

ASSESSMENT OF SOLID TIMBER,  
PLYWOOD AND TIMBER VENEERS ON  
MDF AND PARTICLEBOARD FOR USE AS  
WALL AND CEILING LINING WITH  
RESPECT TO THE BUILDING CODE OF  
AUSTRALIA SPECIFICATION C1.10a

**Report Sponsor**

Timber Development Association  
Level 2, 60 York Street  
Sydney 2010

*Regulatory Information Report*

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## CONTENTS

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<b>1</b>	<b>INTRODUCTION</b>	<b>4</b>
<b>2</b>	<b>TESTED PROTOTYPES</b>	<b>5</b>
<b>3</b>	<b>VARIATION FROM TESTED PROTOTYPES</b>	<b>6</b>
	3.1 Variation to the Thickness of Wall and Ceiling Linings	6
	3.2 Inclusion of Grooves 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 Tested Timber Species As Veneers	6
<b>4</b>	<b>REFERENCED TEST PROCEDURES</b>	<b>7</b>
<b>5</b>	<b>FORMAL ASSESSMENT SUMMARY</b>	<b>7</b>
<b>6</b>	<b>DIRECT FIELD OF APPLICATION</b>	<b>11</b>
<b>7</b>	<b>REQUIREMENTS</b>	<b>11</b>
<b>8</b>	<b>VALIDITY</b>	<b>12</b>
<b>9</b>	<b>AUTHORITY</b>	<b>12</b>
	9.1 Applicant Undertakings And Conditions Of Use	12
	9.2 General Conditions Of Use	13
	9.3 Authorisation On Behalf Of Warrington Fire Research (Aust) Pty Ltd	13
	9.4 Date Of Issue	13
	9.5 Expiry Date	13

## DOCUMENT REVISION STATUS

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Date Issued	Issue No	Description
29/09/06	RIR 45780.1	Initial Issue

# 1 INTRODUCTION

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This report provides a summary of the assessment reports WFRA 45980.1, WFRA 45981.1 and WFRA 45982.1.

This Regulatory Information Report was prepared at the request of the Timber Development Association (TDA) as an assessment of the Fire Hazard performance of solid timber, plywood and timber veneers on MDF and Particleboard substrates for use as wall and ceiling linings in accordance with the requirements of specification C1.10a of the Building Code of Australia.

For the verification of fire hazard properties the Building Code of Australia 2006 (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 timber, plywood or veneered substrates, moreover it details results obtained for the veneers and substrates of the timber species tested. 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.

## 2 TESTED PROTOTYPES

This assessment report makes reference to the following reports in Table 1 and 2 referring to tests in accordance Specification C1.10a of the Building Code of Australia 2006 on various solid and plywood timber.

**Table 1 – Referenced Test Reports 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	
WFRA 499182f	WFRA 499140b	WFRA 499163a	
WFRA 499182g	WFRA 499163o	WFRA 499140c	

Each of the tests 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.

**Table 2 – Referenced Test Reports on Particleboard and MDF**

Report	Species	Total Thickness
WFRA 499240g	Medium Density Fibreboard (MDF)	12mm
WFRA 499240k	Particleboard	12mm

**Table 3 – Referenced Test Reports on Veneered Particleboard and MDF**

Report	Species	Total Thickness
WFRA 499240H.1	0.6mm Ash, Silvertop ( <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, Silvertop ( <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 thick Particleboard	13.5mm

Each of the tests in Table 2 and 3 consisted of three specimens comprising one section of nominal size 100mm by 100mm. The specimen finish on the timber was smooth milled or pressed.

The referenced reports were issued by Warrington Fire Research Pty Ltd and sponsored by Timber Development Association, who has granted permission for reference of the test data in this report.

For significant behaviour during the tests refer to the full referenced test report(s).

### **3 VARIATION FROM TESTED PROTOTYPES**

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#### **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 12mm for wall and ceiling linings.

#### **3.2 INCLUSION OF GROOVES IN WALL AND CEILING LININGS**

It is proposed that for the timber species referenced in the test reports in Section 2 may be used with 12mm wide x 6mm deep “v grooves for use as wall and ceiling linings.

#### **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 table 2 of 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 Table 1 of Section 2 using the same methods and adhesives as those tested in the tested in Table 2 of Section 2. In addition they may be used at a minimum thickness of nominally 6mm for wall and ceiling linings without limitation of substrate.

#### **3.5 APPLICATION OF TESTED TIMBER SPECIES AS VENEERS**

It is proposed that the timber species tested in Table 1 of Section 2 may be used as a 0.6mm veneer applied to each side of 12mm MDF or 12mm Particleboard as tested in WFRA 499240H and WFRA 499240L for use as wall and ceiling linings.

## 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/m<sup>2</sup> 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 4 – Assessment Summary for Solid Timber**

Species	Minimum Thickness (mm)	Group No.	Average Specific Extinction Area (m <sup>2</sup> /kg)
Ash, Alpine - <i>Eucalyptus delegatensis</i>	12	3	<250
Ash, Mountain – <i>Eucalyptus regnans</i>	12	3	<250
Ash, Silvertop - <i>Eucalyptus sieberi</i>	12	3	<250
Beech Myrtle - <i>Northofagus cunninghamii</i>	12	3	<250
Blackbutt - <i>Eucalyptus pilularis</i>	12	3	<250
Blackbutt, New England - <i>Eucalyptus andrewsii</i>	12	3	<250
Blackbutt, WA - <i>Eucalyptus pantens</i>	12	3	<250
Blackwood - <i>Acacia melanoxylon</i>	12	3	<250
Bloodwood Red - <i>Corymbia gummifera</i>	12	3	<250
Box, Brush - <i>Lophostman confertus</i>	12	3	<250
Box, Grey – <i>Eucalyptus microcarpa</i>	12	3	<250
Box, Grey, Coast – <i>Eucalyptus bosistoana</i>	12	3	<250
Brownbarrel - <i>Eucalyptus fastigata</i>	12	3	<250
Gum, Blue, Sydney - <i>Eucalyptus saligna</i>	12	3	<250

**Table 4 – Assessment Summary for Solid Timber Continued....**

Species	Minimum Thickness (mm)	Group No.	Average Specific Extinction Area (m <sup>2</sup> /kg)
Gum, Blue, Southern (TAS) - Eucalyptus globulus	12	3	<250
Gum, Blue, Southern (VIC) - Eucalyptus globulus	12	3	<250
Gum, Manna - Eucalyptus viminalis	12	3	<250
Gum, Red, River - Eucalyptus camaldulensis	12	3	<250
Gum, Rose – Eucalyptus grandis	12	3	<250
Gum, Shining – Eucalyptus nitens	12	3	<250
Gum, Spotted - Corymbia maculata	12	3	<250
Gum, Sugar - Eucalyptus Cladocalyx	12	3	<250
Gum, Yellow - Eucalyptus leucoxyton	12	3	<250
Ironbark, Grey – Eucalyptus drepanophylla	12	3	<250
Ironbark, Red - Eucalyptus sideroxyton	12	3	<250
Jarraah - Eucalyptus marginata	12	3	<250
Karri - Eucalyptus diversicolor	12	3	<250
Mahogany, Red - Eucalyptus resinifera	12	3	<250
Marri - Eucalyptus callophylla	12	3	<250
Merbau - Instia bijuga	12	3	<250
Messmate - Eucalyptus oblique	12	3	<250
Pine, Baltic - Picea abies	12	3	<250
Pine, Hoop - Araucaria cunninghamii	12	3	<250
Pine, Radiata – Pinus Radiata	12	3	<250
Pine, White Cypress - Callitris glaucophylla	12	3	<250
Sheoak, WA - Allocosuarina fraseriana	12	3	<250
Stringy Bark, Yellow - Eucalyptus muellerana	12	3	<250
Tallowood - Eucalyptus microcorys	12	3	<250
Turpentine – Syncarpa glomulifera	12	3	<250
Wattle, Silver – Acacia dealbata	12	3	<250



**Table 5 –Summary of Assessment for Plywood**

Plywood Species	Minimum Thickness (mm)	Group No.	Average Specific Extinction Area (m <sup>2</sup> /kg)
Pine, Radiata – <i>Pinus Radiata</i>	6mm or Greater	3	<250
Lauan - <i>Shorea agsaboensis</i>	6mm or Greater	3	<250

**Table 6 – Summary of Assessment for Solid Timber Veneers**

Veneer Species	Veneer Thickness each side	Substrate	Group No.	Average Specific Extinction Area (m <sup>2</sup> /kg)
Ash, Alpine - <i>Eucalyptus delegatensis</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Ash, Mountain – <i>Eucalyptus regnans</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Ash, Silvertop - <i>Eucalyptus sieberi</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Beech Myrtle - <i>Northofagus cunninghamii</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Blackbutt - <i>Eucalyptus pilularis</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Blackbutt, New England - <i>Eucalyptus andrewsii</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Blackbutt, WA - <i>Eucalyptus pantens</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Blackwood - <i>Acacia melanoxylon</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Bloodwood Red - <i>Corymbia gummifera</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Box, Brush - <i>Lophostman confertus</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Box, Grey – <i>Eucalyptus microcarpa</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Box, Grey, Coast – <i>Eucalyptus bosistoana</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Brownbarrel - <i>Eucalyptus fastigata</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Gum, Blue, Sydney - <i>Eucalyptus saligna</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Gum, Blue, Southern (TAS) - <i>Eucalyptus globulus</i>	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250

**Notes** (1) Untreated MDF of Density Greater than 560kg/m<sup>3</sup>

(2) Untreated Particleboard of Density Greater than 700kg/m<sup>3</sup>

**Table 6– Summary of Assessment for Solid Timber Veneers Continued....**

Veneer Species	Veneer Thickness each side	Substrate	Group No.	Average Specific Extinction Area (m <sup>2</sup> /kg)
Gum, Blue, Southern (VIC) - Eucalyptus globulus	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Gum, Red, River - Eucalyptus camaldulensis	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Gum, Rose – Eucalyptus grandis	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Gum, Shining – Eucalyptus nitens	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Gum, Spotted - Corymbia maculata	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Gum, Sugar - Eucalyptus Cladocalyx	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Gum, Yellow - Eucalyptus leucoxylon	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Ironbark, Grey – Eucalyptus drepanophylla	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Ironbark, Red - Eucalyptus sideroxylon	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Jarrah - Eucalyptus marginata	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Karri - Eucalyptus diversicolor	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Mahogany, Red - Eucalyptus resinifera	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Marri - Eucalyptus callophylla	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Merbau - Instia bijuga	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Messmate - Eucalyptus oblique	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Pine, Baltic - Picea abies	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Pine, Hoop - Araucaria cunninghamii	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Pine, Radiata – Pinus Radiata	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Pine, White Cypress - Callitris glaucophylla	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250

**Notes** (1) Untreated MDF of Density Greater than 560kg/m<sup>3</sup>

(2) Untreated Particleboard of Density Greater than 700kg/m<sup>3</sup>

**Table 6– Summary of Assessment for Solid Timber Veneers Continued....**

Veneer Species	Veneer Thickness each side	Substrate	Group No.	Average Specific Extinction Area (m <sup>2</sup> /kg)
Sheoak, WA - Allocosuarina fraseriana	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Stringy Bark, Yellow - Eucalyptus muellerana	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Tallowwood - Eucalyptus microcorys	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Turpentine – Syncarpa glomulifera	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250
Wattle, Silver – Acacia dealbata	0.6mm	12mm MDF <sup>(1)</sup> or Particleboard <sup>(2)</sup>	3	<250

**Notes** (1) Untreated MDF of Density Greater than 560kg/m<sup>3</sup>

(2) Untreated Particleboard of Density Greater than 700kg/m<sup>3</sup>

## 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 have been expected had the specific elements of construction described herein been tested in accordance with AS/NZS3837 -1998.

The construction of the plywood may vary in the number of veneers used in the make-up however the manufacturing process and adhesives used shall be as for the tested plywood specimens.

The type and coverage of adhesives used for adhesion of the veneers shall be as for the specimens tested in WFRA 499240H and WFRA 499240L.

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

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This assessment report does not provide an endorsement by Warrington Fire Research (Aust) 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 only 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

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### 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 without the permission of Warrington Fire Research.

## 9.3 AUTHORISATION ON BEHALF OF WARRINGTON FIRE RESEARCH (AUST) PTY LTD

Prepared by:

Reviewed by:



K Nicholls



Vivek Apte

## 9.4 DATE OF ISSUE

29th September 2006

## 9.5 EXPIRY DATE

31st September 2011