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E1 THE NATIONAL BUILDING CODE OF FINLAND

Fire safety of buildings
Regulations and guidelines 2011

Decree of the Ministry of the Environment on the fire safety of buildings

Issued in Helsinki on xx April 2011

In accordance with the decision of the Ministry of the Environment, the following regulations and guidelines on the fire safety of buildings have been drawn up in order to be applied to construction in accordance with article 13 of the Land Use and Building Act (132/1999) of 5 February 1999.

This decree shall enter into force on xx April 2011 and repeals the decision of the Ministry of the Environment of 12 March 2002 on the fire safety of buildings and its amendments of 30 June 2008 and 18 December 2008. To applications for a permit made before the entry into force of this Decree, earlier regulations and guidelines can be applied.

The fire-ratings in earlier provisions may be applied to constructions, for which permission has been applied for before 1 April 2012.

Helsinki, xx March 2011

Minister for Housing

Head Engineer

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E 1 THE BUILDING CODE OF FINLAND
Ministry of the Environment, Housing and Building Department

Fire safety of buildings

REGULATIONS AND GUIDELINES 2011

Contents

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LEGEND

Regulations that have been printed in a wide column in this large font size are mandatory.

Guidelines which are in a narrow column in a small font size, contain acceptable solutions.

Explanations *which are in a narrow column in italics, provide additional information as well as contain references to the rules, regulations and guidelines.*

DEFINITIONS
Terminology

Fire extinguishing equipment
Fire extinguishing equipment for extinguishing nascent fires, accessible to everybody. For example, fire hydrant, fire extinguisher and fire blanket.

Automatic fire alarm
Equipment, which automatically and immediately gives warning of a nascent fire. The fire alarm will also give warning of problems that endanger its operative safety.

Automatic fire extinguishing equipment
Fire extinguishing equipment meant to put out fires automatically.

Automatic smoke exhaust equipment
Automatic equipment for removal of fire generated smoke and heat.

Apartment area - abbreviation **h-m ^{2}**

Storey area - abbreviation **k-m ^{2}**

Dry Rising Mains
A pipe installed permanently in a building intended for the supply of extinguishing media.

Exit route
A passable route from each point of the floor surface leading to the exit.

Flare flame
Sudden change of circumstances, in which the surfaces of flammable equipment as a whole flare up in a confined space.

Lighting signal
Lighting, which shows the exit routes. Lighting signal operates together with general lighting, simultaneously and independently.

Partitioned exit route
Partitioned area, through which the building can be evacuated safely.

Partitioning door
Door that meets the requirements of fire rating.

Partitioned building element
Building element that meets the requirements of fire rating with partition between fire areas.

Fire load
Total amount of heat released when the material in a room burns fully. These materials include load-bearing, bracing, fire partitioned, and other building components, together with furnishings and fittings.

Fire load density is expressed in the rules in mega joules in square meters of the floor area (MJ / m $^{2)}$.

Fire and smoke proof exit
Partitioned exit corridor, with access only at the floor level of the partitioned space and further to a balcony or other outside open air space, so that fire and smoke are prevented from accessing the exit.

Fire protected exit
Partitioned exit corridor, with access only from a divided space at floor level.

Firewall
Wall, which for a specific period prevents the fire from spreading to its other side and withstands the collapse and the severe impacts of the collapse of an adjacent building, or parts thereof.

Fire Resistance Time

Period of time expressed in minutes, for which a building element has been verified to meet the prescribed requirements.

Fire barrier
Space with partition between two fire areas. The fire barrier is equipped with two doors that open separately to each individual, restricted fire department, so that it is not necessary to open both the doors at the same time.

Fire Compartment
A part of the building from which the spreading of the fire within the specified time is prevented by partitioning building elements, or by other effective means.

Fire alarm
A device that detects the beginning of fire and alerts those present.

Fire lane
Driveway or other road access used by emergency vehicles, which has access in case of fire or other emergency, close enough to the building and fire-engine water supply points.

Surface
Wall, ceiling and floor surfaces, which have properties that are relevant for igniting and spreading of fire.

Evacuation area
A coherent and functional part of a building for the organisation of evacuation. The evacuation area is often at the same time a fire compartment.

Extinguishing Route
A separate route intended for fire-extinguishing personnel leading from outside to the basement in exit corridors of the different storeys.

Smoke exhaustion
Removal of-smoke and heat generated by fire from the building automatically or by gravity.

Internal corridor
A corridor in an evacuation area leading to exit.

Protective covering
Cladding of the surface and thus protecting the underlying structure for a specified time from ignition, carbonization, or other damage by fire.

Hearth
A building element or a device belonging to the building, in which solid, liquid or gaseous substances are burned.

Emergency lighting
Lighting, which is intended to guarantee lighting for safety of the personnel when normal lighting fails.

Attic
Space between the roof and the ceiling in which it is possible to walk.

The attic is for storage of household utensils or for drying laundry in residential buildings, and in an agricultural building for the storage of equipment or animal fodder.

A roof cavity is not considered to be an attic, as due to its low height and shape, or some other reason, one cannot move about in it.

Exit corridor
The door leading directly out of the evacuation area, or an area in the building or outside of it, through which safe evacuation in case of fire is possible on the ground or some other safe place.

Alternative exit
A more difficult exit route, along which it is possible to find refuge in case of fire.

Added parts are underlined, deleted parts are struck through.

Fire rating

Buildings

Buildings are divided into three fire classes:
P1, P2 and **P3.**

Building elements and building materials

The EN -standards are used in the classification. The standards have been described in general information.

Load-bearing and partitioned building elements are divided into classes based on how they will withstand a fire.

The requirements of building sections are described with the following indications:
R load-bearing capacity,
E integrity,
EI integrity and insulation
EI $_1$ or **EI $_2$** integrity and insulation
- doors and
- windows which can be opened only with a tool, key or similar.

Both classes meet the provisions for the door or window set out in the EI claim.

Explanation
The elevator door can be marked class E or EI (SFS-EN 81-58).

Labels R, REI, RE, EI, E are followed by the fire-resistance time in minutes with one of the following figures: 15, 30, 45, 60, 90, 120, 180 or 240. The notation thus obtained is the fire rating of the building element.

Explanation
The wall's fire rating may be, for example REI 60 and the class of a door in it EI 30 or E 30. A building element, which only meets integrity requirement E, can lead to danger due to thermal radiation. This is to be taken into account by determining the safety distance to the exit route, and flammable materials.

This can be completed with the symbol:
M impact resistance in case of fire.

The compliance of a building component is verified experimentally or by computational methods.

Building elements must be made of such building materials that they meet the criteria imposed by the building classification in each usage.

Building materials are divided into classes based on how they affect fire ignition, spread of fire and the production of smoke.

There is a table in the information provided, according to which the building components can generally be regarded as falling within classes A1 and A1 $_{FL}$ without testing, and separate approval. The table is based on Decision 96/603/EC of the Commission, as amended by 2000/553/EC.

Classes of building materials, with the exception of floor coverings, are described with indications:
A1, A2, B, C, D, E, F
Tubular heat insulation classes are described with indications:
$A1_L$, $A2_L$, B_L, C_L, D_L, E_L, F_L

Smoke generation and formation of droplets are expressed with additional attributes s and d. Smoke yield rating is **s1, s2, s3** and dripping **d0, d1, d2.**

Explanation

A1 *Products which do not participate at all in the fire.*
A2 *Products whose involvement in the fire is very limited.*
B *Products whose participation in the fire is very limited.*
C *Products which are involved in the fire to a limited extent.*
D *Products whose participation in the fire is acceptable.*
E *Products whose behaviour is acceptable in the fire.*
F *Products whose behaviour has not been determined.*

s1 *Smoke production is very low.*
s2 *Smoke production is low.*
s3 *Smoke production does not meet the requirements of s1 and s2.*

d0 *Flaming droplets or particles do not occur.*
d1 *Flaming droplets or components are extinguished quickly.*
d2 *Flaming droplets or parts do not meet the requirements of d0 and d1.*

Classes A1 and F always occur without additional attributes. E without further attributes means that the accessory does not shed flaming droplets. All other categories also include a subdivision, e.g., A2-s1, d0, B-s1, d0, D-s2, d2, d2 E-d2.

Categories of floor coverings are described with indications: **$A1_{FL}$, $A2_{FL}$, B_{FL}, C_{FL}, D_{FL}, E_{FL}, F_{FL}.**

Smoke production is expressed with additional attributes **s1** or **s2.**

Explanation

$A1_{FL}$ *Products which do not participate at all in the fire.*
$A2_{FL}$ *Products whose participation in the fire is extremely limited.*
B_{FL} *Products whose participation in the fire is very limited.*
C_{FL} *Products which are involved in fire in a limited way.*
D_{FL} *Products whose participation in the fire is acceptable.*
E_{FL} *Products whose behaviour is acceptable in the fire.*
F_{FL} *Products whose behaviour has not been determined.*

s1 *Smoke production is limited.*
s2 *Smoke production does not meet the requirements of s1.*

In these regulations and guidelines the following classes are used **A1, A2-s1, d0, B-s1, d0, B-s2, d0, C-s2, d1, D-s2, d2, E, $A2_{FL}$-s1** and **D_{FL}-s1.**

Protective cladding categories are described with indications:
K_2 10 K_2 30 K_2 60. The cladding materials are usually used in conjunction with the accessory class label.

In these regulations and guidelines the following classifications are used:
K_2 60, K_2 30, K_2 10

Cladding covers are divided into classes according to the extent they can be considered in relation to external ignition danger to be easily flammable and slow to spread fire, and how they will protect the substrate from an outbreak.

These regulations and guidelines use classification **B_{ROOF}(t2).**

The information provided has a table, where the roof can generally be considered to fall under classification B_{ROOF} without testing, and a separate approval. The table is based on Decision 2000/553/EC of the Commission.

Added parts are underlined, deleted parts are struck through.

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Uses of buildings

Buildings or their fire compartments are grouped on the basis of their primary use. The bases for the grouping are useful life - daytime, evening or night time use - and how well the users are familiar with the premises and how they are able to escape in case of fire, by themselves or assisted by others.

The examples list the most common uses, in a single building or department the group of users are to consider the nature of the activities as stated above.

Dwellings
For example
- residential apartments
- free-time residences

Accommodation
Facilities which are generally in 24-hour operation and do not include persons in care of others or in confinement.
For example
- hotels
- holiday homes
- residential homes

Institutions
Facilities, which are generally-in 24 hour operation and with persons in care or confinement.
For example
- hospitals
- old peoples' homes
- closed penal institutions

Assembly and business premises
Facilities, which are generally in day or evening use, with a significant audience or number of customers.
For example
- restaurants
- shops
- schools
- sports halls
- exhibition halls
- theatres
- churches
- libraries
- day care facilities

Workplace Facilities
Facilities, which are usually used in daytime and where majority of staff is familiar with the premises.
For example
- offices
- civil services
- administrative facilities

Production and storage facilities
Spaces, which usually have permanent staff familiar with local conditions.
For example
- conventional industrial premises
- agricultural production facilities
- larger warehouses

In production and warehouse premises, the operations are divided into two areas of fire hazard classifications (1, less dangerous and 2, more dangerous). Production and storage facilities have separate instructions in part E2 of the Finnish Building Code.

To production and storage premises can be attached fire-hazardous areas or explosion prone places, where, to a considerable extent, or in a dangerous way, hazardous materials or supplies are produced, handled or stored. Fire or explosion hazardous premises can also be in use in buildings of other usage groups.

Garages
Garages have separate instructions in part E4 of the Finnish Building Code.

Added parts are underlined, deleted parts are struck through.

1
GENERAL

1.1. Scope

1.1.1
These regulations and guidelines are on fire safety of new buildings.

Explanation
In building repair and alteration work these regulations and guidelines are applied in the way specified by the Land Use and Building Act § 13 rules.

1.2 The essential requirement

1.2.1
What has been specifically enacted or provided for in the essential requirements for buildings and other construction works in the Land Use and Building Act or otherwise, remains in force. From the point of view of fire safety, this means specifically that

- in the event of a fire the load-bearing structures of the building will have to last for a minimum period prescribed;
- fire and smoke development and spreading in the building should be restricted;
- the spreading of fire to nearby buildings should be restricted;
- the occupants of the building must be able to escape from the building or be rescued in some other way;
- the safety of rescue teams in building work is to be taken into consideration.

1.3 Verification of satisfaction of the requirement

1.3.1
The fire safety requirement is deemed satisfied if the building is designed and constructed in accordance with these regulations and instructions regarding the classification and numeric values mentioned.

1.3.2
The fire safety requirement has also been met if the building is designed and constructed based on designed fire scenarios, which cover the situations that are likely to occur in the building. Compliance with the requirement is verified on a case-by-case basis, taking into account the characteristics and usage of the building.

Guideline
The planning methods used have been validated. Experimental and computational methods according to the European (EN) and international (ISO) standards may be expected to meet the eligibility criteria, if the application in question is in the area of the validity of the method.

Criteria of the planning, the models used and the results obtained, are to be presented in connection with the building permit process.

Guidelines
The documentation must at least include the following elements:

- description of the building and the fire safety equipment,
- the assumptions made of the use of the building throughout its life cycle,
- the assumptions of the possibilities of action for the fire brigade,
- criteria of the review of selected fire situations,
- critical examination of the failures to the extent necessary with the justification for it,
- required maintenance and servicing operations during the use of the building,
- a description of the methods used, including the suitability of methods of calculation and their limitations, as well as the input data and the assumptions about it with their justifications,
- the results with their sensitivity analysis (to clarify whether a small change in the assumptions made can cause a significant change in fire safety),
- acceptance criteria and the comparison of the results with it and
- the identification of application areas and their borders, if in the planning both points of mutual acceptance in sections 1.3.1 and 1.3.2 have been used.

1.4 Recognition of mutual acceptance

1.4.1
In the appendix to these regulations and guidelines, information is given on the methods available for testing and classification standards. Alongside, and instead of them, valid and equivalent EN or other standards can reciprocally also be used.

Added parts are underlined, deleted parts are struck through.

2
FIRE LOAD

2.1 Determination of fire load

2.1.1
Fire load is determined primarily on the basis of the usage of a fire compartment. Fire load can also be determined on the basis of a reliable estimate or calculation. Fire development calculation also takes into account the location of the fire load, the rate of burning and combustion.

Guideline
Fire load definition is based on the main usage of the premises. The building often has fire compartments that differ from each other. In this case, it may be necessary to determine the fire load of each compartment separately and dimension the fire compartment structures accordingly.

2.2 Groups of fire load

2.1.2
The different uses are placed into the fire load groups in accordance with the fire load density. The fire load groups are as follows:

Guideline
Principles of placing the different methods of use in the fire load groups:

over 1200 MJ/m^2;

- Stocks, which are separate fire compartments.

The fire loads of production and storage facilities are determined or estimated by each target separately.

at least 600 MJ/m^2 and no more than 1200 MJ/m^2;

- Part of the assembly and business premises such as shops, exhibition halls and libraries;
- residential basement sections, which include furniture stores;
- motor vehicle repair and maintenance facilities.

less than 600 MJ/m$^{2;}$

- Apartments, accommodation and nursing facilities;
- part of the assembly and business premises such as restaurants, shops of no more than 300 m ^{2}, offices, schools, sports halls, theatres, churches and day-care facilities;
- garages.

Generally, this group may also have facilities, which have a fire load density of more than 600 MJ / m ^{2,} if these spaces are equipped with automatic fire-extinguishing equipment.

2.2.2
The fire resistance requirements for load-bearing and partitioned structures of the building are based on the above fire load grouping.

Added parts are underlined, deleted parts are struck through.

Added parts are underlined, deleted parts are struck through.

3
FIRE CLASS OF THE BUILDING

3.1 Fire classes

3.1.1
The fire classes of a building are **P1, P2** and **P3.**

Explanation
The load-bearing structures of a building belonging to fire class P1 are assumed, as a rule, to sustain fire without collapse. Building size and number of persons is not limited.

The requirements of load-bearing structures of a building belonging to fire class P2 can be inferior to the previous class. An adequate level of safety is achieved by setting requirements especially into the properties of the surface and in the improvement of the fire safety devices and arrangements. In addition, the number of storeys and people have been limited depending on the usage.

No special requirements of fire resistance for the bearing structures are imposed in fire class P3 within the building. An adequate level of security, depending on the usage, is achieved by limiting the size of the building and the number of persons using it.

The class definitions may be waived for special reasons.

3.1.2
Different parts of the building may belong to different fire classes, provided the spreading of fire is blocked by a firewall.

Exit corridors of the building blocks separated by a firewall are built as separated exits, so that a possible door in the firewall does not have to be used in the event of a fire.

3.2 Restrictions of size of building and the number of people

3.2.1
Restrictions on size of the building are shown in table 3.2.1.

A higher number of the total number of storeys than in the above table can be accepted if the building is equipped with an automatic fire alarm, automatic smoke exhaust system or automatic fire extinguishing equipment.

Added parts are underlined, deleted parts are struck through.

TABLE 3.2.1	**RESTRICTIONS ON THE SIZE OF BUILDINGS**		
Characteristic of the building	**Fire class of the building**		
	P1	**P2**	**P3**
Number of storeys			
- general	no limitations	maximum 2	maximum 2
- residential building, workplace building	no limitations	maximum 4	maximum 2
- automatic fire extinguisher	no limitations	maximum 8	maximum 2
- Production or storage building, garage	no limitations	maximum 2	maximum 1
HEIGHT			
- general	no limitations	maximum 9 m	maximum 9 m
- residential building, workplace building	no limitations	maximum 14 m	maximum 9 m
- automatic fire extinguisher	no limitations	maximum 26 m	maximum 9 m
- One-storey production or storage building	no limitations	no limitations	maximum 14 m
FLOOR AREA Floor area in general			
- one storey building	no limitations	no limitations	maximum 2,400 m^2
- two storey building	no limitations	no limitations	maximum 1,600 m^2
Gross floor area of manufacturing and warehouse buildings as well as car shelters			
- one storey building	no limitations	no limitations	no limitations
- two storey building	no limitations	no limitations	*not allowed*
Description	*The height of the building is the height of the crossing point of the façade and the roof measured from the ground level (Land Use and Building Act, Section 58). If necessary, the mean heights of the corner points of the building are calculated.*		

Added parts are underlined, deleted parts are struck through.

3.2.2
Restrictions on number of persons in maximum two-storey building are shown in table 3.2.2.

TABLE 3.2.2		**MAXIMUM NUMBER OF PEOPLE ALLOWED IN A BUILDING**		
Usage	**Storeys**	**Fire class of the building**		
		P1	**P2**	**P3**
Residences		no limitations	no limitations	no limitations
Residential areas	1	no limitations	number of places 150	number of places 50
	2	no limitations	number of places 50	number of places 10
Nursing homes	1	no limitations	number of places 100	number of places 10
	2	no limitations	number of places 25	*not allowed*
Assembly and business areas	1	no limitations	no limitations	persons 500
	2	no limitations	persons 250	persons 50
Workplace areas	1	no limitations	no limitations	no limitations
	2	no limitations	no limitations	workers 150
Production and stockroom areas	1	no limitations	no limitations	no limitations
	2	no limitations	workers 50	*not allowed*

Guidance

When, in accordance with 3.2.1, buildings of more than two storeys are allowed, there are no limitations on the number of persons.

Two-storey building restrictions on the number of persons relate to cases where the use of the premises is located in whole or in part in the second floor of the building. If these spaces are just on the first floor, single-storey building restrictions can be applied.

If a building has facilities of different use categories, the security of the building is estimated by looking at the building as a whole.

4
PREVENTION OF IGNITION

4.1 General requirements

4.1.1
The building should be designed, constructed and equipped so that fire danger is minimal. The hazard of external ignition must also be considered in this context.

4.1.2
Technical installations must be done so that the danger of ignition and the risk of fire and smoke spreading in the building will not substantially increase due to them.

4.1.3
Fireplaces, chimneys and heating equipment must be placed, constructed or installed so their use will not create a fire or explosion hazard.

Explanation
Regulations and guidelines on chimney flues are in the Finnish Building Code part E3, guidelines on masonry fireplaces in E8 and on the boiler room and fuel storage part E9. For electrical and heating installations, there are separate regulations.

5
LIMITING THE FIRE TO THE FIRE COMPARTMENT

5.1 General requirements

5.1.1
The building should generally be divided into fire compartments to keep the fire and smoke from spreading, to safeguard the exit and to facilitate rescue and extinguishing operations in order to limit damages to property.

5.1.2
Different storeys of the building, basement floors and the attic should generally become set up as separate fire compartments (storey compartments).

The fire compartment size should be restricted so that a fire igniting in a compartment does not lead to proportionately large damages to property (separation by area).

Premises with essentially different uses are to be set up as separate fire compartments, where it is necessary to protect persons or property (separation by use).

Guideline
A fire compartment may consist of several storeys, though not compartments with rooms for accommodation or for patients.

Examples of conventional fire departments are staircases, residential apartments, garages, boiler rooms, production facilities and warehouses. Engine rooms of lifts at the attic level, sauna facilities or other similar rooms are usually

each set up as individual fire compartments separated from the rest of the attic.

In residential buildings, except for buildings of class P2 with 3–4 storeys, it is permissible to locate rooms in the attic for storage of the residents' household goods and for drying laundry. In other buildings, usable attics are not allowed, except in agricultural production and storage buildings, where the attic can be used, if this does not pose a danger to persons and domestic animals. The above does not apply to spaces, which are otherwise permitted at attic level and which satisfy the requirements imposed on fire compartments.

5.1.3
Dwellings, accommodation rooms, nursing rooms or assembly rooms should not in general be located in buildings, incorporating rooms with fire or explosion hazard.

Guideline
If the incorporation is permitted for a particular reason, these rooms shall not be immediately adjacent to each other; or else it must be ensured by effective measures that this will not cause danger to the occupants. Special design is always necessary in case of an explosion hazard.

5.2 Size of the Compartment Area

5.1.2
The maximum area of a fire compartment is shown in Table 5.2.1.

TABLE 5.2.1	**MAXIMUM AREA OF FIRE COMPARTMENTS**		
Usage	**Fire class of the building**		
	P1	**P2**	**P3**
FLOORS			
Residential buildings	partitioning by apartments	partitioning by apartments	partitioning by apartments
Accommodation & treatment centres			
- accommodation overnight	800 m^2	800 m^2	400 m^2
- other facilities	1,600 m^2	1,600 m^2	400 m^2
Assembly and business premises and workplace facilities	2,400 m^2	2,400 m^2	400 m^2
Production and storage facilities and garages	after consideration [1)]	after consideration [1)]	after consideration [1)]
ATTICS AND ROOF CAVITIES	1,600 m^2	1,600 m^2	according to the compartments below [2)]
BASEMENTS	800 m^2	800 m^2	400 m^2

Note on the Table
[1)] Guidelines on production and storage premises are issued in part E2 of the National Building Code of Finland and garage instructions in Part E4.
[2)] In residential buildings this may be substituted for a specific reason

by fire-partitioning into fire compartments of no more than 200 m2.

Guideline

The area is calculated in the same way as the area of premises.

5.2.2
To safeguard evacuation or to facilitate rescue and fire-extinguishing operations the fire compartments are in addition divided into sections:
- accommodation and institutions by rooms of accommodation;
- attics and cavities of the uppermost floor into parts of no more than 400 m2.

5.2.3
A fire compartment can be enlarged by providing it with an automatic fire alarm installation, an automatic smoke extraction installation or an automatic fire-extinguishing system.

6
MAINTAINING THE LOAD-BEARING CAPACITY OF THE CONSTRUCTIONS

6.1 General requirements

6.1.1
A building and the building elements in it must not cause danger through collapse due to the effect of fire within a specified period after the start of the fire. If necessary, for the safety of persons, or with regard to the extent of damage, the building shall sustain the combustion of the entire fire load and cooling without collapse.

6.1.2
If a load-bearing building element is required to have a longer fire resistance time, with respect to integrity E and insulation I, than with respect to load-bearing capacity R, the longer fire resistance time will also be applied to the load-bearing capacity.

6.1.3
The design of load-bearing construction may either be based on a classification, which is based on a standard temperature/time curve or on the actions of a designed fire scenario.

6.2 Design based on classification

6.1.2
The class requirements for the load-bearing capacity of constructions are set out in Table 6.2.1.

Guideline

The idea behind the class requirements is that in order to guarantee the safety of persons and to limit damage, buildings of class P1 with more than two storeys do not collapse during the fire or cooling phase. Their frameworks are assumed to sustain the combustion of all combustible materials within the building or a part of it without being extinguished.

A considerable part of risk of damage may require a similar non-collapsing capacity of a building of class P1 with no more than two storeys.

6.2.2

A load-bearing construction is designed to correspond to the class requirement with reference to the standard temperature/time curve. Compliance with this requirement is attested by:

- testing,
- calculation,
- combining the results of testing and calculation or
- using an acceptable design method based on use of tables.

Added parts are underlined, deleted parts are struck through.

TABLE 6.2.1 CLASS REQUIREMENTS FOR LOAD-BEARING CONSTRUCTIONS

	~~Fire class of the building~~				
	P1		**P2**		**P3**
	Fire Load MJ / m ^{2}				
	over 1,200		600-1,200		under 600
Column	1	2	3	4	5
Up to two storey buildings in general	R 120*	R 90*	R 60*	R 30	-
- If the building insulations are not at least class A2-s1, d0	R 120	R 90	R 60	R 30	-
- institutions, accommodation premises basements	R 120	R 90	R 60	R 30	-
3 to 8-storey buildings in general	R 180	R 120	R 60	■	■
Residential or office buildings with 3-4 storeys					
- storeys	R 180	R 120	R 60	R 60[1)]	■
- basement, fire load of less than 600 MJ/m^2			R 60	R 60	■
- basement, fire load 600-1,200 MJ/m^2		R 120		R 120	■
- basement, fire load over 1,200 MJ/m^2	R 180			R 180	■
Building over 8 storeys	R 240	R 180	R 120	■	■
Under the top of the underground basement located basement storeys	R 240	R 180	R 120	R 120	R 60
Class requirements of the upper roof construction, if the attic insulation is at least class A2-s1, d0-class, or the insulation is protected by class P1 buildings, K_2 60 "protective covering, or EI 60 construction part and the P2-class buildings, class K_2 30-protective covering or part of EI 30 structure.					
- maximum 2 storeys no attic; constructions, which **are** an essential part of load bearing or bracing of the building [2)]	R 60	R 60	R 60	R 30	-
- maximum 2 storeys no attic; structures, which **are not** an essential part of load bearing or bracing of the building [2)]	R 15	R 15	R 15	R 15	-
-					
Cavities, attics or roof structures which are not essential to the building frame load-bearing or fire-hull stiffening structures	-	-	-	-	-

Notes to the table: The fire resistance time requirement of balconies is half of that of the load-bearing constructions of the storey.
Alleviations are permitted in production and storage buildings in accordance with the guidelines E2 of the National Building Code of Finland.

Added parts are underlined, deleted parts are struck through.

1) insulation, and other fillings must be at least A2-s1, d0-class materials.
If the load-bearing structures of the building are not at least class A2-s1, d0, then the building will be equipped with automatic fire-extinguishing equipment and the structures are protected against ignition, carbonization, or other damages, minimum in accordance with 6.2.2.

2) Guideline: Essential elements in the load-bearing frame or bracing in table 6.2.1 are primary beams and roof trusses, stiffening stringers and stiffeners in the roof and other such individual structures that act to maintain the stability of the roof, as well as the joints between. Other structural parts are not essential elements in the structural frame or bracing of the building.

Notes to the table:

*	=	if the load-bearing structures are not at least class A2-s1, d0 in the building, then insulation and other fillings must be at least of class A2-s1, d0-materials
	=	the load-bearing constructions shall be made of materials at least of class A2–s1, d0
-	=	no classification requirement
■	=	not possible

Added parts are underlined, deleted parts are struck through.

TABLE 6.2.2 CLASS P2-OVER TWO STOREYS HIGH BUILDINGS, AUTOMATIC FIRE EXTINGUISHER AND PROTECTION OF THE STRUCTURES

	Automatic fire extinguishing equipment	Protective covering room side [a]	Protective covering outer space side [b]	Explanation
Residential and office buildings 3-4 storeys	Residential Buildings: class 2 (SFS INSTA 900-1) or the equivalent level of performance. Workplace Buildings: OH (SFS EN 12 845) or equivalent level of performance.	K_2 10, A2-s1, d0	K_2 10, A2-s1, d0	SFS-INSTA 900-1 "Residence sprinkler equipment. Part 1: Design, installation and maintenance " SFS-EN 12845 "Fixed fire extinguishing systems. Automatic sprinkler systems. Design, installation and maintenance "
Residential and office buildings 3-4 storeys	Ei	K_2 60, A2-s1, d0, or part of the protective structure of the part EI 60, where plates A2-s1, d0 material. Construction layer against the load-bearing structures K_2 10, A2-s1, d0 or NO 15, A2-s1, d0.	K_2 30, A2-s1, d0, or part of the protective structure of the part EI 30, of which construction layer against the load-bearing structures K_2 10, A2-s1, d0 or EI 15, A2-s1, d0.	
Residential and office buildings 5-8 storeys	OH (SFS EN 12 845) or equivalent level of performance. Extinguishing equipment must be equipped with at least a Class B secured simple water source	K_2 30, A2-s1, d0, or part of the protective structure of the part EI 30, of which construction layer against the load-bearing structures K_2 10, A2-s1, d0 or NO 15, A2-s1, d0.	K_2 30, A2-s1, d0, or part of the protective structure of the part EI 30, of which construction layer against the load-bearing structures K_2 10, A2-s1, d0 or EI 15, A2-s1, d0 [c]	SFS-EN 12845 "Fixed fire extinguishing systems. Automatic sprinkler equipment. Design, installation and maintenance "
Notes to the table:		a) In buildings with automatic fire-extinguishing equipment the upper floor protection can be mitigated by the following: K_2 10 => no requirements; K_2 30 => NO 15, A2-s1, d0. b) Load-bearing parts limited to, in outside or ventilation duct constructions, with the exception of the uppermost roof. Balcony structures used as emergency exits are clad with protective curtain of class K_2 30, A2-s1, d0. c) Derogation: protective covering K_2 10, A2-s1, d0, if the elevation is at least of class B-s1, d0. If the cladding meets the requirement for EI 15, in 3-8 floors in the building the protective cladding can be of K_2 10, A2-s1, d0-class material.		

6.2.3

In up to 7-storey P1-fire class residential building for residential use the supporting frame for one additional floor after the construction, with fire load less than 600 MJ/m^2, can be made of D-s2, d2 articles. Height of the building after the construction of additional floor should not exceed 26 meters. For an additional storey, class requirement for load-bearing structures is R 60 and they are clad with protective cladding K_2 30, or protected for EI 30-part. For housing subdivision and partitioning, the structures of class requirements P1-fire class housing requirements shall be used. In additional storeys, the heat insulation and other fillings must be at least class A2-s1, d0-material.

Guideline

If more than one additional storey is added, compliance with the P2-fire class residential building requirements and its number of floors and height limits are used.

6.2 Design based on fire development

6.3.1
When the design of load-bearing constructions is based on a designed fire concept, a building is considered sufficiently fire safe with respect to load-bearing constructions, if:
- a building of more than two storeys does not generally collapse during the fire or cooling phase or
- a building of no more than two storeys does not collapse during the period required for securing evacuation, rescue operations and controlling the fire.

The conditions represented by the designed fire scenario are used as characteristics of the fire development in such a manner that the characteristics are liable to cover the conditions occurring in the building in question.

Explanation
Fire development methodology based on the use of the principles set out in paragraph 1.3.2.

7
PREVENTION OF FIRE FROM SPREADING FROM A COMPARTMENT

7.1 General requirements

1.1.7
Separating building elements and the associated equipment and accessories should be made so that the spreading of fire from one compartment to another is prevented within a stipulated time.

7.2 Classification requirements of partitioning building elements

7.2.1
The class requirements for fire-separating and partitioning building elements are set out in table 7.2.1.

Added parts are underlined, deleted parts are struck through.

TABLE 7.2.1 TION ELEMENTS	**CLASS REQUIREMENTS FOR PARTITIONED CONSTRUC-**					
	Fire class of the building					
	P1			**P2**		**P3**
	Fire load MJ/m^2			Number of storeys		
	over 1200	600-1200	under 600	3-8	1-2	
Column	**1**	**2**	**3**	**4**	**5**	
Fire-partitioning of building elements in storeys	EI 120	EI 90	EI 60	EI 60	EI 30	EI 30
- partitioning building elements (walls and doors of accommodation rooms)	EI 15	EI 15	EI 15	■	EI 15	EI 15
Partitioning building elements in the attics	EI 30	EI 30	EI 30	EI 30	EI 30	EI 30
- partitioning building elements	EI 15	EI 15	EI 15	EI 15	EI 15	EI 15
Partitioning building elements in basements	EI 120	EI 90	EI 60	As P1	EI 60	EI 30
Note to the table:	Class requirements for partitioning building elements implementing partitioning by area of production and storage buildings according to guidelines E2 of the National Building Code of Finland, those of garages according to guidelines E4 and the class requirements of partitioning building elements of boiler rooms and fuel storages according to guidelines E9.					
Note to the table:	■ = not possible					

7.2.2
A construction which fully or in some parts meets the requirements only with respect to integrity E, may be approved as a partitioning building element. This implies that the exiting of persons is not compromised and the fire does not spread to another fire compartment within the required fire-resistance time. If the area of a part meeting only the integrity requirement is more than 0.1 m^2, an appropriate safety distance to passageways in exits and to ignitable materials is required.

Guideline
A partitioning building element meeting the requirements only with respect to integrity E may cause hazard due to thermal radiation.

Covering an area of only minor water integrity qualification E protective distance is determined so that thermal radiation density at this distance does not exceed 10 kW/m2 during the required fire resistance period of the structure.

For constructions with an area of less than 2 m2, which penetrate thermal radiation, the safety distance to passageways in exits and to ignitable materials is 1.5 m.

7.2.3
For building materials used in partitioning building elements is imposed class requirement A2–s1, d0
- for fire-separating walls in exits of buildings of class P1 with more than two storeys and
- for fire-separation of basement spaces, with the exception of basements of buildings of class P3 belonging to only one apartment.

7.2.4
If the partition walls of an exit corridor in a class P2 buildings with more than two storeys include building materials which do not have at least class A2-s1, d0, they must be clad from the room side with materials of at least class K $_2$ 60, A2-s1, d0, and on the corridor side with materials of at least class C $_2$ 30, A2-s1, d0. If the building is equipped with automatic fire-extinguishing equipment, the requirement is at least K $_2$ 30, A2-s1, d0 on both sides.

7.3 Partition doors, windows and shutters

7.3.1
The fire resistance time of a door, window and other building element covering relatively small openings in a fire-separating building element shall in general be at least half of the fire resistance time required for the fire-separating element.

Guideline:
For doors of class E, the safety distance is to be determined in accordance with paragraph 7.2.2.

7.3.2
A partition door shall in general be self-closing and self-bolting. If the door is kept open in normal use, it shall be equipped with devices that will close the door in the event of a fire.

Guideline
Closing devices are not necessary in fire doors at storey-level of residential apartments.

7.3.3
Partitioning doors in accommodation premises shall be equipped with closing devices.

7.4 Feedthroughs

7.4.1
Necessary pipes, shafts, ducts, wires and flues and the feedthroughs required by conveyors may be mounted through fire-separating building elements, provided that the fire-separating capacity of the building element is not essentially reduced.

7.5 Ventilation equipment

7.5.1
Ventilation equipment shall be made in such a way that they will not increase the hazard of spreading of fire or smoke gases.

The walls of ventilation ducts must in general be made of building materials of at least class A2-s1, d0. The ducts shall be easy to clean.

Explanation
The guidelines regarding the fire safety of ventilation equipment are issued in section E7 of the National Building Code of Finland.

7.6 Attics, cavities, exterior walls and balconies

7.6.1
Attics and cavities shall be built so that the hazard of fire ignition and spreading of fire and smoke in the building is not essentially increased thereby.

Guideline
Voids are separated into parts by effective elements in order to limit the spread of fire. In designing the elements, the need of ventilation of the constructions and other conditions relating to building physics shall be considered.

A building element partitioning the cavity of an attic and the uppermost floor will be extended to the roof.

The eaves cavity is partitioned so that fire cannot easily circumvent from the outside: for instance a sufficiently wide strip of material of class B-s1, d0 may be used.

7.6.2
External walls and balconies shall be constructed so that fire will not spread via them in a hazardous manner.

Guideline
In designing the constructions of external walls, the hazard of fire spreading along the external surface of the external walls, within the construction of external walls and through the joints of external walls and the fire-separating building elements shall be considered.

In designing windows the hazard of fire spreading from one fire compartment to another through windows of opposite or cornering external walls is considered.

Explanation
An external wall is in general not fire-separating; the use of an external wall as a fire-separating wall is set out in Chapter 9.

8
LIMITING THE FIRE GROWTH

8.1 General Requirements

8.1.1
Building materials which do not contribute to fire growth in a hazardous manner shall be used in the building.

Guideline
Building materials must not contain substances that burn without atmospheric oxygen. The materials to be used must not contain substances which, through combustion, generate toxic gases in an exceptional manner or waste which is harmful to the environment.

8.2 Internal surfaces

8.2.1
When assessing the fire-technical characteristics of walls, ceilings and floors, the contribution of the materials to the fire, the time to flashover, the release of heat and the production of smoke and flaming droplets shall be considered.

8.2.2
The class requirements for internal surfaces are set out in Table 8.2.2.

The class requirements do not apply to building elements with a small area such as ordinary doors, windows, attachment surfaces, handrails, baseboards and the joints between boards. The requirements also do not apply to beams and columns of at least class R 30 which are at least of class D-s2, d2.

Guideline
Surfaces may be coated with ordinary layers of filler, putty and paint or wallpapers.

The requirements in the Table are also applied to the surfaces of pipes, ventilation ducts and the surfaces of their insulation materials, unless their quantity is small.

Added parts are underlined, deleted parts are struck through.

TABLE 8.2.2	**CLASS REQUIREMENTS FOR INTERNAL SURFACES**			
Use of the building	**Object**	**Building's fire resistance class**		
		P1	**P2**	**P3**
Dwellings	walls and ceilings	D-s2, d2 [1)]	B-s1, d0 [2)]	D-s2, d2 [1)]
	floors	-	-	-
Accommodation premises	walls and ceilings	D-s2, d2	B-s1, d0	D-s2, d2
	floors	-	-	-
Institutions	walls and ceilings	B-s1, d0	B-s1, d0	D-s2, d2
	floors	D_{FL}-s1	D_{FL}-s1	-
Assembly and business premises				
- fire load less than 600 MJ/m^2 ja				
- area is ≤ 300 m^2	walls and ceilings	D-s2, d2	D-s2, d2	D-s2, d2
	floors	-	-	-
- area is over 300 m^2	walls and ceilings	C-s2, d1	C-s2, d1	D-s2, d2
	floors	-	-	-
- fire load ≥ 600 MJ/m^2	walls and ceilings	B-s1, d0	B-s1, d0	B-s1, d0
	floors	D_{FL}-s1	D_{FL}-s1	-
Office premises	walls and ceilings	D-s2, d2 [1)]	B-s1, d0 [2)]	D-s2, d2 [1)]
	floors	-	-	-
Production and storage premises				
- fire hazard class 1	walls	D-s2, d2	D-s2, d2	D-s2, d2
	ceilings	D-s2, d2	B-s1, d0	D-s2, d2
	floors	D_{FL}-s1	D_{FL}-s1	-
- fire hazard class 2	walls and ceilings	B-s1, d0	B-s1, d0	B-s1, d0
	floors	$A2_{FL}$-s1	$A2_{FL}$-s1	$A2_{FL}$-s1
Motorcar repair shops and service stations, garages (in garages possibility of extenuation in accordance with section E4 of National Building Code of Finland)	walls and ceilings	B-s1, d0	B-s1, d0	B-s1, d0
	floors	$A2_{FL}$-s1	$A2_{FL}$-s1	$A2_{FL}$-s1
Attics and basements				
- usable attics	floors	$A2_{FL}$-s1	D_{FL}-s1	D_{FL}-s1
- unusable attics and low attic spaces and voids	upper surface of the ceil	B-s1, d0	B-s1, d0	-
- basements in general	walls and ceilings	C-s2, d1	B-s1, d0	D-s2, d2
	floors	D_{FL}-s1	D_{FL}-s1	D_{FL}-s1
- rooms for technical service	walls and ceilings	B-s1, d0	B-s1, d0	B-s1, d0
	floors	D_{FL}-s1	D_{FL}-s1	D_{FL}-s1
	boiler room's floors	$A2_{FL}$-s1	$A2_{FL}$-s1	$A2_{FL}$-s1
Exits	walls and ceilings	A2-s1, d0 [3)]	A2-s1, d0	B-s1, d0
	floors	D_{FL}-s1	D_{FL}-s1	D_{FL}-s1
Internal corridors in accommodation and office premises	walls and ceilings	B-s1, d0	B-s1, d0	B-s1, d0
	floors	D_{FL}-s1	D_{FL}-s1	-
Saunas	walls and ceilings	D-s2, d2	D-s2, d2	D-s2, d2
	floors	-	-	-

Symbols in the table: - = no requirement

*

Notes to the table:

1) Minor parts of wall surfaces may be coated with building materials not meeting the requirements of any class.

2) Minor parts of wall surfaces may be coated with building materials of class D-s2, d2. This applies also to walls with a protective covering. In buildings with over two floors the walls and ceilings may be coated with building materials of at least class D-s2, d2, if the premises have been provided with a fire-extinguishing system of performance level OH (SFS-EN 12845) or with a system with similar performance, otherwise the class requirement of the surfaces is A2-s1 , d0.

3) Minor parts of wall and ceiling surfaces may be coated with building materials of class B-s1, d0.

8.2.3

Internal wall and ceiling surfaces in buildings of class P2 shall be provided with a protecting covering material of at least class K_2 10, if the construction is made of materials which are of class C-s2, d1 or worse. However, the requirement does not apply to beams and columns of at least class R 30 of the buildings with not more than two floors.

Explanation
As to the apartment and office buildings with 3-8 floors, the protective covering material requirements that depend on the height and number of floors of the building and on the performance level of the automatic fire extinguishing system have been set out in Table 6.2.2

8.2.4
Requirements of one main class lower may be permitted for surfaces if, considering the use of the fire compartment

- the hazard of ignition or spread of fire is considerably smaller than normal or
- the evacuation possibilities are exceptionally good.

This does not, however, apply to internal corridors, exits or spaces for which the requirement is class D-s2, d2.

Guideline
When considering extenuations on a case-by-case basis, the smoke production and formation of flaming droplets of the building material shall also be taken into account.

8.2.5
When premises have been provided with an automatic fire-extinguishing system, more lenient requirements on surfaces may be permitted.

8.3 External walls

8.3.1
Building materials used in external walls in buildings of class P1 shall be mainly of at least class B-s1, d0.

Guideline
Thermal insulation which is inferior to class B-s1, d0 shall be protected and positioned in such a manner that the fire spreading into the insulation, from one fire compartment to another and from one building to another is prevented. In these cases, plastering or a sheet metal is generally not a sufficient protection.

The framework of external walls in buildings with not more than two floors and the framework of a non-load-bearing external wall in buildings of more than two floors may be made of building materials of class D-s2, d2. If the framework has been made of material of class D-s2, d2,

the insulation shall be made of building material of at least class A2-s1, d0. The framework of load-bearing external walls in buildings with more than two floors shall be made of building materials of at least class A2-s1, d0.

8.3.2
Requirements for building materials of external walls in buildings of class P2 with not more than two floors are imposed only when the material is used as an internal surface of the wall, as a protective covering, as a surface of the ventilation gap or as an external surface of the wall.

The framework of external walls of buildings of class P2 with 3-8 floors may be made of building materials of at least class D-s2, d2.

The insulation material and other filling material shall be in buildings with 3-8 floors at least class A2-s1, d0.

8.3.3
Requirements for building materials of external walls in buildings of class P3 are imposed only when the material is used as an internal or external surface of the wall.

8.3.4
The class requirements for external wall surfaces and the surfaces of ventilation gaps are set out in Table 8.3.4. Concerning balconies, the requirements for external surfaces of external walls shall be observed.

Guideline
Surfaces may be coated with ordinary layers of filler, putty and paint.

Explanation
The requirements for internal surfaces of the external surfaces are set out in paragraph 8.2.

TABLE 8.3.4 REQUIREMENTS OF THE EXTERNAL SURFACES OF THE EXTERNAL WALLS AND THE SURFACES OF THE VENTILATION GAPS

	Building's fire resistance class and use					
	P1		**P2**			**P3**
	Buildings of class P1 in general	Residential and office buildings with not more than 8 floors	Institutions	Residential and office buildings with 3-8 floors	Other buildings of class P2	
External surface of external wall	B-s1, d0 [1)]	B-s2, d0 [2)]	B-s2, d0	B-s2, d0 [2)]	D-s2, d2	D-s2, d2
External surface of ventilation gap	B-s1, d0 [1)]	B-s2, d0 [2)]	B-s2, d0	B-s2, d0 [2)]	D-s2, d2	D-s2, d2
Internal surface of ventilation gap	B-s1, d0	B-s1, d0	B-s1, d0	A2-s1, d0	D-s2, d2	-

Symbol in the Table: **-** = no requirement

Notes to the table: [1)] In buildings of class P1 with not more than 8 floors, a part of the external surface of the external wall may be of class D-s2, d2, if the constructions surrounding such parts protect the wall surface from the spread of fire. Building materials of class D-s2, d2 may be used to a small extent for the fixing of the façade boards in buildings of not more than 8 floors.

In production and warehouse buildings of class P1 with not more than two floors and in assembly and business buildings of class P2 with not more than two floors, materials of class D-s2, d2 may be used for the external surfaces of the external walls and the ventilation gaps if:
- the building is not more than 20 m high,
- the structure of the external walls with its windows and other openings meets the EI 30 requirement,
- the spread of fire caused by external ignition has been prevented in a sufficiently effective manner and
- the spread of fire from the façade to the attic and uppermost floor has been prevented.

2)

In residential or office buildings with not more than 4 floors and in residential or office buildings with not more than 8 floors provided with an automatic fire-extinguishing system, materials of class D-s2, d2 may be used for the external surfaces of the external walls and the external surfaces of ventilation gaps excluding the lowest floor of the building and the upper and lower surfaces of the exits and the windows that are used as emergency exits if:
- the spread of fire in the ventilation gap has been prevented on every floor in a sufficiently effective manner,
- the spread of fire from the façade to the attic and uppermost floor has been prevented,
- falling of large parts of the façade structure in the event of a fire is sufficiently prevented,
- the buildings or structures are not placed closer than 8 metres from the façade, unless the fire spreading is prevented through structural or other means and
- buildings with more than 2 floors with walls with windows or other openings have emergency exits.

8.3.5
For the external surfaces of the external walls and ventilation gaps of an additional floor for residential use with fire load of less than 600 MJ/m^2 of residential buildings of class P1 with not more than 7 floors, the building material used must be of at least class D-s2, d2.

8.4 Roof coverings

8.4.1
Roof coverings shall be made so that a fire does not spread in the roof covering or its substrate in a hazardous manner.

8.4.2
Roof coverings shall in general be of class B_{ROOf}(t2).

8.4.3
Large roof surfaces shall be broken up in parts of not more than 2,400 m^2. The requirement does not apply to cases where the substrate of the roof covering is of at least class A2-s1, d0 or when using the solutions set out in the Table 3 of paragraph 7 in the Annex 'Information for guidance'.

Guideline
The roof surface is divided into parts using vertical or horizontal partitioning elements. They shall as far as possible be located directly above fire-separating walls underneath.

Added parts are underlined, deleted parts are struck through.

8.4.4

Roof coverings not pertaining to class $B_{ROOF}(t2)$ may be permitted in separate buildings without a fireplace, or in special cases also in other buildings, provided this will not cause hazard of localised fire.

Added parts are underlined, deleted parts are struck through.

9
PREVENTION OF FIRE SPREADING TO ADJACENT BUILDINGS

9.1 General Requirements

9.1.1
The fire spreading from one building to another shall not endanger life safety or cause unacceptable property losses or societal consequences.

9.1.2
The distance between buildings shall be such that fire does not spread easily to adjacent buildings and that the hazard of localised fire remains small. If the distance between buildings is less than 8 metres, limitation of the fire spreading shall be ensured through structural or other means.

Guideline
Residential buildings with 1 or 2 floors may be located at least 5 metres from one another, when the total surface area, regarding a wall or a fire compartment, of the parts not meeting the requirements of class EI 30 of the external walls that are less than 8 metres away from the adjacent building is:

- 4 m^2, if the distance from a adjacent building is at least 5 metres
- 8 m^2, if the distance is at least 6 metres
- 12 m^2, if the distance is at least 7 metres

This requires that the buildings belong to the same fire class and the entity thus formed falls below the restrictions imposed on a single building of this fire class regarding the gross floor area and number of occupants.

9.1.3
Roof constructions shall be such that they do not easily ignite from a fire in an adjacent building.

9.2 Firewalls

9.2.1
If a construction work is erected so close to another building that the fire spreading is evident, a firewall shall be used.

Guideline
Buildings located on the same plot of land or building site may in a fire-technical sense be considered as a single building, in which case ordinary fire-separation is sufficient. This requires that the buildings belong to the same fire class and the entity thus formed falls below the restrictions imposed on a single building of this fire class regarding the gross floor area and number of occupants.

When an external wall is used as a fire-separating wall its unsymmetrical construction and the effects of heat radiation and possible window openings shall be considered.

9.2.2

The class requirements for firewalls are set out in Table 9.2.2.

In buildings of class P1 the firewalls shall be made of building materials of class A1.

Added parts are underlined, deleted parts are struck through.

TABLE 9.2.2 CLASS REQUIREMENTS FOR FIREWALLS

	Building's fire resistance class				
	P1		**P2**		**P3**
	Fire load MJ/m^2				
	over 1,200		600-1,200		under 600
Column	**1**	**2**	**3**	**4**	**5**
FIREWALL	EI-M 240	EI-M 180	EI-M 120	EI-M 120	EI-M 60

Symbol in the Table: ☐ = building material of class A1 is required

Guidelines
Roof constructions and insulation materials shall be discontinuous at the firewall. If the materials are at least of class A2-s1, d0, no partitioning is required. If the difference in height between roofs is less than 300 mm, the firewall shall be extended above the roof by at least 300 mm. This may be replaced by a sufficient horizontal partitioning. If the fire load exceeds 1,200 MJ/m^2 the firewall shall be extended above the roof by at least 750 mm, and the extension in height may in general not be replaced by a horizontal partitioning.

The firewall is to be extended sideways by at least 100 mm, and if the fire load exceeds 1,200 MJ/m^2, by at least 750 mm beyond the wall line. Alternatively a partitioning structure in the direction of the wall may also be used.

9.2.3
The fire resistance time of doors or corresponding building elements in firewalls shall be at least the same as the fire resistance time required for the firewall. Doors in firewalls in buildings of class P1 shall be of class A2-s1, d0.

10
EVACUATION IN THE EVENT OF A FIRE

10.1 General Requirements

10.1.1
It must be possible to leave a building safely in case of fire or other emergency. A building shall be provided with an adequate number of appropriately located exits which are sufficiently spacious and easily passable, so that the time to evacuate the building will not be so long as to cause danger.

Guideline
A lift or other similar device is not considered as an exit. It must be possible to transport persons who are unable to move with a stretcher through an exit from each evacuation area.

Passageways in an evacuation area, which leads to an exit, must be sufficiently spacious and easily passable. Passageways leading to an exit may include stairs between

different levels only if the levels can be considered to belong to the same evacuation area.

10.1.2
Exits shall lead outside to the ground level or to some other safe place in the event of a fire.

10.2 Distance to exits

10.2.1
The distance to an exit from each point of an evacuation area is determined along the shortest passable route. If the routes to two separate exits partly join, the length of the common part is counted to twice its length.

Guideline
If a passable route is not known beforehand, the distance is determined along the route following the direction of the walls.

For office or accommodation rooms, classrooms in schools, or similar rather small rooms with access to an exit through an internal corridor, the distance to the exit is measured from the door of the room to the door of the exit.

10.2.2
The maximum permitted distance to the nearest exit is set out in Table 10.2.2.

TABLE 10.2.2	**MAXIMUM LENGTH OF PASSAGEWAYS TO EXIT**
Use of the building	**Length of passageway** (m)
Dwellings	
- one exit	30
- several exits	45
Accommodation premises	30
Institutions	30
Assembly and business premises	
- in general	45
- shops	30
Office premises	
- in general	45
- only one exit	30
Production and storage premises and garages	
- in general	45
- only one exit	30

Guideline
The distances in Table 10.2.2 may be exceeded if
- evacuation in the event of an emergency is possible on a ground-level floor through windows, which can be opened or
- the building has been provided with an automatic fire extinguishing system.

Shorter maximum distances of passageways than those in the Table may be required if an exceptional risk of rapid ignition and spread of fire due to a special use of the premises endangers safe evacuation.

10.3 Number of exits

10.3.1
Each evacuation area of a building where people are staying or working otherwise than temporarily shall in general be provided with at least two separate and appropriately located exits.

Guideline
When an exit is intended to be used only in the event of a fire or other emergencies and when the number of evacuees is small, the exit does not need to meet all prescribed requirements.

10.3.2
One exit is allowed in buildings of not more than 8 floors if the category of use of the evacuation area is dwelling, office premises of less than 300 h-m^2 or production or storage space of less than 300 h-m^2. In these cases the evacuation area must additionally be provided with a fire escape through which it is possible for the evacuees to reach safety by their own means or by measures taken by the fire department.

Guideline
An appropriately located balcony or a window opening through which it is possible to escape to the ground level or to some other safe place in the event of fire either by rescue actions, along a fixed ladder or by using other suitable building elements, may be considered as a fire escape.

If the drop height from a balcony or a window to the ground level or some other safe place in the event of fire is not more than 3.5 m, a fixed ladder is not required.

If the drop height from a balcony or a window used as a fire escape to the ground level or some other safe place in case of fire in a building of class P3 or P2 with 2 storeys is more than 3.5 m, access to safety shall always be secured with a fixed ladder.

A window which is used as a fire escape shall be made easy to open. It's free opening shall be at least 600 mm in height and 500 mm in width, so that the sum of height and width is at least 1,500 mm.

The fire escape arrangements shall be negotiated with the local rescue authority.

10.3.3
One exit may also be permitted in small accommodation premises and institutions and in small assembly and business premises if this does not endanger the safety of the occupants. The evacuation areas shall in general also be provided with a fire escape.

Guideline
One exit is sufficient for instance in accommodation premises with one storey, in which the rooms are reached directly from the outside. One exit may also be considered adequate for an institution intended for not more than ten persons in care and for small cafes, kiosks and shops.

10.3.3

One exit corridor may be permitted even in small accommodation and nursing homes as well as small assembly and business premises, if this does not pose a risk to personal safety. Evacuation areas must generally in addition have a fire escape.

Guideline
One exit is sufficient for example, in one-storey accommodation buildings, in which the rooms are accessed directly from outdoors. One exit can be considered sufficient to a maximum of ten occupants in a nursing home and in a small coffee place, kiosk or small shop.

10.4 Exit dimensions

10.4.1
The minimum width of the exit corridor is calculated on the basis of the number of occupants using it. The number of persons in an evacuation area can be divided between different exits and the widths of the exit corridors are added together.

The highest number of occupants intended to be present in an evacuation area shall primarily be used as the number of occupants. If in one exit there are a number of evacuation areas, the width of the exit is calculated using the largest evacuation area.

Guideline
If the number of persons is not known, or if it is not used, it may be assessed on the basis of the area and use of the premises in accordance with table 10.4.1.

TABLE 10.4.1 ESTIMATION OF THE NUMBER OF OCCUPANTS BASED ON THE AREA

Usage	**Floor area** (m^2/person)
Dwellings	10
Accommodation	10
Institutions	10
Assembly and business premises	
- in general	3
- entertainment-, arts- equivalents assembly rooms	1
Workplace facilities	10
Production and storage facilities	30

10.4.2
The width of an exit corridor should generally be at least 1,200 mm.

Guideline
When a stair lift or other device for transport to another level is installed into a staircase of a building, the exit corridor must be
minimum 900 mm wide. When the exit corridor narrows, the staircase must be equipped with
a smoke exhaust hatch or an automatic device for smoke exhaustion, which is engaged at the entrance level.

In an evacuation area where the maximum number of occupants is 60, the second exit may be 900 mm in width. In residential buildings with no more than two storeys, one exit of 900 mm width is permitted.

10.4.3

When the total number of occupants is over 120, the total minimum width of the exits is calculated by adding
400 mm to1,200 mm for every additional 60 occupants.

The width of an internal corridor leading to an exit corridor is calculated in the same way as the width of the exits in accordance with the number of occupants passing along the corridor.

Guideline
When a fire compartment consists of several storeys joined together by open connections and these storeys form evacuation areas of their own, the occupants have to evacuate from different storeys simultaneously through the same exits. In these cases, the adequacy of the exits is assessed also on the basis of a calculation of the evacuation time for all evacuees.

The width of an exit is measured horizontally, perpendicular to the direction of exit. There may be no narrowing obstacles in the inside minimum width other than skirting, edge beams and banisters.

If there are doors in the exit in the direction of the passage, the minimum free exit width of a doorway or the total free width of the doorways located next to each other may be narrower due to the total width of the frames.

10.4.4
The number and width of doors leading to exits and from rooms to internal corridors shall be adequate in relation to the number of occupants using them.

10.4.5
The height of an exit corridor should normally be at least 2,100 mm.

Guideline
Below the minimum height there should be no obstructions, such as bars, pipes and light fixtures. At the doorways, the height may be reduced according to the necessary frames and thresholds.

10.5 Partition and construction of the exists

10.5.1
An exit corridor is usually made into a separate fire compartment.

10.5.2
The exits should, in buildings of class P1, be at least in accordance with table 10.5.2.

TABLE 10.5.2	**EXITS IN BUILDINGS OF CLASS P1**	
Uppermost storey floor height from the ground	**Number of storeys**	**Exit corridors**
Maximum 24 m	Maximum 8	Partitioned
Over 24 m	Maximum 16	Fireproof

Added parts are underlined, deleted parts are struck through.

Over 24 m	Over 16	One fire- and smoke-proof, the others fireproof

10.5.3
The flights of stairs and landings of an exit in buildings of class P1 with more than two storeys must be made of building materials at least of class A2–s1, d0. When the fire load of the rooms leading to the exit is less than 600 MJ/m2, the flights of stairs and landings shall meet the requirements of class R 30. When the fire load is greater, the corresponding requirement is R 60.

10.5.4
Exits stairways and landings and the supporting structures of 3-8 storey P2 building must be covered, with the exception of tops of stair surfaces, with minimum K_2 30, A2-s1, d0-class material, or protected with at least EI 30 for part of the construction, and A2-s1, d0 class materials when the structures have been made of materials which are not at least class A2-s1, d0. The flights of stairs and landings together with the supporting structures of class P2 building must meet the requirements of class R 30.

10.5.5
Materials, building elements or devices, which increase the fire load or endanger the safety of people due to their smoke production should not be placed in exits.

10.6 Opening doors and lighting and marking of exit routes

10.6.1
Doors located in the direction of the exit passage should in general open in the direction of the exit.

10.6.2
Doors which are necessary for exit must open in the direction of the exit if the number of occupants evacuating through the door exceeds 60.

Explanation
These are doors through which there is access to outside, to an exit or to an internal corridor leading to an exit.

10.6.3
The doors of exits and of areas leading to the exits shall be easily accessible in an emergency.

Guideline
Locks which can be double-bolted without a key in such a way that they cannot be opened from the inside without a key shall not in general be used for exit doors or doors leading to exits.

Locks which can **always** be opened from inside without a key shall be used in exit doors and the doors leading to exits
- in accommodation premises and
- in institutions, where the nature of activity does not require separation.

Locks, which **during normal use of premises** can be in an emergency opened from the inside without a key are used in
- assembly and business premises,
- office premises and
- production and storage facilities.

Access control arrangements should not prevent a safe exit from the building.

10.6.4
Exits of accommodation, institutions, assembly and business premises, and passageways to these exits shall in general be provided with emergency and exit lighting.

Guideline
In addition, other premises from which evacuation may otherwise be difficult shall be provided with emergency or exit lighting, or both.

10.6.5
If the doors of exits and access to them are not clearly visible, or if other doors may confuse the evacuees, the exits, and the access to them should be marked when needed.

10.7 Calculation of evacuation time

10.7.1
In places where personal safety is of particular importance and where the evacuation-safety risks depend on the way the premises are used, and on the restricted or reduced capabilities of the occupants, a calculation of the evacuation time for the specific building may be requested.

Guideline
The calculation of evacuation time is used as a basis for working out the safety assessment set out in clause 11.7.

10.7.2
A calculation of the evacuation time may also be necessary for other targets, if considerable size or exceptional circumstances in them may endanger the safety of persons.

11
ORGANISATION OF EXTINGUISHING AND RESCUE OPERATIONS

11.1 General requirements

11.1.1
The prerequisites for extinguishing fires and rescuing people shall be ensured in a building and its vicinity.

11.1.2
If the location, considerable size or exceptional circumstances of a building pose a particular danger to the safety of the occupants or to fire safety, it may be required that the building be provided with devices or arrangements which improve the fire safety in connection with the issuing of the building permit.

11.1.3
When selecting equipment for the improvement of fire safety, one has to make sure that their mode of operation and properties are suitable for the object.

Explanation

The Ministry of the Interior issues technical regulations and guidelines for devices intended for improvement of fire safety.

11.1.4
Installations, which are expected to operate during a fire, should be made so that their effectiveness is maintained for the required period.

11.1.5
The owner or possessor of a building shall supervise the working order of the fire safety devices.

11.2 Access to fire-extinguishing points

11.2.1
Possibilities for an adequate access to buildings and water supply facilities in the area (fire lane) for the fire and rescue service equipment should be planned.

Explanation

The Ministry of the Interior provides the decrees and guidelines for fire lane marking.

11.2.2
Access should be provided to each fire compartment of an attic for extinguishing operations.

11.2.3
Extinguishing routes should be arranged so that basement storeys can be reached from ground level without a need to pass through the exits of the storeys. The minimum width of the extinguishing route is 900 mm.

Guideline
A separate extinguishing route is not required for the basement of a single dwelling.

Extinguishing routes of basement storeys should not be connected to fire- and smoke-proof exits. Connections may be made to fire-proof exits through exit enclosures and to fire-separated exits through fire doors.

11.2.4
In buildings with more than 16 storeys, lifts shall be equipped with such devices that the lifts can be used for rescue and extinguishing operations.

11.3 Smoke detector and automatic fire alarm

11.3.1
Smoke detectors connected to the main power supply should be installed into the following premises.

- dwellings individually,
- accommodation premises with accommodation rooms for not more than 50 persons,
- institutions with not more than 25 beds,
- daycare premises and
- buildings of class P2 with 3–4 storeys.

Guideline
The operation of the installation should be designed to alarm the personnel or those in danger

so rapidly that there will be enough time for rescue or escape to safety from the hazardous part of the building.
The power supply of the device is ensured for example with a battery or an accumulator.

11.3.2
An automatic fire alarm installation should be installed into accommodation premises and institutions with a higher number of occupants than stated in the previous clause.

11.3.3
If an automatic fire alarm installation is installed into a building or its fire compartment, derogations may be permitted concerning:

- the regulations pertaining to the gross floor area of the building and the area of its fire compartment, provided the fire load is less than 600 MJ/m2 and the relevant premises are not for accommodation,
- the regulations intended to prevent the spreading of fire to neighbouring buildings or to abate the danger of a localised fire.

Explanation
These include provisions on the distance between buildings and the firewall.

When granting derogations it must be ensured that effective extinguishing operations can be commenced sufficiently swiftly.

11.4 Smoke evacuation

11.4.1
Means should be designed and constructed in a building for adequate smoke evacuation suitable for the different premises of the building.

Guideline
The arrangements for smoke evacuation do not require particular measures, if window openings and doorways can be used for smoke evacuation or if the smoke can be exhausted through actions of the fire department.

11.4.2
Means ought to be provided for the evacuation of smoke from, and for the flow of replacement air, to fire-separated exits and fire-separated lift shafts.

Guideline
In two-storey buildings of classes P2 and P3, the means for smoke evacuation from the second-floor exit corridor should be arranged through a window or hatch, simple to open or break, and with an area of at least 0.5 m2.

In buildings of no more than 8 storeys the means for smoke evacuation from the upper part of the exits should be arranged through a window or hatch with an area of at least 1.0 m2, which is simple to open or break.

When designing smoke evacuation from the exits in buildings with more than 8 storeys, it must be ensured that smoke and combustion gases will not endanger the evacuation from the premises connected with the exits.

Arrangements regarding smoke evacuation should be negotiated with local rescue authorities.

11.4.3
Means should be provided for smoke evacuation from the spaces of the basement floor, so that it will not be necessary to use fire separated exits or fire-separated extinguishing routes for smoke evacuation.

11.4.4
If justified causes make it necessary, smoke evacuation should be arranged using special measures, such as smoke vents, smoke venting windows, or windows located in the upper part of the rooms, which are simple to open.

11.4.5
If an automatic smoke exhaust installation which gives a fire alarm during operation is installed in a building or its fire compartment, derogations may be allowed concerning:
- the regulations relating to the gross floor area of the building and the area of its fire compartment,
- the regulations relating to constructions, so that a slower rise in temperature may be applied for the design.

When considering derogations, attention should be paid to the possibility of extinguishing or controlling a fire in its initial stage without endangering the safety of people.

11.5 Fire extinguishers

11.5.1
When required, a building should be provided with appropriate first-aid extinguishing equipment, so that the occupants of the building will be able to start extinguishing operations at the beginning of a fire.

Guideline
The need and type of first-aid extinguishing equipment is defined by the local rescue authority.

Explanation
First-aid extinguishing equipment for production and storage premises and garages are considered in parts E2 and E4 of the National Building Code of Finland.

11.5.2
Dry rising mains for extinguishing operations should be installed in each staircase in all buildings with more than 8 storeys.

11.5.3
If an automatic fire extinguishing installation is installed into a building or its fire compartment, derogations may be permitted concerning:
- the regulations relating to the gross floor area of the building and the area of its fire compartment,
- the regulations on the length of the exit corridors,
- the regulations on the classification of fire load,
- the regulations on constructions, so that the slower rise in temperature in general and the cooling of load-bearing constructions may be applied for the design,
- the regulations on surfaces,
- the regulations intended to prevent the spreading of fire to neighbouring buildings or to abate the danger of a regional fire.

When considering derogations, attention should be paid to the possibilities that the rescue personnel have to extinguish or control a fire at its initial stages without endangering the safety of people.

11.6 Limitation signs

11.6.1
If the application for a permit relates to a design, which is based on a smaller number of occupants than the size of the building would allow, or on an exceptionally small fire load, a sign indicating this limitation shall be placed in the building in an easily seen place.

11.7 Safety assessment

11.7.1
In places where personal safety is of particular importance and where evacuation-safety risks depend on the way the premises are used, and on the restricted or reduced capabilities of the occupants, an assessment should be worked out at an early stage of the design work. The structural and other means which are necessary for reaching a sufficient level of safety are based on this assessment. The safety assessment is prepared in consultation with the designers and users of the building, the authorities responsible for safety issues, and other necessary parties.

Guideline
The building works referred to above include institutions, accommodation premises and dwellings which are intended for occupants whose evacuation capabilities are inferior to normal, due to their reduced capabilities.

Critical factors affecting the operational capacity of persons in fire situations are perceptive, comprehensive and locomotion faculties.

The chief planning officer is responsible for ensuring that the necessary input data needed are available for the design.

For preparation of the safety assessment, safety related information is needed from all parties concerned. The party managing the activities shall define the nature of the activities and the available resources. The chief planning officer shall define the issues related to the building. The rescue department shall provide information on operational readiness.