



Determination 2013/005

Regarding the refusal to grant a building consent for retrofitting foam wall insulation in a house at 1 Wikitora Road, Whanganui

1. The matter to be determined

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

1.2 The parties to this determination are:

- the owners of the house, Ms P Anderson and Mr C Scott (“the applicants”) acting through their agent Airfoam Wall Insulators (Palmerston North) Limited (“the insulation provider”). The insulation provider also represented the applicant for the purposes of the building consent application
- Wanganui District Council, carrying out its duties and functions as a territorial authority and a building consent authority (“the authority”).

1.3 Airfoam Wall Insulation Limited and Airfoam Wall Insulators (Palmerston North) Limited are considered persons with an interest in this determination on the grounds of being the proprietary system provider and installer respectively. I have referred to both companies (and the insulation provider in its role as the applicant’s agent) as “the insulation provider”. The insulation provider has also engaged a building advisory company as an adviser.

1.4 The determination arises from a decision made by the authority to refuse to grant building consent for proposed building work that consisted of retrofitting urea formaldehyde foam insulation (“the insulation”) in the external walls of the applicants’ house. The authority was of the view that the installation would not comply with the Building Code (Schedule 1, Building Regulations 1992) and would adversely affect the house.

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

- 1.5 Therefore, the matter to be determined² is whether the authority correctly exercised its powers in refusing to grant building consent. In considering this matter, I must consider whether there was sufficient evidence provided in the building consent application for the authority to conclude on reasonable grounds that the building work and the existing building (as altered) would comply with the Building Code to the extent required by the Act.
- 1.6 In making my decision on these matters, I have considered the submissions of the parties, and other evidence in this matter. I emphasise that each determination is conducted on a case-by-case basis.

2. The building work

- 2.1 The applicants' house was built sometime between 1910 and 1918. It is a single storey, detached dwelling, constructed of timber framing elevated on concrete perimeter wall foundations. The exterior walls have weatherboard cladding, which is directly fixed to the external wall framing without building paper being used. With the exception of some weatherboards on the southern elevation, the cladding is in good condition and has been painted within the past eight years. The house was extensively renovated in 1995, which included rewiring, new or renovated window joinery, and the addition of a small extension on the southern elevation. This extension is fully insulated and is the area where some of the cladding needs work. Overall, the house appears to be well maintained.
- 2.2 The building work consists of making a series of holes in the external walls through the weatherboards and pumping insulation into the walls to improve the thermal performance of the house. The holes in the external walls are subsequently plugged and a drying regime is followed while the insulation cures.

3. The background

- 3.1 On 18 September 2012 the insulation provider, on behalf of the applicant, applied for building consent to retrofit insulation into the walls of the applicants' house. The application sets out the scope of the building work, stating that the building work consists of:
- ... making a series of 25mm holes in the external walls through the weatherboards and pumping the insulation into the walls to improve the thermal performance of the house. The holes to the external walls are subsequently plugged, and a ventilation regime is followed while the foam cures.
- 3.2 The documents that were part of the building consent application, were:
- a design summary documenting how the building work and existing building would achieve compliance with clauses B1, B2, C1, C2, C3, E2, F2, G9 and H1 of the Building Code.' (Note that this design summary is a general summary of the product methodology and is not specific to the particular installation)

² Under sections 177(1)(a), 177(1)(b) and 177(2)(a) of the Act

- a building investigation report, following an inspection to determine if the applicant's house was suitable to have insulation installed ("the inspection"). The report covered items relating to the performance of the existing building, including the electrical wiring, fire-rated walls, fixed appliances and smoke alarms, structural stability, internal moisture and weathertightness
- a floor plan showing where insulation would be installed, where invasive moisture testing would be carried out after installation 'to demonstrate that the construction moisture is being dissipated', and the positions of smoke alarms and windows.

3.3 In addition, the insulation provider noted that a compliance management report would be filed with its application for a code compliance certificate for the building work. The report would include:

- results from invasive moisture testing carried out to ensure construction moisture was dissipating
- evidence that smoke alarms had been installed
- evidence that the installation holes had been properly repaired
- evidence that installation had not affected the ongoing compliance of the building
- a copy of the insulation guarantee, and a letter from the owner undertaking to apply a suitable coating to the cladding.

3.4 In a letter dated 4 October 2012, the authority requested further information about whether the external walls had building paper installed, and the effect of the insulation on electrical switches.

3.5 The insulation provider responded in a letter dated 4 October 2012, confirming that the house did not have building paper installed and explaining the pre-installation preparation process used to prevent the insulation entering the switch cavities.

3.6 In a letter dated 5 October 2012, the authority made a second request for further information, seeking clarification of how, in the absence of building paper, the building work would 'prevent internal water vapour that condenses into water on the back of the cold cladding from being soaked up by the insulation'.

3.7 The insulation provider responded in an undated letter, enclosing an evaluation tool that it had used 'as a method for establishing likely compliance' of the insulation with Clause E2.3.5 of the Building Code. The evaluation tool drew on the Ministry's guidance on retrofitting insulation in external walls³ and external moisture acceptable solution E2/AS1⁴. The letter stated that:

The tool comprises two parts:

1. E2/AS1 risk matrix as a way of establishing likely weathertight risk of the design, and

³ Department of Building and Housing. (2011). *Guidance on Building Code compliance for retrofitting insulation in external walls*. Available on the publications section of the Ministry's Building and Housing website <http://www.dbh.govt.nz/publications>.

⁴ Contained in: Department of Building and Housing. (2011). *Compliance Document for New Zealand Building Code Clause E2 External Moisture*. Available on the publications section of the Ministry's Building and Housing website <http://www.dbh.govt.nz/publications>

2. Guidance factors – as a way of establishing the factors that increase the risk of E2.3.5 non-compliance or decrease the risk of E2.3.5 non-compliance.

- 3.8 Using the evaluation tool, the insulation provider concluded that the house posed a low weathertightness risk, and that although building paper had not been used ‘there are other mitigating factors that would allow [the authority] to conclude (on reasonable grounds) compliance with E2.3.5 to the extent required by the Act’. The insulation provider also stated that, because the insulation was an ‘open cell vapour permeable foam’, it would shed rather than soak up and hold moisture, and that the insulation provider had explained to the applicants that because there was no building paper ‘ongoing meticulous maintenance will be required’.
- 3.9 In a letter dated 9 October 2012, the authority made a third request for further information, stating that it was ‘not convinced you have proven compliance’. Its concerns included the tendency for weatherboards to leak and the potential for water to become trapped between the cladding and the insulation and not dry out. The authority did not accept the insulation providers’ evaluation tool as a means of establishing compliance.
- 3.10 The insulation provider responded in an undated letter, explaining the logic of the evaluation tool. The provider also referred to the tendency for the insulation to shrink as it cured, resulting in ‘drainage pathways’ that would contribute to the compliance with E2.3.5, noting that the ‘greatest risk for non-compliance’ would be up until construction moisture dissipated, which would be monitored through invasive testing.
- 3.11 In a letter dated 16 October 2012, the authority refused to grant building consent for the proposed work on the grounds that it did not comply with Clause E2 of the Building Code ‘due to the lack of paper behind the weatherboards’. The authority stated the installation of the insulation would cause water that penetrated the weatherboards ‘to be held in the cavity and that this will be detrimental to the durability of the cladding and wall framing’. It also reiterated that for the insulation provider’s evaluation tool to be accepted as a means of compliance it required ‘some form of validation’.
- 3.12 The insulation provider subsequently applied for a determination on behalf of the applicant; the application was received by the Ministry on 30 October 2012.

4. The submissions

- 4.1 The application for determination was accompanied by a submission from the insulation provider dated 23 October 2012.
- 4.2 The submission outlined the background to the application and stated that the focus of the building consent documentation had been to provide as ‘robust a picture’ as possible, so that the authority could be satisfied that the proposed building work complied with the Building Code.
- 4.3 The submission set out the means of establishing Building Code compliance for both the building work and the existing building, including the process to be used for re-sealing the installation holes in the external cladding.

- 4.4 With respect to compliance with Clause E2.3.5, the submission also provided information about the risk factors identified in E2/AS1 and the Ministry's guidance on retrofitting insulation in external walls. These factors can be summarised as:
- Factors reducing risk:
 - given the age of the house, it is not very airtight
 - given the age of the house, durable native timbers have probably been used for framing
 - concrete perimeter foundations, with ventilation tiles; very dry underneath house
 - weatherboard cladding is well-maintained and recently painted
 - permeable linings used throughout.
 - Factors increasing risk:
 - no building paper has been used under the external cladding.
- 4.5 The insulation provider concluded that the house was low risk and well maintained, and that it was satisfied that both the building work and the existing building would continue to comply with the Building Code to the extent required by the Act. The insulation provider also re-stated that, as part of its application for a code compliance certificate, it would be willing to provide post-installation invasive moisture readings and photographs of the building as evidence of code compliance.
- 4.6 With its submission, the insulation provider supplied copies of the building consent application and supporting documentation, and the correspondence that had passed between the parties.
- 4.7 It also supplied a copy of a report about compliance dated 9 September 2011 ("the September 2011" report), which included manufacturer's data and technical specifications for the insulation, and excerpts from the insulation provider's operations manual. This report is not referred to in the building consent application or subsequent correspondence, nor in the insulation provider's submission, so it is not clear whether the authority had access to it when making its decisions about compliance.
- 4.8 In a further submission, dated 5 November 2012, the building adviser on behalf of the insulation provider supplied further information about the risk matrix that it had developed⁵, noting:
- The matrix now takes into account:
 - the E2/AS1 risk score (A)
 - whether building paper is present in the external walls (B)
 - the impermeability of the external cladding (C)
 - the state of the external cladding (i.e. whether it has been well maintained) (D)

⁵ Version 3

- the durability of the timber (E)
 - the extent of subfloor ventilation present.(F)
 - Each of the factors have a value allocated between 1 and 2.5. The formula for calculating the risk is $AB((CD)+E+F)$ and takes account of dependencies between factors, with a score given between 3 and 34
 - The building in question has a risk score of 9 using the above approach (A – 1, B – 2, C – 1.5, D – 1, E – 2, F – 1)
 - Based on this approach, it would appear there is a low risk of non-compliance with respect to E2.3.5.
- 4.9 In a submission dated 23 November 2012, the authority noted the two issues it had concerns with in respect of the building consent application as being:
- the continued durability of the existing structure after the foam insulation is installed due to the lack of building paper behind the existing cladding
 - the lack of any validation of the ‘risk matrix’ supplied by the [building advisory company on behalf of the insulation provider] to confirm compliance with the Building Code.
- 4.10 A draft determination was issued to the parties for comment on 4 December 2012.
- 4.11 The insulation provider accepted the draft without further comment or submission in a response received on 14 December 2012.
- 4.12 In a letter dated 14 December 2012, the authority made a more detailed submission on its concerns outlined in its earlier submission (refer paragraph 4.9 above). The authority submitted (in summary)
- Insulation shrinkage is not an acceptable method to show continued compliance with E2.3.5, and it would require a minimum uniform shrinkage of 6mm to prevent water bridging between the insulation and the back of the cladding. The shrinkage from the back of the cladding is likely to be less than 3mm.
 - The evaluation tool is a ‘good idea’ in principal, but in its present form cannot be accepted as a means of compliance. The evaluation tool is an alternative solution and as such it is the applicant’s responsibility to provide justification for the solution provided.
- 4.13 The authority also submitted its view that as a large section of the insulation provider’s market would be older housing stock that may not have building paper installed, the determination would be important in terms of establishing an ‘acceptable way through the necessary compliance issues required by section 112(b)’. The authority also referred to a recent article authored by BRANZ⁶ on retrofitting insulation, and highlighted paragraphs on shrinkage and lack of building paper that the authority considered relevant.

⁶ Cox-Smith, I (BRANZ Ltd). Retrofitting for cosy walls. *Build*, 129. April/May 2012

5. Approach for assessing the matters to be determined

5.1 The matter for determination is whether the authority correctly exercised its powers in refusing to grant building consent. In considering this matter, I must consider whether there was sufficient evidence provided in the building consent application for the authority to conclude on reasonable grounds that the building work and the existing building (as altered) would comply with the Building Code to the extent required by the Act.

5.2 I have issued a number of determinations about the requirements of the Act, as they relate to alterations to existing buildings, including repairs and remedial work. These determinations include 2010/140, 2010/139, 2010/080, 2011/117, 2012/026 and 2012/027. The Ministry has also issued guidance under section 175 of the Act on Building Code compliance for retrofitting insulation in external walls that is relevant to this determination⁷.

5.3 The Building Code obligations for the building work are:

Clause B2 (B2.3.1)

- compliance with Clause B2, with respect to the other Code clauses

Clause E2 (E2.3.2, E2.3.6)

- compliance with Clause E2.3.2, with respect to the installation holes made in the exterior cladding
- compliance with Clause E2.3.6, with respect to the dissipation of the excess moisture present at the completion of construction

Clause F2 (F2.3.1)

- compliance with Clause F2.3.1, with respect to the installation of the insulation and its ongoing effects.

5.4 The Building Code obligations and the components of the building they relate to, with respect to the compliance of the existing building to the same extent as before (as required by section 112) are:

Clause B1 (B1.3.1)

- the structural performance of the framing is not reduced, with respect to the accumulated moisture causing damage to the framing (relates to Clause E2)
- the structural performance of claddings and internal linings (for withstanding normal loads in use and providing bracing units where relevant) is not reduced

Clause B2 (B2.3.1)

- the durability of the building elements is not reduced, with respect to the extent that other performance requirements apply

⁷ The guidance documents are available on the publications section of the Ministry's Building and Housing website <http://www.dbh.govt.nz/publications>

Clause C2 (C2.2)⁸

- insulation must not cover appliances that generate heat or be positioned so as to cause undue heat to build up in adjacent building elements
- insulation should be installed at a sufficient distance from appliances and other fixed equipment to ensure its surface temperature does not exceed 90° C

Clause C3 (C3.7)

- the compliance of any fire rated walls must not be detrimentally affected

Clause E2 (E2.3.2, E2.3.5)

- the ability of the external wall to prevent the penetration of water that could cause undue dampness or damage must not be reduced
- the ability of the concealed space or cavity to prevent external moisture being accumulated or transferred must not be reduced

Clause G9 (G9.3.1)

- the compliance and continued safety of the electrical wiring must not be detrimentally affected

Clause H1 (Clause H1.3.1, H1.3.2E)

- the thermal performance of the building envelope must not be reduced.

6. Whether there is sufficient evidence to conclude retrofitting insulation complies with the Building Code to the extent required by the Act

6.1 In order to form a view about whether there is sufficient evidence provided in the building consent application for the authority to conclude on reasonable grounds that the building work and the existing building as altered would comply with the Building Code to the extent required by the Act, I have taken account of the regulatory requirements for alterations to buildings as I described in section 5 and the evidence provided in the building consent application.

6.2 The building work

6.2.1 The following table compares the evidence provided in the building consent application with the relevant Building Code obligations for the building work.

Building Code obligation	Requirement	General information provided	Building work specific information provided
Clause E2.3.2	Roofs and exterior walls must prevent the penetration of water that could cause undue dampness, damage to building elements or both	'Weatherboard holes will be sealed with [proprietary] House Filler.' 'The 25mm installation holes will be sealed as follows:	'A building work compliance report will be provided when an application for a CCC is made. This report will provide... • photographic evidence

⁸ Clause C1-C4 of the Building Regulations 1992 were replaced on 10 April 2012 by Clauses C1-C6 of Regulation 6 of the Building (Building Code: Fire Safety and Signs) Amendment Regulations 2012 (SR2012/33). Clauses C1-C4 of the 1992 regulations remain in force (alongside the new regulations) until April 2013.

		<ul style="list-style-type: none"> • Remove excess [insulation] material • Clean outer edge of hole, ensuring that the outer edge of the hole is free of all dust particles • The filler is mixed with a catalyst on site and keyed into the hole in excess of the depth of the cladding, ensuring good adhesion with the outer edges and is left proud whilst curing • After the filler has cured it is sanded flush with the weatherboard • Oil based primer is applied along with 2x finishing coats of either water based or enamel emulsion paint. The type of paint will depend on what had previously been used on the exterior.' 	that the installation holes have been appropriately sealed and primed...'
Clause E2.3.6	Excess moisture present at the completion of construction must be capable of being dissipated without permanent damage to building elements.	<p>'Moisture probes will be installed on slowest drying elevation to track dissipation of construction moisture.'</p> <p>'Where a probe is unable to be installed, holes will be drilled to enable reading of the moisture content.'</p>	<p>'A building work compliance report will be provided when an application for a CCC is made. This report will provide:</p> <ul style="list-style-type: none"> • Moisture probe readings to demonstrate that construction moisture is dissipating...'
Clause F2.3.1	The quantities of gas, liquid, radiation or solid particles emitted by materials used in the construction of buildings, shall not give rise to harmful concentrations at the surface of the material where the material is exposed, or in the atmosphere of any space.	'Owner advised of ventilation requirements, stickers will be placed on appropriate windows, installer checks 1 week post installation for any evidence of smell.'	'Owner understands ventilation requirements during curing'.

6.2.2 With respect to Clause E2.3.2, I am satisfied that the process generally described in the building consent application to make good the penetrations of the external cladding is acceptable. However, I am aware from documentation provided to me in relation to another determination application, that the insulation provider now has an up-to-date operational procedure for sealing exterior installation holes. This information should be provided to the authority in a consolidated way as a part of the building consent application

- 6.2.3 With respect to Clause E2.3.6, I am satisfied that the process described for monitoring post-construction moisture levels is acceptable. I have been able to arrive at this conclusion as the relevant documentation had been provided to me in relation to another determination application. However I note that the authority has not been provided with a copy of this information: it should be provided in a consolidated way as a part of the building consent application
- 6.2.4 With respect to Clause F2.3.1, I am satisfied that the process described in the building consent application material is acceptable. I have been able to arrive at this conclusion as the relevant documentation had been provided to me in relation to another determination application. However I note that the authority has not been provided with this information: it should be provided in a consolidated way as a part of the building consent application. I also note that previous determinations found that there should be a clear procedure for what will happen if there are any post-installation issues with smell indicating formaldehyde levels are not returning to ambient house levels.

6.3 The existing building (as altered)

- 6.3.1 The following table compares the evidence provided in the building consent application with the relevant Building Code obligation for the existing building (as altered).

Building Code obligation	Requirement as relating to the compliance of the existing building as required by section 112	General information provided	Building specific information provided
Clause B1.3.1 for external wall framing, external cladding and internal linings (bracing and normal loads)	The structural performance of the framing is not reduced, with respect to the accumulated moisture causing damage to the framing (relates to Clause E2) The structural performance of claddings and internal linings (for withstanding normal loads in use and providing bracing units where relevant) is not reduced	'Pre installation investigation undertaken with owner to establish current performance of existing building. Where potential issues exist, then the owner will be required to address these.'	'Linings are painted plasterboard and in excellent condition throughout. No evidence of mould or mildew was detected during the inspection.' '... no areas [were found] where the linings were incomplete.' '... the under sink areas of the bathroom and kitchen have no evidence of internal leaks.' '[The owners are not] aware of areas (internally or externally) where there is leaking.'
Clause C2.2 for appliances	Insulation should be installed at a sufficient distance from appliances and other fixed equipment to ensure its surface temperature does not exceed 90°C.	'Appliances will be identified during the pre installation report and foam installation plan amended accordingly.'	'All fireplaces are set within internal walls only.'
Clause C3.7 for fire rated walls	The compliance of any fire rated walls must not be detrimentally affected.	'Existence of any fire rated walls will be established during the pre installation report and these walls will not have	No firewalls were identified.

		foam installed.'	
Clause E2.3.2 and Clause E2.3.5 for the external wall and cladding system	<p>The ability of the external wall to prevent the penetration of moisture that could cause undue dampness or damage must not be reduced.</p> <p>The ability of the concealed space or cavity to prevent external moisture being accumulated or transferred must not be reduced.</p>	<p>'[The inspection] will identify whether any potential issues exist in which case owners will be required to address them.'</p> <p>'For brick veneer homes – owner will be required to coat bricks with appropriate waterproofing agent once curing process complete.'</p>	<p>'A ...native timber framed weatherboard villa...'</p> <p>'The building in general is in excellent condition and has been maintained and renovated to a very high standard.'</p> <p>Weatherboards are 'all in good repair' and 'securely fixed' and have been painted 'within the last 8 years.' 'Some weatherboards require attention in the extension on the Southern elevation. This area will not be insulated...as it is already insulated.'</p> <p>'No evidence of external leaks...no evidence of water staining to wall linings, ceiling or floor coverings or lining. No water damage identified.'</p> <p>'[The owners are not] aware of areas (internally or externally) where there is leaking.'</p> <p>'Ground clearances are good around the entire property. The ground under the house is well ventilated...and dry.'</p> <p>'...windows were either replaced or renovated ...in 1995' '...no evidence was found that windows leaked. No evidence of mould or rot was evident on any part of the timber joinery.'</p> <p>'The [house] does not have building paper installed'</p> <p>The Insulation Provider also submitted an evaluation tool for 'estimating the likelihood of moisture ingress and the ability of the system to manage it without causing permanent damage to the structure or any other building elements.'</p>
Clause G9.3.1 for the electrical wiring	The compliance and continued safety of the electrical wiring must not be detrimentally affected.	<p>'[The inspection] to establish that only PVC coated wiring is present.'</p> <p>'No evidence of</p>	<p>'All wiring is PVC only (the house was completely rewired in 1995)'.</p>

		plasticization.'	'...building preparation process involves temporarily removing electrical switches...and packing the flush box cavity...to prevent [insulation] from entering the switch.'
Clause H1.3.1 and Clause H1.3.2E for the thermal performance of the building	The thermal performance of the building envelope must not be reduced.	'Installation of [the insulation] will improve the thermal performance of the building.'	

- 6.3.2 With respect to Clause B1.3.1 for external wall framing, external cladding and internal linings (bracing and normal loads), I accept that the inspection and the process of assessing the suitability of walls for the insulation will enable any issues that may adversely affect the drying ability of the insulation to be identified and installation into unsuitable locations to be avoided. I also note that the fungicides provide a compensating feature. However, the structural performance may be affected by excessive or prolonged moisture being present in the cavity. Therefore, confirmation that excess moisture present at the completion of construction has dissipated should be provided prior to the issue of a code compliance certificate (also refer to paragraph 6.2.3).
- 6.3.3 With respect to Clause C2.3, I consider that the inspection has adequately considered the location of any in-situ heating devices and that these will be unaffected by the proposed building work.
- 6.3.4 With respect to Clause C3.7, I am satisfied that the inspection adequately considered the existence of any firewalls.
- 6.3.5 With respect to Clause E2.3.2 and Clause E2.3.5, I am satisfied that the inspection has adequately considered the effect of the proposed building work on the external envelope. I have discussed the insulation provider's Clause E2 risk matrix further in paragraphs 6.4.3 to 6.4.7.
- 6.3.6 With respect to Clause G9.3.1 for the electrical wiring, I am satisfied that the inspection has adequately considered the effect of the proposed building work on the existing wiring.
- 6.3.7 With respect to Clause H1.3.1 and Clause H1.3.2E, I am satisfied that the installation of the insulation will not make the thermal performance of the building worse. As described in previous determinations, there is evidence that the thermal performance of buildings is improved through the retrospective installation of insulation. However, the extent to which this is achieved will depend on the effectiveness and durability of the installation and possible shrinkage of the insulation in the wall.

6.4 Compliance with Clause E2.3.5

- 6.4.1 The authority has refused to grant building consent on the grounds that, because no building paper has been used behind the weatherboard cladding, '...it is very likely

some moisture will get behind these weatherboards and ...that the installation of [the insulation] will cause this moisture to be held in the cavity and that this will be detrimental to the durability of the cladding and the wall framing.'

- 6.4.2 In respect of the lack of building paper in this house, in many cases the presence of building paper is an important factor in ensuring compliance with Clause E2.3.5, however, it is not the only factor, and there will be situations where a lack of building paper may not be critical to Building Code compliance, even though it may be best practice.
- 6.4.3 The insulation provider has devised and submitted a risk matrix as an evaluation tool, which it states is a '...logic for estimating the likelihood of moisture ingress and the ability of the system to manage it without causing non-compliance with E2.3.5.' The matrix combines the factors in the external moisture acceptable solution E2/AS1⁹ risk matrix and the Ministry's guidance on retrofitting insulation in external walls¹⁰, and allocates each factor a value.
- 6.4.4 The insulation provider has submitted that the building in question, when evaluated with the submitted risk matrix¹¹, has a risk score of 9 and based on this approach it would appear there is a low risk of non-compliance with respect to E2.3.5.
- 6.4.5 The authority does not accept the risk matrix confirms compliance with the Building Code, noting there has been a lack of validation.
- 6.4.6 I have considered the risk matrix and am of the view that it is a good concept and a useful tool to assist with evaluation and decision-making. I am of the view that the insulation provider has generally identified the relevant attributes and factors that need to be taken into account in assessing compliance.
- 6.4.7 However, it is unclear about the following aspects of the risk matrix:
- How the formulae which calculates an overall score has been derived. Some factors are multiplied together and others are summed.
 - The weighting given to each factor both across the range and within the formulae. For example, in the presence of vapour barrier criteria, scores of 1 are given for the presence of a rigid air barrier, 1.5 for where building wrap is to be retrofitted and 2 for no vapour barrier. In the overall formula, the weighting is given as 1 which is the same as that for the factor which is the E2/AS1. The basis for these decisions is not given.
 - The degree of sensitivity analysis that has been done to get a sense of whether the changing variables match up with experience. For example, the way the formula works, the difference in the calculative number for the same building but with E2/AS1 risk score of 12 or more, is twice that of the same building with a E2/AS1 risk score of 7 or less

⁹ Contained in: Department of Building and Housing. (2011). *Compliance Document for New Zealand Building Code Clause E2 External Moisture*. Available on the publications section of the Ministry's Building and Housing website <http://www.dbh.govt.nz/publications>

¹⁰ Department of Building and Housing. (2011). *Guidance on Building Code compliance for retrofitting insulation in external walls*.

Available on the publications section of the Ministry's Building and Housing website <http://www.dbh.govt.nz/publications>

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- 6.4.8 There is also no information about what the criteria are for making a decision based on the results of the evaluation. In what circumstances (or at what value), for example, would a building be said to be “low risk” or “high risk” or compliant with E2.3.5?
- 6.4.9 Although (for the reasons given above) I cannot currently accept the results of the risk matrix with the information that has been presented to support it, I accept that in this case, based on other information provided in the building consent application, the house will continue to comply with Clause E2.3.5 to the extent required by the Act after the installation of the insulation. This assessment is set out in the insulation provider’s undated letter in response to the authority’s third request for further information (see paragraph 3.10). In my opinion, it takes into account all the relevant factors and correctly assesses that, despite the absence of building paper the house is at a low risk of water ingress and non-compliance.
- 6.4.10 I also accept that the installation of the insulation will not increase this risk. The insulation is open-cell foam and does not readily absorb water. Post-installation shrinkage will mean that there is still capacity for any water that does penetrate the external cladding or internal linings to dissipate. Because of the age of the house and the type of cladding used, there will still be sufficient ventilation for this to occur. Post-installation monitoring will ensure that any construction moisture is dissipated.
- 6.4.11 I note here that all determinations are decided on a case-by-case basis and that in different circumstances the absence of building paper may be a material factor.

6.5 Conclusion

- 6.5.1 Previous determinations¹² have described the need for a thorough inspection, a report describing the factors affecting the building, and an analysis of how these affected compliance and the decision-making process, as well as a description of any processes used during or after installation (e.g. installation around heat generating devices, reinstatement of the external cladding where installation holes were made, ventilation of the building, post construction moisture monitoring etc).
- 6.5.2 The insulation provider has carried out an inspection of the house and supplied a report on the inspection as part of its building consent application documentation. I am satisfied that this report is adequate and that the inspection it was based on thoroughly conducted, and that as a result all relevant aspects of the house have been considered. This has enabled the insulation provider to assess whether the house is suitable to have insulation installed and plan how issues potentially affecting Building Code compliance will be addressed.
- 6.5.3 The design summary is a useful document for summarising how Building Code compliance is to be demonstrated and the relevant processes that are to be used. However, I note that it is not a design summary as such, as it is not particular to the building in question.
- 6.5.4 I am of the view that there are still some gaps in the supporting documentation. Documentation provided in support of the building consent application should be

¹² Determinations 2012/26 and 2012/27.

provided in a consolidated way and provide evidence about the processes to be carried out to ensure compliance, including those mentioned in the design summary and inspection report. This has not been supplied in the current case.

- 6.5.5 In particular, it is not clear whether the authority has been supplied with a copy of the September 2011 report, which contains some extracts from the insulation provider's operating manual. I am aware from other determinations that these extracts are not from the most recent version of the manual. It is not necessary for the insulation provider to provide the entire manual in support of a building consent application. However, it does need to bring together sufficient relevant information to demonstrate compliance with the Building Code. Any information provided relating to the insulation provider's manual should be from the current version.
- 6.5.6 I am therefore of the view that there was not sufficient evidence provided in the building consent application for the authority to conclude on reasonable grounds that the building work and the existing building as altered would comply with the Building Code to the extent required by the Act.

7. What is to be done now

- 7.1 I suggest that the building consent application should be modified and resubmitted to the building consent authority, taking into account the findings of this determination.
- 7.2 Until the shortcomings in the documentation are satisfactorily resolved, the authority is entitled to refuse to grant building consent on the basis that, without adequate documentation, it cannot be satisfied on reasonable grounds that the provisions of the Building Code will be met if the proposed building work is completed in accordance with the plans and specifications that accompanied the application for the building consent.

8. Decision

- 8.1 In accordance with section 188 of the Act, I hereby determine that the authority correctly refused to grant building consent for retrofitting the insulation to the house, and accordingly I confirm that decision.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 5 February 2013.

John Gardiner
Manager Determinations