



## Determination 2012/073

# Regarding the refusal to grant building consent for retrofitting foam wall insulation in a house at 11 St Albans Avenue, Palmerston North

### 1. The matter 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, 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 owner of the house, S J Sorrell (“the applicant”) acting through an 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.
- Palmerston North City Council, carrying out its duties and functions as a territorial authority or 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”.

1.4 The determination arises from a decision made by the authority to refuse to grant a building consent for proposed building work that consisted of retrofitting urea formaldehyde foam insulation (“the insulation”) in the external walls of the applicant’s house, because the authority was not satisfied on reasonable grounds that compliance with the Building Code (Schedule 1, Building Regulations 1992) had been demonstrated.

1.5 Therefore, the matter to be determined<sup>2</sup> is whether the authority correctly exercised its powers in refusing to grant a 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.

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

<sup>2</sup> Under sections 177(1)(b) and 177(2)(a) of 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 existing single storey, detached dwelling was built in 1955, and was constructed of timber framing elevated on concrete perimeter wall foundations. The exterior walls have stucco cladding directly fixed over building paper to the external wall framing. The cladding is in good condition and is free of cracks and other deterioration and has been recently painted. Along with the rest of the house, it appears to be well maintained.

2.2 The building work consists of making a series of holes in the external walls 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 As noted in paragraph 1.2, the insulation provider, on behalf of the applicant, applied for building consent in August 2012 to retrofit insulation into the walls of the applicant's house. The application set out the scope of the building work, stating that the building work consists of:

... making a series of 20mm holes in the external walls and pumping the insulation into the walls to improve the thermal performance of the house. The holes to the external walls are subsequently reinstated, 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', which noted that the design summary was a general summary of the product methodology and not specific to the particular installation
- a 'building investigation report', following an inspection carried out 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

- copies of email correspondence from the Ministry<sup>3</sup> confirming that the installation of external wall insulation was not restricted building work
- a thermal imaging report for a similarly constructed house where insulation had been installed
- a report about compliance dated 1 September 2011 (“the September 2011 report”), that included manufacturer’s data and technical specifications for the insulation, and excerpts from the insulation provider’s operations manual.

3.3 In addition, the insulation provider noted 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 an email dated 23 August 2012, the authority requested further information to demonstrate the proposed building work’s compliance with various performance requirements in Clauses B1, B2, E2 and F2 of the Building Code.

3.5 The insulation provider provided this information in an undated letter. In summary, the letter stated:

<b>Code clause</b>	<b>Method for demonstrating compliance</b>
Clause B1.3.1	Relates to existing building. Compliance will be achieved through E2 clauses.
Clause B2.3.1(a)(ii)	Relates to building work. For compliance see E2.3.2.
Clause E2.3.2	Relates to building work. 20mm installation holes will be sealed by cleaning and preparing site after installation; filling holes with cement mix mortar in excess of the depth of the cladding, ensuring good adhesion and similar look to existing cladding; coating mortar once dry with primer and paint, as used on existing cladding.
Clause E2.3.5	Relates to existing building. 31 year track record, with no evidence that installing insulation affects building durability or weathertightness. Insulation contains three different fungicides to retard growth of fungi.
Clause E2.3.6	Relates to building work. Invasive moisture readings will be used to ensure moisture content of framing returns to pre-installation levels. Readings will form part of code compliance certificate application. 31 year track record, with no evidence that construction moisture causes structural damage. Insulation is open-cell and vapour permeable.

<sup>3</sup> After the date of the correspondence, the then Department of Building and Housing was transitioned into the Ministry of Business, Innovation and Employment. The term “the Ministry” is used for both.

Clause F2.3.1	<p>Relates to building work and existing building. Windows will be left open and stickers placed on them to remind home owners. Refers to determinations 2012/26 and 2012/27 to establish adequacy of this approach.</p> <p>There is no evidence that insulation causes health problems, and attached documents about safety of formaldehyde foam insulation.</p>
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3.6 In addition, with respect to Clauses B1.3.2, B1.3.3, B1.3.4 and E2.3.7, the insulation provider asserted that these clauses were not relevant to retrofitted insulation.

3.7 In a letter dated 11 September 2012, the authority refused to grant a building consent for the proposed work. The authority refused the consent on the grounds that it was ‘not satisfied on reasonable grounds’ that compliance had been demonstrated with respect to Clauses B1, B2, E2 and F2 of the Building Code as follows:

1. B1 – Structure. The long term effects (if any) on structural integrity due to elevated moisture levels and migration and transmission of moisture to framing componentry is indeterminate.
2. B2 – Durability. The long term effects (if any) of elevated moisture levels on building element durability is indeterminate.
3. E2 – External Moisture. It cannot be determined conclusively that residual construction moisture will not create an environment conducive to fungal growth, potentially injurious to health.
4. F2 – Hazardous Building Materials. It cannot be determined conclusively that the quantities of formaldehyde emitted during construction will not give rise to harmful concentrations, potentially injurious to health.

3.8 The insulation provider subsequently applied for a determination on behalf of the applicant and the application was received by the Ministry on 24 September 2012.

## 4. The submissions

4.1 The application for determination was accompanied by a submission from the insulation provider dated 17 September 2012. 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.

4.2 The submission set out the process to be used for resealing the installation holes to the external cladding, and provided information about the risk factors identified in E2/AS1 and the Ministry’s guidance on retrofitting insulation in external walls<sup>4</sup>, and concluded from these that both the building work and existing building would continue to comply with the Building Code. These factors can be summarised as:

- Factors reducing risk:
  - given the age of the house, it is not very airtight

<sup>4</sup> Department of Building and Housing. (2011). *Guidance on Building Code compliance for retrofitting insulation in external walls*. Wellington: Department of Building and Housing. Available on the publications section of the Department’s website <http://www.dbh.govt.nz/publications>

- 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
- exterior cladding is very well-maintained and painted
- permeable linings used throughout, except in bathroom
- building paper is present
- Factors increasing risk:
  - one section of one elevation has no eaves
  - unsealed stucco exterior cladding is porous and needs ongoing maintenance of coating; owner advised of this.

4.3 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.

4.4 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.

4.5 The authority did not acknowledge the application or make a submission.

4.6 A draft determination was issued to the parties for comment on 13 November 2012. Both parties accepted the draft without further comment.

## **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 In order to consider this matter, I must consider the requirements for building work and alterations to existing buildings under the Act and the evidence provided to the authority. 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 determination.

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 relevant 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

**Clause C2 (C2.2)<sup>5</sup>**

- 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

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<sup>5</sup> 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 remains in force (alongside the new regulations) until April 2013.

**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 paragraph 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 obligation for the building work.

Building Code obligation	Requirement	General information provided	Building work specific information provided
Clause E2.3.2 and B2.3.1	Roofs and exterior walls must prevent the penetration of water that could cause undue dampness, damage to building elements or both.  Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the specified durability period.	'Sealing 25mm holes (weatherboard), 20mm holes (fibrolite/stucco), 16mm holes (brick veneer) once curing process complete.'  'For brick veneer homes – owner will be required to coat bricks with appropriate waterproofing agent once curing process complete.'  'For all other claddings, surface will be primed.'  The September 2011 report (refer paragraph 3.2) includes some relevant pages of the product installation manual.	N/A
Clause E2.3.6	Excess moisture present at the completion of construction must be capable of being dissipated without permanent damage to building elements.	'Moisture probes will be installed on slowest drying elevation to track dissipation of construction moisture.'  'Where a probe is unable to be installed, holes will be drilled to enable reading of the moisture content.'	N/A

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.'  Tests on urea formaldehyde foam insulation conducted overseas show that formaldehyde levels decrease rapidly after installation and typically return to ambient house levels within several days.	'Owner understands ventilation requirements during curing'.
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6.2.2 With respect to Clause E2.3.2 and B2.3.1, 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 note that this information has not been provided in a consolidated way, with some old information provided, and some provided in different iterations of documents. This has impacted on the clarity of the information.

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 this information. This information 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. Tests on urea formaldehyde foam insulation conducted overseas show that formaldehyde levels decrease rapidly after installation and typically return to ambient house levels within several days. The building must be continually cross ventilated for the whole curing period of about one month, and this is covered in the manual. I note that the information in the building consent application does not include procedures for the follow up visit. 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)	<p>The structural performance of the framing is not reduced, with respect to the accumulated moisture causing damage to the framing (relates to Clause E2)</p> <p>The structural performance of claddings and internal linings (for withstanding normal loads in use and providing bracing units where relevant) is not reduced</p>	'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.'	<p>'Linings are painted wallpaper and plastered [plasterboard].' '... no areas [were found] where the linings were incomplete ... but there may be voids behind the kitchen cabinetry and bath as is often the case'.</p> <p>'... the under sink areas of the bathroom and kitchen have no evidence of internal leaks.' '[The owners] are not aware of any areas where there are internal leaks.'</p>
Clause B2.3.1 for the existing building elements	The durability of the existing building must not be reduced.	Refer to evidence provided for other Building Code clauses.	Refer to evidence provided for other Building Code clauses.
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.'	'Fixed appliances e.g. wood burners have been identified and noted on floor plan.'
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 foam installed.'	No firewalls were identified.
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 timber framed house with stucco cladding...'</p> <p>'No evidence of external leaks... '... no evidence [was found] of water staining or linings that were not securely fixed due to water damage.'</p> <p>'Ground clearances are good around the entire property. The ground under the house is dry.'</p> <p>'The house appears to have been painted within the last 5 years and is in good condition. No evidence of plaster deterioration was evident during the inspection.'</p> <p>'The house has wooden joinery throughout. During the inspection, no</p>

			evidence was found that windows had leaked. No evidence of mould or rot was evidence on any part of the timber joinery.'
Clause G9.3.1 for the electrical wiring	The compliance and continued safety of the electrical wiring must not be detrimentally affected.	'[The inspection] to establish that only PVC coated wiring is present.'  'No evidence of plasticization.'	'All wiring is PVC only'.
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 B2.3.1 for the existing building elements, I am satisfied that the durability of the existing building elements has not been adversely affected, with the exception of the information needed as referred to in paragraphs 6.3.2 and 6.3.4.
- 6.3.4 With respect to Clause C2.3, I do not consider that the inspection has adequately considered the location of any in situ heating devices. A heat generating device has been identified (from the photographs it is apparent that there is a chimney located next to the front door). Whether the fire place is still operational, or been replaced with an alternative fixed heating device, information will be required as to how compliance with this clause will be achieved.
- 6.3.5 With respect to Clause C3.7, I am satisfied that the inspection adequately considered the existence of any firewalls.
- 6.3.6 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 in this case.
- 6.3.7 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 to the existing wiring.
- 6.3.8 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, provided that the building investigation process is followed, in order to ensure the buildings is suitable for the insulation, as expressed in the installation manual. As

described in previous determinations, there is evidence that the thermal performance of buildings is improved, 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 Conclusion**

- 6.4.1 Previous determinations<sup>6</sup> have described the need for a thorough inspection, a report describing the factors affecting the building, and an analysis of how these affect 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).
- 6.4.2 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 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 to plan how issues potentially affecting Building Code compliance will be addressed.
- 6.4.3 I am of the view that there are still some gaps in the supporting documentation that describe the processes in the inspection report and the 'design summary'. 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, although I note that it is not a design summary as such as it is not particular to the building in question. The documentation provided for the building consent application should be provided in a consolidated way and support the material provided in the 'design summary' and inspection report, and provide evidence about the processes to be carried out.
- 6.4.4 It is not necessary for the entire manual to be provided for a building consent application, however, the insulation provider needs to bring together the information that is relevant to demonstrate Building Code compliance. Any information provided that relates to the insulation provider's manual should be the current version of the manual.
- 6.4.5 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.

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<sup>6</sup> Determinations 2012/26 and 2012/27.

7.2 Until the shortcomings in the documentation are satisfactorily resolved, the authority is entitled to refuse to grant a 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 was correct refuse 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 26 November 2012.

John Gardiner  
**Manager Determinations**