**Chapter 4 General**

4.1\* Goals

4.1.1\* Fire

A goal of this Code is to provide an environment for the occupants that is reasonably safe from fire by the following means:

\*Protection of occupants not intimate with the initial fire development

Improvement of the survivability of occupants intimate with the initial fire development

4.1.2\* Comparable Emergencies

An additional goal is to provide life safety during emergencies that can be mitigated using methods comparable to those used in case of fire.

4.1.3\* Hazardous Materials Emergencies

An additional goal is to provide reasonable life safety during emergency events involving hazardous materials regulated by NFPA 30, NFPA 45, NFPA 54, NFPA 55, NFPA 58, NFPA 72, NFPA 400, and NFPA 495.

4.1.4\* Crowd Movement

An additional goal is to provide for reasonably safe emergency crowd movement and, where required, reasonably safe nonemergency crowd movement.

4.2 Objectives

4.2.1 Occupant Protection

A structure shall be designed, constructed, and maintained to protect occupants who are not intimate with the initial fire development for the time needed to evacuate, relocate, or defend in place.

4.2.2 Structural Integrity

Structural integrity shall be maintained for the time needed to evacuate, relocate, or defend in place occupants who are not intimate with the initial fire development.

4.2.3\* Hazardous Materials Emergencies Protection

Fundamental safeguards shall be provided to reasonably prevent or mitigate events involving hazardous materials as addressed in 4.1.3 to allow the time needed to evacuate, relocate, or defend in place occupants who are not intimate with the initial emergency incident.

4.2.4\* Security Features

Where buildings are designed and constructed to include security features to protect occupants or contents, such features shall not compromise compliance with other requirements of this Code.

4.2.5 Systems Effectiveness

Systems utilized to achieve the goals of Section 4.1 shall be effective in mitigating the hazard or condition for which they are being used, shall be reliable, shall be maintained to the level at which they were designed to operate, and shall remain operational.

4.3\* Assumptions

4.3.1\* General

The protection methods of this Code are based on the hazards associated with fire and other events that have comparable impact on a building and its occupants.

4.3.2 Single Fire Source

The fire protection methods of this Code assume a single fire source.

4.4 Life Safety Compliance Options

4.4.1 Options

Life safety meeting the goals and objectives of Sections 4.1 and 4.2 shall be provided in accordance with either of the following:

Prescriptive-based provisions per 4.4.2

Performance-based provisions per 4.4.3

4.4.2 Prescriptive-Based Option

4.4.2.1

A prescriptive-based life safety design shall be in accordance with Chapters 1 through 4, Chapters 6 through 11, Chapter 43, and the applicable occupancy chapter, Chapters 12 through 42.

4.4.2.2

Prescriptive-based designs meeting the requirements of Chapters 1 through 3, Sections 4.5 through 4.8, and Chapters 6 through 43 of this Code shall be deemed to satisfy the provisions of Sections 4.1 and 4.2.

4.4.2.3

Where a requirement of this Code conflicts with another requirement of this Code, the following shall apply:

\*Where a specific requirement contained in Chapters 11 through 43 conflicts with a general requirement contained in Chapters 1 through 4 and Chapters 6 through 10, the requirement of Chapters 11 through 43 shall govern.

\*Where a requirement contained in Chapters 1 through 4 and Chapters 6 through 10 conflicts with another requirement contained in Chapters 1 through 4 and Chapters 6 through 10, the more specific requirement shall govern.

\*Where a requirement contained in Chapters 11 through 43 conflicts with another requirement contained in Chapters 11 through 43, the more specific requirement shall govern.

4.4.3 Performance-Based Option

A performance-based life safety design shall be in accordance with Chapters 1 through 5.

4.5 Fundamental Requirements

4.5.1 Multiple Safeguards

The design of every building or structure intended for human occupancy shall be such that reliance for safety to life does not depend solely on any single safeguard. An additional safeguard(s) shall be provided for life safety in case any single safeguard is rendered ineffective.

4.5.2 Appropriateness of Safeguards

Every building or structure shall be provided with means of egress and other fire and life safety safeguards of the kinds, numbers, locations, and capacities appropriate to the individual building or structure, with due regard to the following:

Character of the occupancy, including fire load

Capabilities of the occupants

Number of persons exposed

Fire protection available

Capabilities of response personnel

Height and construction type of the building or structure

Other factors necessary to provide occupants with a reasonable degree of safety

4.5.3 Means of Egress

4.5.3.1 Number of Means of Egress

Two means of egress, as a minimum, shall be provided in every building or structure, section, and area where size, occupancy, and arrangement endanger occupants attempting to use a single means of egress that is blocked by fire or smoke. The two means of egress shall be arranged to minimize the possibility that both might be rendered impassable by the same emergency condition.

4.5.3.2 Unobstructed Egress

In every occupied building or structure, means of egress from all parts of the building shall be maintained free and unobstructed. Means of egress shall be accessible to the extent necessary to ensure reasonable safety for occupants having impaired mobility.

4.5.3.3 Awareness of Egress System

Every exit shall be clearly visible, or the route to reach every exit shall be conspicuously indicated. Each means of egress, in its entirety, shall be arranged or marked so that the way to a place of safety is indicated in a clear manner.

4.5.3.4 Lighting

Where artificial illumination is needed in a building or structure, egress facilities shall be included in the lighting design.

4.5.4\* Occupant Notification

In every building or structure of such size, arrangement, or occupancy that a fire itself might not provide adequate occupant warning, fire alarm systems shall be provided where necessary to warn occupants of the existence of fire.

4.5.5\* Situation Awareness

Systems used to achieve the goals of Section 4.1 shall be effective in facilitating and enhancing situation awareness, as appropriate, by building management, other occupants and emergency responders of the functionality or state of critical building systems, the conditions that might warrant emergency response, and the appropriate nature and timing of such responses.

4.5.6 Vertical Openings

Every vertical opening between the floors of a building shall be suitably enclosed or protected, as necessary, to afford reasonable safety to occupants while using the means of egress and to prevent the spread of fire, smoke, or fumes through vertical openings from floor to floor before occupants have entered exits.

4.5.7 System Design/Installation

Any fire protection system, building service equipment, feature of protection, or safeguard provided to achieve the goals of this Code shall be designed, installed, and approved in accordance with applicable NFPA standards.

4.5.8 Maintenance

Whenever or wherever any device, equipment, system, condition, arrangement, level of protection, or any other feature is required for compliance with the provisions of this Code, such device, equipment, system, condition, arrangement, level of protection, or other feature shall thereafter be maintained, unless the Code exempts such maintenance.

4.6 General Requirements

4.6.1 Authority Having Jurisdiction

4.6.1.1

The authority having jurisdiction shall determine whether the provisions of this Code are met.

4.6.1.2

Any requirements that are essential for the safety of building occupants and that are not specifically provided for by this Code shall be determined by the authority having jurisdiction.

4.6.1.3

Where it is evident that a reasonable degree of safety is provided, any requirement shall be permitted to be modified if, in the judgment of the authority having jurisdiction, its application would be hazardous under normal occupancy conditions.

4.6.1.4 Technical Assistance

4.6.1.4.1

The authority having jurisdiction shall be permitted to require a review by an approved independent third party with expertise in the matter to be reviewed at the submitter's expense. [1:1.15.1]

4.6.1.4.2

The independent reviewer shall provide an evaluation and recommend necessary changes of the proposed design, operation, process, or new technology to the authority having jurisdiction. [1:1.15.2]

4.6.1.4.3

The authority having jurisdiction shall be authorized to require design submittals to bear the stamp of a registered design professional. [1:1.15.3]

4.6.2 Previously Approved Features

Where another provision of this Code exempts a previously approved feature from a requirement, the exemption shall be permitted, even where the following conditions exist:

The area is being modernized, renovated, or otherwise altered.

A change of occupancy has occurred, provided that the feature's continued use is approved by the authority having jurisdiction.

4.6.3 Stories in Height

Unless otherwise specified in another provision of this Code, the stories in height of a building shall be determined as follows:

The stories in height shall be counted starting with the level of exit discharge and ending with the highest occupiable story containing the occupancy considered.

Stories below the level of exit discharge shall not be counted as stories.

Interstitial spaces used solely for building or process systems directly related to the level above or below shall not be considered a separate story.

A mezzanine shall not be counted as a story for the purpose of determining the allowable stories in height.

For purposes of application of the requirements for occupancies other than assembly, health care, detention and correctional, and ambulatory health care, where a maximum one-story abovegrade parking structure, enclosed, open, or a combination thereof, of Type I or Type II (222) construction or open Type IV construction, with grade entrance, is provided under a building, the number of stories shall be permitted to be measured from the floor above such a parking area.

4.6.4 Historic Buildings

4.6.4.1

Rehabilitation projects in historic buildings shall comply with Chapter 43.

4.6.4.2\*

The provisions of this Code shall be permitted to be modified by the authority having jurisdiction for buildings or structures identified and classified as historic buildings or structures where it is evident that a reasonable degree of safety is provided.

4.6.5\* Modification of Requirements for Existing Buildings

Where it is evident that a reasonable degree of safety is provided, the requirements for existing buildings shall be permitted to be modified if their application would be impractical in the judgment of the authority having jurisdiction.

4.6.6\* Time Allowed for Compliance

A limited but reasonable time, commensurate with the magnitude of expenditure, disruption of services, and degree of hazard, shall be allowed for compliance with any part of this Code for existing buildings.

4.6.7 Building Rehabilitation

4.6.7.1

Rehabilitation work on existing buildings shall be classified as one of the following work categories in accordance with 43.2.2.1:

Repair

Renovation

Modification

Reconstruction

Change of use or occupancy classification

Addition

4.6.7.2

Rehabilitation work on existing buildings shall comply with Chapter 43.

4.6.7.3

Except where another provision of this Code exempts a previously approved feature from a requirement, the resulting feature shall be not less than that required for existing buildings.

4.6.7.4\*

Existing life safety features that exceed the requirements for new buildings shall be permitted to be decreased to those required for new buildings.

4.6.7.5\*

Existing life safety features that do not meet the requirements for new buildings, but that exceed the requirements for existing buildings, shall not be further diminished.

4.6.8 Provisions in Excess of Code Requirements

Nothing in this Code shall be construed to prohibit a better building construction type, an additional means of egress, or an otherwise safer condition than that specified by the minimum requirements of this Code.

4.6.9 Conditions for Occupancy

4.6.9.1

No new construction or existing building shall be occupied in whole or in part in violation of the provisions of this Code, unless the following conditions exist:

A plan of correction has been approved.

The occupancy classification remains the same.

No serious life safety hazard exists as judged by the authority having jurisdiction.

4.6.9.2

Where compliance with this Code is effected by means of a performance-based design, the owner shall annually certify compliance with the conditions and limitations of the design by submitting a warrant of fitness acceptable to the authority having jurisdiction. The warrant of fitness shall attest that the building features, systems, and use have been inspected and confirmed to remain consistent with design specifications outlined in the documentation required by Section 5.8 and that such features, systems, and use continue to satisfy the goals and objectives specified in Sections 4.1 and 4.2. (See Chapter 5.)

4.6.10 Construction, Repair, and Improvement Operations

4.6.10.1\*

Buildings, or portions of buildings, shall be permitted to be occupied during construction, repair, alterations, or additions only where required means of egress and required fire protection features are in place and continuously maintained for the portion occupied or where alternative life safety measures acceptable to the authority having jurisdiction are in place.

4.6.10.2

Where required by Chapters 11 through 43, construction, alteration, and demolition operations shall comply with NFPA 241.

4.6.10.3\*

In buildings under construction, adequate escape facilities shall be maintained at all times for the use of construction workers. Escape facilities shall consist of doors, walkways, stairs, ramps, fire escapes, ladders, or other approved means or devices arranged in accordance with the general principles of the Code insofar as they can reasonably be applied to buildings under construction.

4.6.10.4

Flammable or explosive substances or equipment for repairs or alterations shall be permitted in a building while the building is occupied if the condition of use and safeguards provided do not create any additional danger or impediment to egress beyond the normally permissible conditions in the building.

4.6.11 Change of Use or Occupancy Classification

In any building or structure, whether or not a physical alteration is needed, a change from one use or occupancy classification to another shall comply with 4.6.7.

4.6.12 Maintenance, Inspection, and Testing

4.6.12.1

Whenever or wherever any device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature is required for compliance with the provisions of this Code, such device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or other feature shall thereafter be continuously maintained. Maintenance shall be provided in accordance with applicable NFPA requirements or requirements developed as part of a performance-based design, or as directed by the authority having jurisdiction.

4.6.12.2

No existing life safety feature shall be removed or reduced where such feature is a requirement for new construction.

4.6.12.3\*

Existing life safety features obvious to the public, if not required by the Code, shall be either maintained or removed.

4.6.12.4\*

Where a door or door frame is not required to be fire protection rated and is equipped with a fire protection listing label, the door and the door frame shall not be required to comply with NFPA 80.

4.6.12.5

Any device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature requiring periodic testing, inspection, or operation to ensure its maintenance shall be tested, inspected, or operated as specified elsewhere in this Code or as directed by the authority having jurisdiction.

4.6.12.6

Maintenance, inspection, and testing shall be performed under the supervision of a responsible person who shall ensure that testing, inspection, and maintenance are made at specified intervals in accordance with applicable NFPA standards or as directed by the authority having jurisdiction.

4.6.12.7

Maintenance, inspection, and testing records shall be documented using approved reports or forms and shall be permitted to be submitted, stored, accessed, and shared electronically in an approved format.

4.6.13\* Noncombustible Material

4.6.13.1

A material that complies with any of the following shall be considered a noncombustible material:

\* A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat

A material that is reported as passing ASTM E136, Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C

A material that is reported as complying with the pass/fail criteria of ASTM E136 when tested in accordance with the test method and procedure in ASTM E2652, Standard Test Method for Assessing Combustibility of Materials Using a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750°C

4.6.13.2

Where the term limited-combustible is used in this Code, it shall also include the term noncombustible.

4.6.14\* Limited-Combustible Material

A material shall be considered a limited-combustible material where both of the following are met:

The material does not comply with the requirements for a noncombustible material in accordance with 4.6.13.

The material, in the form in which it is used, exhibits a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg) when tested in accordance with NFPA 259. [5000:7.1.4.2]

4.6.14.1

The material shall have the structural base of a noncombustible material with a surfacing not exceeding a thickness of 1/8 in. (3.2 mm) where the surfacing exhibits a flame spread index not greater than 50 when tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials. [5000:7.1.4.2.1]

4.6.14.2

The material shall be composed of materials that, in the form and thickness used, neither exhibit a flame spread index greater than 25 nor evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723 and are of such composition that all surfaces that would be exposed by cutting through the material on any plane would neither exhibit a flame spread index greater than 25 nor exhibit evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723. [5000:7.1.4.2.2]

4.6.14.3

Materials shall be considered limited-combustible materials where tested in accordance with ASTM E2965, Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Consumption Calorimeter, at an incident heat flux of 75 kW/m2 for a 20-minute exposure and both the following conditions are met:

The peak heat release rate shall not exceed 150 kW/m2 for longer than 10 seconds.

The total heat released shall not exceed 8 MJ/m2. [5000:7.1.4.2.3]

4.6.14.4

Where the term limited-combustible is used in this Code, it shall also include the term noncombustible. [5000:7.1.4.2.4]

4.6.14.5

Materials shall be considered limited-combustible materials where tested in accordance with ASTM E2965, Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Consumption Calorimeter, at an incident heat flux of 75 kW/m2 for a 20-minute exposure, and both the following conditions are met:

The peak heat release rate shall not exceed 150 kW/m2 for longer than 10 seconds.

The total heat released shall not exceed 8 MJ/m2. [5000:7.1.4.2.5]

4.6.14.6

Where the term limited-combustible is used in this Code, it shall also include the term noncombustible. [5000:7.1.4.2.6]

4.6.15 Fire-Retardant-Treated Wood

Fire-retardant-treated wood shall be a wood product impregnated with chemical by a pressure process or impregnated with chemical by other means during manufacture meeting the requirements in 4.6.15.1 through 4.6.15.5. [703:4.1.1]

4.6.15.1

Fire-retardant-treated wood shall be tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials. [703:4.1.1.1]

4.6.15.2

Fire-retardant-treated wood shall have a listed flame spread index of 25 or less. [703:4.1.1.2]

4.6.15.3

Fire-retardant-treated wood shall not show evidence of significant progressive combustion when the test is continued for an additional 20-minute period. [703:4.1.1.3]

4.6.15.4

The flame front shall not progress more than 10.5 ft (3.2 m) beyond the centerline of the burners at any time during the test. [703:4.1.1.4]

4.6.15.5

Wood structural panels shall be permitted to test only the front and back faces. [703:4.1.1.6]

4.6.16 Fire-Retardant-Treated Wood Treatment

4.6.16.1 Pressure Process

For wood products impregnated with chemicals by a pressure process, the process shall be performed in closed vessels under gauge pressures not less than 50 psi (345 kPa). The treatment shall provide permanent protection to all surfaces of the wood product. [703:4.1.2.1]

4.6.16.2 Other Means During Manufacture

For wood products impregnated with chemicals by other means during manufacture, the treatment shall be an integral part of the manufacturing process of the wood product. The treatment shall provide permanent protection to all surfaces of the wood product. [703:4.1.2.2]

4.6.16.3 Wood Structural Panels

Adjustment to design values for wood structural panels shall be in accordance with the following:

The effect of the treatment, the method of redrying after treatment, and the exposure to high temperatures and high humidities on the flexure properties of fire-retardant-treated softwood plywood shall be determined in accordance with ASTM D5516, Standard Test Method for Evaluating the Flexural Properties of Fire-Retardant-Treated Softwood Plywood Exposed to Elevated Temperatures.

The test data developed by ASTM D5516 shall be used to develop adjustment factors or maximum loads and spans, or both, for untreated plywood design values in accordance with ASTM D6305, Standard Practice for Calculating Bending Strength Design Adjustment Factors for Fire-Retardant-Treated Plywood Roof Sheathing.

Each manufacturer shall publish the allowable maximum loads and spans for service as floor and roof sheathing for their treatment. [5000:45.5.16.3]

4.6.16.4 Lumber

Adjustment to design values for lumber shall be in accordance with the following:

For each species of wood treated, the effect of the treatment, the method of redrying after treatment, and the exposure to high temperatures and high humidities on the allowable design properties of fire-retardant-treated lumber shall be determined in accordance with ASTM D5664, Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant-Treated Lumber.

The test data developed by ASTM D5664 shall be used to develop modification factors for use at or near room temperature and at elevated temperatures and humidity in accordance with ASTM D6841, Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-Retardant-Treated Lumber.

Each manufacturer shall publish the modification factors for service at ambient temperatures of up to 100°F (37.8°C) and for service as roof framing.

The roof framing modification factors shall take into consideration the climatological location. [5000:45.5.16.4]

4.6.16.5 Exposure to Weather or Damp or Wet Locations

Where fire-retardant-treated wood is exposed to weather or damp or wet locations, it shall be identified as "exterior" to indicate that there is no increase in the listed flame spread index when subjected to ASTM D2898, Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing. [5000:45.5.16.5]

4.6.16.6 Interior Applications

Interior fire-retardant-treated wood shall have a moisture content of not over 28 percent when tested in accordance with the procedures of ASTM D3201/D3201M, Standard Test Method for Hygroscopic Properties of Fire-Retardant-Wood and Wood-Based Products, at 92 percent relative humidity. Interior fire-retardant-treated wood shall be tested in accordance with 4.6.16.3 or 4.6.16.4. [5000:45.5.16.7]

4.6.16.7 Moisture Content

Fire-retardant-treated wood shall have a moisture content of 19 percent or less for lumber and 15 percent or less for wood structural panels before use. For wood kiln dried after treatment (KDAT), the kiln temperatures shall not exceed the temperatures used in drying the lumber and plywood submitted for the testing described in 4.6.16.3 or 4.6.16.4. [5000:45.5.16.8]

4.6.17 Grade Plane

The grade plane shall be established by calculating the average of the finished ground level adjoining the building at all exterior walls. Where the finished ground level slopes down from the exterior walls, the grade plane shall be established by the lowest points within the area between the building and the lot line or, where the lot line is more than 6 ft (1.8 m) from the building, between the building and a point 6 ft (1.8 m) from the building.

Upcodes Diagrams

4.7\* Fire Drills

4.7.1 Where Required

Emergency egress and relocation drills conforming to the provisions of this Code shall be conducted as specified by the provisions of Chapters 11 through 43, or by appropriate action of the authority having jurisdiction. Drills shall be designed in cooperation with the local authorities.

4.7.2\* Drill Frequency

Emergency egress and relocation drills, where required by Chapters 11 through 43 or the authority having jurisdiction, shall be held with sufficient frequency to familiarize occupants with the drill procedure and to establish conduct of the drill as a matter of routine. Drills shall include suitable procedures to ensure that all persons subject to the drill participate.

4.7.3 Orderly Evacuation

When conducting drills, emphasis shall be placed on orderly evacuation rather than on speed.

4.7.4\* Simulated Conditions

Drills shall be held at expected and unexpected times and under varying conditions to simulate the unusual conditions that can occur in an actual emergency.

4.7.5 Relocation Area

Drill participants shall relocate to a predetermined location and remain at such location until a recall or dismissal signal is given.

4.7.6\*

A written record of each drill shall be completed by the person responsible for conducting the drill and maintained in an approved manner.

4.8 Emergency Action Plan

4.8.1 Where Required

Emergency action plans shall be provided as follows:

Where required by the provisions of Chapters 11 through 42

Where required by action of the authority having jurisdiction

Upcodes Diagrams

4.8.2 Plan Requirements

Diagram

Upcodes Diagrams

4.8.2.1\*

Emergency action plans shall include the following:

Procedures for reporting of emergencies

Occupant and staff response to emergencies

\*Evacuation, relocation, and shelter-in-place procedures appropriate to the building, its occupancy, emergencies, and hazards

Appropriateness of the use of elevators

Design and conduct of fire drills

Type and coverage of building fire protection systems

Other items required by the authority having jurisdiction

Required emergency action plans shall be submitted to the authority having jurisdiction for review.

4.8.2.3\*

Emergency action plans shall be reviewed and updated as required by the authority having jurisdiction.