



FIRE TERMINOLOGY

If you're confused by fire terms you're not alone, but understanding the terminology is important to avoid potential misunderstandings.

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Fire terms you often hear used include 'fire rating', 'incombustible', 'inflammable' and 'self-extinguishing'. However, these are all either not defined or disapproved terms in International Standard ISO 13943: 2000 Fire safety – Vocabulary and should not be used. ISO 13943 was prepared by consultation with international fire engineering experts and is a valuable guide in the use of fire terminology.

The term 'fire rating' is used in New Zealand Building Code Compliance Document Fire Safety C/AS1 to mean 'fire resistance rating' which is the correct term. Fire rating is a misleading term and can cause confusion, for example, does a piece of fabric have a 'fire rating' when it is difficult to ignite and spread flame?

Fire tests give the answer

All organic products are 'combustible' or 'flammable' to some degree, and all building products may potentially provide some 'fire resistance' but the question is, for how long? The only true answer for the fire performance of a product or material must relate directly to the result in a fire test.

In a Building Code context, fire tests fall into two main categories: resistance to fire and reaction to fire. Resistance to fire is the ability of a building element to prevent fire spreading through it, that is, the fire is on one side and does not penetrate through the barrier to the other side. Reaction to fire is a measure of the flammability and smoke production of a product.

Each category comes with its own terminology, and the Building Code Compliance Document Fire Safety C/AS1 gives clear definitions and cites specific test standards.

Resistance to fire

The correct term used to define resistance to fire is 'fire resistance rating' or FRR. This is also known as fire resistance level (Australia),

fire endurance (USA) and just fire resistance in the UK.

In C/AS1, the main test method is AS 1530.4. Other test methods such as BS 476: Part 20 and its other parts are also permitted but not for fire doors or penetration seals. These must comply with specification standards AS 1905.1 and AS 4072.1 respectively, which use AS 1530.4 as the test method.

The results of the test give three numbers (for example, 60/60/60), which are interpreted in C/AS1 as:

- stability – the ability of the element to carry a load
- integrity – the ability to prevent fire spread by flaming on the non-fire side or the creation of gaps to allow the passage of hot gases
- insulation – the ability to limit the temperature rise on the non-fire side.

The fire resistance rating of a building element must always be given as three numbers, even if some are not applicable. For example, a non-loadbearing wall would only have integrity and insulation (for example, –/60/60).

By defining the requirements for floors, walls, doors, dampers, fire stopping and other building elements giving a fire separating function, this parameter forms the core method of providing fire safety in a building.

Reaction to fire

This category is covered by several different fire tests that apply to internal and external surface finishes, flooring, suspended flexible fabrics (curtains, drapes, underlays and flexible canopies) and membrane structures (tents, marquees and canopies in crowd purpose groups). Table 6.2 of C/AS1 gives the requirements.

Internal surface finishes

Internal surface finishes include wall and ceiling linings, and duct and pipe insulation. These have to meet requirements for spread of flame

index (SFI) and smoke developed index (SDI) as determined by AS/NZS 1530.3.

For the test, a 600 mm × 450 mm specimen is subjected to radiant heating from a 300 × 300 mm gas burner with a small flame. The specimen is slowly brought closer until the flame is only 15 mm from the surface.

Foamed plastics have special requirements given in C/AS1 Table 6.3, with an additional requirement of a flame barrier in most situations. This is determined from a fire resistance test (see above) of at least 10 minutes.

Suspended flexible fabrics and membrane structures

This applies to various fabrics and building underlays (building papers). The appropriate test method is AS 1530.2.

The test is a small ignition test with an alcohol flame applied to the bottom edge of a strip of fabric. Extent and time of vertical flame spread are measured and analysed to give a flammability index (FI).

Floor coverings

Floor coverings for some applications, such as in hospitals and prisons (SC and SD purpose groups), need to be non-combustible (tested to AS 1530.1), or have a 'low radius of effect of ignition' in accordance with BS 5287 when tested to BS 4790.

This test method gives a numbered result (BS 4790), which is used to classify the fire performance in another standard (BS 5287). The term 'non-combustible' is not derived from the standard test AS1530.1 but is defined within C/AS1, and the result is the same.

External walls

There are two options for external walls. If the substrate is non-combustible, then any coating not exceeding 1 mm may be used, →



Only the results of specific fire tests can define a product's fire performance.

otherwise compliance with Table 7.5 of C/AS1 is necessary.

The test method used is AS/NZS 3837. This test subjects a 100 × 100 mm specimen to 50

kW/m² of radiant heating and a small spark for ignition (if any). The result yields information on peak heat release in kW/m² and total heat release in MJ/m². The numbers are then

compared with those in C/AS1 Table 7.5 to give an A or B classification. Untested products, or those exceeding the B specification, take a '–' rating.

Pass/fail rare for test methods

It is rare for test methods to offer a 'pass' or 'fail' result. Usually the result is a number that is then used in conjunction with a specification document (a Standard or a regulatory document) to give a measure of acceptance. The only Standard called up in C/AS1 that gives a pass/fail result is AS 1530.1, where the result is 'deemed combustible' or 'not deemed combustible'. All other tests give one or several numbers as the result.

Therefore, when looking at requirements for products in C/AS1, it is necessary to check the specific definitions given in C/AS1 and relate these back to the descriptions of the test methods given in Appendix C. 🔴