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Assessment of the fire hazard properties of various timber species in accordance with AS 5637.1-2015 and AS ISO 9239.1-2003

Short Form Assessment Report

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1 Introduction

This short form report refers to an assessment report FCO 3590 titled “assessment of the fire hazard properties of various timber species in accordance with AS 5637.1-2015 and AS ISO 9239.1-2003”.

This report is prepared for the purpose of complying with NCC 2019 Volume One Amdt 1 and Volume Two Amdt 1 Clause A5.2 (1) (d) and NCC 2022 Volumes One and Two Clause A5G3 (1) (d) “A report issued by an Accredited Testing Laboratory” relating to Critical Radiant Heat Flux at extinguishment (CRF) and Smoke Development Rate (SDR).

This report reviews and confirms the extent to which the referenced reaction to fire tests listed in Section 2 meet the requirements of AS 5637.1-2015 for determining the group number and average specific extinction area of the material.

The proposed variations to the tested construction presented in Section 3 are subject to an analysis in Appendix B in the referenced assessment report and the conclusions are presented in Section 5 of this report. The field of applicability of the results of this assessment report is presented in Section 6 and subject to the requirements, validity and limitations of Sections 7, 8 and 9.

2 Supporting Data

This assessment report refers to the following report(s) to support the analysis in the referenced assessment report and conclusions of this report.

Table 1: Summary of AS/NZS 3837-1998 tests for various seasoned timber species tested at CSIRO

Common name	Botanical name	Report Reference	Tested thickness (mm)
Blackbutt, WA	*Eucalyptus pantens*	FNK13333	9mm
Box, Brush	*Lophostemon confertus*	FNK13338	9mm
Box, Grey	*Eucalyptus moluccana*	FNK13339	9mm
Gum, Blue, Southern (VIC)	*Eucalyptus globulus*	FNK13348	9mm
Gum, Blue, Sydney	*Eucalyptus saligna*	FNK13340	9mm
Gum, Rose	*Eucalyptus grandis*	FNK13341	9mm
Ironbark, Grey	*Eucalyptus paniculata, E. drepanophylla*	FNK13342	9mm
Jarrah	*Eucalyptus marginata*	FNK13334	9mm
Karri	*Eucalyptus diversicolor*	FNK13335	9mm
Merbau	*Instia bijuga*	FNK13343	9mm
Marri	*Corymbia calophylla*	FNK13336	9mm
Pine, Baltic/Scots	*Pinus sylvestris*	FNK13344	9mm
Sheoak, WA	*Allocosuarina fraseriana*	FNK13337	9mm
Stringybark, Yellow	*Eucalyptus muelleriana*	FNK13345	9mm
Turpentine	*Syncarpia glomulifera*	FNK13346	9mm
White Cypress	*Callitris glaucophylla*	FNK13347	9mm

Table 2: Summary of AS/NZS 3837-1998 tests for various seasoned timber species tested at AWTA

Common name	Botanical name	Report Reference	Tested thickness (mm)
Ash, Alpine	*Eucalyptus delegatensis*	25-000245	9mm
Ash, Mountain	*Eucalyptus regnans*	25-000246	9mm
Ash, Silvertop	*Eucalyptus sieberi*	25-000247	9mm
Beech Myrtle	*Northofagus cunninghamii*	25-000249	9mm
Blackbutt	*Eucalyptus pilularis*	25-000250	9mm
Blackbutt, New England	*Eucalyptus andrewsii*	25-000927	9mm
Blackwood	*Acacia melanoxylon*	25-000251	9mm
Gum, Blue, Southern (TAS)	*Eucalyptus globulus*	25-000252	9mm
Gum, Manna	*Eucalyptus viminalis*	25-000254	9mm
Gum, Red, River	*Eucalyptus camaldulensis*	25-000255	9mm
Gum, Shining	*Eucalyptus nitens*	25-000256	9mm
Gum, Spotted	*Corymbia maculata*	25-000257	9mm
Ironbark, Red	*Eucalyptus sideroxylon*	25-000930	9mm
Mahogany, Red	*Eucalyptus pellita*	25-000931	9mm
Merbau	*Instia bijuga*	25-000929	9mm
Messmate	*Eucalyptus obliqua*	25-000258	9mm
Tallowwood	*Eucalyptus microcorys*	25-000932	9mm
Radiata pine	*Pinus radiata*	25-000244	9mm
Oak, American Red	*Quercus rubra*	23-000967	12mm
Oak, American White	*Quercus alba*	25-000259	9mm
Spruce (Norway)	*Picea abies*	25-000928	9mm

Table 3: Summary of AS/NZS 3837-1998 tests for various seasoned timber species tested at BRANZ

Common name	Botanical name	Report Reference	Features	Tested thickness (mm)
Western Red Cedar	*Thuja plicata*	FH 4384	NA	9mm
Western Red Cedar	*Thuja plicata*	FH 4389	V joint, Shiplap, Regency	9mm

Table 4: Summary of AS ISO 9239.1-2003 tests for various seasoned timber species tested at AWTA

Common name	Botanical name	Report Reference	Tested thickness (mm)
Pine, Radiata	*Pinus radiata*	499183e	19mm
Blackwood Acacia	*Melanoxylon*	499166a	19mm
Pine, Celerytop	*Phyllocladus asplenifolius*	499166k	19mm
Wattle, Silver	*Acacia dealbata*	499183h	19mm
Ash, Mountain	*Eucalyptus regnans*	499166d	19mm
Ash, Alpine	*Eucalyptus delegatensis*	499166m	19mm
Pine, White Cypress	*Callitris glaucophylla*	499166g	19mm
Gum, Rose	*Eucalyptus grandis*	499166r	19mm
Gum, Shining	*Eucalyptus nitens*	499166l	19mm
Beech Myrtle	*Northofagus cunnighamii*	499166b	19mm
Gum, Manna	*Eucalyptus viminalis*	499166p	19mm
Gum, Blue, Southern (TAS)	*Eucalyptus globulus*	499166u	19mm

Common name	Botanical name	Report Reference	Tested thickness (mm)
Messmate	*Eucalyptus obliqua*	499166i	19mm
Brownbarrel	*Eucalyptus fastigata*	499166c	19mm
Gum, Blue, Sydney	*Eucalyptus saligna*	499166t	19mm
Stringybark, Yellow	*Eucalyptus muelleriana*	499183i	19mm
Merbau	*Instia bijuga*	499183c	19mm
Gum, Red, River	*Eucalyptus camaldulensis*	499183a	19mm
Ash, Silvertop	*Eucalyptus sieberi*	499166j	19mm
Bloodwood, Red	*Corymbia gummifera*	499166f	19mm
Gum, Blue, Southern (VIC)	*Eucalyptus globulus*	499166w	19mm
Mahogany, Red	*Eucalyptus resinifera*	499166s	19mm
Blackbutt, New England (1)	*Eucalyptus andrewsii*	499166o	19mm
Gum, Spotted	*Corymbia maculata*	499166e	19mm
Gum, Yellow	*Eucalyptus leucoxylon*	499183g	19mm
Gum, Sugar	*Eucalyptus cladocalyx*	499183b	19mm
Box, Grey	*Eucalyptus microcarpa*	499166q	19mm
Ironbark, Grey	*Eucalyptus drepanophylla*	499166v	19mm
Oak, American Red	*Quercus rubra*	23-002629	19mm
Pine, Radiata	*Pinus radiata*	25-001605	12mm on particleboard (no gap)
Pine, Radiata	*Pinus radiata*	25-001606	12mm on batten
Box, Brush	*Lophostemon confertus*	25-001430	12mm on batten
Blackbutt	*Eucalyptus pilularis*	25-001533	12mm on batten
Gum, Blue, Southern (VIC)	*Eucalyptus globulus*	25-001608	12mm on batten
Tallowwood	*Eucalyptus microcorys*	25-001609	12mm on batten
Turpentine	*Syncarpia glomulifera*	25-001431	12mm on batten
Ironbark, Red	*Eucalyptus sideroxylon*	25-001532	12mm on batten
Oak, American White	*Quercus alba*	25-001286	12mm on batten
Jarrah	*Eucalyptus marginata*	25-001429	12mm on batten
Karri	*Eucalyptus diversicolor*	25-002311	12mm on batten

The referenced tests in Table 1 were conducted by CSIRO North Ryde and sponsored by Forest and Wood Products Australia Limited. The referenced tests in Table 2 were conducted by AWTA, VIC and sponsored by Forest and Wood Products Australia Limited. The referenced tests in Table 3 were conducted by Branz, NZ and sponsored by Timber Development Association (NSW).

The referenced tests in Table 4 were conducted by AWTA, VIC and sponsored by Forest and Wood Products Australia Limited (subcontracted by Warringtonfire Australia). The tests AS/NZS 3837-1998 (Report No. 23-000967) and AS ISO 9239.1-2003 (Report No. 23-002629) conducted on American Red Oak (*Quercus rubra*) were sponsored by Australian Sustainable Hardwoods and have given CSIRO permission to reference the report in this assessment.

3 Proposed Construction

The proposed construction shall be tested timber species as listed in Tables 1-4 subject to the following variations:

- Wall and ceiling lining applications
  - The increase of thickness for specimens as tested in Tables 1-3 from tested 9mm to include 9mm to 19mm
  - The inclusion of specimens as tested in Tables 1-3 when installed with and without gap behind the timber specimen when installed
  - The inclusion of V-joint, Shiplap, Regency and Shadow-line Profiles for specimens as tested in Tables 1-3
- Flooring applications
  - The variation to tested thickness for specimens as tested in Table 4 to include 12mm to 31mm
  - The inclusion of specimens as tested in Table 4 when installed without gap behind the timber specimen when installed onto particleboard or concrete

4 Referenced Standards

Standards:

AS 5637.1-2015	Determination of fire hazard properties – Wall and ceiling linings
AS ISO 9239.1-2003	Australian Standard, Reaction to fire tests for floorings — Part 1: Determination of the burning behaviour using a radiant heat source

5 Conclusion

On the basis of the analysis presented in the referenced assessment report, it is the opinion of this Accredited Testing Laboratory that the tested prototypes described in Section 2 when varied as described in Section 3 will achieve the fire performance stated below when submitted to a standard fire test in accordance with the test methods referenced in Section 4 and subject to the requirements of Section 7, the validity of Section 8 and limitation of Section 9.

The determination of the group number assigned to the timber species in Table 5 was based on the AS/NZS 3837-1998 test in accordance with the requirements of AS 5637.1-2015, and it is confirmed that it is valid for the determination of the Group Number of the particular material or system tested in the cone calorimeter for the prediction of the NCC group number.

Table 5 – Group Number Classification and ASEA in accordance with AS 5637.1-2015

Common name	Botanic name	Group Number Classification	ASEA (m^2/kg)
		Group 3	**< 250**
Ash, Alpine	*Eucalyptus delegatensis*		
Ash, Mountain	*Eucalyptus regnans*		
Ash, Silvertop	*Eucalyptus sieberi*		
Beech Myrtle	*Northofagus cunninghamii*		
Blackbutt	*Eucalyptus pilularis*		
Blackbutt, New England	*Eucalyptus andrewsii*		
Blackbutt, WA	*Eucalyptus pantens*		
Blackwood	*Acacia melanoxylon*		
Box, Brush	*Lophostemon confertus*		
Box, Grey	*Eucalyptus moluccana*		
Gum, Blue, Southern (TAS)	*Eucalyptus globulus*		
Gum, Blue, Southern (VIC)	*Eucalyptus globulus*		
Gum, Blue, Sydney	*Eucalyptus saligna*		
Gum, Manna	*Eucalyptus viminalis*		
Gum, Red, River	*Eucalyptus camaldulensis*		
Gum, Rose	*Eucalyptus grandis*		
Gum, Shining	*Eucalyptus nitens*		
Gum, Spotted	*Corymbia maculata*		
Ironbark, Grey	*Eucalyptus paniculata, E. drepanophylla*		
Ironbark, Red	*Eucalyptus sideroxylon*		
Jarrah	*Eucalyptus marginata*		
Karri	*Eucalyptus diversicolor*		
Mahogany, Red	*Eucalyptus pellita*		
Marri	*Corymbia calophylla*		
Merbau	*Instia bijuga*		
Messmate	*Eucalyptus obliqua*		
Oak, American Red	*Quercus rubra*		
Oak, American White	*Quercus alba*		
Pine, Baltic/Scots	*Pinus sylvestris*		
Radiata pine	*Pinus radiata*		
Sheoak, WA	*Allocosuarina fraseriana*		
Spruce (Norway)	*Picea abies*		
Stringybark, Yellow	*Eucalyptus muelleriana*		
Tallowwood	*Eucalyptus microcorys*		
Turpentine	*Syncarpia glomulifera*		
Western Red Cedar	*Thuja plicata*		
White Cypress	*Callitris glaucophylla*		

Table 6: CRF and Smoke Development Rate in accordance with AS ISO 9239.1-2003

Common name	Botanic name	12mm thick or greater without gap	19mm thick or greater without gap	Smoke Development Rate (%-minutes)
		CRF		
Pine, Radiata	*Pinus radiata*	≥1.2	≥2.2 and < 4.5	≤ 750
Pine, Celerytop	*Phyllocladus asplenifolius*	≥1.2	≥2.2 and < 4.5	
Ash, Mountain	*Eucalyptus regnans*	≥1.2	≥2.2 and < 4.5	
Ash, Alpine	*Eucalyptus delegatensis*	≥1.2	≥2.2 and < 4.5	
Gum, Rose	*Eucalyptus grandis*	≥1.2	≥2.2 and < 4.5	
Gum, Manna	*Eucalyptus viminalis*	≥1.2	≥2.2 and < 4.5	
Messmate	*Eucalyptus obliqua*	≥1.2	≥2.2 and < 4.5	
Stringybark, Yellow	*Eucalyptus muelleriana*	≥1.2	≥2.2 and < 4.5	
Gum, Shining	*Eucalyptus nitens*	≥2.2 and < 4.5	≥2.2 and < 4.5	
Brownbarrel	*Eucalyptus fastigata*	≥2.2 and < 4.5	≥2.2 and < 4.5	
Gum, Blue, Sydney	*Eucalyptus saligna*	≥2.2 and < 4.5	≥2.2 and < 4.5	
Ash, Silvertop	*Eucalyptus sieberi*	≥2.2 and < 4.5	≥2.2 and < 4.5	
Blackbutt, New England (1)	*Eucalyptus andrewsii*	≥2.2 and < 4.5	≥2.2 and < 4.5	
Box, Brush	*Lophostemon confertus*	≥2.2 and < 4.5	≥2.2 and < 4.5	
Blackbutt	*Eucalyptus pilularis*	≥2.2 and < 4.5	≥2.2 and < 4.5	
Tallowwood	*Eucalyptus microcorys*	≥2.2 and < 4.5	≥2.2 and < 4.5	
Karri	*Eucalyptus diversicolor*	≥2.2 and < 4.5	≥2.2 and < 4.5	
Oak, American Red	*Quercus rubra*	≥2.2 and < 4.5	≥2.2 and < 4.5	
Beech Myrtle	*Northofagus cunnighamii*	≥2.2 and < 4.5	≥4.5	
Blackwood Acacia	*Melanoxylon*	≥2.2 and < 4.5	≥4.5	
Wattle, Silver	*Acacia dealbata*	≥2.2 and < 4.5	≥4.5	
Gum, Blue, Southern (TAS)	*Eucalyptus globulus*	≥2.2 and < 4.5	≥4.5	
Gum, Blue, Southern (VIC)	*Eucalyptus globulus*	≥2.2 and < 4.5	≥4.5	
Gum, Yellow	*Eucalyptus leucoxylon*	≥2.2 and < 4.5	≥4.5	
Pine, White Cypress	*Callitris glaucophylla*	≥4.5	≥4.5	
Merbau	*Instia bijuga*	≥4.5	≥4.5	
Gum, Red, River	*Eucalyptus camaldulensis*	≥4.5	≥4.5	
Bloodwood, Red	*Corymbia gummifera*	≥4.5	≥4.5	
Mahogany, Red	*Eucalyptus resinifera*	≥4.5	≥4.5	
Gum, Spotted	*Corymbia maculata*	≥4.5	≥4.5	
Gum, Sugar	*Eucalyptus cladocalyx*	≥4.5	≥4.5	
Box, Grey	*Eucalyptus microcarpa*	≥4.5	≥4.5	
Ironbark, Grey	*Eucalyptus drepanophylla*	≥4.5	≥4.5	
Turpentine	*Syncarpia glomulifera*	≥4.5	≥4.5	
Ironbark, Red	*Eucalyptus sideroxylon*	≥4.5	≥4.5	
Oak, American White	*Quercus alba*	≥4.5	≥4.5	
Jarrah	*Eucalyptus marginata*	≥4.5	≥4.5	

6 Field of direct application of the results

The results of this assessment are applicable to wall and ceiling linings and floor linings and floor coverings specified by the National Construction Code NCC (BCA).

7 Requirements

This report details the test conditions and expected results that specific elements of the construction described herein would achieve when tested in accordance with the requirements of AS 5637.1-2015 and AS ISO 9239.1-2003.

Any further variations with respect to thickness, and composition may invalidate the conclusions drawn in this report.

8 Term of Validity

This assessment report will lapse on 31st December 2030. Should you wish us to re-examine this report with a view to the possible extension of its term of validity, please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this assessment in the light of new knowledge.

9 Limitations

The conclusions of this assessment report may be used to directly assess the fire hazardous properties under such conditions, but it should be recognised that a single test method will not provide a full assessment of the fire hazard under all fire 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.

This assessment report does not provide an endorsement by CSIRO of the actual products supplied to industry. The referenced 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 is reviewed on or, before, the stated expiry date.

The information contained in this 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.

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