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3 June 2019

**Fairview Architectural
18-20 Donald St
Lithgow NSW 2790**

Attention: Ashley How

**Re: Vitracore G2 Review Against NCC 2019
Project: JV19-00103
Version: 1.0**

1. Introduction

- 1.1 RED Fire Engineers has been engaged by Fairview Architectural to provide a review to help determine if its aluminium composite cladding product Vitracore G2 is suitable for use in facades in Australia.
- 1.2 The following is provided for information only. It is not a comprehensive review of BCA requirements for all projects – reference should be made to the Building Surveyor/Certifier and the fire safety engineer for each project.
- 1.3 References to the BCA means either the National Construction Code Series 2019 Volume One: Building Code of Australia – Class 2 to 9 Buildings (Australian Building Codes Board, 2019a), or Volume Two: Building Code of Australia – Class 1 and 10 Buildings (Australian Building Codes Board, 2019b).
- 1.4 This document mainly applies to buildings that adopt the Deemed-to-Satisfy (DtS) Provisions of the BCA. The DtS Provisions describe one way of meeting the

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Performance Requirements of the BCA. Buildings that are subjected to a fire engineering Performance (Alternative) Solution is another way of meeting the Performance Requirements.

2. Definitions: External walls and ancillary element for external walls

- 2.1 An external cladding such as Vitracore G2 may be used as either an external wall or an ancillary element to an external wall.
- 2.2 The BCA defines external wall as an outer wall of a building which is not a common wall (for NCC Volume One) or not a separating wall (for NCC Volume Two).
- 2.3 The BCA defines a wall as loadbearing if it carries the gravity loads of anything attached to it (including but not limited to floors, roofs, beams, columns, signs, cladding etc.).
- 2.4 BCA Clause C1.14 lists the ancillary elements that can be used on external walls.

3. Vitracore G2 Analysis

- 3.1 Vitracore G2 has undergone AS 1530 part 1 and part 3 tests. We have reviewed the results of these tests and have produced the following summary:
 - AS 1530 Part 1 - Tests the lamina (layers) separately: the results of the testing showed that the profiled aluminium core of the material and the aluminium skins were deemed non-combustible. This is as expected because all three materials are aluminium, with the profiled aluminium core filling the 2.8 mm gap between the aluminium sheets (CSIRO, 2015a).
 - AS 1530 part 3 – Tests the complete cladding panel: the test determined the 4 mm thick Vitracore G2 aluminium composite panel had the following indices (CSIRO, 2015b)
 - Ignitability: 0 (0-20)
 - Spread of Flame: 0 (0-20)
 - Heat evolved: 0 (0-10)
 - Smoke Developed: 1 (0-10)
- 3.2 Vitracore G2 is consisted of three non-combustible layers of aluminium; a face skin, a profiled aluminium core and a rear skin. Between these layers is a film of VE-998 polymer adhesive which is applied as a continuous film during manufacturing resulting in a continuous thickness of 0.101 mm, therefore the total thickness of the adhesive layers is approximately 0.2 mm.
- 3.3 An assessment by CSIRO (CSIRO, 2019) states:

The face, core and reverse face aluminium layers were not tested separately to AS 1530.1. However, these layers all comprise the same aluminium material, therefore testing them in one test meets the requirement to test the materials that form this panel.



- 3.4 BCA Clause C1.9 (e)(vii) states that bonded laminated materials containing combustible fibres, may be used wherever a non-combustible material is required, providing that:
- Each lamina, including any core, is non-combustible; and
 - Each adhesive layer does not exceed 1 mm in thickness and the total thickness of the adhesive layers does not exceed 2 mm; and
 - The spread of flame index and the smoke development index of the laminated material as a whole does not exceed 0 and 3 respectively.
- 3.5 Vitracore G2 is an aluminium composite panel with a nominal thickness of 4 mm meets all the above requirements, as demonstrated in the various tests, hence can be used wherever a non-combustible material is required.
- 3.6 According to DtS Provisions in the BCA for Type A and Type B construction, external walls need to be non-combustible. As Vitracore G2 can be used where non-combustible materials are required it can be used both as part of an external wall or as an ancillary element to an external wall.
- 3.7 Vitracore G2 can be used as part of an external wall without requiring a special layer of non-combustible material behind it. The exception to this is when material is required to achieve an FRL, which is covered in more detail in Section 6.

4. Testing in accordance with AS 5113:2016

- 4.1 Vitracore G2 is a Deemed-to-Satisfy Solution and there is no NCC requirement to test it using AS 5113:2016. To provide information for the use of Vitracore G2 as part of a Performance Solution, Vitracore G2 was tested on 24 November 2017 in accordance with the test protocols of AS 5113:2016 and BS 8414-2:2005 by Exova Warrington Aus Pty Ltd in their facility in Dandenong VIC.
- 4.2 The tested specimen was a 160 mm thick external wall system consisting of a steel frame clad with 4 mm thick Vitracore G2. The test results indicated that the tested assembly did not exhibit external flame spread more than that permitted by the external wall classification criteria in AS 5113:2016. However, as expected for any aluminium panel, the falling debris criterion in AS 5113:2016 was not met. This test data is suitable for use by a fire safety engineer developing a building specific Performance Solution.

5. Group Number of Vitracore G2

- 5.1 Vitracore G2 has not been tested for a material group number but it may be used wherever a non-combustible material is required, in accordance with BCA Clause C1.9(e)(vii).
- 5.2 As such Vitracore G2 can also be used as a wall and ceiling lining because its reaction of fire performance is considered, on the basis of BCA Clause C1.9(e)(vii), to be equivalent to or better than a material with a material group number 1. This is because a group 1 material is defined in AS 5637.1:2015 as a material that does not reach flashover when exposed to 100 kW for 600 s followed by exposure to 300 kW for 600 s only, in a test to AS ISO 9705-2003, but the material could be



combustible, just that its heat release rate plus that of the test burner output did not reach 1,000 kW (Clause 5.2.2 of AS 5637.1:2015).

6. Use of Vitracore G2 as part of walls requiring an FRL

- 6.1 Vitracore G2 does not have an FRL but will not adversely affect the FRL of a wall because it is non-combustible. When a wall requires a specific FRL, Vitracore G2 can be used as part of that wall or as an ancillary element to that wall providing the wall itself has the required FRL.
- 6.2 Most manufacturers of lightweight fire rated wall systems will provide confirmation that the application of cladding to external fire rated wall systems does not impair the fire resistance level. For instance, CSR (manufacturers of 'Gyprock' fire rated wall systems) state in their 'Red Book' ^[1] that "The Fire Resistance Level (FRL) of the systems detailed in this section will not be detrimentally affected by... the addition of an exterior cladding." The same statement is provided by CSR for their steel and timber stud wall systems.
- 6.3 Individual wall manufacturers other than CSR should be approached for confirmation if their products are used.

7. Penetrations through Vitracore G2

- 7.1 If a service penetration is through a wall at a location that requires protection under clause C3.4 of the BCA, then the penetration must be appropriately fire stopped in accordance with Clause C3.15 of the BCA.
- 7.2 If the penetration is through a wall at a location required to be fire-resisting under clause 3.7.2.4(a) and (b) of the NCC Volume Two, then the penetration must be appropriately protected in accordance with the provisions prescribed under clause 3.7.2.4(c) of NCC Volume Two.

8. Conclusion

- 8.1 As discussed Vitracore G2 complies with the DtS Provisions when used where non-combustible materials are required as specified in the BCA. This means that Vitracore G2 can be used both as part of an external wall or as an ancillary element to an external wall. Vitracore G2 can be used on walls requiring an FRL without adversely impacting the FRL of the wall.

¹ CSR Gyprock, 'The Red Book™ Fire, Acoustic & Thermal Design Guide', February 2017.



8.2 If you have any queries in regard to the above, please do not hesitate to contact the undersigned.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'M.C. Hui', located below the 'Yours sincerely,' text.

M.C. Hui

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Appendix A: References

Australian Building Codes Board, 2019a. *National Construction Code 2019 Volume One: Building Code of Australia - Class 2 to 9 Buildings*. Canberra: Australian Building Codes Board.

Australian Building Codes Board, 2019b. *National Construction Code 2019 Volume Two: Building Code of Australia - Class 1 and 10 Buildings*. Canberra: Australian Building Codes Board.

CSIRO, 2015a. *Combustibility test for materials in accordance with AS 1530.1-1994, Vitracore G2 - Corrugated honeycomb aluminium core, Report No. FNC11476B*, North Ryde, NSW: CSIRO.

CSIRO, 2015b. *AS 1530.3:1999 Simultaneous determination of ignitability, flame propagation, heat release and smoke release, Vitracore G2, Report No. FNE11459C*, North Ryde, NSW: CSIRO.

CSIRO, 2019. *Advisory report regarding Fairview Vitracore G2 aluminium composite panel with respect to NCC 2019 volume 1 clause C1.9, FCO-3166 Revision D*, North Ryde, NSW: CSIRO.