

The behaviour in fire of any building materials or parts is characterized partly by its capacity to contribute, under specific conditions, to the propagation of fire (reaction to fire) and partly by its capacity to maintain its functions in the event of fire (fire resistance).

Reaction to fire

A material's reaction to fire corresponds with its facility to catch fire and to propagate fire.

A material's reaction to fire is its capacity to contribute to fuelling the fire and so to spread it.

Euroclasses

Euroclasses take 3 criteria into account:

- fire development

Performance level (7 classes) :

A1	} Products slightly or very slightly combustible
A2	
B	Combustible products whose contribution is very limited
C	Combustible products whose contribution is limited
D	Combustible products whose contribution is significant
E	Combustible products whose contribution is very significant
F	No declared performance

- development of smoke

3 levels of smoke (s=smoke) :

s1	no or little production of smoke
s2	limited production of smoke
s3	significant production of smoke

- production of burning droplets

3 levels of classes (d=droplet):

d0	no burning droplets
d1	no persistent droplets after 10 sec
d2	no declared performance

Sandwich panels cannot be classed A1.

The order of 21 November 2002 brings the French reaction-to-fire classification in line with Euroclasses for building products. So, classes A1 to F replace M0 to M4 as soon as EC markings for the product in question become effective.

French classification M

M classifications characterize inflammability and the capacity to develop flames.

Materials are divided into 5 categories :

- M0 non-combustible
- M1 inflammable with great difficulty
- M2 inflammable with difficulty
- M3 inflammable
- M4 easily inflammable

While waiting for harmonized specifications backed by EC product markings, choice of classification is left to the industry to ensure its product is evaluated either under the M classification or under the Euroclass system by an approved laboratory.

Fire safety

Euroclass / M classification transposition

The order of 21 November 2002, the so-called «transposition order», defines the rules of acceptability of European classes to meet the conditions of French regulations which remain for the time being expressed under the «M» classification. So, when a category M reaction-to-fire class is demanded, the use of a building product with a Euroclass classification is authorized in compliance with the following table :

Requirements	Classes		
Fireproof	A1	-	-
M0	A2	s1	d0
M1	A2	s1	d1
	A2	s2 s3	d0 d1
	B	s1 s2 s3	d0 d1
M2	C	s1 s2 s3	d0 d1
M3	D	s1	d0
M4 (non dripping)		s2 s3	d1
M4	All classes except Ed2 and F		



It is not an equivalent table between the classifications. For example, the class M1 isn't equal to the Euroclass B-s2,d0 and conversely.

Fire resistance

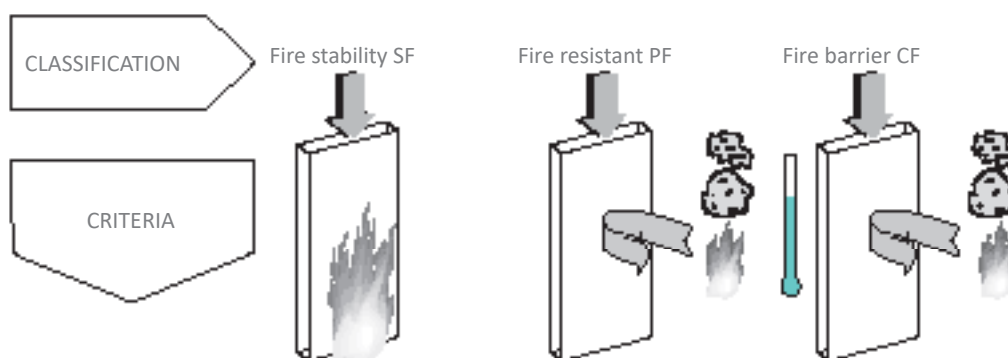
Fire resistance is the time during which building parts can play the role which is assigned to them in spite of the action of fire.

International standard ISO 834

An international standard ISO 834 determines testing conditions and classification ratings depending on 3 criteria explained below and expressed as time periods, the values encountered in clean rooms are generally between ¼ hour and 1 hour.

Classifications are drawn up to meet 3 criteria, expressed as time.

- 1 - FIRE STABILITY (SF), where solidity only is required.
- 2 - FLAME ARRESTING (PF), for which, in addition to solidity, is required flame resistance and resistance to hot or inflammable gases.
- 3 - FIRE SHIELD (CF), for which is required solidity, resistance to hot or inflammable gases and, in addition, thermal insulation (140°C must not be exceeded overall and 180°C at a said point on the no exposed face).



CLASSIFICATION	Fire stability SF	Fire resistant PF	Fire barrier CF
CRITERIA			
Mechanical stability	•	•	•
Fire integrity and gas tightness		•	•
Thermal insulation			•

European standard EN 1350

The order of 22 March 2004 makes official the use of the fire resistance classification adopted by the European Community (standard EN 13501). Products are thus harmonized according to 3 criteria and backed by performances expressed in minutes:

- R : bearing capacity
- E : fire integrity
- I : thermal insulation

The R classification is not applied either to doors or sandwich panels that are considered as no bearing elements.

Standard equivalence:

- Flame arresting PF: Resistance to flame and hot gases = classification E
- Fire shield CF: Resistance to flame and hot gases together with thermal insulation = classification EI

Example: Fire shield rating of one hour (CF60) for an interior wall is the equivalent of classification E160.