

DLW FLOORING

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Technical Information

Construction Technology

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Fire Safety, Flammability of floor coverings

1 General

The objective of fire protection (safety) is to prevent the spread of hazardous fires and in the event of a fire, to provide for effective fire fighting and the rescue of people and animals. For this reason, it is prohibited to use construction products that are still easily flammable after installation in public buildings.

The flammability of construction products and building elements has been laid down in EN 13501-1 since 2002. This is a European standard, which must be transposed into national law after a transitional period of 5 years, i.e. by 2007.

Every member country of the European Union is responsible for incorporating and adopting this classification in its country-specific rules and regulations.

Architects and building consultants are responsible for ensuring that the stipulated flammability ratings are specified for the building materials to be used on individual construction projects and indicated in the tender documents.

At the planning stage the building codes of each federal state of Germany and the associated regulations and directives must be taken into account to ensure that the invitation to tender includes the relevant requirements stipulated by the construction authorities in relation to the flammability of the building materials for the respective construction project.

In Germany class E_{fl} ("normally flammable" building materials) is generally sufficient for the private residential sector.

In other buildings and areas which are not categorised as belonging to the private residential sector the requirements in relation to fire safety are more stringent.

There are two different groups:

- 1 Installations of standard type and usage: These are residential buildings and buildings used for a comparable purpose. A distinction is made here between classes of buildings depending on the building height and number of dwelling units, whereby different stipulations governing fire safety need to be observed.
- 2 Installations of special type and usage: In this group additional regulations / directives must be observed according to the type of installation, e.g. for:
 - high-rise buildings
 - sales outlets
 - places of public assembly
 - catering establishments
 - hospitals
 - industrial buildings
 - garages
 - places of work
 - school buildings, etc.

For installations of a special type and usage individual project-specific fire safety reports are generally required. They list the fire safety ratings for the different building areas as specified by the fire safety expert. The fire safety reports are submitted to the regional construction authorities together with the planning applications by the consultants and architects responsible for each construction project during the building approval process.

In the event of any queries relating to the fire regulations advice is also available from a fire safety officer at the municipal fire brigade or the regional construction authorities.

All national fire classifications in the countries of the European Union have been superseded by the Euro classes B_{fl}-s1 and C_{fl}-s1 (fire-retardant) according to EN 13501-1, which are now binding in the European Union.



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fl = flooring
s = smoke

This European standard for the fire classification of construction products according to their reaction to fire tests lays down these new classes for the flammability of floor coverings, which are now applicable throughout Europe for the first time.

The "CE mark" for floor coverings specifies the testing or classification of flammability according to EN 13501-1, whereby this must be confirmed by a declaration of conformity. This mark indicates that according to the manufacturer, a product satisfies the essential requirements of the corresponding harmonised European standards and can be freely traded across boundaries in EU ter-

ritory.

EN 13501-1 specifies the methods to be used for classifying the flammability of construction products.

The testing of floor coverings differs from that of customary construction products and is described separately in this standard. This standard will supersede the national standards for the flammability of floor coverings still applicable in the individual EU countries.

The following table comments on the new European fire classes.

Table 1:

<u>Class</u>	<u>Comment</u>
A1 _{fl}	Only achieved by non-flammable floor coverings which do not present any risk in terms of smoke formation
A2 _{fl}	Only achieved by non-flammable floor coverings with low levels of organic binding agents
B _{fl}	Radiation intensity = 8 kW/m ² = flame-retardant construction products
C _{fl}	Comparable with German B1 classification Radiation intensity of 4.5 kW/m ² = flame-retardant construction products
D _{fl}	Radiation intensity here only 3 kW/m ² = normally flammable construction products
E _{fl}	"Small burner" test = normally flammable construction products
F _{fl}	No requirements made, no test = easily flammable construction products

2 Construction products

Construction products include materials in the form of sheets and tiles, i.e. also floor coverings. It is thus not correct to associate floor coverings with fire resistance classifications.

2.1 Non-flammable construction products

Construction products and construction product groups classified as A1_{fl} and A2_{fl} according to EN 13501-1 do not contribute to fire at all. These requirements are so stringent that they cannot be satisfied by organic floor coverings (PVC, linoleum or rubber floor coverings, textile floor coverings made of natural or synthetic fibres).

2.2 Flammable construction

products

Flammable construction products according to EN 13501-1 are divided into the fire classes B_{fl}-s1 and C_{fl}-s1.

As regards the test conditions, the fire class C_{fl}-s1 more or less corresponds to the previous national building materials fire classes for "fire-retardant" floor coverings. For normally flammable floor coverings the fire classes A_{fl}-s2, B_{fl}-s2, C_{fl}-s2, D_{fl} and E_{fl} apply, and for easily flammable floor coverings F_{fl}.

3 Testing and classification

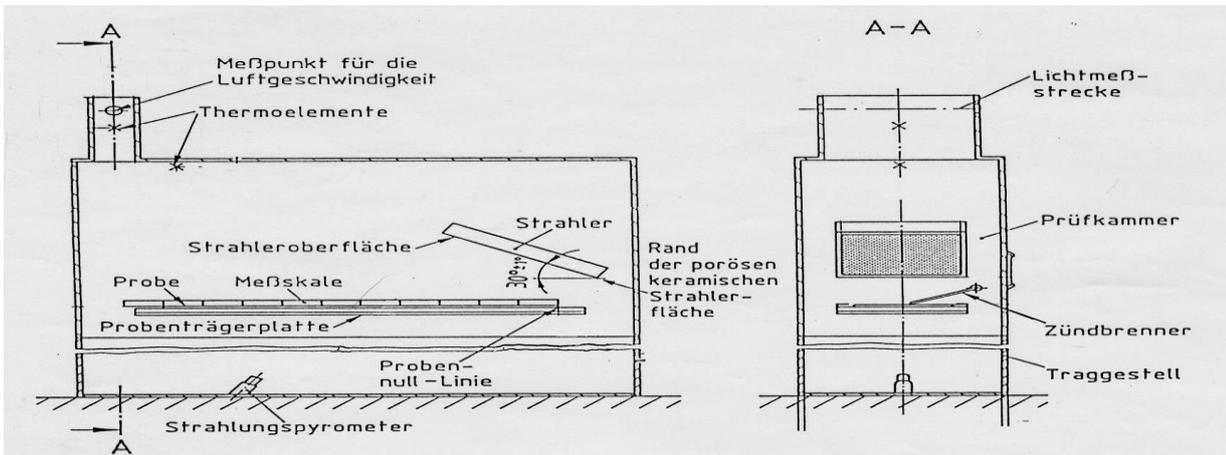
3.1 Classes B_{fl} and C_{fl} = flame-retardant

Floor coverings are deemed to be fire-retardant if they satisfy the requirements of the radiant-panel test for fire classes B_{fl} and C_{fl}. The radiant-panel test according to EN ISO 9239-1 basically consists of a gas-fired radiant heat source and several points of ignition. The sample is placed horizontally on a fibre-cement board under the radiant heat source positioned at an angle of 30° to the sample. This results in a radiation energy that acts on the sample, decreasing over its length. Floor coverings can be tested loose laid. For the floor coverings tested in this manner this is also verification of fully or partial glued using any standard adhesive. If only fully adhered throughout installation is used for a floor covering in practice, it can be glued for testing as well. The adhesive used

Radiant Panel Test:

should then be specified for actual practice on fitting. The test establishes at what level radiation energy in kW/m² the flames extinguish. 4.5 kW/m² is the minimum value for the fire classes B_{fl}-s1 and C_{fl}-s1. In addition, testing must be carried out according to EN ISO 11925-2. The value determined for vertical flame spread must not exceed Fs < 150 mm within 20 seconds. If adhesives are used during testing, they must also be listed in the test report and resulting certification and should always be employed in practical use / installation.

For floor coverings classified as A2_{fl}, B_{fl}, C_{fl} and D_{fl} an additional test and classification is required for smoke density and smoke formation. Here the reduction in light transmission in the exit flue is measured and mapped in a diagram as a function of time. The diagram is then used to determine the result. A value of ≤ 750% x min corresponds to the class s1 – little smoke formation with fire. Floor coverings which do not satisfy the criteria of class s1 are classified as s2.



3.2 Classes B_{fl}, C_{fl}, D_{fl} – normally flammable

Testing is carried out using the so-called small burner method, according to EN ISO 11925-2:

In a combustion chamber a vertically positioned sample is exposed to a defined flame of a burner positioned at an angle of 45°. With edge flaming flame impingement is carried out on the lower edge of the sample, and with surface flame impingement the samples are exposed to the flame 40 mm above the lower edge. The flame impingement time is 15 seconds in each case.

The requirements on construction products of the fire classes D_{fl} and E_{fl} - normally flammable are deemed to have been satisfied if the tip of the flame does not reach a reference mark made 150

mm above the flame impingement point in less than 20 seconds in any of the 5 samples. If this requirement is not satisfied, the construction product is classified in fire class F_{fl} - easily flammable. In addition, it is noted whether burning material drips from the samples during the test. A material is deemed to drip while burning if dripping material causes an easily flammable piece of paper lying under the sample to catch fire within 20 seconds.

Note: The classification B_{fl} and C_{fl} for floor coverings which are tested in terms of flammability according to EN ISO 9239-1 and EN ISO 11925-2 does not apply with installation as a wall covering.



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4 Fire certification

For all construction products classified in the fire classes $B_{fi} -s1$ and $C_{fi} -s1$ it is necessary to apply for a so-called general test certificate from an official materials testing laboratory and conclude a supervision agreement. This entitles the institute responsible for supervision to take a sample of the relevant quality from production at least once a year and perform testing. At the same time the manufacturer must carry out routine self-checks verifying normal flammability. The results of the self-checks have to be submitted to the institute responsible for supervision.

Resilient and textile DLW floor coverings are classified in the fire classes $B_f -s1$ and $C_f -s1$ if they are fully adhered throughout to a floor made of mineral material.

Fire test certificates for our floor coverings are available on website www.dlw.eu.