

CRITICAL RADIANT FLUX (CRF) AND SMOKE DEVELOPMENT RATE

Specification C1.10a Fire Hazard Properties: Floor Coverings

A floor covering is required to have Critical Radiant Flux (CRF) greater than specified values dependent on building type, location within the building and whether or not a sprinkler system is to be installed. Where the building does not have a sprinkler system it must also have a Smoke Development Rate of less than (<) 750 percent-minutes.

The lowest CRF value allowed for non-sprinkled buildings is 1.2 kW/m² with no requirement for some sprinkled buildings. For various building types and specific locations within buildings there is an increased CRF being 2.2 or greater *or* 4.5 or greater. The different levels are related to whether a sprinkler system is installed and the mobility of the occupants or closeness to an exit. The highest requirement is 4.5 kW/m² for fire isolated exits.

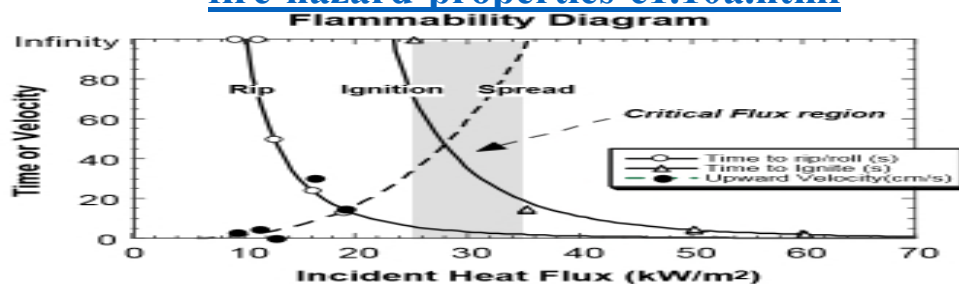
There are many combinations of timber floors that are available from parquet, strip flooring, plywood, floating and exposed particleboard and plywood floors. Generic data is available from the timber industry for products that are not specific to the one manufacturer; for example, tongue and groove (T&G) flooring or plywood that are from the one species. Floating floors and particleboard vary from manufacturer to manufacturer and the individual manufacturer should be consulted for this information.

The critical criteria for T&G flooring and parquet are the species and the thickness of the timber. There will be different CRF values for different thicknesses within the one species.

The results of testing on various timber species and their performance is provided in Table 2 which is broken into two parts; 12 mm and 19 mm thicknesses for various species. For 12 mm flooring (i.e. parquet or strip) there is a requirement that it be backed by particleboard, or placed onto a non-combustible substrate such as concrete.

A common mistake made by designers when specifying particleboard or plywood flooring under a carpet, is to require the substrate floor to have a CRF. This is not necessary when the substrate is not the topmost covering. In this instance, the Fire Hazard Properties will be required for the particleboard or plywood flooring substrate and the CRF will be required for the carpet. But when a carpet manufacturer tests carpet to determine CRF data, the carpet and substrate used e.g. plywood or particleboard, should be nominated as part of the test.

Reference: Timber.net.au <http://www.timber.net.au/index.php/fire-safety-fire-hazard-properties-c1.10a.html>



This diagram shows that when the incident heat flux is below the critical heat flux the material will just rip or spread, over this critical heat flux (which is specific for each material) it will ignite.

CRITICAL RADIANT FLUX (CRF) AND SMOKE DEVELOPMENT RATE				
	12mm thicker or greater		19mm thick or greater	
Common species name	CRF	Smoke Development Rate % -minute	CRF	Smoke Development Rate % -minute
Ash-Silvertop		≤ 750	More Than 2.2 & less than 4.5	≤ 750
Beech, Myrtle	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Blackbutt	More Than 2.2 & less than 4.5	≤ 750	More Than 2.2 & less than 4.5	≤ 750
New England Blackbutt	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Blackwood	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Brush box	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Grey Box	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Cypress	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Sydney Blue Gum	More Than 2.2 & less than 4.5	≤ 750	More Than 2.2 & less than 4.5	≤ 750
Southern Blue Gum	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Red River Gum	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Rose gum	More Than 2.2 & less than 4.5	≤ 750	More Than 2.2 & less than 4.5	≤ 750
Spotted Gum	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Grey ironbark	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Red Ironbark	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Jarrah	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Karri	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Red Mahogany	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Merbau	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Messmate	More Than 2.2 & less than 4.5	≤ 750	More Than 2.2 & less than 4.5	≤ 750
Radiata Pine	More Than 2.2 & less than 4.5	≤ 750	More Than 2.2 & less than 4.5	≤ 750
Stringybark Yellow	More Than 2.2 & less than 4.5	≤ 750	More Than 2.2 & less than 4.5	≤ 750
Tallowwood	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750
Turpentine	More Than 2.2 & less than 4.5	≤ 750	4.5 or greater	≤ 750