

The building material class - Baustoffklasse

The **German DIN standard 4102-1** and the **EU standard EN 13501-1** define the **building material classes**. Both standards are currently valid and can be compared with each other approximately. Due to different test criteria, however, not every building material class from one standard can always be clearly assigned to a class of the other standard.

Building material classes according to DIN 4102-1

The German standard divides building materials into **non-combustible materials (Class A)** and **combustible materials (Class B)**. Both classes have so-called subclasses, which are subdivided as follows:

Class A:

A1: Non-flammable materials (e.g.: sand, gravel, concrete, lime).

A2: Non-flammable materials containing small amounts of combustible materials (e.g.: gypsum fire protection boards).

Class B:

B1: Flame-retardant building materials (e.g.: certain PVC products, flame-retardant chipboard).

B2: Normal-flammable building materials (e.g.: standardised wood materials, wood, standardised bitumen board)

B3: Lightly flammable building materials (e.g. paper, straw, wood wool).

There are two ways to prove the respective classification into a building material class: Either the building material or building material composite is already classified and listed in DIN 4102-4, or it must be tested in a **fire test** according to DIN 4102-1.



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The way in which a building material, and in particular building components consisting of several building materials, behave in the event of fire is regulated by the **classification into fire resistance classes**.

Building material classes in a tabular overview

For better comparability, we have compared the respective **building material classes according to EN 13501-1 and DIN 4102-1** in a table.

Euro- Main classes	Euro-Subclasses			DIN 4102-1 in comparison
A1	A1			A1
A2	A2-s1, d0			A2
		A2-s1, d1	A2-s1, d2	B1
	A2-s2, d0	A2-s1, d1	A2-s1, d2	
B	A2-s3, d0	A2-s3, d1	A2-s3, d2	B1
	B-s1, d0	B-s1, d1	B-s1, d2	
	B-s2, d0	B-s2, d1	B-s2, d2	
C	B-s3, d0	B-s3, d1	B-s3, d2	B1
	C-s1, d0	C-s1, d1	C-s1, d2	
	C-s2, d0	C-s2, d1	C-s2, d2	
D	C-s3, d0	C-s3, d1	C-s3, d2	B2
	D-s1, d0	D-s1, d1	D-s1, d2	
	D-s2, d0	D-s2, d1	D-s2, d2	
E	E-d2			B2
F	No performance defined			B3



Building/Construction product classes according to EN 13501-1

The EU standard EN 13501-1 mentions **construction product classes**, which is, however, **nothing different from the building material class of the German standard**. Therefore, depending on the standard, we also use the term used in each case.

The European standard is in comparison to the German classification somewhat more detailed. This is reflected on the one hand in the higher number of main categories (7) and on the other hand in the numerous subcategories, which are made up of the factors **smoke development (s) and dripping behaviour (d) as well as their individual weighting**.

Smoke development and dripping behaviour are broken down as follows and are subject to the requirements according to EN 13823:

Smoke development:

s1: none/low

s2: limited

s3: unlimited

Dripping behaviour:

d0: no burning dripping

d1: no continuous burning dripping

d2: neither d0 nor d1

Example: A product could thus have the **classification B-s1, d0**, which means that the building material is **hardly flammable, causes little smoke development and does not drip in case of fire**.








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The fire class

Occasionally, one encounters the term **fire class**, which, however, has nothing to do with the classification of building materials but with the **classification of fires according to EN 2**.

Notes on fire classes can be found on fire extinguishers, for example. They indicate for which classes the extinguishing agent contained (for example: ABC powder extinguisher) is suitable.

A		Solid non-melting substances	Glow and Flames
B		Liquids, solid melting substances	Flames
C		Gases	Flames
D		Metals	Glow
F		Cooking fats and oils	Flames

The fire resistance class

The fire resistance class is made up of the following factors

area of application and the duration in minutes,

during which the building material or component fulfilled its strength requirements in the corresponding fire test.



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The following classes are distinguished:

Class F: e.g. Load-bearing walls, columns, pillars

Class W: e.g. Non-load-bearing exterior walls, partition walls, parapets

Class T: e.g. Fire protection closures such as doors, gates or roller shutters

Class G: Glazing

Class L: Ventilation ducts

Class K: Shut-off devices

Class S: Cable penetrations

Class R: Pipe penetrations

Possible time intervals are: 30, 60, 90, 120 or 180 minutes.

Example:

Supplemented by the respective minute specifications, a **fire resistance class** could then be **T90**.

A suitable product would then be, for example, a **fire door that withstands a fire for at least 90 minutes**.



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The fire behaviour

The European standard EN 13501-2 is also a little more detailed than the German standard when it concerns fire behaviour. Similar to DIN 4102-1, there are fire resistance classes that define the fire behaviour by a classification and a respective minute value.

However, combinations of classes are also considered here and can provide extensive information on the building product with individual minute values for each combination.

Class R (Résistance): Preservation of load-bearing capacity and stability.

Class E (Etanchéité): Maintaining the room closure

Class I (Insulation): Maintaining the surface temperature limit on the side facing away from the fire.

Class W (Radiation; originally Watt): limitation of the heat radiation average

Class M (Mechanical): increased mechanical strength

Class S (Smoke): limitation of smoke penetration

Class C (Closing): self-closing fire protection closures

Class G: resistance to soot fire

Class K: effectiveness of fire protection cladding on walls and ceilings



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Possible times are: 10, 15, 20, 30, 45, 60, 90, 120, 180, 240 or 360 minutes.

Example:

R 180/RE 90/REI 30/REI-M - e.g. a wall that

- retains its load-bearing capacity for 205 minutes,
- fulfils the room-closing function for 115 minutes,
- provides the required thermal insulation for 40 minutes
- and meets all criteria for impact stress.



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