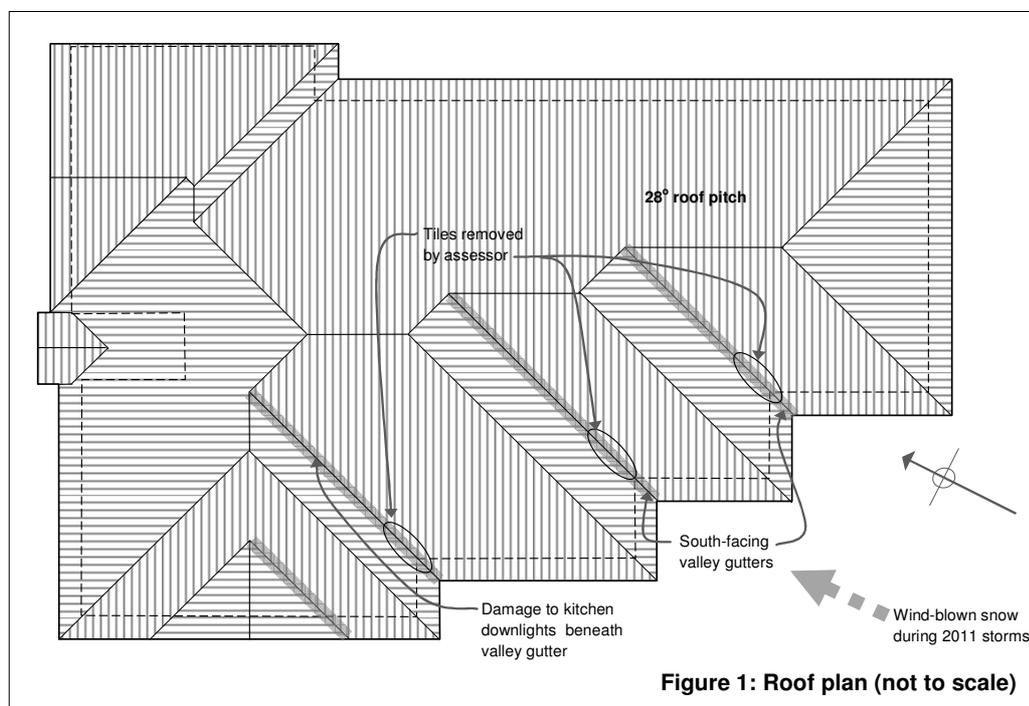
² In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

³ Under section 177(1)(a) of the Act

- 1.6 In making my decision, I have considered the submissions of the parties, the report of the assessor engaged by the Weathertightness Homes Resolution Service to assess the roof damage (“the WHRS assessor”) and the other evidence in this matter.

2. The building work and background

- 2.1 The subject roof repairs are on a detached house situated on a level semi-rural rural site in a high wind zone as described in NZS 3604⁴. Construction is generally conventional light timber frame, with a concrete slab and foundations, masonry veneer cladding, aluminium windows and concrete tile roofing.
- 2.2 The 28° pitched hipped roof includes gables above the northwest garage and entry canopy, and a small projecting gable to the southwest living area. The roof generally has eaves and verge overhangs, except above the northeast wall of the garage and the southwest projecting gable above the living area. The roof plan is fairly complex, with many valley gutters as shown in Figure 1.



- 2.3 The authority issued a building consent (No. 061455) in early 2007 and carried out various inspections during construction, with the final inspection ‘passed’ on 9 August 2007 and a code compliance certificate issued on 16 October 2007.

2.4 The snowstorm damage

- 2.4.1 During a snowstorm on 25 July 2011, snow accumulated on top of the ceiling insulation – particularly below the valley gutters to the southwest. When the snow melted, water saturated the insulation, damaging ceiling linings and kitchen downlights.
- 2.4.2 A second more severe snowstorm on 15 August 2011 resulted in greater volumes of snow blown into the roof space. At the applicants’ request, the authority inspected the roof on 22 August 2011 together with a number of other houses in the region that had similar snow entry. The authority’s file note noted that ‘construction was IAW [in accordance with] E2/AS1.’

⁴ New Zealand Standard NZS 3604:1999 Timber Framed Buildings

- 2.4.3 Failing to resolve matters with the original builder to ensure that snow ingress did not recur, and because their insurance company refused to cover any future claims for damage, the applicants lodged a claim with the Weathertightness Homes Resolution Service (“WHRS”) on 14 February 2012.
- 2.4.4 The WHRS assessor completed an ‘eligibility’ report on 2 March 2012. The claim was accepted as eligible and a further more detailed investigation was subsequently carried out as outlined below.

3. The WHRS assessor’s report

- 3.1 As mentioned in paragraph 1.6, I have taken the report from the WHRS assessor as independent expert evidence in considering this matter. The assessor is a member of the New Zealand Institute of Building Surveyors and inspected the damage to the house on 17 May 2012, providing a report completed on 6 July 2012.

3.2 General

- 3.2.1 The assessor described the house and its construction as ‘generally of a conservative low risk design with the use of traditional soffits’ and noted the applicants’ descriptions of the snowstorms that resulted in the damage and their subsequent claim as outlined in paragraph 2.4.
- 3.2.2 The assessor considered other houses in the region with similar tiled roofs and snow ingress during the August 2011 snow storm; based on media reports of snow damage at the time, enquiries from affected homeowners, and discussions with local roofing companies. The assessor noted that:
- snow ingress appeared to be in new housing areas on the Canterbury Plains where the absence of mature planting and surrounding buildings made the houses particularly vulnerable to southerly storms
 - reports from the Fire Service indicated that ‘most of the homes had tiled roofs, were relatively new and had not sustained earthquake damage’
 - there were few reports of snow ingress problems in the Christchurch area, where southerly storms are likely to be moderated by Banks Peninsula
 - thousands of houses in the Christchurch City area have similar tiled roofs with no underlay, including many with a satisfactory history of use over a long period, together with some relatively new houses in the eastern suburbs.
- 3.2.3 The assessor also investigated the authority’s property records for the house and other relevant information and attached relevant copies to his report, including:
- the undated building consent
 - extracts from the consent specifications
 - roof details as shown in the consent drawings
 - some of the inspection records and the code compliance certificate
 - photographs taken following the 25 July and 15 August 2011 snowstorms
 - article on roof snow damage in region, Northern Outlook, August 27, 2011
 - the authority’s file note dated 22 August 2011

- extracts from the concrete tile standard NZS 4206⁵
- E2/AS1 as at 1 July 2005, section 8.2 Masonry Tiles, Figures 27 to 29.

3.2.4 The assessor considered the photographs taken by the applicants shortly after the 2011 snowstorms and noted the following:

- Although some limited snow had accumulated above roof framing below the ridge tiles and at some tile laps, the main entry appeared to be at valley gutters.
- The snow was very light and had been blown further into the roof space, where it accumulated on top of fibreglass insulation and other horizontal surfaces.
- When insulation was removed when the snow melted, the underlying plasterboard was found to be soaked, particularly in the living area and kitchen, where water had damaged recessed downlights.
- The damaged ceiling linings appeared to be predominately below the south-facing valley gutters.

3.3 Invasive investigations

3.3.1 In order to investigate the underlying construction, the assessor inspected the valley gutters and removed roof tiles at three locations (see Figure 1 at paragraph 2.2); contrasting the as-built junctions with comparable details in E2/AS1 and NZS 4206.

3.3.2 The assessor categorised his findings in terms of ‘primary’ or ‘secondary’ deficiencies. As outlined in paragraph 1.5, secondary deficiencies identified by the assessor are not considered in this determination and are therefore not described further in the following paragraphs.

3.3.3 In regard to the ‘primary deficiencies’ considered in this determination, the assessor referred to E2/AS1 Figure 27 and included the following comments (in summary):

- Dimensions of the underlying valley gutters accord with Figure 27, at 250mm overall width and 140mm from the gutter centre to 20mm high upturns. The gutters sit on 25mm valley boards, with ‘splay’ battens at the edges.
- The lines of cut tiles at valleys are inconsistent and some locations have only 85mm effective cover, compared to 100mm minimum shown in Figure 27.
- Significant gaps were apparent between the top of the valley gutter upturn and the underside of the cut valley tiles, some large enough to allow a hand to be inserted into the roof space.
- Figure 27 shows ‘splay battens’ against gutter upturns, with the top of battens in line with the top of the upturn. However, in the case of the subject gutters:
 - there are gaps of 20mm between battens and upturns in some areas
 - the gutter upturn and the valley board provide an overall thickness of 45mm whereas the adjoining batten is 53mm thick, leaving a gap of 8mm
 - where valley tiles overlap, the underside of the upper tile is lifted by the tile thickness which increases gaps in those locations.
- There was no evidence of leaks below the east-facing valley gutter.

⁵ NZS 4206:1992 Concrete Interlocking Roofing Tiles

3.4 The assessor's conclusions

3.4.1 Taking account of the nature of the 2011 snowstorm and the incidence of significant snow ingress through tiled roofs in the region as outlined in paragraph 3.2.2, the assessor came to the following conclusions (in summary):

- Although some limited snow accumulated at laps and hip ridges, such isolated and limited amounts during an extreme weather event can be expected to dissipate without any significant damage to building elements.
- Gaps to valley gutters were large enough to allow snow to be sucked through the gaps due to the rare combination of sufficient wind pressure and unusually light snow. The south-facing valley gutters coincided closely with the direction of the southerly wind and allowed significant snow entry into the roof space.
- The south-facing gutters therefore did not comply with Clause E2.3.2 of the Building Code, which requires roofs to prevent water penetration that could cause undue dampness or damage to building elements.

3.5 In regard to 'primary deficiencies' identified in the valley gutters, the assessor therefore limited the remedial work 'to repair current and likely future damage' to the removal of tiles at the sides of valley gutters and the installation of seals at the tile overlaps to the gutters.

4. The remedial work

4.1 A proposal for the remedial work was subsequently prepared based on the assessor's report, and a 'Design Solution' dated 23 September 2013 was submitted to the authority. The report described each deficiency identified by the assessor and provided 'proposed repair action' to remedy the deficiency. To address the resolution of the additional 8mm thickness of the existing battens identified by the assessor, the proposal was to install compressive foam to either side of the battens.

4.2 Consent documentation was then prepared based generally on the approved proposal and the authority issued a building consent for 'dwelling repairs' (No. BC132770) dated 28 February 2014. The consent drawings included a detail for remedial work to resolve deficiencies identified at the valley gutters.

4.3 The consent detail changed from the earlier proposal as it called for compressive foam to be installed between the splay batten and the cut valley tile. (I note that moving the position of seals to the top of battens effectively resolved the requirement to fill an additional 8mm gap created by the added thickness of existing battens).

4.4 The authority inspected the repairs on 18 August and 9 October 2014; observing a number of items did not accord with the consent drawings, including a change to the seal used and defects in its installation. The authority issued 'an inspection note confirming that the installation did not comply with the building consent.'

4.5 The proposed remedial work to the valley gutters

4.5.1 On 3 March 2015 The authority met with the builder engaged to carry out the remedial work to discuss 'practical issues encountered' with installing the specified foam seals:

...due to variations in the size and weight of the cut valley tiles on the foam strip. The builder confirmed he would carry out further testing to identify a workable solution.

- 4.5.2 The builder submitted a proposed installation plan for repairing the valley gutters and submitted this to the authority in an email dated 9 April 2015. The builder's proposal included photographs of a mock installation showing:
- compressible foam seal cut to form an 'L' shape profile, to allow fixing to splay battens while maximising the size of gap able to be filled at the crests of the tile profile
 - the seal installed between a tile and a batten, showing that the foam completely fills the gap between the tile profile and the batten
 - the seal installed beneath the overlap of two tiles, showing a small triangular gap (of about 20mm x 20mm) at the end of the tile overlap.
- 4.5.3 The above email also described the work and suggested that the following inspections of the 'critical phases of the work' be carried out:
- After removal of existing valley gutters to ensure 'all support timbers in the valley and at the eaves line are in place and approved'.
 - After one valley gutter is completed and the foam is installed, including inspecting the line of the tiles, the tile overhang and the fixings.
 - Final inspection of the completed valley gutters.
- 4.5.4 In an email to the builder dated 12 April 2015, the authority noted that the proposal had been briefly reviewed and asked 'what action do you propose to close off the gaps shown in the photos?'
- 4.5.5 In response to the draft determination (refer paragraph 5.4), the authority has expanded on their concerns about the proposal being related to where the strip extends beneath cut tiles, where the tile weight is insufficient to compress the foam properly which 'may hold the tile further off the batten and cause the tile to unseat and fall into the valley tray'.
- 4.6 The applicants forwarded the proposal and response to the assessor, noting that they were preparing an application for a determination on the use of the compressible foam 'in an 'L' shape between tile and splay batten.' The application was accepted for determination on 14 April 2015.

5. The submissions

- 5.1 The applicants provided copies of:
- the WHRS assessor's report
 - email correspondence between the builder, the authority and the assessor.
- 5.2 The authority made no submission in response to the application for determination, but provided copies of:
- the initial 'Design Solution' dated 23 September 2013
 - the building consent for the repair work
 - the consent drawings and specifications.
- 5.3 A draft determination was issued to the parties for comment on 4 May 2015, which was accepted by the applicant and by the builder on 18 May 2015.

5.4 The authority's response to the draft determination

5.4.1 The authority responded to the draft determination on 19 May 2015, stating that the draft was not accepted and attaching a submission. The authority outlined the background to the situation and I have clarified the draft where I consider appropriate.

5.4.2 The authority also expanded on its original concerns (see paragraph 4.5.5) about the proposed seal installation and noted:

In the absence of any available qualitative, or best practice, information, [the authority] sought clarification from the builder as to what action would be proposed to close off the observed gaps shown in the photos (... email of 10/04/15). No response from the builder was received.

5.4.3 The authority noted that it has not declined the use of the proprietary foam strips and I have amended the draft accordingly. However the authority stated it:

...is concerned that there is an increased probability that smaller tiles will become unstable, as has already occurred with the Black foam, which will increase the probability for ingress of external moisture.

5.5 The applicants' response to the above

5.5.1 The applicant responded to the authority's comments on the draft determination in an email to the Ministry dated 24 May 2015, noting their concern that any increase to the scope of the determination will delay the repairs with winter arriving.

5.5.2 The applicants also included the following comments about the authority's response to the draft determination (in summary):

- The authority's email to the builder on 12 April 2015 was the stimulus for seeking a determination and the draft determination answered the question of whether a roof needed to be 'sealed' against all air flow (see Table 1).
- The determination was requested in order to avoid further delays to the repairs and the application was limited to the proposed installation of the seals 'as this was the only unknown element to the repair plan'.
- The 'full installation configuration is not contentious' and the builder advises that 'all the issues noted in the authority's 'inspection report of 10 October 2014 will be remedied.' (see paragraph 4.4).
- The builder also advises that 'the proposed L-shape installation of the foam will reduce the instability of the tiles' and there is therefore no need for the determination to cover the installation of the total system.

5.6 My response to the authority's comments

5.6.1 In regard to the authority's comments, I note the following:

- The background to this determination indicates that this roof is not a 'leaking' roof in the normal sense of the word, as there was no indication of moisture penetration in the five years prior to or since the very unusual snow storms during 2011.
- The concerns now raised about the proposed seal installation (see paragraph 4.5.5) were not described until the authority responded to the draft determination on 18 May 2015, and I note that the response to the builder on

12 April 2015 did not indicate any detailed review or clarify concerns held by the authority.

- The builder's proposal for installing the seals included a proposed process for the authority to inspect 'critical phases of the work' and the completion of a sample gutter (see paragraph 4.5.3). I consider that this process should allow the authority and builder to identify and resolve any installation problems.
- The authority has issued a building consent for the roof repair work and is responsible for inspecting that work during construction. The applicants have not disputed other aspects of the building work, which I consider should be dealt with during the normal course of inspections expected for these repairs.

5.6.2 Taking the above into account, I do not consider that the matter to be determined needs to be increased in its scope. If the process described by the builder and considered in this determination is carried out, and outstanding issues cannot be resolved during the course of inspections, the authority has the right under the Act to seek a determination. However, I am also of the opinion that the parties should be capable of resolving any remaining items without needing a further determination.

6. Compliance of the proposed seals

6.1 The authority appears to maintain that the compressible seals proposed to be installed to the valley gutters will not sufficiently seal the tiles at the valleys to prevent future snow ingress in similar storms. In such a weather event, the roof would therefore risk not complying with the performance requirements of Clause E2.3.2.

6.2 I note that the authority's concerns originally appeared to be limited to the gaps likely to remain under tile overlaps after the proposed installation of the compressible foam seals. The authority has since expanded its concerns to include whether smaller cut tiles over the seals could become unstable and increase the risk of moisture penetration (see paragraph 5.4.3).

6.3 Expected performance of the proposed seals

6.3.1 The suggested sequence of installation and inspections outlined by the builder (see paragraph 4.5.1) includes the removing existing valley gutters and inspecting underlying 'support timbers', together with the installation and inspection of one valley gutter prior to proceeding with the remaining gutters. As noted in paragraph 5.6.1, I consider that such a process should allow the authority and builder to identify and resolve any problems in the installation.

6.3.2 Although removing the gutters could provide the opportunity to reinstate them 8mm higher to line up with the tops of battens, I consider that changing the proposed position of the seals to the top of the re-used splay battens effectively resolves the additional thickness of the existing battens as identified by the assessor. I therefore leave this to the parties to resolve when the gutters are removed in due course.

- 6.3.3 I make the following observations on the background to the situation and on the proposed installation of compressible seals to the valley gutters of this house:

Table 1:

Relevant background circumstances and relevant compliance requirements	The subject circumstances and proposed valley seal system
The 15 August 2011 snowstorm was considered to be a very rare storm with unusually light wind-driven snow	The wind force was not ameliorated by planting and buildings because the subdivision is relatively new. The wind direction also coincided with vulnerable defective valley gutters
Building Act s19(1) Code compliance can be established via compliance with an Acceptable Solution	Some aspects of the valley gutters did not comply with the details called for in E2/AS1
E2/AS1 Table 10 as at 1 July 2005 called for underlay to be installed to concrete tiled roofs below 20° pitch.	The 28° pitch roof has no underlay beneath the concrete tiles, in accordance with Table 10
E2/AS1 Table 10 amended 5 August 2011 Amended to include underlay for all tiled roofs in <u>very high</u> and <u>extra high</u> wind zones. Table 10 remains current.	The tiled roof is in a <u>high</u> wind zone, so the lack of underlay complies with the current E2/AS1 Table 10 (refer paragraph 6.3.4).
The subject valley gutters included significant defects that increased expected gaps and air movement into the roof space	The proposed compressible foam seal installation will close gaps between tile profile and splay batten, with small gaps remaining at tile overlaps.
History of use of similar roofs Many older houses in the region ⁶ have concrete tiled roofs with no underlay, some air gaps into the roof space and no history of significant problems with snow entry	The small gaps remaining at the tile overlaps after the seal installation are less than a tile thickness, which would be significantly less than those expected in older tiled roofs.
Clause E2.3.2 requires prevention of moisture causing undue dampness or damage.	Clause E2 does not require a roof to be 'sealed' against all air flow. Any snow managing to penetrate remaining minor air gaps would be insignificant and expected to dissipate without causing undue dampness or damage.
Building Act s18(1)(a) Building work not required to achieve performance criteria beyond that required by the Building Code	Repairs to the defective valley gutters will result in the gutters complying with the minimum specifications called for in E2/AS1, with the seals providing additional protection.

- 6.3.4 Following reports of snow entry into roof spaces during the August 2011 storm, I note that the Ministry informally consulted the roofing industry as to whether any changes to E2/AS1 Table 10 were required. In view of the nature and rarity of the storm, together with the lack of similar known problems in high wind snow-prone areas in southern regions, it was decided that changes were not warranted.

- 6.3.5 Taking into account the assessor's report and the above observations, I consider that the proposed installation of compressible seals, including the process and inspections proposed by the builder, is likely to reduce potential air flow to an acceptable level and to prevent significant snow ingress into the roof space in the future.

⁶ Including State Houses built in the 1950's, which are now some 60 years old

6.4 Conclusion

- 6.4.1 I have reasonable grounds to be satisfied that the proposed seal installation, including the process and inspections proposed by the builder, to the roof of this house will meet the performance requirements of Clause E2 for the roof to prevent moisture penetration that would result in undue dampness or damage to building elements. Consequently, I am satisfied that the proposed seals considered in this determination will comply with Clause E2 and Clause B2 of the Building Code.

7. The decision

- 7.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the proposed method of installing compressible seal strips beneath the concrete roof tiles at the valley gutters will comply with Clauses B2 and E2 of the Building Code.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 12 June 2015.

John Gardiner
Manager Determinations and Assurance