



**REGULATORY INFORMATION
ASSESSMENT REPORT**

Assessment of solid timber, plywood and veneered board materials used as wall and ceiling lining with respect to the Building Code of Australia Specification C1.10a

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CONTENTS

1	INTRODUCTION	4
2	TESTED PROTOTYPES	5
3	VARIATION TO TESTED PROTOTYPES	6
3.1	Variation to the Thickness of Wall and Ceiling Linings	6
3.2	Inclusion Of Various Joint Profiles In Wall And Ceiling Linings	6
3.3	Increase In The Thickness Of Plywood For Wall And Ceiling Linings	6
3.4	Application Of Tested Timber Species As Plywood	6
3.5	Application Of Various Adhesives To The Construction Of Plywood	6
3.6	Timber Veneers On Mdf And Particle Board Substrates	6
4	REFERENCED TEST PROCEDURES	7
5	FORMAL ASSESSMENT SUMMARY	7
6	DIRECT FIELD OF APPLICATION	9
7	REQUIREMENTS	10
8	VALIDITY	10
9	AUTHORITY	11
9.1	Applicant Undertakings and Conditions of Use	11
9.2	General Conditions of Use	11
9.3	Authorisation on behalf of Exova Warringtonfire Aus Pty Ltd	11
9.4	Date of Issue	11
9.5	Expiry Date	11

1 INTRODUCTION

This report was prepared at the request of the Timber Development Association (TDA) as an assessment of the Fire Hazard performance of various timber species and of various timber thicknesses for use as wall and ceiling linings in accordance with the requirements of specification C1.10a of the Building Code of Australia. This report supersedes 45980.3 issued 14/510.

For the verification of fire hazard properties the Building Code of Australia 2010 (BCA) Specification C1.10a requires testing to ISO 9705 "Fire tests – Full scale room test for surface products" or AS/NZS 3837:1998 "Method of test for heat and smoke release rates for material and products using an oxygen consumption calorimeter". ISO 9705 is commonly referred to as the "ISO room fire test", whilst AS/NZS 3837 is better known as the "Cone calorimeter test".

As an alternative to an ISO 9705 test the BCA permits testing to AS/NZS 3837:1998 "Method of test for heat and smoke release rates for material and products using an oxygen consumption calorimeter" in conjunction with the prediction method outlined in Specification A2.4 of the BCA.

The main outcome from these tests is a material's "Group Number". The materials Group Number is an indication of its 'time to flashover' in the ISO room fire test. The Group Number may be gained directly from testing a material in the above-mentioned ISO room fire test, or alternatively be predicted using data obtained from testing of the material in the cone calorimeter.

This report is not intended to be a comprehensive assessment of all commercially available timbers, moreover it details results obtained for timber species tested at the time of issue of this report. However, should further testing be undertaken this report may be updated to reflect the results of such testing.

The tested systems are described in Section 2 and are subject to the proposed variations described in Section 3 if tested in accordance with the referenced test method described in Section 4. The conclusions of the report are summarised in Section 5.

The validity of this assessment is conditional on compliance with Sections 7, 8 and 9 of this report.

Summaries of the test data on which this assessment is based are provided in the appendices together with a summary of the critical issues and the main points of argument leading to the assessment conclusions.

2 TESTED PROTOTYPES

This assessment report makes reference to the following reports in Table 1 referring to tests in accordance Specification C1.10a of the Building Code of Australia 2006 on various timber species.

Table 1 – Referenced Test Reports on solid Timber

WFRA 499163j	WFRA 499163f	WFRA 499163t	WFRA 499140f
WFRA 499163b	WFRA 499163k	WFRA 499182l	WFRA 499163q
WFRA 499240d	WFRA 499140d	WFRA 499163r	WFRA 499182k
WFRA 499163i	WFRA 499163s	WFRA 499163d	WFRA 499182e
WFRA 499240b	WFRA 499182n	WFRA 499163p	WFRA 499163n
WFRA 499163h	WFRA 499163e	WFRA 499182j	WFRA 499182h
WFRA 499140a	WFRA 499240c	WFRA 499182b	WFRA 499240n
WFRA 499163l	WFRA 499163c	WFRA 499163u	WFRA 499240a
WFRA 499163v	WFRA 499163g	WFRA 499182m	WFRA 499182i
WFRA 499140e	WFRA 499182c	WFRA 499182d	FH4384
WFRA 499182f	WFRA 499140b	WFRA 499163a	FH4385
WFRA 499182g	WFRA 499163o	WFRA 499140c	FH4389
FH4391	FH4392	FH4393	FH494

Table 2 – Referenced Test Reports on Particleboard and MDF

Report	Species	Total Thickness
WFRA 499240g	Medium Density Fibreboard (MDF)	12mm
WFRA 499240k	Particleboard	12mm
WFRA 2146200E	Medium Density Fibreboard (MDF)	12mm
CMIT 02/276	Medium Density Fibreboard (MDF)	12mm
FH4386	Medium Density Fibreboard (MDF) faced with PVA adhesive	6.5
FH4388	Medium Density Fibreboard (MDF) faced with Resorcinol adhesive	6.5

Table 3 – Referenced Test Reports on Veneered Particleboard and MDF

Report	Species	Total Thickness
WFRA 499240H.1	0.6mm Ash, Alpine (<i>Eucalyptus Sieberi</i>) Veneer on each side of 12mm thick MDF	13.5mm
WFRA 499240J.1	0.6mm Box, Brush (<i>Lophostman confertus</i>) Veneer on each side of 12mm thick MDF	13.5mm
WFRA 499240L.1	0.6mm Ash, Alpine (<i>Eucalyptus Sieberi</i>) Veneer on each side 12mm thick Particleboard	13.5mm
WFRA 499240M.1	0.6mm Box, Brush (<i>Lophostman confertus</i>) Veneer on each side of 12mm Particleboard	13.5mm
CMIT 02/276	Tasmanian Oak Veneer on 12mm thick Particleboard	12mm

Each of the tests prefixed WFRA in table 1 consisted of three specimens comprising two sections and included a tongue and groove joint with total specimen size nominally 100mm by 100mm. The specimen thicknesses were nominally 12mm or 19mm and the finish on the timber was smooth milled.

The tests in Table 1 prefixed FH and prefixed WFRA in Table 2 consisted of three specimens comprising one section with total specimen size nominally 100mm by 100mm.

Table 4 – Referenced Test Reports - Plywood

Report	Species	Thickness
WFRA 499240Ej	Lauan - Shorea agsaboensi	3.6mm
WFRA 499240F	Pine, Radiata – Pinus Radiata	7.3mm

Each of the tests in Table 4 each consisted of three specimens comprising one section of total specimen size nominally 100mm by 100mm. The specimen thicknesses were nominally 4mm or 7mm and the finish on the timber was smooth milled.

3 VARIATION TO TESTED PROTOTYPES

3.1 VARIATION TO THE THICKNESS OF WALL AND CEILING LININGS

It is proposed that the timber species referenced in the test reports in Section 2 may be used at a minimum thickness of 9mm for wall and ceiling linings.

3.2 INCLUSION OF VARIOUS JOINT PROFILES IN WALL AND CEILING LININGS

It is proposed that the timber species referenced in the test reports in Section 2 may be used with the following joint profiles:

- V-joint
- Shiplap profile
- Regency
- Or any other profiled lining nominally 9mm thick or greater and incorporating profile features leaving a minimum of 5mm thickness of timber at discrete locations across the lining board.

3.3 INCREASE IN THE THICKNESS OF PLYWOOD FOR WALL AND CEILING LININGS

It is proposed that for plywood tested in the test reports shown in Section 2 may be used at a minimum thickness of nominally 6mm for wall and ceiling linings without limitation of substrate for use as wall and ceiling linings.

3.4 APPLICATION OF TESTED TIMBER SPECIES AS PLYWOOD

It is proposed that for plywood may constructed from the species tested in Section 2 for wall and ceiling linings without limitation of substrate.

3.5 APPLICATION OF VARIOUS ADHESIVES TO THE CONSTRUCTION OF PLYWOOD

In addition to the variations above the proposed wall linings shall be made from plywood constructed from the species tested in Table 1 using the same methods and the adhesives listed below.

- PVA
- Resorcinol
- PU

3.6 TIMBER VENEERS ON MDF AND PARTICLE BOARD SUBSTRATES

It is proposed that timber veneers 0.5mm to 0.85mm thickness and density greater than 500kg/m³ may applied to each side of Particleboard substrates having a dry density of nominally 700kg/m³ and MDF having a dry density of 560kg/m³ to 740kg/m³ without detrimentally effecting the “group number” or “Average Specific Extinction Area” with respect to the referenced test procedures in Section 4.

Table 4 - Summary of Proposed Veneered Board Construction

Substrate	
Material	Particleboard (Dry Density nominally 700kg/m ³) MDF (Dry Density 560g/m ³ to 740g/m ³)
Thickness	6mm (Nominal)
Veneer	
Material	Unmodified untreated timber or CCA Treated Radiata Pine
Thickness	0.6mm (Nominal)
Dry Density	Greater than 500kg/m ³ OR an assessed species
Adhesive Material	PVA and Resorcinol
Position of Veneers	A timber veneer shall be applied to each face, though does not have to be of the same species on each side

4 REFERENCED TEST PROCEDURES

Reference was made to Specification C1.10a which requires the calculation of “Group Number” and “Average Extinction Area” to be calculated using Clause 3 of Specification A2.4 from data obtained by testing the material at 50 kW/m² irradiance in the horizontal orientation with an edge frame in accordance with AS/NZS 3837:1998 – *Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter*.

5 FORMAL ASSESSMENT SUMMARY

On the basis of the discussion presented in this report it is the considered opinion of this test authority that if the tested specimens described in Section 2 had been configured as described in Section 3 they would achieve the performance stated below if tested in accordance with the test method referenced in Section 4, subject to the requirements in section 7

Table 5 – List of Assessed Species

Tested Species
Ash, Alpine - Eucalyptus delegatensis
Ash, Mountain – Eucalyptus regnans
Ash, Silvertop - Eucalyptus sieberi
Beech Myrtle - Northofagus cunnighamii
Blackbutt - Eucalyptus pilularis
Blackbutt, New England - Eucalyptus andrewsii
Blackbutt, WA - Eucalyptus pantens
Blackwood - Acacia melanoxylon
Bloodwood Red - Corymbia gummifera
Box, Brush - Lopehostman confertus
Box, Grey – Eucalyptus microcarpa
Box, Grey, Coast – Eucalyptus bosistoana
Brownbarrel - Eucalyptus fastigata

Tested Species
Gum, Blue, Sydney - Eucalyptus saligna
Gum, Blue, Southern (TAS) - Eucalyptus globulus
Gum, Blue, Southern (VIC) - Eucalyptus globulus
Gum, Manna - Eucalyptus viminalis
Gum, Red, River - Eucalyptus camaldulensis
Gum, Rose – Eucalyptus grandis
Gum, Shining – Eucalyptus nitens
Gum, Spotted - Corymbia maculata
Gum, Sugar - Eucalyptus Cladocalyx
Gum, Yellow - Eucalyptus leucoxylo
Ironbark, Grey – Eucalyptus drepanophylla
Ironbark, Red - Eucalyptus sideroxylo
Jarrah - Eucalyptus marginata
Karri - Eucalyptus diversicolor
Mahogany, Red - Eucalyptus resinifera
Marri - Eucalyptus callophylla
Merbau - Instia bijuga
Messmate - Eucalyptus oblique
Oak, American - Quercus Abla
Pine, Baltic - Picea abies
Pine, Hoop - Araucaria cunninghamii
Pine, Radiata – Pinus Radiata
Pine, Radiata – Pinus Radiata (CCA Treated)
Pine, White Cypress - Callitris glaucophylla
Rosewood, Papua New Guinea - Pterocarpus indicus
Sheoak, WA - Allocosuarina fraseriana
Stringy Bark, Yellow - Eucalyptus muellerana
Teak, Burmese – Tectona grandis *
Tallowood - Eucalyptus microcorys
Turpentine – Syncarpa glomulifera
Walnut, Black (American Walnut) - Juglans nigra
Wattle, Silver – Acacia dealbata
Western Red Cedar – Thuja plicata

Table 6 - Application to Solid Timber Linings

Species	Thickness	Joint Profile	Group Number	Average Specific Extinction Area (m ² /kg)
As listed in Table 5	9mm or Greater	Any profiled lining nominally 9mm thick or greater and incorporating profile features leaving a minimum of 5mm thickness of timber at discrete locations across the lining board.	3	<250*

* Average Specific Extinction Area (m²/kg) = 280 (m²/kg) for Burmese Teak

Table 7 - Application to Plywood Linings

Species	Thickness	Plywood Adhesive	Group Number	Average Specific Extinction Area (m ² /kg)
As listed in Table 5	6mm or Greater	<ul style="list-style-type: none"> • PVA • Resorcinol • PU 	3	<250*

* Average Specific Extinction Area (m²/kg) = 280 (m²/kg) for Burmese Teak

Table 8 - Application to Veneered Board Linings

Lining Construction		Performance	
		Group No.	Average Specific Extinction Area (m ² /kg)
Substrate			
Material	Particleboard (Dry Density nominally 700kg/m ³) MDF (Dry Density 560kg/m ³ to 740kg/m ³)	3	<250
Thickness	6mm (Nominal)		
Veneer			
Material	Unmodified untreated timber or CCA Treated Radiata Pine		
Thickness	0.6mm to 0.85mm (Nominal)		
Dry Density	> 500kg/m ³ OR a species listed in Table 5		
Adhesive Material	PVA and Resorcinol		
Position of Veneers	A timber veneer shall be applied to each face, though does not have to be of the same species on each side		

6 DIRECT FIELD OF APPLICATION

This assessment applies to wall and ceiling linings of buildings that are required to have Fire Hazard Properties in accordance with BCA Specification C1.10a.

7 REQUIREMENTS

This report details the methods of construction, test conditions and assessed results that would be expected had the specific elements of construction described herein been tested in accordance with AS/NZS3837 -1998

Any further variations with respect to size, constructional details, edge or end conditions, other than those identified in this report, may invalidate the conclusions drawn in this report.

8 VALIDITY

This assessment report does not provide an endorsement by Exova Warringtonfire Aus Pty Ltd of the actual products supplied.

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.

Because of 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.

The assessment can therefore only relate to the actual prototype test specimens, testing conditions, and methodology described in the supporting data, and does not imply any performance abilities of constructions of subsequent manufacture.

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 the subject of constant review and improvement and it is recommended that this report be reviewed on, or before, the stated expiry date.

The information contained in this report shall not be used for the assessment of variations other than those stated in the conclusions above. The assessment is valid provided no modifications are made to the systems detailed in this report. All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.

9 AUTHORITY

9.1 APPLICANT UNDERTAKINGS AND CONDITIONS OF USE

By using this report as evidence of compliance or performance the applicant(s) confirms that:

- to their knowledge the component or element of structure, which is the subject of this assessment, has not been subjected to a fire test to the Standard against which this assessment is being made, and
- they agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test by a test authority in accordance with the Standard against which this assessment is being made and the results are not in agreement with this assessment, and
- they are not aware of any information that could adversely affect the conclusions of this assessment and if they subsequently become aware of any such information, agree to ask the assessing authority to withdraw the assessment.

9.2 GENERAL CONDITIONS OF USE

This report may only be reproduced in full without modifications by the report sponsor. Copies, extracts or abridgments of this report in any form shall not be published by other organisations or individuals without the permission of Exova Warringtonfire Aus Pty Ltd.

9.3 AUTHORISATION ON BEHALF OF EXOVA WARRINGTONFIRE AUS PTY LTD

Prepared by:

Reviewed by:



K. G. Nicholls



Steve Kettle

9.4 DATE OF ISSUE

7th July 2010

9.5 EXPIRY DATE

30th April 2015