

T-FIT®

What do the Euroclass and ASTM E84 fire classifications mean?

T-FIT®
INSULATION

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Euroclass (EN 13501-1) is a standardised testing and classification system used in the Europe to show the relative resistance to fire of building materials. The European Commission has defined criteria to classify materials from A1 through to F.

The standard consists of up to five separate tests, the results of which are used to assign a certain class to the material. The two most common tests, used to classify materials of class B and below, are described as follows:

EN ISO 11925-2 ignitability test

- Common to all Euroclass testing, the sample is mounted vertically in a chamber and exposed to a small flame attack with a Bunsen burner angled at 45° to the sample for 30 seconds and then observed for 60 seconds after flame removal. The flame spread is recorded, and filter paper is positioned below the sample to test for flaming droplets or particles. The test is conducted with the flame impinging on both the edge and the surface of the sample.

EN 13823 single burning item test

- Test method employed for all materials with a classification of D and above. The specimen to be tested is mounted on a trolley, positioned in a frame beneath an exhaust system, similar to the configuration of a corner of a room. The material is then exposed to thermal attack by a sand-box burner supplied with propane (the single burning item) for 20 minutes; this item can be seen as e.g. a burning wastepaper basket in the corner of a room. The heat and smoke rates are measured instrumentally and the physical characteristics, such as whether the material drips, are assessed by observation.
- This is a large-scale test, with the pieces of material tested being 1.5 metres in height. The test material can be mounted upon different substrates, depending on how it will be mounted in its end use as a building material.

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The class that shows highest resistance to fire is class A1, showing that the material is completely non-combustible, such as concrete and bricks, however the highest rating that plastics can achieve is class B.

For materials rated between B and D, a second classification is given related to the smoke emission during combustion. The smoke rating that shows the lowest smoke production is 's1'. Materials that achieve categories B to E are also given a rating for the level of flaming droplets and particles produced during combustion. The best rating for flaming droplets is 'd0', which indicates that no droplets were produced during the test. Products with an A rating are not given grades for smoke emission or flaming droplets, since they do not contribute to fire.

Classification	Definition
A1	No contribution to fire
A2	Very limited contribution to fire
B	Limited contribution to fire
C	Minor contribution to fire
D	Medium contribution to fire
E	High contribution to fire
F	Extremely flammable

Category	Classification level	Definition
Smoke emission	s1	Amount of smoke and speed of smoke production is low
	s2	Amount of smoke and speed of smoke production is average
	s3	Amount of smoke and speed of smoke production is high
Production of flaming droplets or particles	d0	No dripping
	d1	Low amounts of dripping
	d2	High amounts of dripping

The best Euroclass rating that a polymer foam will be able to achieve is B-s1,d0. This excellent flammability rating is achieved by Zotek® F foams, used to make T-FIT® Clean and T-FIT® Hygiene. The material achieves this rating without the inclusion of any flame-retardant additives, since the PVDF polymer used to make it has naturally high resistance to fire.

ASTM E84

The ASTM E84 standard is a test of the relative surface burning behaviour of a material, conducted in what is known as Steiner Tunnel apparatus. This consists of a 25-ft vented tunnel, lined with firebrick, with the test material mounted to the top of the chamber in the 'ceiling' position. At one end of this chamber, the test material is subjected to a high-energy flame for ten minutes. The flame spread along the test material and the smoke density produced are measured and used to calculate the FSI (Flame spread index) and SDI (Smoke developed index) for the test material.

The FSI is determined to the nearest multiple of 5 and is calculated from the relationship between flame-spread distance along the specimen and time taken. An optical cell mounted at the exhaust of the apparatus is used to measure smoke density, and the performance of the test material is compared against that of fibre-cement board and select grade red oak surfaces (set at arbitrary values of 0 and 100 respectively) to give the SDI.

For applications where smoke production is of vital importance, such as in air ducts, then an FSI of 25 or below and an SDI of 50 or below are recommended, but for other general construction uses, the following classes apply.

Class	Flame Spread Index (FSI)	Smoke Developed Index (SDI)
Class A	0 to 25	0 to 450
Class B	26 to 75	0 to 450
Class C	76 to 200	0 to 450

UL723

Underwriters Laboratories (UL) is a world leader in product safety testing and certification, setting standards for different product categories and testing products to make sure they meet the standards.

ZOTEK® F 42 HT LS foam, used to make T-FIT® Clean, has been tested by UL to the UL 723 standard (same surface burning test method as ASTM E84). According to UL testing and auditing of Zotefoams processes and raw materials, ZOTEK® F 42 HT LS foam achieved an excellent rating of 0 for FSI and 0 for SDI. Important to note this flammability rating is achieved without the use of flame-retardant additives.

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