

BUILDING CODES AND REGULATIONS

PRODUCTION BUILDINGS

SNiP 2.09.02-85*

Official Edition

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Kositskiy central institute of standard design and urban development, CJSC

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INTRODUCED by TsNIIpromzdanii of the USSR Gosstroy.

PREPARED FOR APPROVAL by the Main Directorate of Technical Regulation of the USSR Gosstroy (N.N.Polyakov).

With putting into effect of SNiP 2.09.02-85* "Production Buildings" the chapter of SNiP II-90-81 "Production Buildings of Industrial Enterprises" becomes invalid.

Introduced into SNiP 2.09.02-85* are changes No.1 and No.2 approved by Resolutions of the USSR Gosstroy No.196 of 27 September 1988 and No.18 of 24 April 1991.

The items and tables into which the changes were introduced are marked with an asterisk in the present Building Codes and Regulations.

While using the normative document one should take into account the approved changes of building codes and regulations and state standards published in the journal "The Bulletin of Building Technology" and the information index "State Standards" of Russia's State Committee of Standards.

To readers' attention!

On page18 there is Change No.3 to SNiP 2.09.02-85* "Production Buildings" approved by Resolution No.18-23 of Russia's Gosstroy of 31 March 1994. Date of putting into effect of Change No.3 is July 1994.

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USSR Gosstroy	Building Codes and Regulations	SNiP 2.09.02-85*
	Production Buildings	Instead of SNiP II-90-81

The present codes extend to design of production buildings¹ and spaces as well as laboratory buildings¹ and spaces*.

The present codes do not extend to the design of buildings and spaces for production and storage of explosives and blasting supplies, underground buildings*.

1. GENERAL

1.1 By their explosion-fire and fire hazard the spaces and buildings are subdivided into categories (A,B,B,Г,Д) depending on production processes used in them and properties of available (handled) substances and materials.

The categories of buildings and spaces are established in the design's process part in compliance with the all-Union codes of the process design "Determining categories of spaces and buildings by their explosion-fire hazard" (ONTP 24-86) approved by the USSR Ministry of Internal Affairs, department process design codes or special lists approved in the established procedure.

1.2 The total area of a building is determined as a sum of all storey areas (above surface, including utility services storeys, lower cellar and basement storeys), measured within internal surfaces of external walls (or axes of extreme columns where there are no external walls), tunnels, internal platforms, mezzanine floors, all tiers of internal stacks, ramps. Galleries (horizontal projection) and passages to other buildings².

The total building's area does not include crawl space areas less than 1.8 m high to the bottom of projecting elements (where no passages are required to service utility lines), above suspended ceilings designed according to 2.16 as well as platforms for servicing crane tracks, cranes, conveyors, monorails and luminaries.

The area of spaces occupying two and more storeys by height within a high-rise building (with two and multiple tiers of windows) should be included into the total area within one storey.

1.3 Automatic fire-extinguishing and fire alarm systems (including fire warning systems) in buildings should be provided in conformance with all-Union and departmental normative documents and lists of buildings and spaces subject to equipping with automatic Fire-extinguishing units, automatic fire alarms and warning systems approved by ministries and departments in the established procedure.

2. SPACE-PLANNING AND STRUCTURAL CONCEPTIONS

Space-Planning Conceptions

2.1 Space-planning conceptions of buildings and spaces shall provide a possibility of renovation and technical re-equipment of production, change of production processes and transfer to new product types.

2.2* In design of buildings one should:

Unite, as a rule, in one building the spaces for different production processes, storage, administrative and service spaces as well as spaces for mechanical equipment;

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¹ BELOW – BUILDINGS.

² THE TERMS AND DEFINITIONS ARE PRESENTED IN THE MANDATORY APPENDIX.

assume the number of storeys in the range established in 2.7 on the basis of comparison of technical and economic indices referring to arrangement of production facilities in buildings of different height and with consideration of high quality architectural conceptions;

assume space-planning conceptions of buildings with account of reducing the area of external enclosing components;

assume the area of light openings in compliance with the codes of natural and artificial lighting design considering the requirements in 2.42;

assume buildings without light openings, if it is allowed by process conditions, sanitary-hygienic requirements and is economically expedient;

use primarily buildings, structures and pre-assembled modules of mechanical and process equipment in the form of factory-made complete blocks;

develop space-planning conceptions with account of the necessity to reduce dynamic effects on building components, production processes and personnel caused by vibro-active equipment or external sources of vibrations.

2.3 Architectural conceptions of buildings should be assumed with account of town planning, climatic conditions of a construction area and the nature of built environment. The interior color finish should be provided in conformance with GOST 14202-69 and GOST 12.4.026-76.

2.4* Geometric parameters of buildings – modular dimensions of bays, column spacings and storey shall conform to the requirements of GOST 23838-89 (STCMEA 6084-87), those of mobile (prefabricated) buildings –GOST 22853-86. In development of existing building renovation designs it is allowed to deviate from the parameters specified, if they are substantiated in the design's process part.

2.5 The height of single-storey buildings (from the floor to the bottom of horizontal load-bearing components on supports) shall be at least 3 m, the storey height of high-rise buildings (from the landing floor in the given storey to the landing floor of the next floor), except the height of utility service storeys, shall be at least 3.3.m.

2.6 In spaces the height from the floor to the bottom of the roof (floor) projecting elements shall be at least 2.2 m, the height from the floor to the bottom of projecting parts of service lines and equipment in regular human passages and in means of egress –at least 2 m, while in non-regular human passages – at least 1.8 m. When it is required for fire engines to enter the building ,the driveway height shall be at least 4.2 m to the bottom of projecting parts of utility lines and equipment.

2.7 The fire-resistance degree of buildings, the allowable number of storeys and the floor area within a fire compartment (below – floor area) should be assumed according to Table 1.

When equipping spaces with automatic fire-extinguishing units, the floor areas specified in Table 1 are allowed to be increased by 100%, except buildings of IIIa and IIIb fire-resistance degrees.

Floor areas and allowable numbers of storeys are established for buildings with spaces of the same category. If a building has spaces of different categories, the floor area and the allowable number of storeys are determined by the common category of the building (or a fire compartment) which is established in the design's process part in conformance with the process design codes.

With available unobstructed process openings in the floors of adjacent storeys the total area of these storeys shall not exceed the floor area specified in Table 1.

2.8* In single storey buildings of IV a fire-resistance degree it is allowed to arrange spaces of categories A and B with the total area of not more than 300 m². The above spaces shall be isolated with fire walls of the 1st type and floors of the 3d type. External walls of these spaces shall be made from non-combustible or slow-burning materials.

It is allowed to design single-storey mobile buildings of IVa fire-resistance degree and categories A and B with the area of not more than 75m².

Table 1*

Category of buildings of fire compartments	Allowable number of storeys	Fire-resistance degree	Floor area within fire compartment, m ² , in buildings		
			Single-storey	Multi-storey	
				With two storeys	With three and more storeys
A, Б	6	I	Not limited		
A, Б (except buildings in the oil-processing, gas, chemical and petrochemical industries)	6 1	II IIIa	5200	Same -	-
A – buildings in the oil-processing, gas, chemical and petrochemical industries	6 1	II IIIa	Not limited 3500	5200 -	3500 -
Б – buildings in the oil-processing, gas, chemical and petrochemical industries	6 1	II IIIa	Not limited 3500	10400 -	7800 -
Б	8 3 2 1 2* 2 1	I, II III IIIa IIIb IVa IV V	Not limited 5200 25000 15000 2600 2600 1200	limited 3500 10400** - 2000 2000 -	2600 - - - - -
Г	10 3 6 1 2* 2	I, II III IIIa IIIb IVa IV	Not limited 6500 Not limited 20000 6500 3500	limited 5200 limited - 5200 2600	3500 - - - -
Д	10 3 6 1 2* 2 2	I, II III IIIa IIIb IVa IV V	Not limited 7800 Not limited 25000 10400 3500 2600	limited 6500 limited - 7800 2600 1500	3500 - - - - -

*At height of one- and two-storey buildings of not more than 18 m (from the first storey floor to the bottom of horizontal roof bearing components on support).

** When equipping fire-hazardous spaces in two-storey buildings with automatic fire-extinguishing units.

Notes: 1*. In buildings of I, II, III and IIIa fire-resistance degrees instead of fire walls it is allowed to use fire protection zones of the 1 st type.

2. Timber-sawing shops with up to four frame saws, wood-working shops for primary wood-processing and wood-chipping stations are allowed to be housed in two-storey buildings of V fire-resistance degree with the floor area of 600m².

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3. Spaces of category Б in the flour-and –cereals and animal feed industries are allowed to be housed in buildings of I and II fire-resistance degrees with the number of storeys up to 8 inclusive.

4. When determining the number of storeys the account is to be taken of platforms, tiers and mezzanines the areas of which at any elevation is over 40% of the building floor area. In this case the requirements to the floor area are the same as for a multi-storey building.

5*. It is allowed to design buildings of IIIa fire-resistance degree and B category with the number of storeys from 3 to 6 inclusive when using enclosing components (walls and roofs) with the zero flame-spread limit, roof slabs with 0.75 h fire-resistance rating, equipping fire-hazardous spaces with automatic fire-extinguishing units and isolating these spaces with fire walls of the 1st type. The floor area for buildings with three and more storeys should be assumed not more than 10400m². In one-storey buildings of IIIa fire-resistance degree and B category, when using enclosing components (walls and roofs) with the zero flame-spread limit, floor slabs with 0.75 h fire-resistance rating and isolating fire-hazardous spaces with fire walls of the 1st type, it is allowed to assume the floor area not more than 50000m², if spaces of categories А,Б and В are equipped with automatic fire-extinguishing units.

6. The floor area in buildings of II fire-resistance degree where wood-working facilities are to be housed, should be assumed for: two-storey buildings – not more than 7800m², three and more storeys – not more than 5200m².

7*. Laboratory buildings of research institutes dealing with natural and technical sciences of the I and II fire-resistance degrees and B category are allowed to be designed up to 10 storeys high inclusive (when using the tenth storey as a utility one and with the finished floor elevation in the upper working storey of not more than 30 m from the planning ground level).

¹Types of fire walls to be assumed in conformance with SNiP 2.01/02-85*.

2.9 Spaces of categories А and Б should be arranged at external walls and in multi-storey buildings – in upper storeys, if it is allowed by process requirements.

Arrangement of spaces of categories А and Б in lower and basement storeys is not allowed.

2.10* When arranging in one building or space the production processes with different explosion-fire and fire hazards, one should provide measures preventing explosions and fire spreading. Efficiency of these measures shall be proved in the design's process part. If the above measures are not sufficiently effective, the production processes with different explosion-fire and fire hazards should be arranged in separate spaces; in this case spaces of categories А, Б and В should be separated one from another, as well as from spaces of categories Г and Д and corridors with fire walls and fire-resisting floors of the following types:

In buildings of I fire-resistance degree – fire walls of the 1st type¹, fire-resisting floors (inter-storey and over basements) of the 2nd type;

In buildings of II, III and IIIb fire-resistance degrees – fire partitions of the 1st type, in buildings of IIIa fire-resistance degree – of the 2nd type(0.75), in buildings of IV a fire-resistance degree the spaces of category В – fire walls of the 2nd type, spaces of categories А and Б – in conformance with 2.8, fire-resisting floors (inter-storey and over basements) of the 3d type;

In buildings of IV fire-resistance degree – fire resting floors of the 3d type over basement.

When arranging in the space the production processes with the same explosion-fire and fire hazard, the necessity of their separation one from another with partitions as well as arrangement of vestibule-locks where there are openings in these partitions, shall be substantiated in the design's process part; the use of fire walls is not mandatory, except the cases provided by the process design codes.

2.11 In locations of openings in fire walls separating spaces of categories А and Б from spaces of other categories, corridors and staircase, one should provide vestibule-locks with a constant excess air pressure in conformance with the requirements of SNiP 2.04.05-86. Enclosing components of vestibule-locks should be designed in conformance with SNiP 2.01.02-85*. Arrangement of common vestibule-locks for two and more spaces of the above categories is not allowed.

2.12 When in fire walls the provision is made for openings than cannot be closed with fire doors or gates, for communication between adjacent spaces of categories В,Г and Д in locations of these openings one should provide open (without doors or gates) vestibule-locks of at least 4m long equipped with automatic fire-extinguishing units at the run 4 m long with the volume water flow rate of 1 l/s per 1m³ of the vestibule-lock enclosing elements shall be fire-resisting with 0.75 h rating.

2.13 When it is necessary to arrange openings that cannot be closed with fire doors or gates in fire walls separating spaces of categories А and Б from other spaces, one should provide a complex of measures preventing fire spread and penetration of combustible gases, vapors of flammable and combustible liquids, dust, fibers capable to form explosive concentrations into adjacent storeys and spaces; efficiency of these measures shall be substantiated in the design's process part.

2.14* Basements, when spaces of category B are arranged in them, shall be divided by fire walls of 1st type into parts, each being not more than 3000m² in area, the width of each part (measuring from an external wall) shall not, as a rule, exceed 30 m. In these spaces one should provide windows of at least 0.75 m wide and at least 1.2 m high. The total window area should be assumed at least 0.2% of the space floor area. In spaces over 1000 m² in area one should provide at least two windows. Floor slabs over basements shall have at least 0.75 h fire-resistance rating.

Corridors shall be at least 2 m wide with exits directly outside or through isolated staircases. Partitions separating spaces from corridors shall be fire-resisting of the 1st type.

Basements with spaces of categories B which according to process requirements cannot be arranged at external walls, should be divided with fire walls into parts each being not more than 1500m² in area with provision of smoke removal in conformance with SNiP 2.04.05-86.

In basements having exits directly outside the spaces of category B of 700 m² and more in area shall be equipped with automatic fire-extinguishing units, less than 700 m² – with automatic fire alarm systems. In basements having no such exits the spaces of category B of 300 m² and more in area shall be equipped with automatic fire-extinguishing units, less than 300 m² – with an automatic fire alarm system.

2.15 In spaces and corridors one should provide smoke removal in case of fire in conformance with SNiP 2.04.05-86.

In buildings of categories A, B and B the corridors should be divided every 60m with fire walls of the 2nd type and doors of the 3^d type.

2.16* In production spaces where maintenance of stable parameters of the air environment is required by the process conditions, it is allowed to design additional horizontal enclosing components to arrange mechanical equipment and utility lines in the space above them:

Suspended (boarded) ceilings – when access to utility services does not require a passage for servicing personnel. For servicing of the above utility lines it is allowed to provide hatches and vertical steel ladders;

Utility storeys – when according to process conditions the servicing of mechanical equipment, utility lines and auxiliary process units arranged in this space requires provision of passages the height of which is assumed in conformance with 2.6.

Suspended ceilings are not allowed to be designed in spaces of categories A and B.

Suspended ceilings structures should be assumed with account of the requirements of SNiP 2.01.02-85*. In buildings with roofs from steel profiled decking with roll or mastic roof covering the suspended ceiling frame cladding and insulation of piping and air ducts running over suspended ceilings, shall be made from non-combustible materials.

With available utility lines (air ducts, piping or cable bunches with over 12 cables) in the space above the suspended ceiling and having insulation from combustible or slow-burning materials one should provide automatic fire-extinguishing. When laying 5 or 12 cables and electric wires with such insulation it is necessary too provide an automatic fire alarm system. When laying cables in steel water-gas pipes, piping and air ducts with non-combustible insulation over the suspended ceiling, the fire alarm system and automatic fire-extinguishing are not required.

2.17 The entry of rail tracks into buildings is allowed to be provided in conformance with the design's process part. One should not provide moving-in of locomotives – also into spaces of categories A and B, while that of steam and diesel locomotives – also into spaces of categories B and into spaces with floor or roof structures from combustible materials.

2.18 Rail head tops shall be at the finished floor elevation.

2.19 Storages of raw materials, semi-finished and finished products located in production buildings as well as loading docks (ramps) should be designed with account of the requirements of SNiP 2.11.01-85*.

2.20 In multi-storey buildings over 15 m high from the planning grade level to the finished floor elevation in the upper storey (not counting a utility storey) and with available permanent working places or equipment at elevation over 15 m to be serviced more than three times a shift, one should provide passenger elevators. Cargo elevators shall be provided in conformance with the design's process part.

The number and lifting capacity of elevators should be assumed with account of passenger and cargo traffics. With the number of employees (in the most numerous shift) of not more than 30 on all floors located above 15 m the building should be provided with one elevator.

In front of elevators in spaces of categories A and B on all floors one should provide vestibule-locks with a constant excess air pressure of 20 Pa (2 kgf/m²).

2.21 In buildings with the height from the planning grade level to the finished floor elevation in the upper storey of more than 30 m one should provide elevator hallways that shall be separated from other spaces and corridors with fire walls of the 1st type and fire doors of the 2nd type. In elevator shafts with no vestibule-locks at exits from them an excess air pressure during fire shall be ensured in conformance with SNiP 2.04.05-86.

Evacuation of People from Buildings and Spaces

2.22* Fire escapes (emergency exits) are not allowed to be provided through spaces of categories A and B and vestibule-locks attached to them as well as through production spaces in buildings of IIIb, IVa and V fire-resistance degrees.

It is allowed to provide one fire escape (without arranging the second one) through spaces of categories A and B from spaces on the same floor where mechanical equipment is located for servicing the above spaces and where is no permanent occupancy, if the distance from the remotest point of the space with mechanical equipment to the fire escape from spaces of categories A and B does not exceed 25 m.

2.23 Fire escapes from staircases located in built-in sections and insets of not more than four storeys high with spaces of categories Г and Д are allowed to be provided through a spaces of categories Г and Д outside on condition that the fire escapes are located on two sides of built-in sections and insets (if these built-in sections and insets divide the building into isolated parts).

2.24* Fire escapes from spaces located on mezzanine floors and insets (built-in sections) in buildings of I, II and IIIa fire-resistance degrees as well as on mezzanine floors of one-storey mobile buildings of category Г and Д of IV a fire-resistance degree intended for arrangement of mechanical equipment, having no permanent working places, are allowed to be provided into internal open steel stairs located in spaces of categories B, Г and Д and designed in conformance with 2.59 (as to the flight gradient and width). The distance from the remotest point of the space with mechanical equipment to the fire escape from the building shall not exceed the values specified in Table 2 (with account of the stairway length equal to its tripled height), while arranging the above stairs in spaces of category B – these spaces and fire-hazardous spaces on mezzanine floors and insets (built-in sections) shall be equipped with fire-extinguishing units. It is allowed to provide one fire escape (without arranging the second one) into an internal or external open steel stair from the above spaces where the distance from the remotest point of the space to the exit into the stair does not exceed 25 m.

2.25 Gates for railway rolling stock as well as sliding and rolled-up gates for any kind of transportation are not allowed to be considered as fire escapes.

2.26* It is allowed to provide one fire escape (without arranging the second one):

a) from any storey in buildings of I and II fire-resistance degrees with the number of above-surface storeys not more than four, with spaces of category Д and the number of employees in the most numerous shift on each floor of not more than five and the floor area of not more than 300m²;

b) from a space located in any storey (except basement and lower storeys), if this exit leads to two fire escapes from fire escapes from the floor, distance from the remotest working place to the exit from the space does not exceed 25 m and the number of employees in the most numerous shift does not exceed:

5 people – a space of categories A, Б;

25 “---“ ----“ ----- category B;

50 “---“ -----“ -----“ categories Г and Д;

c) from a space of category Д of not more than 300m² in area with the number of employees in the most numerous shift of not more than five, located in any storey (except the first one), into the external steel stair meeting the requirements of 2.59. the stair enclosing components shall be non-combustible. The distance from the remotest working place to the stair exit shall not exceed 25 m.

d) from one-storey mobile buildings of categories A and Б of not more than 54 m² in area, of other categories – not more than 108 m². the number of employees in the most numerous shift shall not exceed 5 people in buildings of categories A and Б, 25 people – in buildings of categories B, Г and Д. In the above buildings one should provide 25% of outside opening windows without protective nets and grates;

e) from any floor (tier) of multi-storey (multi-tier) buildings of IIIa fire-resistance degree and category Д with the height from the planning grade level to the finished floor elevation in the upper storey (tier) of not more than 30 m at the floor (tier) area of not more than 300 m² into internal or external steel stair to be designed according to 2.59 (as to the flight gradient and width). The total number of employees in the building in the maximum shift shall not exceed 5 people, the distance from the remotest working place to the stair exit shall not be more than 25 m, the stair's enclosing components shall be made from non-combustible materials. In the building it is allowed in addition to spaces of category Д to arrange electrical rooms (alarm panelboards, control desks and cabinets, distribution stations). It is allowed to arrange an exit to the roof from the top landing of the internal stair through a fire hatch of the 2nd type at least 0.6x0.8 m in size using a steel step ladder.

Table 2

Space volume thou.m ³	Space category	Fire-resistance degree of building	Distance, m, at the density of human flow in the common passage, person/m ²		
			Up to 1	Over 1 up to 3	Over 3 up to 5
Up to 15	A, Б	I, II, IIIa	40	25	15
	B	I, II, III, IIIa, IIIb, IV, V	100	60	40
			70	40	30
50	30	I, II, IIIa	60	35	25
30	A, Б	I, II, IIIa	60	35	25
	B	I, II, III, IIIa IIIb, IV	145 100	85 60	60 40
40	A, Б	I, II, IIIa	80	50	35
	B	I, II, III, IIIa IIIb, IV	160 110	95 65	65 45
50	A, Б	I, II, IIIa	120	70	50
	B	I, II, III, IIIa	180	105	75
60 and more	A, Б	I, II, IIIa	140	85	60
60	B	I, II, III, IIIa	200	110	85
80 and more	B	I, II, III, IIIa	240	140	100
Irrespective of the volume	Г, Д	I, II, III, IIIa IIIb, IV V	Not	limited	
			160	95	65
			120	70	50

Notes: 1. The human flow density is defined as the ratio of the number of people escaping through a common passage and this passage area.

2. For spaces over 1000m² in area the distance specified in Table 2 includes the length of the way along the corridor to the exit outside or into a staircase.

3. The distances for spaces of categories A and Б are established with account of the spillage area of flammable or combustible liquids, equal to 50 m²; at other numerical values of the spillage area the distances specified in Table 2 are multiplied by coefficient 50/F, where F – possible spillage area to be determined in the design's process part.

4. At intermediate values of space volumes the distances are determined by linear interpolation.

5. The distances are established for spaces up to 6 m high (for single-storey buildings the height is assumed to the truss bottom); with the space height over 6 m the distances are increased: at the space height of 12 m – by 20%, 18 m – by 30%, 24 m – by 40% but not more than 140 m for spaces of

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categories A, B and 240 m – for spaces of category B; at intermediate values of space heights the increase of distances is determined by linear interpolation.

2.27 As a second exit from the second and higher storeys in buildings of not more than 30 m high from the planning grade level to the finished floor elevation in the upper storey it is allowed to provide an external steel stair meeting the requirements in 2.59, if the number of employees in each storey (except the first one) in the most numerous shift does not exceed:

15 persons – in multi-storey buildings with spaces of any category;

50 persons – in two-storey buildings with spaces of category B;

100 persons – same, of categories Г and Д.

2.28* From basements and lower storeys over 300 m² in area as well as from each part of the basement specified in 2.14, one should provide at least two fire escapes. It is allowed to design fire escapes from basements with spaces of categories Г and Д into spaces of the above categories located on the first floor. Fire escapes from basements with spaces of category B (including oil basements and cable floors in basements) should be provided, as a rule, through isolated staircases having an exit directly outside. It is allowed to use common staircases to outside, separated with a blind fire wall of the 1st type to the height of two flights.

At least two exits (doors) should be provided from each of category B. The exits shall be arranged so that there would not be dead ends over 25 m long.

Fire escapes from basements with category B spaces not adjoining the external walls are allowed to be provided into the first storey with spaces of categories Г and Д. The stairs for exit to the first floor shall be enclosed with fire walls, in the basement in front of the stairs one should provide vestibule-locks with an excess air pressure during fire.

Exits from basements with spaces of categories B, Г and Д should be provided outside the handling equipment working zone.

2.29 The distance from the remotest working place to the nearest fire escape from a space directly outside or into a staircase shall not exceed the values specified in Table 2.

2.30* Internal racks and landings shall have, as a rule, at least two open steel stairs. It is allowed to design one stair, when the floor area of each tier of the rack or landing does not exceed 108 m² for spaces of categories A and B, and 400 m² for spaces of categories B, Г and Д.

The distance from the remotest point on landings and racks to the nearest fire escape from the building should be assumed according to Table 2 with account of the way length along an open stair from a landing or rack assumed equal to the tripled flight height.

Fire escapes from landings and rack tiers the area of which at any elevation exceeds 40% of the floor area, with available permanent working places on them, should be provided through staircases.

It is allowed to provide one of fire escapes into an external stair to be designed in conformance with 2.59.

2.31 The distance from the remotest working place to the nearest fire escape from single-storey or two-storey buildings of IVa fire-resistance degree with combustible polymer insulation should be assumed not more than:

In one-storey buildings with spaces of category B-50 m, of categories Г, Д – 80 m;

In one-storey buildings with spaces of category B-40 m, of categories Г, Д – 60 m;

The above distances are allowed to be increased by 50%, if the floor area not occupied by equipment in spaces is 75 m² and more per one employee in the most numerous shift.

In one-storey buildings with spaces of categories B, Г, Д, when it is impossible to observe the above distances, fire escapes shall be located in external walls along a building's perimeter every 72 m. The stair flight width depending on the number of people escaping by it from the second floor, as well as the width of doors, corridors or passages in the means of egress shall be assumed as 0.6 m per 100 persons.

2.32 The distance along a corridor from the door of the remotest space of not more than 1000 m² in area to the nearest exit outside or into a staircase shall not exceed the values specified in Table 3.

When arranging spaces of different categories on one floor, the distance along a corridor from the door of the remotest space to the exit outside or into the nearest staircase is determined by a more hazardous category.

2.33 The width of a fire escape (door) from spaces should be assumed with regard of the total number of people escaping through this exit, and the number of people per 1 m of the exit (door) width specified in Table 4.

2.34 The width of a fire escape (door) from a corridor outside or into a staircase should be assumed with regard to the total number of people escaping through this exit, and the number of people per 1 m of the exit (door) width specified in Table 5, but not less than 0.8 m.

2.35 The stair flight width should be assumed not less than the design width of a fire escape (door) from the floor with the widest door into a staircase but not less than 1 m. The width of passages and stairs to single working places is allowed to be assumed as 0.7 m, while for evacuation of not more than 50 people – 0.9 m.

2.36 In buildings of categories A and Б one should provide pressurized staircases of the 3d type¹ with natural lighting and a constant excess air pressure in vestibule-locks. In these buildings of not more than 30 m high from the planning grade level to finished floor elevation in the upper storey it is allowed to provide regular staircases of the 1st type, if spaces of categories A, Б have exits into a corridor through vestibule-locks.

2.37 In buildings of categories B up to 30 m high from the planning grade level to the finished floor elevation in the upper storey one should provide regular staircases of the 1st type; in these buildings it is allowed to provide up to 50% of internal pressurized staircases of the 3d type with an excess air pressure in vestibule-locks during fire. In the above buildings over 30 m high all staircases shall be pressurized of the 2nd type (with natural lighting).

2.38 In buildings of categories Г, Д one should provide regular staircases of the 1st type (with natural lighting through windows in external walls). It is allowed to provide 50% of pressurized staircases of the 3d type, without natural lighting, with an excess air pressure in vestibule-locks during fire.

In the above buildings over 30 m high from the planning grade level to the finished floor elevation in the upper storey the regular staircases of the 1st type (with natural lighting) shall be divided to the height of two flights with a blind fire wall every 20 m by height (with transfer from one part of the staircase into the other from beyond).

¹ The stair types are assumed in conformance with SNiP 2.01.02-85*.

2.39 Pressurized staircases shall have emergency lighting.

Pressurized staircases of the 2nd type shall be divided to the height of two flights with a blind fire wall every 30 m by height in buildings of categories Г and Д and 20 m – in buildings of category Б (with transfer from one part of the staircase into another beyond its volume).

2.40 The width of tambours and vestibule-locks should be assumed more than the opening width by at least 0.5 m (by 0.25 m on either side of the opening), while the depth – more than the width of a door or gate by at least 0.2 m but not less than 1.2 m.

Table 3

Location of exit	Space category	Building's fire-resistance degree	Distance along corridor, m, to exit outside or into the nearest staircase at density of human flow in corridor, persons/m ²			
			Up to 2	Over 2 up to 3	Over 3 up to 4	Over 4 up to 5
Between two exits outside or into staircases	A, Б	I, II, IIIa	60	50	40	35
	B	I, II, III, IIIa, IIIb, IV, V	120	95	80	65
			85	65	55	45
60			50	40	35	
Г, Д	I, II, III, IIIa, IIIb, IV, V	180	140	120	100	
		125	100	85	70	
		90	70	60	50	
Into dead end corridor	Irrespective of category	I, II, III, IIIa, IIIb, IV, V	30	25	20	15
			20	15	15	10
			15	10	10	8

Note: Density of human flow in the corridor is defined as a ratio of the number of people escaping from spaces into the corridor and the area of this corridor, with the corridor design width assumed with account of the requirements in SNIP 2.01.02-85.

Table 4

Space volume, thou.m ³	Space category	Fire-resistance degree of building	Number of people per 1 m of fire escape (door) width, person
15	A, Б	I, II, IIIa	45
	B	I, II, III, IIIa	110
		IIIb, IV, V	75 55
30	A, Б	I, II, IIIa	65
	B	I, II, III, IIIa IIIb, IV	155 110
40	A, Б	I, II, IIIa	85
	B	I, II, III, IIIa IIIb, IV	175 120
50	A, Б	I, II, IIIa	130

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	B	I, II, III, IIIa IIIb	195 135
60 and more	A, Б	I, II, IIIa	150
60	B	I, II, III, IIIa IIIb	220 155
90 and more	B	I, II, III, IIIa	260
Irrespective of the volume	Г, Д	I, II, III, IIIa IIIb, IV V	260 180 130

Notes: 1. The number of people per 1 m of exit width at intermediate values of space volumes by interpolation.

2. The number of people per 1 m of the fire escape over 6 m high increases: at the space height of 12 m – by 20%, 18 m – by 30%, 24 m – by 40%; at intermediate values of space heights the increase of the people number per 1 m of the exit width is determined by interpolation.

Table 5

Space category	Fire-resistance degree of building	Number of people per 1 of fire escape (door) width from corridor, persons
A, Б	I, II, IIIa	85
B	I, II, III, IIIa IIIb, IV, V	175 120 85
Г, Д	I, II, III, IIIa IIIb, IV, V	260 180 130

Structural Conceptions General requirements

2.41 When designed buildings, one should assume, as a rule, fully-prefabricated type components and products, including components delivered in sets and prefabricated buildings (modules).

2.42 In spaces of categories A and Б one should provide external easily releasable enclosing components.

As easily releasable one should use, as a rule, glazed windows and skylights. If the glazing area is insufficient, it is allowed to use roof elements from steel, aluminum and asbestos cement sheets and efficient insulation as easily releasable components. The area of easily releasable components should be determined by calculation. If the calculation data are unavailable, the area of easily releasable components shall be at least 0.05 m² per 1 m³ of the space of category A and at least 0.03 m² – the space of category Б.

2.43 Galleries, landings and ladders for maintenance of load-lifting cranes should be designed in conformance with the Rules of Installing and State Operation of Hoisting Cranes, approved by the USSR Gosgortekhnadzor.

2.44 For repair and cleaning of window and skylight glazing, when the use of movable or portable floor-type inventory devices (ladders, rolling platforms, telescopic hoists) is not possible due to arrangement of the process equipment or the building's total height, it is allowed to provide stationary

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devices ensuring safe execution of the above work. The use of these devices shall be substantiated in the design's process part.

2.45 Parts of floors and process areas where apparatus, units and equipment are installed with available flammable, combustible and toxic liquids shall have blind sides from non-combustible materials or trays. The side height and the area between the sides or that of trays are established in the design's process part.

Note: 1 Window glass is referred to easily releasable elements at 3, 4 and 5 mm thickness and the area at least 0.8, 1 and 1.5 m², respectively. The wire glass is not referred to easily releasable elements.

2. the roll covering on parts of easily releasable roof components should be cut in sheets of not more than 180 m² in area each.

3. The design load from the mass of easily releasable roof components shall be not more than 0.7 kPa (70 kgf/m²).

Building's roofs

2.46 Heated buildings should be designed, as a rule, with inside rain leaders.

It is allowed to design heated buildings of not more than 10 m high without inside rain leaders at the roof width (with one-side pitch) of not more than 36 m.

2.47 Unheated buildings should be designed without inside rain leaders. It is allowed to design multi-bay unheated buildings with inside rain leaders, if production heat releases are available and ensure positive indoor temperature, or if the use of special heating of rainwater funnels, standpipes and downpipes is justified.

2.48 Along buildings' external wall perimeter one should provide guardrails on the roof in conformance with SNiP 2.01.02-85*. In buildings with inside rain leaders it is allowed to use parapets as guardrails. With the parapet height less than 0.6 m it should be supplemented with a grate guard to the height of 0.6 m from the roof surface.

Skylights

2.49* The necessity of arranging skylights and their types (clerestoreys, U-shaped, aeration skylights, etc.) are established in the design depending on the features of a production process, sanitary-hygienic and environmental requirements with account of climatic conditions in the area of construction and environmental requirements with account of climatic conditions in the area of construction.

2.50 Skylights shall be of a non-blown type. The skylight length shall be not more than 120 m. the distance between the skylight ends and between the skylight end and the external wall shall be at least 6 m. Skylight leaves shall be mechanically opened (by switching on the opening mechanisms at space entrances) and duplicated with manual control.

Opening clerestories taken into account in smoke removal calculations shall be uniformly spread over the roof area.

2.51 Under glazing of clerestories made from sheet soda-lime glass, multiple glazed units, box glass as well as along the internal side of rectangular aeration skylight glazing one should provide a metal guard screen.

2.52 Clerestories with translucent elements from polymer materials (acrylic plastic, polyether glass-reinforced plastics, etc.) are allowed to be used only in buildings of I and II fire-resistance degrees in spaces of categories Γ and Д with roofs from non-combustible or slow-burning materials and roll coverings with a protective gravel grit. The total area of translucent elements of these skylights shall not exceed 15% of the total roof area, the area of one skylight opening – not more than 10 m², while the specific mass of translucent elements – not more than 20 kg/m².

The distance (clear) between clerestories with translucent elements from polymer materials shall be at least 4 m with the light opening area up to 5 m², and at least 5 m with the light opening area from 5 to 10 m².

When combining skylights into groups, they are considered as one skylight which has all above limitations.

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Between clerestories with translucent polymer materials in the longitudinal and transverse directions of the building roof the fire precaution spacings at least 6 m wide shall be arranged every 54 m. The horizontal distance from the opposite walls to clerestories with translucent fills from polymer materials shall be at least 5 m.

Walls and Partitions

2.53 External and internal walls of heated and unheated buildings should be designed, as a rule, as prefabricated from panels and factory-made sheet materials. In external walls the joint sealing should be ensured.

For buildings and spaces with evident heat excess of over 50 W/m³ one should use, as a rule, uninsulated enclosing components, providing, when necessary, the heating of permanent occupancy zones with local heating appliances.

Partitions should be designed, as a rule, from prefabricated panels (boards) as well as in the form of frames with plate and sheet material cladding.

2.54* Window openings not intended for ventilation and smoke removal should be filled with glazed non-openable sashes or with box glass; for window openings with double and triple glazing one should provide the openable leaves in internal sashes for glass cleaning. Sashes intended for ventilation and smoke removal shall be mechanically opened.

2.55 Windows in spaces with humid or wet conditions shall have sealed joints between glazing and sashes as well as packing of rabbet ledges of leaf elements preventing penetration of humid air from a space into an inter-glazing gap. In such buildings the wall-to-window adjoining portions shall be protected against moistening by means of making drips, vapor barriers of jambs.

2.56 Gates should be assumed, as a rule, of a type design. With a remote and automatic opening of the gate a possibility of its manual opening shall be provided in all cases. Clear dimensions of gates for surface transport should be assumed with the excess of vehicle clearance (in the loaded state) by at least 0.2 m in height and by 0.6 m in width.

Stairs

2.57 The flight gradient in staircases should be assumed as 1:2 with the tread width 0.3 m; for basement storeys and attics it is allowed to assume the stair flight gradient as 1:1.5 with the tread width 0.26 m.

2.58 Internal open stairs (without staircase walls) shall have a gradient of not more than 1:1. The gradient of open stairs for passage to single working places is allowed to be increased to 2:1. For inspection or equipment with the rise height of not more than 10 m it is allowed to design vertical ladders 0.6 m wide.

2.59 External open steel ladders intended for escape of people shall have a gradient of not more than 1:1 and be at least 0.7 m wide. These ladders shall be with landings at the level of fire escapes and have guardrails 1.2 m high. The above ladders should be located, as a rule, at blind (without windows) portions of walls with at least 0.5 h fire resistance rating and a zero flame-spread rating of at least 1 m from window openings.

2.60 For buildings with the height from the planning grade level to the eaves or parapet top 10 m and more one should design one exit to the roof (for each full or non-full 40000 m² of roof) including:

One-storey buildings without external escape stairs – along an external open steel ladder to be designed in conformance with 2.59;

Multi-storey buildings – from staircases.

When it is inadvisable to have a staircase for exit to the roof within the height of the upper storey, it is allowed for buildings with the height from the planning grade level to the finished floor elevation in the upper storey of not more than 30 m to design an open external steel ladder according to 2.59 for exit to the roof from a staircase through the landing of this ladder.

It is allowed not to provide an exit to the roof of one-storey buildings with the total roof area of not more than 100 m².

2.61 For buildings with the height from the planning grade level to the eaves or parapet top of more than 10 m as well as at height differences and the roof of aeration skylights one should provide external steel fire escape ladders to be designed in conformance with SNiP 2.01.02-85*.

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When determining the number and location of external steel fire escape ladders one should take into account the external stairs intended for people evacuation (see 2.59) and external ladders intended for exit to the roof (see 2.60).

3. ADDITIONAL REQUIREMENTS TO DESIGN OF BUILDINGS IN THE NORTHERN CONSTRUCTION-CLIMATIC ZONE

3.1 Buildings should be designed, as a rule, of a simple rectangular shape in plan, without height differences. In those cases when the height difference is required due to process or technical-economical considerations, it should be located, as a rule, on the windward side or along the prevailing wind direction.

3.2 Spaces with wet conditions should not be located, as a rule, at external walls of buildings.

3.3 Buildings' facades should be designed without recesses, fillets and other elements retaining precipitation.

3.4 Arrangement of equipment and utilities on buildings' roofs is not allowed.

3.5 Fire escapes from buildings should be located, as a rule, in the walls extending parallel to the prevailing wind direction (according to the wind rose for the winter period).

3.6 At entrances into heated buildings one should provide double vestibule-locks (with three doors); the dimensions of each vestibule-lock shall be assumed in conformance with 2.40; the internal vestibule-lock shall be heated.

3.7 Gates and process openings in external walls of heated buildings shall have warm air curtains; gates of buildings with wet or humid conditions in spaces shall have warm air curtains and vestibule-locks.

3.8* When designing buildings on permanently frozen soils, one should apply principle I or II of using permanently frozen soils and bases in conformance with SNiP 2.02.04-88.

3.9 Buildings (with bases according to principle I) should be designed, as a rule, without basement or lower storeys, tunnels and channels, if the design heat conditions for base soils are retained.

In conformance with the design's process part it is allowed to design if the design heat conditions for base soils are retained.

3.10 When designing buildings (with bases according to principle II), one should;

a) provide structural solutions ensuring slow and uniform thawing of base soils in the course of construction and use. In case of preliminary thawing of base soils one should provide, if necessary, improvement of soil structural properties by compaction, stabilization, etc.;

b) assign the height of spaces, openings (gates, doors, etc.), distances in height between equipment and components of buildings and structures with the reserves ensuring a possibility of normal use of the building during settlement of structures and retaining of rated dimensions when all settlements are over;

c) design foundations for equipment and handling facilities considering a possibility of bringing equipment and handling facilities in the design position under non-uniform settlements in the process of operation;

d) provide a possibility of bringing components in the design position under settlements of buildings.

3.11 In design of buildings (with bases according to principles I and II) the furnaces and heat-releasing units should be located on floor slabs or on individual footings not connected with bearing components.

3.12 In design of buildings (with bases according to principle II), when deformations of bases do not exceed ultimate values given in SNiP 2.02.01-83, structural schemes of buildings are allowed to be assumed without account of construction features in the Northern construction-climatic zone.

3.13 In design of buildings (with bases according to principle II), when deformations of bases can exceed the ultimate values given in SNiP 2.02.01-83, the structural solutions shall ensure stability, strength and serviceability of buildings under non-uniform settlements of the base. To ensure the above requirements the buildings should be designed:

With rigid structural schemes, when structural elements cannot have mutual displacements;

With yielding structural schemes, when there is a possibility of mutual displacements of hinged structural elements, while providing stability and strength of these elements as well as serviceability of buildings.

Multi-storey as well as one-storey buildings with 12 m and less bays should be designed, as a rule, with a rigid structural scheme, while one-storey buildings with bays over 12 m (single-bay and multi-bay) – with a yielding structural scheme.

3.14 In design of buildings with a rigid structural scheme (with a base according to principle II0, as a rule, one should:

Not allow wall breaking in plan;

Provide internal walls to the building's total width or length;

Locate cross bearing walls or frames at the distance of not more than 12 m one from another;

Assume window openings equal and locate them uniformly;

Not allow local weakening of walls as a result of arranging recesses, grooves, channels;

Provide connection of prefabricated roof and floor elements between themselves;

Use reinforced girths, reinforce stone wall piers and corners.

3.15 In design of buildings with a yielding structural scheme (with a base according to principle II), as a rule, one should:

Use structural schemes of buildings with columns rigidly restrained by foundations and hinged with roofs;

Use components with a minimum allowable rigidity in the vertical plane;

Design roofs and floors in the form of rigid horizontal diaphragms connected with longitudinal and cross walls and columns;

Assign supporting and fixing areas of structural elements proceeding from strength assurance under non-uniform settlement of buildings.

3.16 Stability and strength of a building, elements and connections with rigid and yielding structural schemes should be verified by calculation for the most unfavorable combinations of loads and effects including non-uniform of bases.

CHANGE No.3
to SNiP 2.09.02-85* “PRODUCTION BUILDINGS”

*(approved by Resolution of Russia’s Gosstroy
No.18-23 of 31 March 1994)*

Date of putting into effect – 1 July 1994.
Section 1 to be supplemented with item 1.4 running as follows:

“**1.4** When using the labor of handicapped at a plant, one should observe additional requirements specified in the appropriate items of the codes depending on the handicap type.

When establishing at an enterprise the specialized shops (sections) intended for the use of handicapped labor, one should be also guided with “Uniform Sanitary Rules for Enterprises (production Associations), Shops and Sections Intended for the Use of Labor of Handicapped and Old-Age Pensioners” of the USSR Ministry of Health (No.2672-83 of 01.03.83).

Item 2.20 to be supplemented with the fourth paragraph running as follows:

“If on the second floor and higher there are spaces intended for the labor of handicapped using wheelchairs, the building should be provided with a passenger elevator, unless it is possible to arrange working places for handicapped on the ground floor. The elevator cabin shall have dimensions of not less than: 1.1 m in width, 2.1 m in depth, 0.85 m of the door opening width”.

Item 2.33 to be supplemented with the text running as follows:

“but not less than 0.9 m, if among employees there are handicapped with failures of supporting and motion organs”.

Item 2.34 to be supplemented with the text running as follows:

“If among employees there are handicapped with failures of supporting and motion organs, the stair flight should be assumed at least 1.2 m”.

Item 2.35 to be supplemented with the text running as follows:

“If among employees there are handicapped with failures of supporting and motion organs, the stair flight width should be assumed at least 1.2 m”.

Item 2.40 to be supplemented with the text running as follows:

“If among employees there are handicapped using wheelchairs, the depth of tambours and vestibule-locks should be assumed at least 1.8 m”.

Item 2.58 The first sentence after the words: “not more than 1:1” to be supplemented with the words: “if among employees there are handicapped with failures of supporting and motion organs – not more than 1:2”.