



REGULATORY INFORMATION REPORT

ASSESSMENT OF THE CRITICAL RADIANT FLUX (CRF)
PERFORMANCE OF SOLID TIMBER (MINIMUM
THICKNESS 12MM) AND PLYWOOD (MINIMUM
THICKNESS 15MM) WHEN TESTED IN ACCORDANCE
WITH AS/ISO 9239.1-2003

EWFA Report No:

RIR 21419-05

Report Sponsor

Forest and Wood Products Australia Limited
Level 11, 10-16 Queen Street,
Melbourne VIC 3000

DOCUMENT REVISION STATUS

Date Issued	Issue No	Description
15/6/07	RIR 21419-00	Initial Issue
18/9/07	RIR 21419-01	Typographical amendment and inclusion of 17mm plywood data
21/12/15	RIR 21419-02	Revised to change the details of report sponsor
24/08/16	RIR 21419-03	Typographical amendment
19/06/18	RIR 21419-04	Revised to extend validity for further 5 years
02/07/18	RIR 21419-05	Typographical amendment

CONTACT INFORMATION

Exova Warringtonfire Aus Pty Ltd - ABN 81 050 241 524

NATA Registered Laboratory

Unit 2, 409-411 Hammond Road
Dandenong Victoria 3175
Australia

T: +61 (0)3 9767 1000
F: +61 (0)3 9767 1001

New South Wales

Suite 802, Level 8
383 Kent Street
Sydney NSW 2000
Australia

T: +61 (0)2 9211 4333

Perth

Unit 22
22 Railway Road
Subiaco WA 6008
Australia

T: +61 (0)8 9382 3844

Victoria

Unit 2, 409-411 Hammond Road
Dandenong Victoria 3175
Australia

T: +61 (0)3 9767 1000
F: +61 (0)3 9767 1001

Queensland

T6. L12
133 Mary Street
Brisbane QLD 4000
Australia

T: +61 (0)7 3238 1700
F: +61 (0)7 3211 4833

Canberra

2/11 Murray Cres
Griffith ACT 2603
Australia

T: +61 (0)2 6260 8488

CONTENTS

1	INTRODUCTION	4
2	TESTED PROTOTYPES	4
3	VARIATION FROM TESTED PROTOTYPES	5
	3.1 Timber Flooring 12mm or Thicker (No Substrate)	5
	3.2 Plywood Flooring 15mm or Thicker (No Substrate)	5
	3.3 Timber Flooring 12mm or Thicker on A Substrate	5
	3.4 Plywood Flooring 15mm or Thicker on A Substrate	5
4	REFERENCED TEST PROCEDURES	5
5	FORMAL ASSESSMENT SUMMARY	6
	5.1 Timber Flooring 12mm or Thicker (No Substrate)	6
	5.2 Timber Flooring 12mm or Thicker (No Substrate)	7
	5.3 Timber Flooring 12mm or Thicker on A Substrate	8
	5.4 Plywood Flooring 15mm or Thicker (No Substrate)	9
	5.5 Plywood Flooring 15mm or Thicker on A Substrate	10
6	DIRECT FIELD OF APPLICATION	11
7	REQUIREMENTS	11
8	VALIDITY	11
9	AUTHORITY	12
	9.1 Applicant Undertakings And Conditions Of Use	12
	9.2 General Conditions Of Use	12
	9.3 Authorisation On Behalf Of Exova Warringtonfire Aus Pty Ltd	12
	9.4 Date Of Issue	12
	9.5 Expiry Date	12

1 INTRODUCTION

This Report contains the minimum information required to demonstrate compliance with the Building Code of Australia NCC 2016 Volume One.

The Referenced Assessment Report was prepared at the request of Forest and Wood Products Australia Limited (FWPA) as an assessment of the Fire Hazard performance of solid timber and plywood for use as flooring with respect to the requirements of Specification C1.10 of the National Construction Code 2016 Volume One, Building Code of Australia, Class 2 to Class 9 Buildings (NCC).

Specification C1.10 requires testing to AS/ISO 9239.1-2003 – “Reaction to Fire Tests for Floors Part 1: Determination of the Burning Behaviour Using a Radiant Heat Source”.

The main outcome from these tests is a material’s Critical Radiant Heat Flux (CRF). The test measures the radiant energy required to just sustain burning. The test involves the specimen being held horizontally under the influence of a radiant heat source at one end. When ignited the burning progresses along the specimen away from the radiant source until it stops. The radiant heat flux at the point at which burning ceases is the Critical Radiant Heat Flux.

The amount of smoke evolved is also determined using a light extinction smoke meter mounted in the flue, not that dissimilar to the existing unit on the AS/NZS 1530.3 apparatus.

The tested systems considered in this report 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 the referenced assessment is conditional on compliance with Sections 7, 8 and 9 of this report.

Summaries of the test data on which the referenced assessment is based on 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

The Referenced Assessment Report makes reference to the following reports in Table 1 and 2 referring to tests in accordance with the requirements of the general provisions A1.1 and the Specification C1.10 of the NCC on various solid and plywood timber. The test reports were sponsored by the Forest and Wood Products Australia Limited (FWPA) and undertaken by Warrington Fire Research Australia.

The Referenced Assessment Report makes reference to the latest version of reports WFRA 41117, WFRA 499241 A-K, 2141900 A-D and 2200000A-B. The referenced reports were prepared by Warrington Fire Research Pty Ltd and sponsored by Forest and Wood Products Australia Limited (FWPA).

3 VARIATION FROM TESTED PROTOTYPES

3.1 TIMBER FLOORING 12MM OR THICKER (NO SUBSTRATE)

The proposed construction is for the timber species as tested in the referenced test reports, to be 12mm thick or thicker and fixed to structural framing (e.g. floor joists) and achieve a CRF of 2.2kW/m² and Smoke Development Rate of less than 750% Minutes.

3.2 PLYWOOD FLOORING 15MM OR THICKER (NO SUBSTRATE)

The proposed construction is for the timber plywood species as tested in the referenced test reports, to be 15mm thick or thicker fixed to structural framing (e.g. floor joists) and achieve a CRF of 2.2kW/m² and Smoke Development Rate of less than 750% Minutes.

3.3 TIMBER FLOORING 12MM OR THICKER ON A SUBSTRATE

The proposed construction is for the timber species as tested in the referenced test reports, to be 12mm thick or thicker fixed or laminated to a substrate in Table 3.1 with PVA, or other water-based adhesives and no air gap between flooring and substrate and achieve a CRF of 2.2kW/m² and Smoke Development Rate of less than 750% Minutes.

3.4 PLYWOOD FLOORING 15MM OR THICKER ON A SUBSTRATE

The proposed construction is for the timber plywood species as tested in the referenced test reports, to be 15mm thick or thicker fixed or laminated to a substrate in Table 3.1 with PVA, or other water-based adhesives and no air gap between flooring and substrate and achieve a CRF of 2.2kW/m² and Smoke Development Rate of less than 750% Minutes.

Table 3.1 Proposed Flooring Substrates

Substrate	Thickness (mm)
Particleboard 716kg/m ³	19mm or greater
Fibre cement	15mm or greater
Normal Weight Concrete floor	75mm or greater
Light weight concrete floor	75mm or greater

4 REFERENCED TEST PROCEDURES

Reference was made to Specification C1.10 which requires the Critical Radiant Heat Flux (CRF) and the smoke development rate to be tested in accordance with AS/ISO 9239.1-2003.

5 FORMAL ASSESSMENT SUMMARY

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

5.1 TIMBER FLOORING 12MM OR THICKER (NO SUBSTRATE)

Table 5.1- Performance of Timber Flooring Species

Flooring Species	Thickness (mm)	Performance	
		CRF (kW/m ²)	Smoke Develop. Rate (%- Mins)
Ash, Alpine - <i>Eucalyptus delegatensis</i>	12mm or greater	Greater than or equal to 1.2 and less than 4.5	<750
Ash, Mountain – <i>Eucalyptus regnans</i>			
Ash, Silvertop - <i>Eucalyptus sieberi</i>			
Beech Myrtle - <i>Northofagus cunninghamii</i>			
Blackbutt - <i>Eucalyptus pilularis</i>			
Blackbutt, New England - <i>Eucalyptus andrewsii</i>			
Bloodwood Red - <i>Eucalyptus gummifera</i>			
Box, Brush - <i>Lophostman confertus</i>			
Box, Grey – <i>Eucalyptus microcarpa</i>			
Brownbarrel - <i>Eucalyptus fastigata</i>			
Gum, Blue, Southern (TAS) - <i>Eucalyptus globulus</i>			
Gum, Blue, Southern (VIC) - <i>Eucalyptus globulus</i>			
Gum, Blue, Sydney - <i>Eucalyptus saligna</i>			
Gum, Manna - <i>Eucalyptus viminalis</i>			
Gum, Red, River - <i>Eucalyptus camaldulensis</i>			
Gum, Rose – <i>Eucalyptus grandis</i>			
Gum, Shining – <i>Eucalyptus nitens</i>			
Gum, Spotted - <i>Corymbia maculata</i>			
Gum, Sugar - <i>Eucalyptus cladocalyx</i>			
Gum, Yellow - <i>Eucalyptus leucoxydon</i>			
Ironbark, Grey – <i>Eucalyptus drepanophylla</i>			
Ironbark, Red - <i>Eucalyptus sideroxydon</i>			
Jarraah - <i>Eucalyptus marginata</i>			
Karri - <i>Eucalyptus diversicolor</i>			
Mahogany, Red - <i>Eucalyptus resinifera</i>			
Merbau - <i>Instia bijuga</i>			
Messmate - <i>Eucalyptus obliqua</i>			
Pine, White Cypress - <i>Callitris glaucophylla</i>			
Stringy Bark, Yellow - <i>Eucalyptus muellerana</i>			
Tallowwood - <i>Eucalyptus microcorys</i>			
Turpentine – <i>Syncarpa glomulifera</i>			
Wattle, Silver – <i>Acacia dealbata</i>			

5.2 TIMBER FLOORING 12MM OR THICKER (NO SUBSTRATE)

Table 5.2- Performance of Flooring Species

Flooring Species	Thickness (mm)	Performance	
		CRF (kW/m ²)	Smoke Develop. Rate (%-Mins)
Beech Myrtle - <i>Northofagus cunninghamii</i>	12mm or greater	Greater than or equal to 4.5	<750
Blackbutt, New England - <i>Eucalyptus andrewsii</i>			
Bloodwood Red - <i>Eucalyptus gummifera</i>			
Box, Brush - <i>Lophostman confertus</i>			
Box, Grey – <i>Eucalyptus microcarpa</i>			
Gum, Blue, Southern (TAS) - <i>Eucalyptus globulus</i>			
Gum, Blue, Southern (VIC) - <i>Eucalyptus globulus</i>			
Gum, Blue, Sydney- <i>Eucalyptus Saligna</i>			
Gum, Red, River - <i>Eucalyptus camaldulensis</i>			
Gum, Spotted - <i>Corymbia maculata</i>			
Gum, Sugar - <i>Eucalyptus cladocalyx</i>			
Gum, Yellow - <i>Eucalyptus leucoxyton</i>			
Ironbark, Grey – <i>Eucalyptus drepanophylla</i>			
Ironbark, Red - <i>Eucalyptus sideroxyton</i>			
Jarraah - <i>Eucalyptus marginata</i>			
Karri - <i>Eucalyptus diversicolor</i>			
Mahogany, Red - <i>Eucalyptus resinifera</i>			
Merbau - <i>Instia bijuga</i>			
Pine, White Cypress - <i>Callitris glaucophylla</i>			
Stringy Bark, Yellow- <i>Eucalyptus muellerana</i>			
Tallowwood - <i>Eucalyptus microcorys</i>			
Turpentine – <i>Syncarpa glomulifera</i>			
Wattle, Silver – <i>Acacia dealbata</i>			

5.3 TIMBER FLOORING 12MM OR THICKER ON A SUBSTRATE

Table 5.3 Proposed Flooring Substrates

Substrate	Thickness (mm)
Particleboard 716 kg/m ³	19 mm or greater
Fibre Cement	15 mm or greater
Normal Weight Concrete Floor	75 mm or greater
Light Weight Concrete Floor	75 mm or greater

Table 5.4 Timber Flooring Options for Proposed Substrate

Flooring Species	Thickness (mm)	Performance	
		CRF (kW/m ²)	Smoke Develop. Rate (%-Mins)
Ash, Alpine - <i>Eucalyptus delegatensis</i>	12mm or greater	Greater than or equal to 1.2 and less than 4.5	<750
Ash, Mountain – <i>Eucalyptus regnans</i>			
Ash, Silvertop - <i>Eucalyptus sieberi</i>			
Beech Myrtle - <i>Northofagus cunninghamii</i>			
Blackbutt - <i>Eucalyptus pilularis</i>			
Blackbutt, New England - <i>Eucalyptus andrewsii</i>			
Bloodwood Red - <i>Eucalyptus gummifera</i>			
Box, Brush - <i>Lophostman confertus</i>			
Box, Grey – <i>Eucalyptus microcarpa</i>			
Brownbarrel - <i>Eucalyptus fastigata</i>			
Gum, Blue, Southern (TAS) - <i>Eucalyptus globulus</i>			
Gum, Blue, Southern (VIC) - <i>Eucalyptus globulus</i>			
Gum, Blue, Sydney - <i>Eucalyptus saligna</i>			
Gum, Manna - <i>Eucalyptus viminalis</i>			
Gum, Red, River - <i>Eucalyptus camaldulensis</i>			
Gum, Rose – <i>Eucalyptus grandis</i>			
Gum, Shining – <i>Eucalyptus nitens</i>			
Gum, Spotted - <i>Corymbia maculata</i>			
Gum, Sugar - <i>Eucalyptus cladocalyx</i>			
Gum, Yellow - <i>Eucalyptus leucoxyton</i>			
Ironbark, Grey – <i>Eucalyptus drepanophylla</i>			
Ironbark, Red - <i>Eucalyptus sideroxyton</i>			
Jarraah - <i>Eucalyptus marginata</i>			
Karri - <i>Eucalyptus diversicolor</i>			
Mahogany, Red - <i>Eucalyptus resinifera</i>			
Merbau - <i>Instia bijuga</i>			
Messmate - <i>Eucalyptus obliqua</i>			
Pine, White Cypress - <i>Callitris glaucophylla</i>			
Stringy Bark, Yellow - <i>Eucalyptus muellerana</i>			
Tallowwood - <i>Eucalyptus microcorys</i>			
Turpentine – <i>Syncarpa glomulifera</i>			
Wattle, Silver – <i>Acacia dealbata</i>			

5.4 PLYWOOD FLOORING 15 MM OR THICKER (NO SUBSTRATE)

Table 5.5 Plywood Flooring Options (No Substrate)-CRF 1.2 and less than 2.2 KW/m²

Species of Plywood Flooring	Thickness (mm)	Performance	
		CRF (kW/m ²)	Smoke Development Rate (%- Mins)
Pine, Radiata – <i>Pinus radiata</i>	15mm or greater	Greater than or equal to 1.2 and less than 2.2	<750
Pine, Slash – <i>Pinus elliottii</i>			
Pine, Hoop - <i>Araucaria cunninghamii</i>			
Pine, Radiata – <i>Pinus radiata</i>	17mm or greater		
Pine, Slash – <i>Pinus elliottii</i>			

Table 5.6 Plywood Flooring Options (No Substrate)-CRF 2.2 and less than 4.5 KW/m²

Species of Plywood Flooring	Thickness (mm)	Performance	
		CRF (kW/m ²)	Smoke Development Rate (%- Mins)
Pine, Hoop - <i>Araucaria cunninghamii</i>	15mm or greater	Greater than or equal to 2.2 and less than 4.5	<750
Pine, Radiata – <i>Pinus radiata</i>	17mm or greater		
Pine, Slash – <i>Pinus elliottii</i>			

5.5 PLYWOOD FLOORING 15MM OR THICKER ON A SUBSTRATE

Table 5.7 Proposed Flooring Substrates

Substrate	Thickness (mm)
Particleboard 716 kg/m ³	19mm or greater
Fibre cement	15mm or greater
Normal Weight Concrete floor	75mm or greater
Light Weight Concrete floor	75mm or greater

Table 5.8 Plywood Flooring Options for Proposed Substrate-CRF 1.2 and less than 2.2 KW/m²

Species of Plywood Flooring	Thickness (mm)	Performance	
		CRF (kW/m ²)	Smoke Development Rate (%- Mins)
Pine, Radiata – <i>Pinus radiata</i>	15mm or greater	Greater than or equal to 1.2 and less than 2.2	<750
Pine, Slash – <i>Pinus elliottii</i>			
Pine, Hoop <i>Araucaria cunninghamii</i>			
Pine, Radiata – <i>Pinus radiata</i>	17mm or greater		
Pine, Slash – <i>Pinus elliottii</i>			

Table 5.9 Plywood Flooring Options for Proposed Substrate- CRF 2.2 and less than 4.5 KW/m²

Species of Plywood Flooring	Thickness (mm)	Performance	
		CRF (kW/m ²)	Smoke Development Rate (%- Mins)
Pine, Hoop - <i>Araucaria cunninghamii</i>	15mm or greater	Greater than or equal to 2.2 and less than 4.5	<750
Pine, Radiata – <i>Pinus radiata</i>	17mm or greater		
Pine, Slash – <i>Pinus elliottii</i>			

6 DIRECT FIELD OF APPLICATION

The referenced assessment report applies to floors of buildings that are required to have Fire Hazard Properties in accordance with NCC Specification C1.10.

The results of the referenced assessment report are based on actual test data and the scope is necessarily limited to the specifications indicated in section 3 and discussed in the appendices of the assessment.

7 REQUIREMENTS

The referenced assessment 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/ISO 9239.1-2003.

Any further variations other than those identified in this report, may invalidate the conclusions drawn in this report.

8 VALIDITY

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

The conclusions of the referenced assessment report 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 referenced assessment report 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.

The referenced assessment report 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 the referenced assessment 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 without the permission of Exova Warringtonfire Aus Pty Ltd.

9.3 AUTHORISATION ON BEHALF OF EXOVA WARRINGTONFIRE AUS PTY LTD

Prepared by:



M.Akl

Revised by:



O.Saad

9.4 DATE OF ISSUE

19/06/2018

9.5 EXPIRY DATE

30/06/2023