

FIRE RESISTANCE CLASSES

The classification of construction products and building elements provides a means of expressing the fire resistance of these elements.

Classification according to the direct field of application (DIAP):

The classification is based on data from fire resistance and smoke leakage tests which are within the direct field of application of the relevant test standard (in accordance with the classification standard EN 13501).

Designation of the fire resistance class:

The fire resistance class is indicated by means of a combination of letters and numbers. The letters refer to the different performance parameters, as far as those apply to the element in question.

The performance parameters are:

R: loadbearing capacity

E: integrity

I: thermal insulation

W: limitation of radiation

M: mechanical resistance

C: self closure

S: smoke leakage

G: soot fire resistance

K: fire protection

During the test, it is determined how long the building element preserves the tested performance when exposed to fire. Each performance has a number of criteria which determine when a building element loses that performance (see below). Based on the test, the building element is assigned one of the following fire resistance classes: resistance to fire during 15, 20, 30, 45, 60, 90, 120, 180, 240 or 360 minutes.

Loadbearing capacity

The loadbearing capacity is the ability of the construction element to withstand specified mechanical actions whilst being exposed to fire, at one or more sides, during a determined period of time, without loss of structural stability. The criteria applied to determine the loss of stability, vary according to the type of loadbearing element:

- for flexurally loaded elements, such as floors, roofs:
 - a rate of deformation (rate of deflection);
 - a limit state for the actual deformation (deflection).
- for axially loaded elements, such as columns, walls:
 - a rate of deformation (rate of contraction);
 - a limit state for the actual deformation (contraction).

Integrity

Integrity is the ability of the construction element with a separating function to withstand exposure to fire on one side without fire propagation to the unexposed side as a consequence of flaming or the passage of hot gases. The integrity is evaluated on the basis of the following three aspects:

- cracks or openings exceeding the given dimensions;
- ignition of a cotton pad;
- sustained flaming on the unexposed side.

Thermal insulation

Thermal insulation is the ability of the construction element to withstand exposure to fire on one side without fire propagation to the unexposed side as a consequence of heat transfer. Thermal insulation limits the heat transfer as a result of which neither the unexposed side nor adjacent materials will ignite.

Limitation of radiation

The limitation of radiation is the ability of a construction element - when exposed to fire on one side - to reduce the probability of fire propagation as a consequence of a significant heat radiation, either through the element or from the unexposed surface to adjacent materials. The limitation of heat radiation is determined by the period of time for which the maximum value of radiation, measured as specified in the test standard, does not exceed the limit value of 15 kW/m².

Mechanical resistance

The mechanical action is the ability of a construction element to withstand an impact representing the effect caused by the structural failure of an other component. The element is subjected to a predefined impact shortly after it has been tested to determine its loadbearing capacity, integrity and/or thermal insulation. The element should resist the impact without prejudice to the R, E and/or I performance.

Self closure

The self closure is the ability of an open door or window to close fully and to engage a fitted latching device, without human intervention so only by stored energy or by means of electricity backed by a system of stored energy in case of power failure.

This applies to elements that are mostly closed and should close automatically when opened and to elements that are mostly open and should close automatically in case of fire.

Smoke leakage

Smoke leakage is the ability of a construction element to reduce or eliminate the passage of hot/cold gases or smoke from one side of the element to the other.

Soot fire resistance

Soot fire resistance is the ability of a chimney or related construction elements to withstand soot fire. This includes aspects of smoke leakage and thermal insulation.

Fire protection

Fire protection is the ability of a wall or ceiling covering to provide protection against ignition, charring and other damage to the materials behind the coverings for a specified period of time. Coverings are the outer surfaces of construction elements such as walls, floors and roofings.

Classification according to the extended field of application (EXAP):

A classification based on the extended field of application is not covered by the above-referenced standard (EN 13501), but it is assigned according to the European standard EN 15524. The designation of the classification is nevertheless the same as specified in the classification standard.

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