Fire assessment report

Fire hazard properties of veneered Flameblock™ FRMDF

Client: Briggs Veneers Pty Ltd

Job number: 23754 Revision: R5.0

Issue date: 16 May 2019 Expiry date: 31 May 2024

Amendment schedule

Version	Date	Information relating to report			
R0.0	Issue: 28 September 2009	Reason for issue	First issue		
			Prepared by	Reviewed by	
	Expiry: 30 September 2009	Name	K.G. Nicholls	S. Kettle	
		Signature			
R1.0	Issue: 28 February 2014	Reason for issue	Inclusion of additional veneers and substrate		
			Prepared by	Reviewed by	
	Expiry: 28 February 2019	Name	K. G. Nicholls	D. Nicholson	
		Signature			
R2.0	Issue: 10 March 2019	Reason for issue	Inclusion of nominal density for the Flameblock™ substrate		
			Prepared by	Reviewed by	
	Expiry: 28 February 2019	Name	K. G. Nicholls	D. Nicholson	
		Signature			
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			Prepared by	Reviewed by	
	Expiry: 28 February 2019	Name	K. G. Nicholls	D. Nicholson	
		Signature			
R4.0	Issue: 15 April 2016	Reason for issue	Revised with typographical correction		
			Prepared by	Reviewed by	
	Expiry: 28 February 2019	Name	K. G. Nicholls	D. Nicholson	
		Signature			
R5.0	Issue: 16 May 2019	Reason for issue	Revalidation in accordance with AS 5637.1:2015		
			Prepared by	Reviewed by	Approved by
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General conditions of use

Exova Warringtonfire rebranded to Warringtonfire on 1 December 2018. Apart from the change to our brand name, no other changes have occurred. The introduction of our new brand name does not affect the validity of existing documents previously issued by us.

Executive summary

This report presents an assessment on the likely fire hazard properties of veneered Flameblock™ FRMDF in accordance with AS 5637.1:2015 and "C/VM2 (Amendment 5) – Verification Method: Framework for Fire Safety Design" of the New Zealand building code. Multiple ISO 9705 room burn tests were conducted on hardwood and softwood veneer species bonded to a Flameblock™ FRMDF. The results from these tests were then applied to predict the likely performance of a range of veneers, as summarized in Table 1.

Table 1 Assessed fire hazard properties of timber veneers bonded to a 12-25 mm thick Flameblock™ FRMDF substrate

Veneer Type	Maximum Density (kg/m^3)	Maximum Thickness (mm)	Group Number
Natural timber	755	0.6	2
TrueGrain™ reconstituted dyed	415	0.55	2
TrueGrain™ reconstituted undyed	755	0.6	2
Tabu/Woodstock/Ecologna™ dyed	755	0.6	2

All veneer species with a density up to 755 kg/m^3 bonded to a Flameblock FRMDF™ (12-25 mm thick) are likely to achieve Group 2. The raw Flameblock™ FRMDF with no veneers are also likely to achieve Group 2. The variations and outcome of this assessment are subject to the limitations and requirements described in section 4 of this report. The results of this report are valid until 30 April 2024.

Contents

1. Introduction

This report documents the findings of the assessment undertaken to determine the likely fire hazard properties of timber veneers bonded to a Flameblock™ FRMDF in accordance with AS 5637.1:2015 and "C/VM2 (Amendment 5) – Verification Method: Framework for Fire Safety Design" of the New Zealand building code. This assessment is carried out at the request of Briggs Veneers Pty Ltd. The client details are included in Table 2.

Table 2 Client details

Client	Address
Briggs Veneers Pty Ltd	409 Victoria Street, Wetherill Park, NSW - 2164. Australia.

2. Framework of the assessment

An assessment is an opinion of the likely performance of a component or element of structure if it were subject to a standard fire test.

No specific framework or methodology, standard or guidance documents exists in Australia for undertaking assessments. Therefore, we have followed the Guide to Undertaking Assessments in Lieu of Fire Tests prepared by the Passive Fire Protection Federation (PFPF) in the UK[1].

This Guide provides a framework to undertake assessments in the absence of specific fire test results. *'Some areas where assessments may be offered are:*

- *Where a modification is made to a construction which has already been tested*
- *Interpolation or extrapolation of results of a series of fire resistance tests, or utilisation of a series of fire test results to evaluate a range of variables in a construction design or a product*
- *Where, for various reasons – e.g. size or configuration – it is not possible to subject a construction or a product to a fire test.'*

Assessments will vary from relatively simple judgements on small changes to a product or construction through to a detailed and often complex engineering assessments of large or sophisticated constructions.

[1] Guide to Undertaking Assessments In Lieu of Fire Tests - The Passive Fire Protection Federation (PFPF), June 2000, UK.

3. Description of the tested specimen and variations

3.1 System description

The system consists of the Flameblock™ FRMDF with or without timber veneers.

3.2 Relevant test data

The assessment of the variation to the tested system to determine its likely performance is based upon the results of the fire test/s documented in the reports summarised in Table 3 and Table 4. Further details of the tested system are described in Appendix A.

Table 3 Referenced ISO 9705 – 2003 (R2016) test data

Report number	Veneer Name	Veneer Type	Veneer Density (kg/m^3)	Veneer Thickness (mm)	Substrate
RTF190014.1	American White Oak	Natural	755	0.6	12 mm Flameblock FRMDF
RTF190015.1	TrueGrain Black Onyx	Dyed - Reconstituted	380	0.55	12 mm Flameblock FRMDF
RTF190022.1	Grey Ironbark	Natural	1106	0.6	12 mm Flameblock FRMDF
RTF180222.1	Hoop Pine	Natural	530	0.6	12 mm Flameblock FRMDF

Table 4 Referenced AS 3837 – 1998 test data

Report number	Veneer Name	Veneer Type	Veneer Density (kg/m^3)	Veneer Thickness (mm)	Substrate
EWFA 2376600a.1	-	-	-	-	12 mm Flameblock FRMDF
EWFA 2376600e.1	Radiata Pine	Natural	550	0.6	12 mm Flameblock FRMDF
EWFA 2376600c.1	Grey Ironbark	Natural	1106	0.6	12 mm Flameblock FRMDF
EWFA 2376600i.1	Truegrain Anthracite	Reconstituted	415	0.6	12 mm Flameblock FRMDF
EWFA 2376600g.1	Truegrain Black Onyx	Reconstituted	380	0.6	12 mm Flameblock FRMDF

3.3 Purpose of test

AS 5637.1:2015 sets out procedures for the assessment of internal wall and ceiling linings according to their tendency to ignite, release heat, cause flashover, release smoke and contribute to fire growth.

3.3.1 Performance criteria

Australia

Specification C1.10 of the National Construction Code 2019 Volume One (NCC) requires materials intended to be used as internal wall and ceiling linings to obtain Group Numbers in accordance with AS 5637.1:2015. The Group Number of a material or a system is based on its ‘time to flashover’ in the AS ISO 9705 room burn test. The time to flashover is defined as the time required for the heat release rate to reach 1 MW. Below is a description on how a material or a system achieves a certain Group Number:

- Group 1 – Materials classified as Group 1 do not reach flashover after ten minutes exposure to a heat source delivering 100 kW immediately followed by a further ten minutes exposure to 300 kW.
- Group 2 – Materials classified as Group 2 reach flashover after ten minutes of exposure to a 100 kW heat source.
- Group 3 – Material classified as Group 3 reach flashover after two minutes, but before ten minutes of exposure to 100 kW heat source.
- Group 4 – Materials classified as group 4 reach flashover before two minutes of exposure to a 100 kW heat source.

The NCC and AS 5637.1:2015 also define the smoke growth rate index, or $SMOGRA_{RC}$, as a quantity which may be obtained from the smoke obscuration measurements obtained through the AS ISO 9705:2003 (R2016) test. The $SMOGRA_{RC}$ for a material is obtained by finding the maximum value of the average rate of smoke growth, where the averages are found from the total smoke obscuration determined over intervals of one minute, then dividing that value by the time that maximum occurred and multiplying the result by 1000.

New Zealand

New Zealand Ministry of Business, Innovation and Employment’s verification method “C/VM2 – (Amendment 5) Verification Method: Framework for Fire Safety Design” provides guidelines on establishing group numbers for lining materials. The framework allows for classification of materials by group number, which indicates the amount of time taken for the material being tested to reach flashover under ISO 9705:1993 test conditions. AS ISO 9705:2003 (R2016) standard states that it is identical to and has been reproduced from ISO 9705:1993, therefore the data obtained from the referenced tests in this report may are still applicable to this assessment.

The Group Number of a material or a system in accordance with Appendix A of C/VM2 is defined by the time taken for the heat release rate as measured during the ISO 9705:1993 test to reach flashover (1 MW) as per the scheme below;

- Group 1 – Materials classified as Group 1 do not reach flashover after ten minutes exposure to a heat source delivering 100 kW immediately followed by a further ten minutes exposure to 300 kW.
- Group 1 – S – Materials that are classified as Group 1-S do not reach flashover after ten minutes exposure to a heat source to a heat source delivering 100 kW immediately followed by a further ten minutes exposure to 300 kW and in addition the average smoke production rate for the period between 0 and 20 minutes of the test period does not exceed 5.0 m^2s^{-1}.
- Group 2 – Materials classified as Group 2 reach flashover after ten minutes of exposure to a 100 kW heat source.

- Group 2 – S – Materials that are classified as Group 2-S do not reach flashover after ten minutes exposure to a heat source delivering 100 kW and in addition the average smoke production rate for the period between 0 and 10 minutes of the test period does not exceed 5.0 m^2s^{-1}.
- Group 3 – Material classified as Group 3 reach flashover after two minutes, but before ten minutes of exposure to 100 kW heat source.
- Group 4 – Materials classified as group 4 reach flashover before two minutes of exposure to a 100 kW heat source.

3.4 Variations to tested system

The timber veneer species listed in Table 5 to Table 8 have not been subject to a standard fire test. We have therefore undertaken an assessment of these products based on data collected and analysed from the referenced test reports to predict the likely fire hazard properties of these species.

Table 5 Natural timber veneers with a maximum thickness and density of 0.6 mm and 755kg/m^3 respectively

Preferred Common Name	Botanical Name	Density (kg/m^3)
Acacia, Rose	*Acacia dealbata*	655
Alder, Rose	*Caldcluvia australiensis*	600
Anegre	*Pouteria robusta*	550
Anegre, Figured	*Pouteria spp.*	550
Ash Burr	*Fraxinus excelsior*	680
Ash Olive Burl	*Fraxinus spp.*	700
Ash, Mountain	*Eucalyptus regnans*	680
Ash, Silver	*Flindersia bourjotiana & schottiana*	670
Ash, Tasmanian	*Eucalyptus regnans*	680
Ash, Victorian	*Eucalyptus regnans*	680
Ash, White	*Fraxinus americana & excelsior*	690
Avodire, Figured	*Turraeanthus africanus*	575
Beech, Curly	*Fagus sylvatica*	710
Beech, European	*Fagus sylvatica*	710
Beech, Unsteamed	*Fagus sylvatica*	710
Birch, Australian White	*Schizomeria ovata*	640
Birch, Canadian Red	*Betula alleghaniensis*	690
Birch, Curly	*Betula pendula*	640
Birch, European	*Betula pendula*	640
Birch, Masur	*Betula pendula*	640
Birch, Quilted European	*Betula pendula*	640
Blackwood, Birds Eye	*Acacia melanoxylon*	650
Blackwood, Tasmanian	*Acacia melanoxylon*	650
Calantas	*Toona calantas*	480
Cherry, American	*Prunus serotina*	560
Cherry, European	*Prunus avium*	600
Cherry, Queensland	*Sloanea australis*	600

Coachwood, NSW	*Ceratopetalum apetalum*	602
Elm Burr	*Ulmus carpinifolia & glabra*	575
Elm, European	*Ulmus rubra*	600
Elm, Red	*Ulmus rubra*	600
Eucalypt, Smoked	*Eucalyptus globulus (plantation only)*	740
Eucalypt, Tear-drop	*Eucalyptus delegatensis & regnans*	650
Fir, Douglas (“Oregon”)	*Pseudotsuga menziesii*	550
Gum, Red Heart	*Liquidambar styraciflua*	545
Gum, Rose	*Eucalyptus grandis*	750
Koto	*Pterygota macrocarpa*	595
Leatherwood	*Eucryphia billardieri*	740
Mahogany, Brazilian	*Swietenia macrophylla*	590
Mahogany, Khaya	*Khaya sivorensis*	568
Mahogany, Pomelle	*Entandrophragma & Khaya spp.*	670
Makore	*Tieghemella heckelii*	685
Makore, Figured	*Tieghemella heckelii*	685
Makore, Pomelle	*Tieghemella heckelii*	685
Maple Burl	*Acer macrophyllum*	545
Maple, Birds Eye	*Acer saccharum*	705
Maple, Curly	*Acer saccharum*	705
Maple, Figured Qld	*Flindersia brayleyana*	560
Maple, Figured Rock	*Acer saccharum*	705
Maple, Queensland	*Flindersia brayleyana*	560
Maple, Quilted	*Acer saccharum*	705
Maple, Rock	*Acer saccharum*	705
Meranti	*Shorea spp.*	675
Myrtle Burl, American	*Umbellularia californica*	635
Myrtle Burr, Tasmanian	*Nothofagus cunninghamii*	700
Myrtle, Birdseye	*Nothofagus cunninghamii*	700
Myrtle, Figured Tasmanian	*Nothofagus cunninghamii*	700
Myrtle, Flame	*Nothofagus cunninghamii*	700
Myrtle, Southern	*Nothofagus alpina*	520
Myrtle, Tasmanian	*Nothofagus cunninghamii*	700
Nyatoh	*Palaquium spp.*	620
Oak Burr	*Quercus robur & petraea & alba*	755
Oak, American White	*Quercus alba*	755
Oak, European	*Quercus robur & petraea*	755
Oak, Figured Tasmanian	*Eucalyptus delegatensis & regnans*	650
Oak, Plantation (Plantation Southern Blue Gum)	*Eucalyptus globulus (plantation only)*	740
Oak, Rift	*Quercus robur & petraea & alba*	755

Oak, Silky	*Cardwellia sublimus*	550
Oak, Smoked	*Quercus robur & petraea & alba*	755
Oak, Tasmanian	*Eucalyptus delegatensis & regnans*	650
Padouk	*Pterocarpus soyauxii*	745
Pearwood	*Pyrus communis*	690
Pine, Baltic	*Pinus sylvestris*	550
Pine, Birds Eye	*Pinus radiata*	550
Pine, Celery Top	*Phyllocladus aspleniifolius*	645
Pine, Hoop	*Araucaria cunninghamii*	530
Pine, Huon	*Dacrydium (Lagarostrobus) franklinii*	560
Pine, Kauri	*Agathis spp.*	540
Pine, Radiata	*Pinus radiata*	550
Rimu, Coloured Heart	*Dacrydium cupressinum*	519
Rimu, Pale	*Dacrydium cupressinum*	519
Rosewood, New Guinea	*Pterocarpus indicus*	593
Sapele	*Entandrophragma cylindricum*	670
Sapele, Pomelle	*Entandrophragma cylindricum*	670
Sassafras, Black Heart	*Atherosperma moschatum*	620
Sassafras, Golden	*Atherospermia moschatum*	620
Sen, Japanese	*Acanthopanax ricinofolus*	560
Sycamore, Figured	*Acer pseudoplatanus*	615
Sycamore, Queensland	*Ceratopetalum succirubrum*	620
Sycamore, White	*Acer pseudoplatanus*	615
Tea Tree	*Melaleuca leucadendron*	745
Vitex	*Vitex cofassus*	700
Walnut Burr	*Juglans nigra*	610
Walnut, American	*Juglans nigra*	610
Walnut, New Guinea (“Pacific Walnut”)	*Dracontomelum mangiferum*	625
Walnut, Queensland	*Endiandra palmerstonii*	680
Walnut, Silky	*Dillenia spp.*	730
Wattle, Silver	*Acacia dealbata*	655

Table 6 TrueGrain reconstituted dyed veneers with maximum thickness and density of 0.55mm and 415 kg/m^3 respectively

Preferred Common Name	Botanical Name	Density (kg/m^3)
TrueGrain Anthracite	*Populus euramericana*	415
TrueGrain Biscotti	*Triplochiton scleroxylon*	380
TrueGrain Black Gold	*Triplochiton scleroxylon*	380
TrueGrain Black Onyx	*Triplochiton scleroxylon*	380
TrueGrain Bouchon	*Triplochiton scleroxylon*	380
TrueGrain Burnt Wood	*Triplochiton scleroxylon*	380
TrueGrain Charred Makassar	*Triplochiton scleroxylon*	380
TrueGrain Cheri	*Populus euramericana*	415
TrueGrain Chocolate	*Triplochiton scleroxylon*	380
TrueGrain Cinder	*Triplochiton scleroxylon*	380
TrueGrain Claret	*Triplochiton scleroxylon*	380
TrueGrain Crema	*Triplochiton scleroxylon*	380
TrueGrain Dove	*Populus euramericana*	415
TrueGrain Dusk	*Triplochiton scleroxylon*	380
TrueGrain Ebony Vogue	*Triplochiton scleroxylon*	380
TrueGrain Ghost Ash	*Triplochiton scleroxylon*	380
TrueGrain Heather	*Triplochiton scleroxylon*	380
TrueGrain HoneySuckle	*Triplochiton scleroxylon*	380
TrueGrain Intense Cocoa	*Triplochiton scleroxylon*	380
TrueGrain Liana	*Triplochiton scleroxylon*	380
TrueGrain Limed Grey Oak	*Triplochiton scleroxylon*	380
TrueGrain Limewood	*Triplochiton scleroxylon*	380
TrueGrain Liquorice	*Triplochiton scleroxylon*	380
TrueGrain Luca	*Triplochiton scleroxylon*	380
TrueGrain Maize	*Triplochiton scleroxylon*	380
TrueGrain Marzipan	*Triplochiton scleroxylon*	380
TrueGrain Mocha	*Triplochiton scleroxylon*	380
TrueGrain Oatmeal	*Triplochiton scleroxylon*	380
TrueGrain Pebble	*Triplochiton scleroxylon*	380
TrueGrain Pinecone	*Triplochiton scleroxylon*	380
TrueGrain Sand	*Triplochiton scleroxylon*	380
TrueGrain Taupe	*Populus euramericana*	415
TrueGrain Wenge	*Triplochiton scleroxylon*	380
TrueGrain Zebrano Faso	*Triplochiton scleroxylon*	380
TrueGrain Zebu	*Triplochiton scleroxylon*	380

Table 7 TrueGrain reconstituted undyed veneers with maximum thickness and density of 0.6mm and 755 kg/m³ respectively

Preferred Common Name	Botanical Name	Density (kg/m³)
TrueGrain American Walnut	*Juglans nigra*	610
TrueGrain Blackbutt	*Eucalyptus pilularis*	900
TrueGrain Blackwood	*Acacia melanoxylon*	650
Truegrain European Birch	*Betula pendula*	640
TrueGrain Hoop Pine	*Araucaria cunninghamii*	530
TrueGrain Jarrah	*Eucalyptus marginata*	820
TrueGrain Mountain Ash	*Eucalyptus regnans*	680
TrueGrain Pacifica	*Dracontomelum mangiferum*	625
TrueGrain Queensland Cherry	*Sloanea australis*	600
TrueGrain Rift Oak	*Quercus alba*	755
TrueGrain Silky Oak	*Cardwellia sublimus*	550
TrueGrain Silver Ash	*Flindersia bourjotiana & schottiana*	670
TrueGrain Silver Beech	*Nothofagus menziesii*	705
TrueGrain Southern Myrtle	*Nothofagus alpina*	520
TrueGrain Tasmanian Ash	*Eucalyptus regnans*	680
TrueGrain Tasmanian Oak	*Eucalyptus delegatensis & regnans*	650

Table 8 Tabu/Woodstock/Ecoligna dyed veneers with a maximum thickness and density of 0.6 mm and 755 kg/m³ respectively

Preferred Common Name	Botanical Name	Density (kg/m³)
Ecoligna Raven	*Quercus robur & petraea & alba*	755
Ecoligna Shale	*Liriodendron tulipifera*	455
Tabu American Cherry (all colours)	*Prunus serotina*	560
Tabu American Walnut (all colours)	*Juglans nigra*	610
Tabu American Walnut Burl (all colours)	*Juglans nigra*	610
Tabu Anegre (all colours)	*Pouteria altissima*	550
Tabu Ash (all colours)	*Fraxinus excelsior*	680
Tabu Birch (all colours)	*Betula pendula*	640
Tabu Birds Eye Maple (all colours)	*Acer saccharum*	705
Tabu Elm (all colours)	*Ulmus cglabra*	575
Tabu Eucalypt (all colours)	*Eucalyptus globulus (plantation only)*	740
Tabu European Walnut Burl (all colours)	*Juglans regia*	640
Tabu Lacewood (all colours)	*Panopsis spp.*	530
Tabu Larch (all colours)	*Larix spp.*	575
Tabu Oak (all colours)	*Quercus robur & petraea & alba*	755
Tabu Pine (all colours)	*Pinus rigida*	545
Tabu Pomelle Eucalypt (all colours)	*Eucalyptus globulus (plantation only)*	740

Tabu Pomelle Makore (all colours)	*Tieghemella heckelii*	685
Tabu Quilted Maple (all colours)	*Acer saccharum*	705
Tabu Rock Maple (all colours)	*Acer saccharum*	705
Tabu Sycamore (all colours)	*Acer saccharinum & rubrum*	705
Tabu Tay (all colours)	*Pterygota macrocarpa*	595
Tabu Tulipwood (all colours)	*Liriodendron tulipifera*	455
Woodstock Aubergine Tay	*Pterygota macrocarpa*	595
Woodstock Black Tulipwood	*Liriodendron tulipifera*	455
Woodstock Brown Ash	*Fraxinus excelsior*	680
Woodstock Charcoal Tay	*Pterygota macrocarpa*	595
Woodstock Chocolate Tay	*Pterygota macrocarpa*	595
Woodstock Dutch Tulipwood	*Liriodendron tulipifera*	455
Woodstock Flinders Oak	*Quercus robur & petraea & alba*	755
Woodstock Ghost Anegre	*Pouteria altissima*	550
Woodstock Grey Birch	*Betula pendula*	640
Woodstock Gunmetal Birch	*Betula pendula*	640
Woodstock Lichen Tulipwood	*Liriodendron tulipifera*	455
Woodstock Macchiato Tay	*Pterygota macrocarpa*	595
Woodstock Mocha Tay	*Pterygota macrocarpa*	595
Woodstock Naples Ash	*Fraxinus excelsior*	680
Woodstock Pewter Oak	*Quercus robur & petraea & alba*	755
Woodstock Platinum Ash	*Fraxinus excelsior*	680
Woodstock Spanish Tulipwood	*Liriodendron tulipifera*	455

3.5 Schedule of components

This section outlines the schedule of components of the assessed system/s subject to a fire test referenced in Appendix A.

Table 9 Schedule of components of assessed systems

Item		Description
Lining		
1.	Product name	Timber veneer on 12mm FLAMEBLOCK™ FRMDF
	Material	Natural pale-brown coloured Fire Retardant MDF (FR MDF). Briggs Flameblock FR MDF is made primarily from softwood (gymnosperm) wood fibres with up to 5% hardwood (angiosperm) wood fibres. The wood fibres are bonded together with melamine-urea-formaldehyde (MUF) adhesive. Fire retardancy is imparted by phosphate and other inorganic salts in the proportion 9% to 10% by weight. The veneer was adhered to the MDF using heat-cured crosslinked PVA.
	Measured uncut sheet size	2400mm x 1200mm x 13.5mm thick (measured) (12mm thick Flameblock sandwiched in between two layers of 0.55-0.6 mm thick veneer, as nominated by the client)
	Installation	The MDF boards were screw fixed to the room walls and ceiling using plasterboard screws (item 2). The ceiling panels were installed first, followed by the rear wall panels and lastly the right and left walls. The ceiling was installed with the full width and length panels. Three rows of screws were used, one through the centre of the panels lengthwise and on both sides. Fixings were at 600mm centres, with a 50mm offset from the edges. The wall panels were trimmed by 14mm to allow for the ceiling panel thickness. The same screw centres were used, with a 50mm offset from the edges of the panels.
Fixings		
2.	Product name	#8 x 65mm Needle point fine thread plasterboard screw
	Installation	Used to screw fix the panels (item 1) to the room walls and ceiling. Screw holes were pre-drilled.

4. Scope, objective and assumptions

4.1 Scope and objective

- This assessment is performed in accordance with requirements of AS ISO 9705 – 2003 (R2016) and AS 5637.1:2015 with the purpose of determining group numbers using classification schemes given in AS 5637.1:2015 and “C/VM2 – Verification Method: Framework for Fire Safety Design” of the New Zealand building code.
- The scope of this report is limited to the variations to the tested systems described in section 3.4.
- This report applies to flat un-slotted, non-routed panels only.
- Any changes to the veneer thickness, glue type, glue layer thickness, substrates or fixing methods other than those identified in this report, may invalidate the findings of this assessment. A separate test or assessment has to be carried out to validate those changes.
- The data, methodologies, calculations and conclusions documented in this report specifically relate to the assessed system/s and must not be used for any other purpose.

4.2 Assumptions

- This report has been prepared based on information provided by others. Warringtonfire has not verified the accuracy and/or completeness of this information and will not be responsible for any errors or omissions that may be incorporated into this report as a result.
- The system, component or element of structure has not been subjected to the standard fire test against which this assessment is being made.

5. Assessment 1 – Timber species

5.1 Description of variation

The group number of a material or a system is based on its 'time to flashover' in the AS ISO 9705 room burn test. Flashover usually occurs when the fire is fully developed and all combustible items in the room are involved in the fire. In AS 5637.1:2015, flashover is said to occur when the total heat release rate exceeds 1MW (1000 kW). The fire hazard properties of timber are dependent on multiple factors such as density, thickness, microstructure and chemical composition. For veneered timber materials, additional factors such as the type and thickness of the adhesive layer also contribute to the fire.

This assessment report investigates the influence of veneer density on the overall fire hazard properties of the veneered Flameblock™ FRMDF when used as a wall and ceiling lining material.

Timber is a non-homogeneous and non-isotropic material which is made from a mixture of complex natural polymers of high molecular weight such as cellulose, hemicellulose and lignin. The density of a timber species depends on the corresponding relative polymeric content and its microstructure (permeability). Hence, the critical parameter used to define the fire hazard properties of the veneered Flameblock™ FRMDF in this assessment is veneer density. All other parameters such as moisture content, veneer thickness, adhesive type and adhesive thickness are kept constant. The effect of these variables is outside the scope of this assessment.

5.2 Methodology

The approach and method used for this assessment to meet the requirements of the referenced standard is summarised in Table 10.

Table 10 Method of assessment

Assessment approach	
Level of complexity[2]	Intermediate assessment
Type of assessment	Quantitative – interpolation Comparative

5.3 Assessment

5.3.1 Raw Flameblock™ FRMDF

The effect of timber veneers on the fire hazard properties of the Flameblock™ FRMDF was established through small-scale cone testing in accordance with AS/NZS 3837 – 1998. Critical parameters such as heat release rates, mass loss and smoke production were measured.

As summarized in Table 11, the fire hazard properties of the raw Flameblock™ FRMDF were consistently better than the veneered counterparts. The absence of timber veneers and adhesives on the surface of the FRMDF resulted in a significant drop in the heat release rates and the corresponding smoke production. The timber veneers not only acted as an additional fuel source, but also hindered the efficient release of non-volatile gases released from the FRMDF. A similar behaviour is expected if these materials are tested under room burn conditions. It is therefore expected that the Flameblock FRMDF (minimum thickness of 12 mm) will achieve at least Group 2.

[2] Guide to Undertaking Assessments In Lieu of Fire Test - The Passive Fire Protection Federation (PFPF), June 2000, UK.

Table 11 Effect of timber veneers on the fire hazard properties of the Flameblock™ FRMDF

Veneer	Substrate	Peak HRR (kW/m²)	Average HRR at 180s (kW/m²)	Average Effective Heat of Combustion (MJ/kg)
-	12 mm Flameblock™ FRMDF	91.2	22.4	1.6
0.6 mm Radiata Pine	12 mm Flameblock™ FRMDF	157	42.6	4.3
0.6 mm Grey Ironbark	12 mm Flameblock™ FRMDF	191.5	53.6	4.5
0.6 mm Truegrain™ Anthracite	12 mm Flameblock™ FRMDF	177.9	39.7	3.9
0.6 mm Truegrain™ Black Onyx	12 mm Flameblock™ FRMDF	159.7	41.0	4.0

5.3.2 Natural timber veneers

Multiple ISO 9705 room burn tests were conducted on the Flameblock™ FRMDF with different hardwood and softwood species veneers, the results of which are shown in Figure 1 and Figure 2.

Hardwood

As shown in Figure 1, two peaks were observed for both hardwood species. However, the magnitude of the first peak is significantly higher for the Grey Ironbark (~1050 kW) than the American White Oak (< 500 kW). The room lined with Grey Ironbark veneered FRMDF went into flashover in approximately 6 minutes, thereby achieving Group 3. The room lined with the American White Oak veneered FRMDF went into flashover when the burner output was increased to 300 KW at 12 minutes, thereby achieving Group 2.

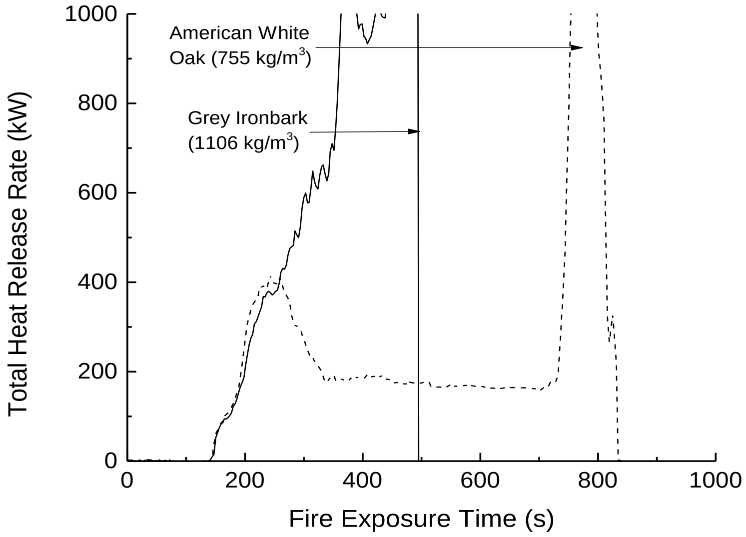

Figure 1 Total heat release rates of hardwood natural timber veneers adhered to the Flameblock™ FRMDF when tested in accordance with AS ISO 9705 – 2003 (R2016)

The thermally thin nature of the Grey Ironbark (1106 kg/m^3) veneer and its higher density resulted in a rapid flame spread and heat release in the first few minutes of the test eventually leading to flashover. Large amounts of highly flammable hydrocarbon volatiles are released in a very short time and therefore become fuel to sustain the fire.

Similar behaviour was not observed for the American White Oak (755 kg/m^3) with the same veneer thickness. The rate of heat release was significantly lower in the first few minutes, which gave enough time for the flame retardants embedded within the FRMDF to activate. The activation of the flame retardants was most likely in the gaseous phase by interfering with the combustion reaction, thus reducing both flame propagation and the amount of heat returned from the fire to the material.

Softwood

The heat release rates of the Hoop Pine (softwood) veneered FRMDF was similar to the American White Oak. However, the magnitude of the first peak was slightly greater for the Hoop Pine, possibly due to the greater porosity. The difference was still not significant enough for the system to achieve flashover in the first 10 minutes of burn time. The product achieved a rating of Group 2.

Based on the above discussion, it can be concluded that all softwood and hardwood veneers up to 750 kg/m^3 will likely achieve Group 2 when tested in accordance with AS 5637.1:2015 and AS ISO 9705 – 2003 (R2016).

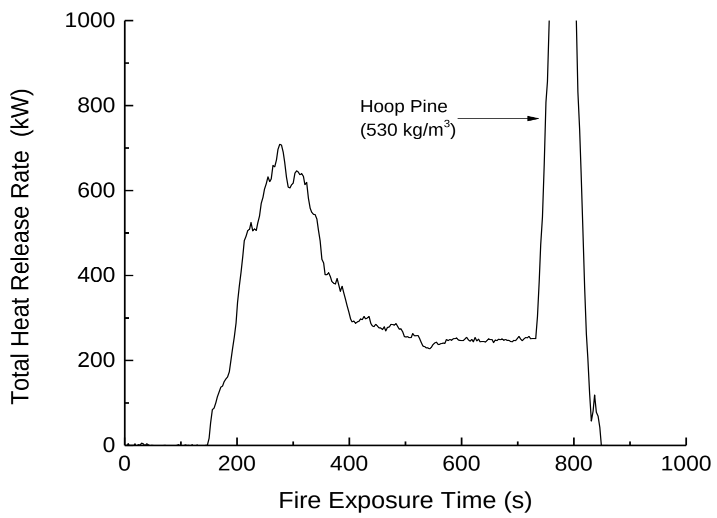

Figure 2 Total heat release rates of softwood (Hoop Pine) veneer adhered to the Flameblock™ FRMDF when tested in accordance with AS ISO 9705 - 2003

5.3.3 TrueGrain™ reconstituted veneers

Reconstituted veneers are made from natural timber veneers which are dyed, laminated and re-sliced. All dyed reconstituted veneers listed in Table 6 are made from Poplar and Ayous and have similar densities (between 380 – 415 kg/m^3). The dye percentage in all reconstituted veneers is confirmed by the sponsor of this report to be less than 1 wt%.

An ISO 9705 room burn test was conducted on the TrueGrain™ Black Onyx veneer adhered to the Flameblock™ FRMDF. This veneer was chosen for its dark colour, thereby making it the worst-case scenario due to its ability to absorb more heat. The density of the veneer was measured to be 380kg/m^3. Cone tests performed on the TrueGrain™ Anthracite (415 kg/m^3) and the TrueGrain™ Black Onyx showed no significant differences in the fire hazard properties - see Table 11.

As shown in Figure 3, the magnitute of the first peak was less than 400 kW. The room did not go into flashover until after the burner output was increased to 300 kW, thereby achieving Group 2. It is therefore expected that all other dyed reconstituted veneers listed in Table 6 will perform similarly under room burn conditions.

The un-dyed reconstituted veneers consist of primarily natural timber (up to 990 kg/m^3) that are laminated and re-sliced. The polymeric content in these veneers is negligible and hence is expected not to detrimentally affect their respective fire hazard properties. It can therefore be concluded that the performance of un-dyed veneers listed in Table 7 are expected to perform similar to the natural timber veneers of the same density.

5.3.4 Tabu/Woodstock/Ecoligna™ dyed veneers

These veneers are made from natural timber which are treated with a dye to improve colour consistency when compared to the undyed veneers. The dye percentage in all reconstituted veneers is confirmed by the sponsor of this report to be less than 1 wt%. It can therefore be concluded that the performance of un-dyed veneers listed in Table 8 are expected to perform similar to the natural timber veneers of the same density.

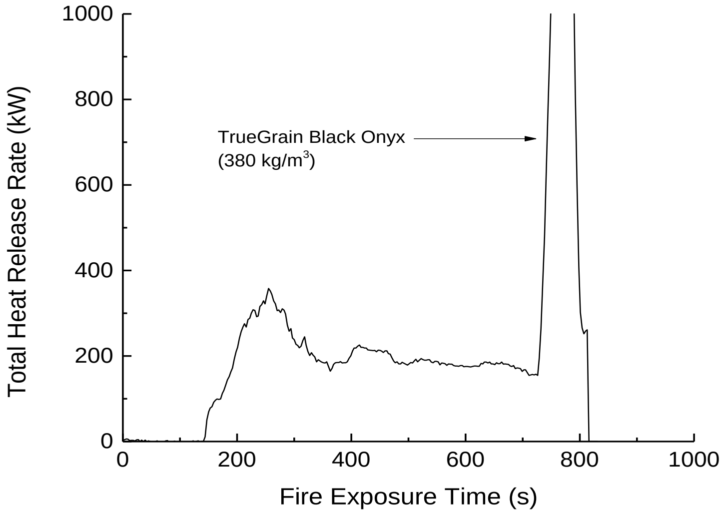

Figure 3 Total heat release rates of TrueGrain™ Black Onyx reconstituted dyed veneer adhered to the Flameblock FRMDF when tested in accordance with AS ISO 9705 – 2003 (R2016)

5.4 Conclusion

Based on the above discussion, it is expected that the raw Flameblock™ FRMDF with a minimum thickness of 12 mm will achieve at least Group 2. All veneer species with a density up to 750 kg/m^3 bonded to a Flameblock™ FRMDF are also likely to achieve Group 2.

6. Validity

Warringtonfire Australia does not endorse the tested or assessed product in any manner. The conclusions of this assessment may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all conditions.

Due to the nature of fire testing and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

This assessment is based on information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are subject to constant review and improvement. It is therefore recommended that this report be reviewed on or, before, the stated expiry date.

This assessment represents our opinion as to the performance likely to be demonstrated on a test in accordance with AS 5637.1:2015, on the basis of the evidence referred to above. We express no opinion as to whether that evidence, and/or this assessment, would be regarded by any building certifier as sufficient for that or any other purpose. This assessment is provided to Briggs Veneers Pty Ltd for its own purposes and we cannot opine on whether it will be accepted by building certifiers or any other third parties for any purpose.

Appendix A Summary of supporting test data

A.1 Test report – RTF 180222.1

Table 12 Information relating to test report

Item	Information relating to test report
Report sponsor	Briggs Veneers Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The test was conducted on 18 December 2018.
Test standards	The test was conducted in accordance with AS 5637.1:2015 and AS ISO 9705 - 2003.
Variation to test standards	None
General description of tested specimen	The ISO 9705 room burn test consisted of walls and ceilings lined with a Hoop Pine (natural timber) veneer bonded to the Flameblock™ FRMDF with PVA glue.
Instrumentation	The test report states that the instrumentation was in accordance with AS ISO 9705 - 2003.

The results achieved by the test specimen is outlined below.

Table 13 Results summary of test report

Group Number	$SMOGRA_{RC}$ (m^2s^{-2} × 1000)	Average Smoke Production Rate (0-10 mins) (m^2s^{-1})
2	4.7	0.77

A.2 Test report – RTF 190022.1

Table 14 Information relating to test report

Item	Information relating to test report
Report sponsor	Briggs Veneers Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The test was conducted on 8 February 2019.
Test standards	The test was conducted in accordance with AS 5637.1:2015 and AS ISO 9705 - 2003.
Variation to test standards	None
General description of tested specimen	The ISO 9705 room burn test consisted of walls and ceilings lined with a Grey Ironbark (natural timber) veneer bonded to the Flameblock™ FRMDF with PVA glue.
Instrumentation	The test report states that the instrumentation was in accordance with AS ISO 9705 - 2003.

The results achieved by the test specimen is outlined below.

Table 15 Results summary of test report

Group Number	$SMOGRA_{RC}$ ($m^2s^{-2} \times 1000$)	Average Smoke Production Rate (0-10 mins) (m^2s^{-1})
3	28.9	1.68

A.3 Test report – RTF 190014.1

Table 16 Information relating to test report

Item	Information relating to test report
Report sponsor	Briggs Veneers Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The test was conducted on 2 April 2019.
Test standards	The test was conducted in accordance with AS 5637.1:2015 and AS ISO 9705 - 2003.
Variation to test standards	None
General description of tested specimen	The ISO 9705 room burn test consisted of walls and ceilings lined with a TrueGrain™ Black Onyx (reconstituted dyed timber) veneer bonded to the Flameblock™ FRMDF with PVA glue.
Instrumentation	The test report states that the instrumentation was in accordance with AS ISO 9705 - 2003.

The results achieved by the test specimen is outlined below.

Table 17 Results summary of test report

Group Number	$SMOGRA_{RC}$ (m^2s^{-2} × 1000)	Average Smoke Production Rate (0-10 mins) (m^2s^{-1})
2	10.3	0.33

A.4 Test report – RTF 190015.1

Table 18 Information relating to test report

Item	Information relating to test report
Report sponsor	Briggs Veneers Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The test was conducted on 3 April 2019.
Test standards	The test was conducted in accordance with AS 5637.1:2015 and AS ISO 9705 - 2003.
Variation to test standards	None
General description of tested specimen	The ISO 9705 room burn test consisted of walls and ceilings lined with a American White Oak (natural timber) veneer bonded to the Flameblock™ FRMDF with PVA glue.
Instrumentation	The test report states that the instrumentation was in accordance with AS ISO 9705 - 2003.

The results achieved by the test specimen is outlined below.

Table 19 Results summary of test report

Group Number	$SMOGRA_{RC}$ ($m^2s^{-2} \times 1000$)	Average Smoke Production Rate (0-10 mins) (m^2s^{-1})
2	5.8	0.28

A.5 Test report – EWFA 2376600a.1

Table 20 Information relating to test report

Item	Information relating to test report
Report sponsor	Briggs Veneers Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The test was conducted on 17 August 2009.
Test standards	The test was conducted in accordance with AS/NZS 3837 - 1998.
Variation to test standards	None
General description of tested specimen	The small-scale cone calorimetry test was conducted on the raw Flameblock™ FRMDF at an incident radiant heat flux of 50 kW/m^2.
Instrumentation	The test report states that the instrumentation was in accordance with AS/NZS 3837 - 1998.

Table 21 Results summary of test report

Property	Mean Value	Units
Irradiance	50	kW/m^2
Exhaust flow rate	24	l/s
Time to ignition	Failed to ignite	s
Peak heat release rate (HRR) after ignition	91.2	kW/m^2
Average HRR at 60s	32.3	kW/m^2
Average HRR at 180s	22.4	kW/m^2
Average HRR at 300s	16.5	kW/m^2
Total heat released	8.1	MJ/m^2
Average effective heat of combustion	1.6	MJ/kg
Mass percentage pyrolyzed	47.7	%
Average mass loss rate	8.4	g/m^2/s

A.6 Test report – EWFA 2376600e.1

Table 22 Information relating to test report

Item	Information relating to test report
Report sponsor	Briggs Veneers Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The test was conducted on 17 August 2009.
Test standards	The test was conducted in accordance with AS/NZS 3837 - 1998.
Variation to test standards	None
General description of tested specimen	The small-scale cone calorimetry test was conducted on a Radiata Pine veneer bonded to the Flameblock™ FRMDF at an incident radiant heat flux of 50 kW/m^2.
Instrumentation	The test report states that the instrumentation was in accordance with AS/NZS 3837 - 1998.

Table 23 Results summary of test report

Property	Mean Value	Units
Irradiance	50	kW/m^2
Exhaust flow rate	24	l/s
Time to ignition	23	s
Peak heat release rate (HRR) after ignition	157	kW/m^2
Average HRR at 60s	96	kW/m^2
Average HRR at 180s	42	kW/m^2
Average HRR at 300s	N/A	kW/m^2
Total heat released	7.8	MJ/m^2
Average effective heat of combustion	4.3	MJ/kg
Mass percentage pyrolyzed	16.4	%
Average mass loss rate	9.5	g/m^2/s

A.7 Test report – EWFA 2376600c.1

Table 24 Information relating to test report

Item	Information relating to test report
Report sponsor	Briggs Veneers Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The test was conducted on 17 August 2009.
Test standards	The test was conducted in accordance with AS/NZS 3837 - 1998.
Variation to test standards	None
General description of tested specimen	The small-scale cone calorimetry test was conducted on a Grey Ironbark veneer bonded to the Flameblock™ FRMDF at an incident radiant heat flux of 50 kW/m^2.
Instrumentation	The test report states that the instrumentation was in accordance with AS/NZS 3837 - 1998.

Table 25 Results summary of test report

Property	Mean Value	Units
Irradiance	50	kW/m^2
Exhaust flow rate	24	l/s
Time to ignition	19	s
Peak heat release rate (HRR) after ignition	191.5	kW/m^2
Average HRR at 60s	109	kW/m^2
Average HRR at 180s	53.6	kW/m^2
Average HRR at 300s	N/A	kW/m^2
Total heat released	10.2	MJ/m^2
Average effective heat of combustion	4.5	MJ/kg
Mass percentage pyrolyzed	19.5	%
Average mass loss rate	10.5	g/m^2/s

A.8 Test report – EWFA 2376600i.1

Table 26 Information relating to test report

Item	Information relating to test report
Report sponsor	Briggs Veneers Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The test was conducted on 17 August 2009.
Test standards	The test was conducted in accordance with AS/NZS 3837 - 1998.
Variation to test standards	None
General description of tested specimen	The small-scale cone calorimetry test was conducted on a TrueGrain™ Anthrecite veneer bonded to the Flameblock™ FRMDF at an incident radiant heat flux of 50 kW/m^2.
Instrumentation	The test report states that the instrumentation was in accordance with AS/NZS 3837 - 1998.

Table 27 Results summary of test report

Property	Mean Value	Units
Irradiance	50	kW/m^2
Exhaust flow rate	24	l/s
Time to ignition	24	s
Peak heat release rate (HRR) after ignition	177.9	kW/m^2
Average HRR at 60s	89.7	kW/m^2
Average HRR at 180s	39.7	kW/m^2
Average HRR at 300s	27.1	kW/m^2
Total heat released	7.3	MJ/m^2
Average effective heat of combustion	3.9	MJ/kg
Mass percentage pyrolyzed	16.8	%
Average mass loss rate	9.5	g/m^2/s

A.9 Test report – EWFA 2376600g.1

Table 28 Information relating to test report

Item	Information relating to test report
Report sponsor	Briggs Veneers Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The test was conducted on 17 August 2009.
Test standards	The test was conducted in accordance with AS/NZS 3837 - 1998.
Variation to test standards	None
General description of tested specimen	The small-scale cone calorimetry test was conducted on a TrueGrain™ Black Onyx veneer bonded to the Flameblock™ FRMDF at an incident radiant heat flux of 50 kW/m^2.
Instrumentation	The test report states that the instrumentation was in accordance with AS/NZS 3837 - 1998.

Table 29 Results summary of test report

Property	Mean Value	Units
Irradiance	50	kW/m^2
Exhaust flow rate	24	l/s
Time to ignition	16	s
Peak heat release rate (HRR) after ignition	159.7	kW/m^2
Average HRR at 60s	83.9	kW/m^2
Average HRR at 180s	41.0	kW/m^2
Average HRR at 300s	N/A	kW/m^2
Total heat released	7.4	MJ/m^2
Average effective heat of combustion	4.0	MJ/kg
Mass percentage pyrolyzed	16.5	%
Average mass loss rate	9.9	g/m^2/s