

Determination 2024/040

The compliance with clause B2 Durability of macrocarpa timber cladding containing knots

1415 Devon Road, Brixton, Waitara

Summary

The determination will consider whether the macrocarpa timber cladding complies with Building Code clause B2 *Durability* with regard to knots in the timber boards.



Figure 1: The macrocarpa cladding

In this determination, unless otherwise stated, references to “sections” are to sections of the Building Act 2004 (“the Act”) and references to “clauses” are to clauses in Schedule 1 (“the Building Code”) of the Building Regulations 1992.

The Act and the Building Code are available at www.legislation.govt.nz. Information about the legislation, as well as past determinations, compliance documents (eg Acceptable Solutions) and guidance issued by the Ministry, is available at www.building.govt.nz.

1. The matter to be determined

- 1.1. This is a determination made under due authorisation by me, Peta Hird, for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment (“the Ministry”).¹
- 1.2. The parties to the determination are:
 - 1.2.1. L and K Klenner, the owners of the property (“the owners”), who applied for this determination.
 - 1.2.2. M Ritchie, the licensed building practitioner who carried out the building work (“the builder”).
 - 1.2.3. New Plymouth District Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.
- 1.3. This determination arises from concerns raised by the authority during the final inspections that the macrocarpa timber cladding does not comply with Clause B2 Durability.
- 1.4. The matter to be determined, under section 177(1)(a), is whether the macrocarpa cladding constructed as part of building consent BC22/130056 complies with Building Code clause B2 *Durability*. The determination is limited to considering the knots in the cladding.
- 1.5. I have not considered the quality, condition and compliance of the cladding product supplied by the manufacturer or other aspects of the cladding.

2. The building work and background

- 2.1. On 5 May 2022, building consent BC22/130056 was issued for a new single level detached dwelling on the owners’ semi-rural property. The plans show the dwelling having two primary wall cladding types: macrocarpa timber weatherboards and brick masonry. The chimney area is clad in vertical fibre cement boards.

¹ The Building Act 2004, section 185(1)(a) provides the Chief Executive of the Ministry with the power to make determinations.

- 2.2. The macrocarpa cladding was installed by the builder on various planes on all elevations, with knots of various sizes and shapes visible on most boards. The cladding specifications are:
 - 2.2.1. Boards of 180mm width and 18.5mm depth.
 - 2.2.2. Shiplap profile, where the cladding overlaps with the neighbouring board, including weather grooves.
 - 2.2.3. Installed vertically and directly fixed.
 - 2.2.4. Finished and sealed with a timber oil, specified to be used on external timber claddings.
- 2.3. Construction began on the dwelling in June 2022. The cladding was delivered to the site 18 August 2022, and was installed during January to February 2023.
- 2.4. The authority undertook three ‘final’ inspections, on 18 April 2023, 29 May 2023 and 26 July 2023, all of which failed. The second and third of these identified an issue relating to clause B2, stating: “Sections of finish and durability of the native timber cladding appears to be outside the scope of NZBC [New Zealand Building Code] B2”.
- 2.5. Further correspondence from the authority on 18 August 2023 stated that while the supply of cladding may have met NZS3631:1988,² the on-site selection must still meet NZS3602:2003.³
- 2.6. On 6 September 2023, the owners stated they would replace questionable cladding identified in the site inspections and call for a further inspection. However, it is my understanding that the replacement was not carried out.
- 2.7. The owners later applied for this determination.

3. Submissions

The owners

- 3.1. The owners submitted that they believe the cladding complies with the requirements of clause B2.
 - 3.1.1. The owners have provided a compliance statement from the manufacturer regarding the quality assurance processes which states “This is to certify that [the manufacturer] supplied graded ‘Heart Grade’ macrocarpa (code compliant for cladding) which meets the standards set in NZS 3602 for

² New Zealand Standard 3631:1988 *New Zealand Timber Grading Rules*

³ New Zealand Standard 3602:2003 *Timber and wood-based products for use in building Part 1 Mandatory requirements for compliance with durability provisions of clause B2 of the New Zealand Building Code Section 103.2*

durability of Cypress timbers”⁴, and “It is recognised that visually graded timber can have up to 5% of timber ‘out of grade’...”.

3.1.2. The owners have advised that:

- (1) An inspection of the boards at the property had been carried out by the cladding manufacturer in April 2024, with the view that the majority of knots are tight, and ‘understanding the desires and expectations of the homeowner’, believe the provided timber will be suitable for the 15-year expected life.
- (2) The manufacturer sighted “a few larger knots over 50mm” on the installed boards however, these larger knots “were less than half the width of the board” which they do not believe will affect the durability in the long term.
- (3) The manufacturer agrees that while there are some defects “that would be preferably graded out at installation”, visual grading has always factored in a 5% inclusion of ‘out of grade’.

3.1.3. The owners believe the work to replace weatherboards would “potentially damage the integrity of the existing structure” and “maybe worse than one or two knot checks or cracks that can easily maintain[ed]”.

The authority

3.2. The authority did not make a formal submission. However, in correspondence with the owners, the authority stated:

- 3.2.1. NZS3631 establishes visual grading rules for timber selection into quality classes, but it cannot be used in isolation from NZS3602, which specifies requirements for timber and wood-based products in building construction.
- 3.2.2. NZS3602 covers materials, design, and construction aspects relevant to performance in use, and provides approval of species and grades for specific building applications, demonstrating the interconnectedness of the two standards in ensuring compliance in building projects.

3.2.3. No formal inspections took place after 9 July 2024.

The builder

3.3. The builder did not make a submission.

⁴ Macrocarpa is a member of the Cypress family.

4. Discussion

Legislation

- 4.1. Section 17 requires all building work to comply with the Building Code. The Building Code sets out the performance criteria, which are the qualitative and quantitative requirements that are to be satisfied in performing the functional requirements of a Building Code clause. If the performance criteria are not satisfied, the building work will be non-compliant with that Building Code clause.
- 4.2. In this case, I will consider whether the macrocarpa cladding complies with the performance criteria of clause B2 with regard to the knots in the timber boards.
- 4.3. The functional requirements of clause B2.2 states:

Building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the building.
- 4.4. In the performance requirements of clause B2, B2.3.1 (b) states:

B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:
(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
- 4.5. In this case, the durability of the macrocarpa cladding boards are being considered. The boards themselves, as building elements, are expected by the Code to satisfy the performance requirements for at least 15 years, with normal maintenance which could include following manufacturer recommendations and washing down exposed surfaces.

Compliance of the cladding

- 4.6. The cladding was installed in 2023, and based on the plans and submissions the means of compliance was Acceptable Solution⁵ B2/AS1 *Durability*.⁶ For timber and wood-based products, paragraph 3.2 of B2/AS1 cites NZS3602:2003 Part 1⁷ as forming part of the Acceptable Solution.
- 4.7. NZS3602 section 111 outlines the requirements for wood-based building components with a 15-year durability period. The applicable paragraphs are:
- 4.7.1. 111.2.3 where grading requirements additional to those in NZS3631:1988 are provided, and
- 4.7.2. 111.2.5 where no finishes or a stain finish is permitted on particular species, including macrocarpa.⁸
- 4.8. NZS3631:1988 describes the timber grading rules, which are carried out in factories of timber product manufacturers. It is widely understood from this standard that it is acceptable that 95% of the timber products leaving factories meet the NZS3631 requirements, with 5% being 'out of grade' (either of higher or lower grade).
- 4.9. Section 111.2.3 of NZS3602 requires, that in addition to NZS3631:
- (a) All holes, resin and bark pockets shall be excluded;
- (b) Knot sizes shall not exceed 50mm, or 25mm width for spike knots.
- While this section is followed by comment C111.2.3 regarding the dressing grade plus the above requirements being the lowest grade suitable for exterior claddings, this is an informative comment only.
- 4.10. The owners have stated that they believe the cladding complies with B2 because the manufacturer has confirmed that the timber is graded to both standards, with only up to 5% of it being 'out of grade'. However, regardless of the standard for *supply* of timber, the requirement for construction is compliance with the Building Code.
- 4.11. In photographs provided by the owners and taken by the authority during inspections, it is apparent over all elevations on the dwelling that there is a high frequency of knots in boards across all elevations (figure 1). The sizes and shapes of

⁵ Section 19 of the Act sets out how compliance with the Building Code is established. It gives various methods that can be used for establishing compliance, such as Acceptable Solutions, Verification Methods and current registered product certificates. These means of compliance must be accepted by the building consent authority if they are being used as the compliance pathway.

⁶ B2/AS1 2nd edition, amendment 12, effective on 28 November 2019

⁷ Part 1 of NZS3602 is modified by B2/AS1 with regard to timber treatment.

⁸ NZS3602:2003 section 111.2.5 gives heart cypress as one of the permitted species which is the overarching species of which macrocarpa falls within.

the knots vary. However, photographs of individual knots show some with bark pockets around the edges or knots with holes or a combination of both, as well as cracks and splits that appear to be full thickness.

- 4.12. While splits and cracks are also apparent in the photographs provided, the parties have not raised these as a concern relating to the durability of the cladding for the purpose of this determination and so I have not considered these further.
- 4.13. In their submissions, the owners noted that the manufacturer, on inspection, sighted a “few larger knots over 50mm”, and knots of 30-45mm “across 60% of the cladding”.
- 4.14. The requirements of section 111.2.3 are for all holes and bark products to be excluded and that knots shall not exceed 50mm in size. It is evident there are holes and bark pockets, and therefore the cladding as installed does not comply with B2.3.1(b) by way of NZS3602.
- 4.15. NZS3602 does not allow for these items to remain untreated, such as holes being stained but not filled in, and in this case, they have been left open.
- 4.16. Given the frequency and consistency of knots generally across all elevations, I am of the view there will be multiple knots containing bark pockets and/or holes across these elevations. While there are some sheltered areas on the dwelling, such as the covered entry and eaves of at least 400mm, the dwelling is in a very high wind zone⁹ with the boards also installed on gable ends. In this location as well as lower areas on elevations with eaves, the cladding will not be sheltered from wind-blown rain.
- 4.17. It is unknown whether the bark pockets and holes are the full thickness of the boards. However, even partial penetration into the boards will mean moisture can get in and sit in these areas in the boards and soak into the grain of the timber. Although the cladding boards have been treated with a timber oil after installation, this oil does not in-fill any holes and I am of the view it will not significantly reduce the effects of moisture ingress in the holes and bark pockets in the knots.
- 4.18. Moisture soaking into the timber grain will lead to premature deterioration of the boards, which will not meet the intended life of no less than 15 years required by B2.3.1(b).
- 4.19. While not a matter for this determination, I note that the primary consequence of the cladding boards not complying with B2 concerns the performance of the cladding with regard to Clause E2 External Moisture, specifically performance criteria E2.3.2.¹⁰ Failure of the macrocarpa cladding in multiple areas across the

⁹ As per NZS3604:2011 *Timber-framed buildings*

¹⁰ New Zealand Building Code 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.*

dwelling will result in moisture ingress to the extent that it would cause undue dampness and/or damage to the wall assembly.

5. Decision

- 5.1. In accordance with section 188 of the Building Act 2004, I determine that the macrocarpa timber cladding installed on the dwelling under BC22/130056 does not comply with clause B2 Durability due to the size and extent of the knots in the boards.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 13 August 2024.

Peta Hird

Principal Advisor, Determinations