

CRITICAL RADIANT FLUX TESTING

INTERFACE AUSTRALIA TESTING ALL PRODUCTS TO ISO 9239-1 FOR CRITICAL RADIANT FLUX

Confused about which correct Critical Radiant Flux (CRF) test result is required for your project?

This paper outlines the building classes and provide you with a matrix to find the right CRF test result for your projects.

All floorcovering manufacturers should be able to provide you with a CRF test certificate for their floorcovering which will include the CRF test result and Smoke Development Rate. This may also be reported as the Critical Heat Flux (CHF).

See the following for further explanation.

CRITICAL RADIANT FLUX TESTING TO ISO 9239-1

For floor materials and floor coverings the ISO new requirements are based on the materials Critical Radiant Flux, as measured by the international standardised test ISO 9239-1.

The Critical Radiant Flux can be defined as the minimum radiant energy a fire needs to sustain flame propagation on the material.

The lower the CRF result number the greater the tendency of the material to spread flame. That is, the CRF is a measure of the minimum amount of energy required to ignite and sustain a flame in the flooring system.

BUILDING CODE OF AUSTRALIA

The Building Code of Australia defines Critical Radiant Flux as “the critical heat flux at time of extinguishment as determined by ISO 9239-1”.

In Table 1 of this paper we set out the various required values for CRF according to the building use type and whether or not sprinklers are fitted.

In relation to building use, general uses are distinguished from aged care accommodation and from Class 9a buildings (hospitals/medical facilities). In general, the requirements for aged care and health care facilities are stricter than the general requirements, while requirements in unsprinklered buildings are also stricter than in sprinklered buildings. Requirements for fire isolated exits are also stricter.

Fire-isolated exits need to resist a fire for varying degrees of time (this is their “fire rating”) ranging from

30 minutes to upto 4 hours. The required fire rating of a fire-isolated exit is dependant on the likely severity of a fire within a building, the time it would take occupants to evacuate and for the fire brigade to intervene.

In addition, the specification sets a limit of 750% per minute for smoke generation - to be applied only in relation to unsprinklered occupancies.

Building Classes

The Building Code of Australia classifies buildings into 10 classes and a number of sub-classes. These are listed below:

Class 1 - One of more buildings which in association constitute:

- Class 1a - a single dwelling being

- (i) a detached house; or

- (ii) one or more dwellings each being a building, separated by a fire-resisting wall, including a row house, terrace house, town house or villa unit.

- Class 1b - a boarding house, guest house, hostel or the like, not exceeding 300m² and in which not more than 12 persons would be resident.

- Class 2 - A building containing 2 or more sole occupy units, each being a single dwelling.

- Class 3 - A residential building, other than class 1 or 2, which is a common place of long term or transient living for a number of persons, including:

- (a) a boarding house, guest house, hostel, lodging house or backpacker accommodation; or

- (b) a residential part of a hotel or motel; or

- (c) a residential part of a school; or

- (d) accommodation for the aged, children or people with disabilities; or

- (e) a residential part of a health-care building which accommodates members of staff; or

- (f) a residential part of a detention centre.

- Class 4 - A dwelling in a building that is class 5, 6, 7, 8 or 9 if it is the only dwelling in the building.

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- Class 5 - An office building used for professional or commercial purposes, excluding buildings of class 6, 7, 8 or 9.

- Class 6 - A shop, or other building for the sale of goods by retail or the supply of services direct to the public, including

- (i) an eating room, cafe, restaurant, milk or soft-drink bar; or

- (ii) a dining room, bar, shop or kiosk part of a hotel or motel; or

- (iii) a hairdresser's or barber's shop, public laundry, or undertakers establishment; or

- (iv) market or sale room, showroom or service station.

- Class 7 - A building which is

- (a) Class 7a - a car park; or

- (b) Class 7b - for storage, or display of goods or produce for sale by wholesale.

- Class 8 - A laboratory or a building in which a handicraft or process of the production, assembling, altering, repair packing, finishing, or cleaning of goods or produce is carried out for trade, sale or gain.

- Class 9 - A building of public nature:

- (a) Class 9a - a health-care building including those parts of the building set aside as a laboratory; or

- (b) Class 9b - an assembly building including a trade workshop, laboratory or the like in a primary or secondary school, but excluding any other parts of the building that are of another class; or

- (c) Class 9c - an aged care building.

- Class 10 - A non-habitable building or structure.

- (a) Class 10a - a non-habitable building being a private garage, carport, shed or the like; or

- (b) Class 10b - a structure being a fence, mast, antenna, retaining or free-standing wall, swimming pool, or the like.

LIFT CARS

In a lift car, the fire hazard properties of materials used as:

1. floor materials and floor coverings must have a critical radiant flux not less than 2.2; and

2. walls and ceiling linings must be a Group 1 material or a Group 2 material in accordance with Clause 3.

FLOOR MATERIALS & FLOOR COVERINGS

A floor material or floor covering must have:

1. a critical radiant flux not less than that listed in Table 1; and

2. in a building not protected by a sprinkler system complying with Specification E1.5, a maximum smoke development rate of 750 percent - minutes.

THE TEST

AS/ISO 9239-1 Critical Radiant Flux Test

The Critical Radiant Flux (CRF) test, which measures the radiant energy required to just sustain burning, is used in some parts of the USA and some parts of Europe to regulate floorcoverings.

The test involves the product being held horizontally under the influence of a radiant heat source at one end. It is ignited at that end and the radiant heat flux at the point at which combustion ceases is determined. This is the Critical Radiant Flux. The heat flux at the hot end is 11kW/m² while at the cool end is 1.0kW/m². During the test the floorcovering is allowed to burn under influence of the radiant heat source. There is just sufficient air movement in the test chamber to remove the products of combustion into the flue.

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

USING THE CRF RESULT

Refer to Table 1 below to match building class requirements with the right CRF test result for your projects.



Table 1 - Critical Radiant Flux (CRF in kW/m²) of Floor Materials and Floor Coverings

Class of Building	General	General	Fire Isolated Exits
	Building not fitted with a sprinkler system complying with specification E1.5	Building fitted with a sprinkler system complying with specification E1.5	
Class 2, 3, 5, 6, 7, 8 or 9b Excluding accommodation for the aged	2.2	1.2	2.2
Class 3 accommodation for the aged	4.5	2.2	4.5
Class 9a Patient care areas	4.5	2.2	4.5
Areas other than patient care	2.2	1.2	4.5
Class 9c Residential use areas	-	2.2	4.5
Areas other than residential use	-	1.2	4.5

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