



Determination 2021/011

Regarding the compliance of timber bevel back weatherboards, coated with dark grey paint, installed on a house at 81 Chelmsford Street, Ngaio, Wellington



Summary

This determination considers whether timber bevel backed weatherboards, painted in a dark colour, complied with Building Code Clause B2 [Durability], as it relates to Clause E2 [External Moisture]. The determination considers the degree of exposure to sunlight, access for maintenance and inspection of the cladding, the design, and the specification of the materials used, as well as a number of other factors that contribute to a Building Code compliance assessment of this nature

1. The matter to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004 (“the Act”) made under due authorisation by me, Katie Gordon, National Manager Determinations, Ministry of Business, Innovation and Employment (“the Ministry”), for and on behalf of the Chief Executive of the Ministry.¹
- 1.2 The parties to the determination are:
 - the owner of the house, Majestic Motor Limited (“the applicant”), represented by the applicant’s architect for the project (“the architect)
 - Wellington City Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.

¹ The Building Act and Building Code (Schedule 1 of the Building Regulations 1992) are available at www.legislation.govt.nz. Information about the legislation, as well as past determinations, compliance documents and guidance issued by the Ministry, is available at www.building.govt.nz

- 1.3 This determination arises from a dispute between the parties about the Building Code compliance of timber bevel back weatherboards (“the weatherboards”) installed on a house. The authority is of the view that the installed weatherboards do not comply with Clause² B2.3.1 due to the colour of paint applied to the weatherboards as this may cause the weatherboards to cup and split.
- 1.4 The matter to be determined³ is therefore whether the weatherboards, as originally installed, complied with Clause B2 Durability of the Building Code, with respect to Clause E2 External moisture.
- 1.5 In making my decisions, I have considered the submissions of the parties and other evidence.

2. The building work

- 2.1 The building is situated on a back section on a sloping site in an urban setting with housing on four sides; the house faces south west (Figure 1). The site is in a broad valley with rising ground from west to north; there are substantial hills to the west and north.

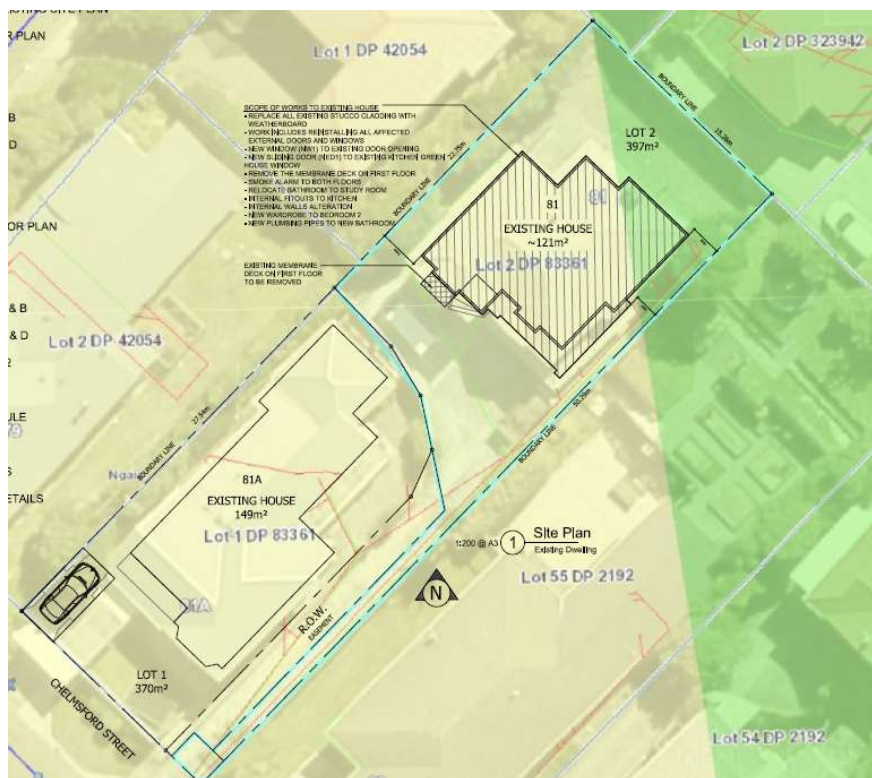


Figure 1: Site plan indicating 81 Chelmsford Street [not to scale]

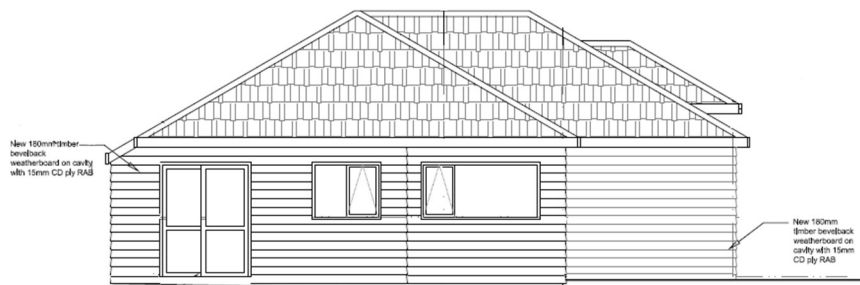
- 2.2 The house is a two-storey building (Photo 1). The garage and main entry are located on the lower ground level. The upper first floor has two split levels; the greatest proportion of the upper level opens onto a large deck at the rear (north east) elevation of the site (Photo 2).

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

³ Under sections 177(1)(a) of the Act

**Photo 1:** front (south west) elevation**Photo 2:** rear (north east) elevation

- 2.3 The house is timber-framed with existing brick cladding remaining to the lower ground level. The metal tile hipped roof cladding remains as existing, the roof has no significant eaves.
- 2.4 The existing plaster cladding to the upper first floor split level part of the building has been removed and replaced with timber weatherboards on a 20mm cavity on a 15mm H3.2 treated plywood rigid air barrier (RAB). On each elevation, the weatherboard cladding is at most one storey high (see Figures 2 and 3).

**Figure 2: First floor, rear (north east) elevation [not to scale]****Figure 3: Front (south west) elevation [not to scale]**

- 2.5 The weatherboards are H3.1 treated Pinus radiata with a bevel back profile, measuring 187 x 18mm and providing a 155mm cover. This provides a lap of 32mm between successive weatherboards. The weatherboards have been painted dark grey, with the paint type described as a 'cool' colour by the paint manufacturer; the

manufacturer describes a ‘cool colour’ as one that “enables much of the infrared portion of the sun’s energy to be reflected”.

- 2.6 I also note in paragraphs 4.9 and 4.10 that the parties have expressed different views about the colour of the protective coating used. I have therefore referred to the manufacturer’s description of ‘dark grey’ for ease of reference.

3. Background

- 3.1 A building consent (authority reference number SR 442662) was issued on 12 July 2019 for alterations to the existing two storey dwelling. The building work included the recladding of the upper level, internal alterations, and the construction of a timber deck.

- 3.2 The authority carried out a final inspection on 13 March 2020. The inspection notes state the inspection failed, noting:

Timber [weatherboards] are painted black. Statement from cladding manufacturer on letterhead confirming the paint used is acceptable and will not cause adverse movement or cupping in the future.

- 3.3 The architect sought advice from the weatherboard manufacturer. In an email dated 20 March 2020, the weatherboard manufacturer advised the architect that paint with a light reflectance value (“LRV”) of 45 or higher was required, however:

If using darker colours, [‘cool’ colours] is an option but only some [colours] are suitable ... for the use on [the weatherboards] as the colour [needs] to have a total solar reflectance “TSR” rating of 40% or more.

- 3.4 The architect wrote to the authority on 30 April 2020, 1 May 2020 and 4 May 2020. The architect noted that the weatherboard manufacturer stated a total solar reflectance (“TSR”) of 40% or more was required, however, the paint used had a TSR of 25%, and considered the warranty support from the weatherboard manufacturer may not be a mandatory requirement as unbranded weatherboards could be used that were cut and supplied as long as they met the profile requirements.

- 3.5 The authority wrote to the architect on 30 April 2020 and 4 May 2020. The authority stated its position was that:

Unless we receive a warranty statement from the weatherboard manufacturer, then we cannot sign the [code compliance certificate] off due to concerns around the weatherboard’s ability to meet B2 while painted in the current colour.

- 3.6 The Ministry received an application for a determination on 4 May 2020.

- 3.7 Subsequently, the architect wrote to the Ministry on 14 August 2020 to confirm the applicant has sold the house, and that it had been repainted using a “...Half-Stack colour which is a compatible paint colour with the [manufacturer’s] specification”. The repainting has meant the authority has now conducted and “passed” a final inspection. However, the issue of the code compliance certificate has been suspended⁴. The architect therefore requested that suspension of the power by the authority to issue the code compliance certificate be given consideration under section 183 of the Act.

- 3.8 The architect also confirmed that the applicant still wished to proceed with the determination regardless of the repainting and sale of the house.

⁴ Section 183(1) of the Act – Decision or exercise of power suspended until determination made

3.9 On the 17 August 2020 the Ministry issued a direction under section 183(1) of the Act to the effect that the authority’s “power to issue a code compliance certificate in this case is not suspended”, but “this direction is not the determination under section 188 of the Act”.

4. The submissions

4.1 The applicant

4.2 In the submission accompanying the application, and further information received on 26 May and 30 June 2020, the architect noted:

- the authority requested a statement from the weatherboard manufacturer to support the use of the dark grey paint, however, this was not obtained
- the weatherboard manufacturer states paint is to be used with a TSR of 40% or more. The dark grey paint used has a TSR value of 25%
- the weatherboards are manufactured in accordance with NZS 3617, which is referenced in E2/AS1⁵. Whether the weatherboards are warranted or not makes no difference to whether the provisions of E2/AS1 are met and therefore a decision about Building Code compliance.

4.3 The architect provided copies of:

- photographs of the building
- the site notice dated 13 March 2020 issued by the authority
- correspondence from the weatherboard manufacturer to the architect dated 20 March 2020
- correspondence between the architect and authority between 30 April 2020 and 4 May 2020 about the issue
- the weatherboard manufacturer’s technical manual and installation guide (dated September 2019) and the weatherboard manufacturer’s paint guide
- the paint manufacturer’s reflectance spectral curves comparing standard and ‘cool’ paint shades and guidance about dark paint colours
- information from the paint manufacturer about the dark grey paint, LRV and TSR
- the building consent plans
- information about the sunlight exposure at the site, including sun path diagrams, shading from roof eaves and vegetation, means of access by way of a timber deck for inspection and maintenance of the most exposed elevation, the benefits of the rigid air barrier (RAB) and cavity formed behind the cladding, and possible effects if the weatherboards were to show signs of splitting due to excessive heat absorption
- information about the site including orientation of the building, its urban setting and elevation, and description of the local topography as “moderately sloping” rising from a low point to the south of the property to a high point to the north.

⁵ An Acceptable Solution for Clause E2 External moisture

4.4 **The authority**

4.5 The authority acknowledged the application on 26 May 2020. The authority submitted:

- its primary concern in terms of compliance with Clause B2.3.1(b). The authority is concerned the weatherboards will cup and split, which will lead them failing to satisfy this requirement
- it considers that Clause E2 is met, however, due to the dark grey colour, there is also the potential the weatherboards would eventually fail to meet the requirements of Clause E2.3.2
- it advised the architect that the weatherboards were unlikely to meet the durability requirement, due to the dark colour the weatherboards have been painted, and the lack of evidence that the paint applied meets the manufacturer's requirement of an LRV paint of 45 or higher as stated in the weatherboard manufacturer's technical manual and installation guide
- it sought information from the architect to demonstrate the dark grey paint has an LRV of 45 or higher, but no evidence has been provided.
- In addition it also considered:
 - the lack of technical expertise and advice available in New Zealand for maintaining a pine weatherboard that has been painted with a dark colour
 - that more fixings do not always produce a desired result. Table 24 of E2/AS1 requires single nailing and BRANZ advice⁶ also advises this approach
 - that the dwelling requires significant scaffolding to access the weatherboards at the upper level, which is a significant and costly barrier to any owner seeking to carry out untimely increased maintenance to the weatherboards.

4.6 The authority provided a copy of extracts of the consented specifications.

4.7 **Draft determination and further submissions**

4.8 A draft determination was issued to the parties for comment on 31 July 2020.

4.9 The authority responded to the draft determination on 5 August 2020. The authority confirmed it did not accept the draft determination, and requested that the following comments were to be taken into account:

- the paint was better described as black, not dark grey
- the paint manufacturer's website states that using its product "will reduce the likelihood of heat related issues affecting the timber but will not eliminate them", and that using that product "should still be considered a risk"
- it believed the determination had made an assumption that the manufacturer's minimum total solar resistance value was conservative and the determination did "not take into account the requirements of 14G" of the Building Act 2004⁷, or the comments in Acceptable Solution E2/AS1, paragraph 2.4⁸

⁶ BUILD magazine 150, dated October 2015

⁷ 14G Building Act 2004: Responsibilities of product manufacturer or supplier

⁸ Acceptable Solution E2/AS1, Amendment 9, effective 27 June 2019, comment to paragraph 2.4: "Dark colours cause claddings to reach higher temperatures, which results in more thermal expansion and greater risk of cracking of joints in monolithic wall claddings. Risks of

- that the light reflectance value (LRV) of 6 and a total solar resistance (TSR) of 25 given by the paint manufacturer, “falls short of the requirements of the weatherboard manufacture” (sic)
- that it did not agree to an assumption being made about TSR values that “is not reliant on evidence”
- that it did not agree that a cavity design with a rigid air barrier behind the cladding justifies the weatherboards not complying with Building Code Clause B2
- that the authority still believes that using a dark coloured paint has the potential for the cladding to reach high temperatures, which could lead to the “weatherboards cupping and splitting”, and therefore not complying with Building Code Clause B2.3.1(b)
- raised the issue of normal maintenance as stated in Building Code Clause B2.3.1, and noted Acceptable Solution B2/AS1, item 2.1.2⁹
- it queried what would be achieved by requiring the building consent to be amended
- confirmed that although not related to the matter for determination, that the building owner has now chosen to paint “the house in a lighter colour”, and as such, the authority “is now satisfied the weatherboards in there [sic] current state will meet the requirements of B2.3.1 (b)”.

4.10 The applicant responded on 13 August 2020 to the comments made by the authority regarding the draft determination. The applicant stated:

- the paint colour is dark grey (colour code 44-47-47), and has a different colour code from “pure black” which is 0-0-0
- there are risks associated with any cladding system, “but the Building Code is not driven by eliminating risk”
- it did not deny “that dark painted timber is “riskier” than light painted timber”
- that for this case, the timber weatherboards will “most likely...satisfy the 15 year durability with normal maintenance, as they can be easily visually inspected”
- that in order not to meet the durability requirements of the Building Code, one “would expect catastrophic failure within 15 years i.e. the splitting and cupping would need to be so severe that [a person] could see through the damaged boards to the RAB board¹⁰ behind”
- there are many examples of timber weatherboard clad buildings painted a dark colour
- that “dark painted weatherboards can exhibit warping, distortion and cupping over time, however that doesn’t mean non-compliance with the Building Code”

cracking are also associated with dark colours on painted timber wall claddings and trim...Colour cards from some coating manufacturers may include reflectance values”.

⁹ Acceptable Solution B2/AS1, item 2.1.2: It is the responsibility of the person specifying the *building element* to determine normal maintenance requirements. These may be based on the manufacturer’s recommendations and may also include periodic inspections of elements not readily observable without a specific effort (e.g. access to roof or subfloor spaces).

¹⁰ Rigid Air Barrier (RAB) board

- that “Warranties and Guarantees given by manufacturers are just lip service within a building consent
- that the “cladding manufacturer, Architect, Council and Builder are inherently tied to this project through implied warranties of Section 362I¹¹ of the Building Act”
- a manufacturers’ warranty for a cladding system described in Acceptable Solution E2/AS1 “is not a legal requirement when seeking a building consent”
- an interpretation of section 14G¹² of the Act
- that “The weatherboards [for this case] are not installed to [the manufacturer’s] specifications i.e. painted dark”
- “even should a split appear in the bevel-back weatherboard, the “cladding construction system” would still satisfy the Performance Requirements of Clause E2”, and described the construction, materials, and benefits of a 20mm cavity behind the timber weatherboards
- where the timber weatherboards were to be fixed, and that the cladding to northern aspect of the dwelling, being the most susceptible to sunlight exposure, “is easily observed and inspected with a deck across the full frontage”
- that amending the building consent will delay the issue of the Code Compliance Certificate.

4.11 **Additional information**

4.12 The Ministry contacted both the manufacturer of the timber bevel backed weatherboard cladding and the manufacturer of the specified paint coating for more information.

4.13 The weatherboard manufacturer, using the services of the coating manufacturer, confirmed:

- the minimum LRV coating required for the specified weatherboards is greater than or equal to 45%
- the minimum TSR value required for the specified weatherboards is greater than or equal to 40%
- there could be a slight reduction in the minimum values to 40% for the LRV, and 36% for the TSR
- the minimum values for the LRV and TSR are derived from laboratory testing.

4.14 The manufacturer of the protective coating confirmed:

- the LRV for the protective coating is 6%
- the TSR for the protective coating is 26%
- the coating “is tinted using the same base paint as the non-cool versions therefore also meet the different gloss levels as per [parts 7, 8, 9 and 10 of] AS3730”¹³.

¹¹ Section 362I of the Act: Implied warranties for building work in relation to household units

¹² 14G of the Act: Responsibilities of product manufacturer or supplier

¹³ Australian Standard AS 3730 – Guide to the properties of paints for buildings

5. Discussion

5.1 This determination must consider whether the weatherboards, as installed with the original dark grey paint, complied with Clause B2 Durability of the Building Code, with respect to Clause E2 External moisture.

5.2 The paint applied was a ‘cool’ colour with a ‘total solar resistance’ (TSR) value of 26%, and ‘light reflective value’ (LRV) of 6%.

5.3 I note at this point that the applicant has already taken steps to repaint the house a different (lighter) colour. The authority has subsequently conducted and “passed” a final inspection related to the building work. Following a request from the architect on 14 August 2020, the Ministry issued a direction under section 183 of the Act on 17 August 2020 which confirms the authority’s power to issue the code compliance certificate in this case is not suspended. I am therefore of the view that I am not required to consider the external coating on the dwelling now, but at the request of the applicant, the dark grey paint that was previously applied to the timber weatherboards.

5.4 The Legislation

5.5 All building work must comply with the Building Code to the extent required by the Act, whether or not a building consent is required in respect of that building work¹⁴.

5.6 The relevant provisions of the Building Code in this case are Clause B2.3.1 and Clause E2.3.2, which state:

Clause B2 – Durability

B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code...

(b) 15 years if:

- (i) Those building elements (including the building envelope...) are moderately difficult to access or replace, or
- (ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

(c) 5 years if:

- (i) The building elements (including...renewable protective coatings...) are easy to access and replace, and
- (ii) Failure of those building elements to comply with the Building Code would be easily detected during normal use of the building.

Clause E2 - External Moisture

E2.3.2 Roofs and exterior walls shall prevent the penetration of water that could cause undue dampness or damage to building elements.

5.7 A building consent authority must accept compliance with an Acceptable Solution as establishing compliance with the Building Code¹⁵.

5.8 Acceptable Solution E2/AS1 provides a design solution for horizontal bevel back timber weatherboards¹⁶.

¹⁴ Section 17 of the Act

¹⁵ Section 19(1)(b) of the Act

¹⁶ Acceptable Solution E2/AS1 – External Moisture, Amendment 9 effective 27 June 2019, section 9.4 – Timber Weatherboards

5.9 Application of weatherboards and protective coatings in this case

- 5.10 Notwithstanding the dispute over the dark grey protective coating used, I have received no evidence to suggest that the timber bevel backed weatherboards as installed in this case do not comply with the Building Code. This includes the rigid air barrier and cavity construction behind the cladding.
- 5.11 The matter of dispute between the parties is the use of a dark grey protective coating which had been used on the external exposed surfaces of the weatherboards, and the possible effects this may have had on the durability of the cladding system.
- 5.12 I note at this point that in response to the draft determination both parties referenced section 14G of the Act¹⁷. I have received no information from either party or the manufacturers of the individual products concerned that would lead me to believe that either the timber weatherboards, or the protective coating, would not meet the relevant performance requirements of the Building Code if installed in accordance with the technical data, plans, specifications, and advice prescribed by the manufacturers.
- 5.13 The weatherboard manufacturer's technical manual and installation guide, as detailed in paragraphs 4.3 and 4.5, states the weatherboard system is suitable for use as a solution to meet E2/AS1.
- 5.14 With respect to finishes to timber weatherboards, paragraph 9.4.9 of Acceptable Solution E2/AS1 states:

Two coats of exterior grade paint shall be applied, after priming, to all exposed surfaces. Paint systems shall comply with any of Parts 7, 8, 9 or 10 of AS 3730.

COMMENT:

The minimum durability period for protective coatings is 5 years¹⁸. Improvement in durability and stability of weatherboards can be achieved by priming all surfaces including backs of boards.

...

With tangentially-sawn weatherboards, particularly painted or stained in dark colours, cupping is possible. Providing additional fixings may help restrain the board, but will usually result in splitting of the boards.

- 5.15 Acceptable Solution E2/AS1¹⁹ provides for a maximum LRV of 40% for finish colours but only with respect to flush-finished fibre-cement sheet and EIFS²⁰ claddings, and UPVC flashings. E2/AS1 does not refer to TSR values, and does not state maximum or minimum LRV values for protective coatings to timber weatherboards.
- 5.16 The weatherboard manufacturer's technical manual and installation guide²¹ only refers to LRV and states:
- Use only a premium quality house paint that has a Light Reflective Value (LRV) of 45 or higher and a gloss level of 10 per cent or more.
- 5.17 However, I note that the weatherboard manufacturer's technical manual and installation guide does not refer to TSR, or an associated minimum value required. Regardless, in response to an enquiry from the Ministry (refer to paragraph 4.13) the

¹⁷ Section 14G of the Act – Responsibilities of product manufacturer or supplier

¹⁸ New Zealand Building Code clause B2 – Durability, clause B2.3.1 (c)

¹⁹ Current Acceptable Solution E2/AS1, 3rd edition, amendment 9, effective 27 June 2019., section 2.0 - General, paragraph 2.4 – Cladding finish colours. First referenced in E2/AS1, 3rd edition (10) Part 1, effective from 1 February 2005

²⁰ EIFS - Exterior Insulation and Finish System

²¹ Bevel Back Technical Manual and Installation Guide, September 2019 edition, Section 4 – Painting and maintenance, sub-section 4.3 – Top coat selection

- weatherboard manufacturer stated a minimum TSR value of 40% was required, with a possible reduction down to 36%.
- 5.18 With respect to the use of dark paint colours, the weatherboard manufacturer provided advice to the architect (refer to paragraph 3.3) that if a dark coloured paint is required for a project, a ‘cool’ paint colour can be used, provided it has a TSR of 40% or more.
- 5.19 TSR measures the amount of solar energy reflected away from the surface, in contrast to LRV, which measures how much of the visible spectrum of light is reflected by the painted surface; the higher the percentage number of the TSR, means the surface is more effective at reflecting the radiation of the sun. Excessive heat being absorbed by timber weatherboards can be the cause of warping, cracking, and cupping of the boards. Therefore, I am of the view that TSR is a better measure of the impact of the paint colour on weatherboards than LRV.
- 5.20 I also note the statement made by the paint manufacturer, in its technical guide, which confirms that LRV only measures ‘visible’ light (which equates for approximately 44% of “energy distribution of sunlight”), whereas TSR takes into account ‘visible’ light, ‘ultra-violet’ light, and ‘infra-red’ light (the last two making up the remaining 56% of the “energy distribution of sunlight”).
- 5.21 The risks of using dark paint colours is signalled in E2/AS1, but the information is provided at an ‘informative’ level only for timber weatherboards. The “comment” under paragraph 2.4 of E2/AS1 states “Risks of cracking are also associated with dark colours on painted timber wall claddings”. This suggests that the risk is relatively low, and does not need to be managed with a normative requirement. This is supported by the fact that in comparison, E2/AS1 contains normative requirements for reflectivity of paint colours for fibre-cement and EIFS claddings (refer paragraph 5.15)²².
- 5.22 The authority referenced information available from the paint manufacturer to the effect that using its product “will reduce the likelihood of heat related issues affecting the timber but will not eliminate them”, and that using that product “should still be considered a risk”.
- 5.23 Regardless, the Building Code is performance based and the degree of risk needs to be assessed on a case-by-case basis. That assessment should take into consideration factors such as (but not limited to) the type of cladding and protective coating used, maintenance requirements, available access for inspection, orientation and elevation of the building, degree of exposure to direct sunlight, the local topography, and features that can provide shading to the external cladding.
- 5.24 I also note the risks of using dark paint colours referred to in E2/AS1 appear to be based on experiences prior to the development of more modern ‘cool’ paints, which have a pigment technology that enables the paint to reflect more heat, so it does not become as hot as a normal colour formulation would. The use of the TSR metric is relatively recent, which explains why E2/AS1 refers to reflectivity (and therefore LRV).
- 5.25 The information provided by the weatherboard manufacturer does not appear to provide a justification for a minimum 40% TSR in coatings (refer to paragraph 4.13). The Ministry sought clarification from the weatherboard manufacturer about whether

²² Acceptable Solution E2/AS1 – Paragraphs 2.4 (for cladding finish colours), 9.7.4.2 (for fibre-cement sheets), and 9.9.6.3 (for EIFS claddings)

the TSR and LRV percentages were derived from laboratory testing, and the weatherboard manufacturer engaged the paint manufacturer to respond on its behalf. Although the paint manufacturer did provide substantive information on the nature of the testing of its product, no indication was given as to whether the tests were conducted specifically on the bevel backed timber weatherboards in question; it only referred to “timber samples”. Further, there was no indication in the data provided whether the results of the tests met the minimum performance requirements of 5 years for renewable protective coatings in compliance with Building Code Clause B2.3.1(c), or indeed that of the weatherboards themselves of 15 years (Clause B2.3.1(b))

- 5.26 I also note the weatherboard manufacturer offers a 25-year warranty, which is substantially longer than the minimum 15 year durability required by Clause B2.3.1(b).
- 5.27 Although the weatherboard manufacturer’s warranty provides for certain “conditions” (for example, in respect of product installation, coating and jointing systems, maintenance, repairs and compliance with the Building Code), it does not state it is dependent on the application of protective coatings with a minimum TSR value.
- 5.28 In consideration of the evidence before me, it is reasonable to assume that the minimum 40% TSR value stated by the manufacturer of the weatherboards is based on a worst-case assessment of where and how the weatherboards are likely to be used including (but not limited to) sites exposed to a high degree of direct sunlight. As this type of weatherboard complies with the requirements of E2/AS1, the relevant dimensions represent an accumulation of New Zealand experience of the performance of such weatherboards in a wide range of New Zealand climatic conditions.
- 5.29 In this case, considered together, the following factors emerge:

Exposure

- The orientation of the house is such that the rear (north east) elevation will receive the majority of the direct exposure to the sun (see Photo 2 and Figure 2). The same applies to the side (north west) elevation during the afternoon and evening.
- The orientation of the house is such that the front (south west) elevation, and side (south east) elevation, will receive no or minimal direct exposure to the sun (see Photo 1 and Figure 3).
- The house is located in an urban setting surrounded by other buildings, and partly shaded by well-established vegetation along the side (north west) elevation.
- The extent of the overhang of the roof eaves only provide minimal shading to the uppermost rows of weatherboards.

Access

- As indicated in Photo 2, access to the most exposed elevation (rear / north east) is via a timber deck. This provides easy access for the inspection, maintenance, or replacement of the protective coating or the weatherboards.

- The elevation (height above ground level) of the house is two storeys to the least exposed elevation (front / south west), and only single storey to the most exposed elevation (rear / north east).
- Access to the timber weatherboards along the side (north west) elevation is only moderately difficult due to the slope of the land and height above ground level.

Maintenance

- Failure of the timber weatherboards or protective coating would be easily detected during normal maintenance (see Appendix B)^{23 24 25}.
- The manufacturers of both the timber weatherboards and protective coating have provided information on maintenance requirements of the respective products

Design and specifications

- The use of the timber bevel backed weatherboards is common in New Zealand and included in Acceptable Solution E2/AS1.
- An informative section of Acceptable Solution E2/AS1 states that for tangentially-sawn weatherboards, particularly painted in dark colours, cupping is possible, but this can be mitigated by providing additional fixings which may help restrain the boards. However care would need to be exercised when using these additional fixings that they don't split the weatherboards.
- A conservative cladding design with a ventilated cavity and rigid air barrier has been used, which will assist to mitigate the impact of any ingress of external moisture if it were to occur, until such time that the weatherboards or the protective coating could be inspected, maintained or replaced.
- The Building Code is performance based and sets no minimum values for LRV or TSR.
- There are no minimum values stated in Acceptable Solution E2/AS1 for LRV or TSR associated with protective coatings applied to timber weatherboards.
- The weatherboard manufacturer's technical manual and installation guide only provides a minimum LRV value, and not a corresponding TSR value.
- No evidence has been provided that confirms the minimum TSR value stated by the weatherboard manufacturer relates directly to its timber bevel backed product.
- The manufacturer of the protective coating confirmed its 'cool' colour product has a 26% TSR value. The manufacturer of the weatherboards has stated it requires a minimum 40% TSR value coating to be applied to its product. There is clearly a difference in the TSR values, but that of itself does not necessarily mean that compliance with the Building Code has or is likely to be compromised (specifically clauses B2.3.1 (b) for the external cladding, and B2.3.1 (c) for the protective coating, as they relate to Clause E2).

²³ Acceptable Solution B2/AS1, amendment 12, effective 28 November 2019, section 1.2 – Assessing required durability, items 1.2.1 e) – failure to comply with the Building Code would go undetected during normal use of the building but would be easily detected during normal maintenance, 1.2.1 f) – failure to comply with the Building Code would be easily detected during normal use of the building.

²⁴ Acceptable Solution B2/AS1, amendment 12, effective 28 November 2019, section 2.0, sub-section 2.1 – normal maintenance.

²⁵ Acceptable Solution E2/AS1, Third edition, amendment 9, effective 27 June 2019, section 2.5 – Maintenance - general

- 5.30 Therefore, in consideration of all specific factors in this case, I am of the view that the weatherboards, as originally installed and painted with the dark grey ‘cool’ colour paint applied, would have met the 15-year durability requirement set out in Clause B2.3.1(b), and therefore comply with Clause B2 with respect to Clause E2.
- 5.31 The decision reached in this determination is case specific. All such cases will need to be considered individually, including issues associated with (but not limited to):
- the type of external cladding used and its fixing details
 - whether the wall has penetrations such as windows and doors or other features to reduce the thermal stress on the cladding
 - the orientation of the building
 - local topography
 - any surrounding features that may provide additional shading to the exposed elevations of the building
 - other features of the building itself that can provide shading to the external cladding
 - the elevation (height above finished ground level) and general exposure of the building to direct sunlight and solar energy
 - maintenance requirements associated with the external cladding and protective coatings as detailed by the respective manufacturers
 - ease of access for inspection, normal maintenance, and replacement of the external cladding and any protective coating.

6. The decision

- 6.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the weatherboards as originally painted in a dark grey colour and installed on the building complied with Building Code Clause B2 Durability with respect to Clause E2 External Moisture.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 31 May 2021.

Katie Gordon
National Manager, Determinations

Appendix A: legislation

The Building Act 2004

14G Responsibilities of product manufacturer or supplier

(1) In subsection (2), product manufacturer or supplier means a person who manufactures or supplies a building product and who states that the product will, if installed in accordance with the technical data, plans, specifications, and advice prescribed by the manufacturer, comply with the relevant provisions of the [building code](#).

(2) A product manufacturer or supplier is responsible for ensuring that the product will, if installed in accordance with the technical data, plans, specifications, and advice prescribed by the manufacturer, comply with the relevant provisions of the [building code](#).

17 All building work must comply with building code

All building work must comply with the [building code](#) to the extent required by this Act, whether or not a building consent is required in respect of that building work.

19 How compliance with building code is established

(1) A building consent authority must accept any or all of the following as establishing compliance with the [building code](#):

(a) compliance with regulations referred to in [section 20](#):

(b) compliance with an acceptable solution:

(ba) compliance with a verification method:

(c) a determination to that effect made by the chief executive under [subpart 1](#) of Part 3:

(ca) a current national multiple-use approval issued under [section 30F](#), if every relevant condition in that national multiple-use approval is met:

(d) a current product certificate issued under [section 269](#), if every relevant condition in that product certificate is met:

(e) to the extent that compliance with a requirement imposed by regulations made under the [Electricity Act 1992](#) or the [Gas Act 1992](#) is compliance with any particular provisions of the [building code](#), a certificate issued under any of those regulations to the effect that any energy work complies with those requirements.

Appendix B

Acceptable Solution B2/AS1 – “Durability” (second edition, Amendment 12 effective 28 November 2019)

1.2 Assessing required durability

1.2.1 e) Failure to comply with the NZBC would go undetected during normal use of the building but would be easily detected during normal maintenance – applies where normal maintenance will identify faults unlikely to be observed by building occupants until significant damage has occurred. Examples are degradation of exterior claddings on roofs and walls, sealant filled joints, flashings, services with specific provision for inspection access, chimneys and flues. A 15 year durability is required.

1.2.1 f) Failure to comply with the NZBC would be easily detected during normal use of the building – applies where the failure is obvious to the building occupants. Examples are exposed building elements which are damaged or inoperative such as protective finishes, essential signs, sticking doors, slip resistant surfaces, stair treads and surface-run building services equipment. A 5 year durability is required

Acceptable Solution B2/AS1 – “Durability”, second edition, Amendment 12 effective 28 November 2019

2.0 Maintenance

2.1 Normal maintenance

2.1.1 Normal maintenance is that work generally recognised as necessary to achieve the expected durability for a given building element. The extent and nature of that maintenance will depend on the material, or system, its geographical location and position within the building, and can involve the replacement of components subject to accelerated wear.

2.1.2 It is the responsibility of the person specifying the building element to determine normal maintenance requirements. These may be based on the manufacturer’s recommendations and may also include periodic inspections of elements not readily observable without a specific effort (e.g. access to roof or subfloor spaces).

2.1.3 Basic normal maintenance tasks shall include but not be limited to:

- a) Where applicable, following manufacturers’ maintenance recommendations,
- b) Washing down surfaces, particularly exterior building elements subject to wind driven salt spray,
- c) Re-coating interior and exterior protective finishes,
- d) Replacing sealant, seals and gaskets in joints,
- e) Replacing valves, washers and similar high wear components in easily accessed service equipment and other building elements,
- f) Cleaning and replacing filters in building services systems,
- g) The regular servicing of boilers, cooling towers, lifts, escalators, emergency lighting and fire protection equipment, and
- h) The maintenance of signs for access, escape routes, emergency equipment and hazardous areas.

COMMENT:

Maintenance does not include such things as upgrading building elements to meet the demands of new technology or the increased environmental expectations of users.

Acceptable Solution E2/AS1 – “External Moisture”, third edition, Amendment 9 effective 27 June 2019

2.5 Maintenance – general

Maintenance shall be carried out as necessary to achieve the required durability of materials, components and junctions.

The extent and nature of necessary maintenance is dependent on the:

- a) Type of cladding or components used,
- b) Position of cladding or components on the building,
- c) Geographical location of the building, and
- d) Specific site conditions.

COMMENT:

A deterioration in the appearance of the surface of a cladding does not necessarily relate to a deterioration in the weathertightness of the cladding.

2.5.1 Regular maintenance

Regular maintenance of a building will include:

- a) Washing exterior surfaces,
- b) Inspecting surfaces and junctions, and repairing or replacing items when necessary, in order to preserve the weathertightness of the building....