(Provisional)

MYANMAR NATIONAL BUILDING CODE 2012

PART 5E

BUILDING SERVICES

(FIRE)

TWG 5E - FIRE

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Part -1

Title

The code serves to establish the minimum requirements for fire safety provisions. The Code specifies construction, occupancy and protection features that are necessary to minimize danger to life and property from fire. It takes into account the function, design, management, operation, and maintenance of buildings to secure the life safety of occupants in the event of a fire. This code of practice shall be called **"Myanmar Fire Services Code of Practice".**

DEFINITION

Exit

That portion of a means of egress system which is separated from other interior spaces of a building or struction and opening protectives as required to provide a protected path of egress travel between the exit access and the exit discharge .Exits include exterior exit doors at ground level, exit enclosures, exit passageways, exterior exit stairs, exterior exit ramps exits.

Exit Access

That portion of a means of egress system that leads from any occupied portion of a building or structure to an exit.

Exit Discharge

That portion of a means of egress system between the termination of an exit and a public way .

Area of refuge

An area where persons unable to use stairways can remain temporarily to await instructions or assistance during emergency evacuation.

Corridor

An enclosed exit access component that defines and provides a path of egress travel to an exit.

Net Floor area

The actual occupied area not including unoccupied accessory areas such as corridors, stairway, toilet room, mechanical rooms and closets.

Handrail

A horizontal or sloping rail intended for grasping by the hand for guidance or support.

Occupant Load

The number of persons for which the means of egress of a building or portion thereof is designed.

Means of Egress

A continuous and unobstructed path of vertical and horizontal egress travel from any occupied portion of a building or structure to a public way. A means of egress consists of three separate and distinct parts: the exit access, the exit and the exit discharge.

Ramp

A walking surface that has a running slope steeped than one unit vertical in 20 units horizontal (5-percent slope).

Stair

A change in elevation, consisting of one more risers.

Stairway

One or more flights of stairs, either exterior or interior, with the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one level to another.

Spiral Stairway

A stairway having a closed circular form in its plan view with uniform section-shaped treads attached to and radiating from a minimum-diameter supporting column.

Building

Any structure for whatsoever purpose and of whatsoever materials constructed and every part thereof whether used as human habitation or not and includes foundation, plinth, walls, floors, roofs, chimneys, plumbing and building services, fixed platforms, VERANDAH, balcony, cornice or projection, part of a building or anything affixed thereto or any wall enclosing or intended to enclose any land or space and signs and outdoor display structures. Tents, tarpaulin shelters, etc erected for temporary and ceremonial occasions with the permission of the Authority shall not be considered as building.

Emergency Lighting

Lighting provided for use when the supply to the normal lighting fails.

Emergency Lighting System

A complete but discrete emergency lighting installation from the standby power source to the emergency lighting lamp(s), for example, self-contained emergency luminaires or a circuit from central battery generator connected through wiring to several escape luminaries.

Fire Door

A fire-resistive door approved for openings in fire separation.

Fire Lift

The lift installed to enable fire services personnel to reach different floors with minimum delay.

Fire Resistance Rating

The time that a material or construction will withstand the standard fire exposure as determined by fire test done in accordance with the standard methods of fire tests of materials/structures.

Fire Resistance

Fire resistance is a property of an element of building construction and is the measure of its ability to satisfy for a stated period some or all of the following criteria:

a) resistance to collapse,

b) resistance to penetration of flame and hot gases, and

c) resistance to temperature rise on the unexposed face up to a maximum of 180ºC and / or average temperature of 150ºC.

PART - 2

USE AND OCCUPANCY CLASSIFICATION

5E.2.1.1 General

Structures or portions of structures shall be classified with respect to occupancy in one or more of the groups listed below.

1) Assembly Groups A-1, A-2, A-3, A-4 and A-5
2) Business Group B
3) Educational Group E
4) Factory and Industrial Groups F-1 and F-2
5) High Hazard Groups H-1, H-2, H-3, H-4 and H-5
6) Institutional Groups I-1, I-2, I-3 and I-4
7) Mercantile Group M
8) Residential Group R-1, R-2, R-3 and R-4
9) Storage Group S-1 and S-2
10) Utility and Miscellaneous Group U

Assembly Groups

5E.2.1.2 Assembly occupancies shall include the following:

A-I Motion picture theaters concert halls
Theaters

A-2 Banquet halls
Night clubs
Restaurants
Taverns and bars

A-3 Art galleries
Bowling alleys
Courtrooms
Dance halls (not including food or drink consumption)
Exhibition halls
Funeral parlors
Gymnasiums (without spectator seating)
Indoor swimming pools (without spectator seating)
Indoor tennis courts (without spectator seating)
Lecture halls
Libraries
Museums
Place of religious worship
Pool and billiard parlors
Waiting areas in transportation terminals

A-4 Arenas
Skating rinks
Swimming Pools
Tennis courts

A-5 Assembly uses intended for participation in or viewing outdoor activities including, but not limited to:
Amusement park structured
Bleachers
Grandstands
Stadiums

BUSINESS GROUP B

5E.2.1.3 Airport traffic control towers

Ambulatory health care facilities

Banks

Barber and beauty shops

Car wash

Dry cleaning and laundries: pickup and delivery stations and self-service

Education occupancies for students above the 12th grade

Laboratories: testing and research

Motor vehicle showrooms

Post offices

Print shops

Radio and television stations

Telephone exchanges

Training and skill development not within a school or academic program

* **Definitions** - The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings show herein.

CLINIC, OUTPATIENT - Buildings or portions thereof use to provide medical care on less than a 24-hour basis to individuals who are not rendered incapable of self-preservation by the services provided.

EDUCATIONAL GROUP - E

5E.2.1.4 Educational Group E

Education Group E occupancy includes, among others, the use of a building or structure, or a portion thereof, by six or more persons at anyone time for educational purposes through the 12th grade. Religious educational rooms and religious auditoriums, which are accessory to place of religious worship and have occupant loads of less than 100, shall be classified as A-3 occupancies.

* **Day care**. The use of a building or structure, or portion thereof, for educational, supervision or personal care services for more than five children older than 2½ years of age, shall be classified as a Group E occupancy.

FACTORY GROUP F

5E.2.1.5 Factory Industrial Group F

Factory Industrial Group F occupancy includes, among others, the use of a building or structure, or a portion thereof, for assembling, disassembling, fabricating, finishing,

manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous or Group S storage occupancy.

5E.2.1.6 Factory Industrial F-1 Moderate-hazard Occupancy

Factory industrial uses which are not classified as Factory Industrial F-2 Low Hazard shall be classified as F-1 Moderate Hazard and shall include the following:

Aircraft (manufacturing, not to include repair)

Athletic equipment

Automobiles and other motor vehicles

Bakeries

Beverages: over 16-percent alcohol content

Bicycles

Boats

Brooms or brushes

Business machines

Cameras and photo equipment

Canvas or similar fabric

Carpets and rugs (includes cleaning)

Clothing

Construction and agricultural machinery

Disinfectants

Dry cleaning and dyeing

Electric generation plants

Electronics

Engines (including rebuilding)

Food processing

Furniture

Hemp products

Jute products

Laundries

Leather products

Machinery

Metals

Millwork

Motion pictures and television filming (without spectators)

Musical instruments

Optical goods

Paper mills or products

Photographic film

Plastic products

Printing or publishing

Shoes

Soaps and detergents

Textiles

Tobacco

Upholstering

Wood; distillation

Woodworking (cabinet)

5E.2.1.7 Factory Industrial F-2 Low-hazard Occupancy

Factory industrial uses that involve the fabrication or manufacturing of noncombustible materials which during finishing, packing or processing do not involve a significant fire hazard shall be classified as F-2 occupancies and shall include the following:

Beverages: up to and including 16-percent alcohol content

Brick and masonry

Ceramic products

Foundries

Glass products

Gypsum

Ice

Metal products (fabrication and assembly)

HIGH-HAZARD GROUP - H

5E.2.1.8 Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5.

Definitions. The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

AEROSOL CONTAINER - A metal can or a glass or plastic bottle designed to the dispense and aerosol. Metal cans shall be limited to a maximum size of 3.3.8 fluid ounces (1000ml). Glass or plastic bottles shall be limited to a maximum size of 4 fluid ounces (118 ml).

BOILING POINT - The temperature at which the vapor pressure of a liquid equals the atmospheric pressure of 14.7 pounds per square inch (psi) (101 kpa) gage or 760 mm or mercury. Where an accurate boiling point is unavailable for the material in question, or fro mixtures which do not have a constant boiling point, for the purpose of this classification, the 20-percent evaporated point of a distillation performed in accordance with ASTM D 86 shall be used as the boiling point of the liquid.

CLOSED SYSTEM - The use of a solid or liquid hazardous material involving a closed vessel or system that remains closed during normal operations where vapors emitted by the product are not liberated outside of the vessel or system and the product is not exposed to the atmosphere during normal operations; and all uses of compressed gases. Examples of closed systems for solids and liquids include product conveyed through a piping system into a closed vessel, system or piece of equipment.

COMBUSTIBLE DUST - Finely divided solid material that is 420 microns or less in diameter and which, when dispersed in air in the proper proportions, could be ignited by a flame, spark or other source of ignition. Combustible dust will pass through a U.S. No.40 standard sieve.

COMBUSTIBLE FIBERS - Readily ignitable and free-burning materials in a fibrous or shredded form, such as cocoa fiber, cloth, cotton, excelsior, hay, hemp, henequen, istle, jute, kapok, oakum, rags, sisal, Spanish moss, straw, tow, wastepaper, certain synthetic fibers or other like materials. This definition does not include densely packed baled cotton.

COMBUSTIBLE LIQUID - A liquid having a closed cup flash point at or above 100ºf (38ºC). Combustible liquids shall be subdivided as following:

Class II - Liquids having a closed cup flash point at or above 100ºF (38ºC) and below 140ºF (60ºC).

Class IIIA - Liquids having a closed cup flash point at or above 140ºF (60ºC) and below 200ºF (93ºC).

Class IIIB - Liquids having a closed cup flash point at or above 200ºF(93ºC).

The category of combustible liquids does not include compressed gases or cryogenic fluids.

COMPRESSED GAS - A material, or mixture of materials, that:

1) Is a gas at 68ºF (20ºC) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure; and

2) Has a boiling point of 68ºF (20ºC) or less at 14.7 psia (101 kPa) which is either liquefied, nonliquefied or in solution, except those gases which have no other health or physical-hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia (282 kPa) at 68ºF (20ºC).

The states of a compressed gas are categorized as follows:

1) Nonliquefied compressed gases , other than those in solution, which are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68º F (20ºC).

2) Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68ºF (20ºC).

3) Compressed gases in solution are nonliquefied gases that are dissolved in a solvent.

4) Compressed gas mixtures consists of a mixture of two or more compressed gases contained in a packaging, the hazard properties of which are represented by the properties of the mixture as a whole.

CONTROL AREA - Spaces within a building where quantities of hazardous materials not exceeding the maximum allowable quantities per control area are stored, dispensed, used or handled. See also the definition of “Outdoor control area” in the international Fire Code.

CRYOGENIC FLUID - A liquid having a boiling point lower than -150ºF (-101ºC) at 14.7 pounds per square inch atmosphere (psia) (an absolute pressure of 101 kPa).

DEFLAGRATION - An exothermic reaction, such as the extremely rapid oxidation of a flammable dust or vapor in air, in which the reaction progresses through the unburned material at a rate less than the velocity of sound. A deflagration can have an explosive effect.

DETONATION - An exothermic reaction characterized by the presence of a shock wave in the material which established and maintains the reaction.The reaction zone progress through the material at a rate greater than the velocity of sound. The principle heating mechanism is one of shock compression. Detonations have an explosive effect.

DISPENSING - The pouring or transferring of any material from a container, tank or similar vessel, whereby vapors, dusts, fumes, mists or gases are liberated to the atmosphere.

EXPLOSION - Am effect produced by the sudden violent expansion of gases, which may be accompanied by a shock wave or disruption, or both, of enclosing materials or structures. An explosion could result from any of the following:

1) Chemical changes such as rapid oxidation, deflagration or detonation, decomposition of molecules and runway polymerization (usually detonations).
2) Physical changes such as pressure tank ruptures.
3) Atomic changes (nuclear fission or fusion)

EXPLOSIVE - A chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, dynamite, black powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, igniters and display fireworks.

High Explosive - Explosive material, such as dynamite, which can be caused to detonate by means of a No.8 test blasting cap when unconfined.

Low Explosive - Explosive material that will burn or deflagrate when ignited. It is characterized by a rate of reaction that is less than the speed of sound. Examples of low explosives include, but are not limited to, black powder, safety fuse; igniter cord: fuse lighters; fireworks.

Mass-detonating Explosive - Division 1.1, 1.2 and 1.5 explosives alone or in combination, or loaded into various types of ammunition or containers, most of which can be expected to explode virtually instantaneously when a small portion is subjected to fire, severe concussion, impact, the impulse of an initiating agent or the effect of a considerable discharge of energy from without. Materials that react in this manner represent a mass explosion hazard. Such an explosive will normally cause severe structural damage to adjacent objects. Explosive propagation could occur immediately to other items of ammunition and explosive stored sufficiently close to and not adequately protected from the initially exploding pile with a time interval short enough so that two or more quantities must be considered as one for quantity-distance purposes.

FLAMMABLE GAS - A material that is a gas at 68ºF (20ºC) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa_ of pressure (a material that has a boiling point of 68 of (20ºC) or less at 14.7 psia (101 kPa) which:

1) Is ignitable at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air, or

2) Has a flammable range at 14.7 psia (101kPa) with air of at least 12 percent, regardless of the lower limit.

The limits specified shall be determined at 14.7 psi (101 kPa) of pressure and a temperature of 68ºF (20ºC) in accordance with ASTM E 681.

FLAMMABLE LIQUEFIED GAS - A liquefied compressed gas which , under a charged pressure, is partially liquid at a temperature of 68ºF (20ºC) and which is flammable.

FLAMMABLE LIQUID - A liquid having a closed cup flash point below 100ºF (38ºC). flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:

Class IA - Liquids having a flash point below 73ºF (23ºC) and a boiling point below 100ºF (38ºC).

Class IB - Liquids having a flash point below 73ºF (23ºC) and a boiling point at or above 100ºF (38ºC).

Class IC - Liquids having a flash point at or above 73ºF (23ºC) and below 100ºF (38ºC).

The category of flammable liquids does not include compressed gases or cryogenic fluids.

FLAMMABLE MATERIAL - A material capable of being readily ignited from common sources of heat or at temperature of 600ºF (316ºC) or less.

ORGANIC PEROXIDE - An organic compound that contains the bivalent derivative and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. Organic peroxides can pose an explosion hazard (detonation or deflagration) or they can be shock sensitive. They can also decompose into various unstable compounds over an extended period of time.

Class I - Those formulations that are capable of deflagration but not detonation.

Class II - Those formulations that burn rapidly and that pose a moderate reactivity hazard.

Class III - Those formulations that burn rapidly and that pose a moderate reactivity hazard.

Class IV - Those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.

Class V - Those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard.

Unclassified Detonable - Organic peroxides that are capable of detonation. These peroxide pose an extremely high explosion hazard through rapid explosive decomposition.

OXIDIZER - A material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials and, if heated or contaminated' can result in vigorous self-sustained decomposition.

Class 4 - An oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock and that causes a severe increase in the burning rate of combustible materials with which it comes into contact. Additionally, the oxidizer causes a severe increase in the burning rate and can cause spontaneous ignition of combustibles.

Class 3 - An oxidizer that causes a severe increase in the burning rate to combustible materials with which it comes in contact.

Class 2 - An oxidizer that will cause a moderate increase in the burning rate of combustible materials with which it comes in contact.

Class 1 - An oxidizer that does not moderately increase the burning rate of combustible materials.

OXIDIZING GAS - A gas that can support and accelerate combustion of other materials.

PHYSICAL HAZARD - A chemical for which there is evidence that it is a combustible liquid, cryogenic fluid, explosive, flammable (solid, liquid or gas), organic peroxide (solid or liquid) , oxidizer (solid or liquid), oxidizing gas, pyrophoric (solid, liquid or gas) unstable (reactive) material (solid, liquid or gas) or water-reactive material (solid or liquid).

PYROPHORIC - A chemical with an auto ignition temperature in air, at or below a temperature of 130ºF (54.4ºC).

PYROTECHNIC COMPOSITION - A chemical mixture that produces visible light displays or sounds through a self-propagating, heat-releasing chemical reaction which is initiated by ignition.

TOXIC - A chemical falling within any of the following categories:

1) A chemical that has a median lethal does (LD50) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

2) A chemical that has a median lethal dose (LD50) of more than 200 milligrams per kilogram, but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.

3) A chemical that has a medical lethal concentration (LC50) in air of more than 200 parts per million, but not more than 2000 parts per million by volume of gas or vapor, or more than 2 milligrams per liter but not more than 20 milligrams per liter of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

UNSTABLE (REACTIVE) MATERIAL - A material, other than an explosive, which in the pure state or as commercially produced, will vigorously polymerize, decompose, condense or become self-reactive and undergo other violent chemical changes, including explosion, when exposed to heat, friction or shock, or in the absence of an inhibitor, or in the presence of contaminants, or in contact with incompatible materials. Unstable (reactive) materials are subdivided as follows:

Class 4 - Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures. This class includes materials that are sensitive to mechanical or localized thermal shock at normal temperatures and pressures.

Class 3 - Materials that in themselves are capable of detonation or of explosive decomposition or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures.

Class 2 - Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical

change with rapid releases of energy at normal temperatures and pressures, and that can undergo violent chemical change at elevated temperatures and pressures.

Class 1 - Materials that in themselves are normally stable but which can become unstable at elevated temperature and pressure.

WATER-REACTIVE MATERIAL - A material that explodes; violently reacts; produces flammable, toxic or other hazardous gases; or evolves enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture. Water-reactive materials are subdivided as follows:

Class 3 - Materials that react explosively with water without requiring heat or confinement.

Class 2 - Materials that react violently with water or have the ability to boil water. Materials that produce flammable, toxic or other hazardous gases or evolve enough heat to cause auto ignition or ignition of combustibles upon exposure to water moisture.

Class 1 - Materials that react with water with some release of energy, but not violently.

High-hazard Group H-1

Buildings and structures containing materials that pose a detonation hazard shall be classified as Group H-1. Such materials shall include, but not be limited to, the following:

Detonable pyrophoric materials

Explosive:

Division 1.1 - Explosive that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.

Division 1.2 - Explosive that have a projection hazard but not a mass explosion hazard.

Division 1.3 - Explosive that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

Exception: Materials that are used and maintained in a form where either confinement or configuration will not elevate the hazard from a mass fire to mass explosion hazard shall be allowed in H-2 occupancies.

Division 1.4 - Explosive that pose a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.

Exception: Articles, including articles packaged for shipment, that are not regulated as an explosive under Bureau of Alcohol, Tobacco and Firearms regulations, or unpackaged articles used in process operations that do not propagate a detonation or deflagration between articles shall be allowed in H-3 occupancies.

Division 1.5 - Very insensitive explosive. This division is comprised of substances that have a mass explosion hazard, but that are so insensitive there is very little probability of initiation or of transition form burning to detonation under normal conditions of transport.

Division. 1.6 - Extremely insensitive articles which do not have a mass explosion hazard. This division is comprised of articles that contain only extremely insensitive detonating substance and which demonstrate a negligible probability of accidental initiation or propagation.

Organic peroxides, unclassified detonable Oxidizer, Class 4

Unstable (reactive) materials, Class 3 detonable and Class 4

High-hazard Group H-2

Buildings and structures containing materials that pose a deflagration hazard or a hazard from accelerated burning shall be classified as Group H-2. Such materials shall include, but not be limited to, the following.

Class I, II or IIIA flammable or combustible liquids which are used or stored in normally open containers or systems, in closed containers or system pressurized at more than 15 psi (103.4 kpa) gage.

Combustible dusts

Cryogenic fluids, flammable

Flammable gases

Organics, peroxides, Class I

Oxidizers, Class 3, that are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 psi (103 kpa) gage Pyrophoric liquids, solids and gases, nondetonable Unstable (reactive) materials, Class 3, nondetonable Water-reactive materials, Class 3.

High-hazard Group H-3

Buildings and structures containing materials that readily support combustion or that pose a physical hazard shall be classified as Group H-3. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA flammable or combustible liquids that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103.4 kpa) or less

Combustible fibers, other than densely packed baled cotton

Consumer fireworks, 1.4G (Class C, Common)

Cryogenic fluids, oxidizing

Flammable solids

Organic peroxides, Class II and III

Oxidizers, Class 2

Oxidizers, Class 3, that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103 kpa)or less

Oxidizing gases

Unstable (reactive) materials, Class 2

Water-reactive materials, Class 2

High-hazard Group H-4

Buildings and structures which contain materials that are health hazard shall be classified as Group H-4. Such materials shall include, but not be limited to, the following:

Corrosives

Highly toxic materials

Toxic materials

High-hazard Group H-5 structures

Semiconductor fabrication facilities and comparable research and development areas in which hazardous production materials (HPM) are used and the aggregate quantity of materials in excess of their listed shall be classified as Group H-5.

INSTITUTIONAL GROUP - I

5E.2.1.9 Institutional Group I

Institutional Group I occupancy includes, among others, the use of a building or structure, or a portion thereof, in which people are cared for or live in a supervised environment, having physical limitations because of health or age are harbored for medical treatment or other care or treatment, or in which people are detained for penal or correctional purposes or in which the liberty of the occupants is restricted. Institutional occupancies shall be classified as Group 1-1,1-2,1-3 or 1-4.

Group I-1 -This occupancy shall include buildings, structure or parts thereof housing more than 16 persons, on a reason, live in a supervised residential environment that provides personal care services. The occupants are capable of responding to an emergency situation without physical assistance from staff. This group shall include, but not be limited to, the following:

Alcohol and drug centers

Congregate care facilities

Convalescent facilities

Group homes

Social rehabilitation facilities

A facility such as the above with five or fewer person shall be classified as a Group R-3 or , housing at least six and not more than 16 persons, shall be classified as Group R-4.

Group I-2 - This occupancy shall include building and structures used for medical, surgical, psychiatric, nursing or custodial care of persons who are not capable of self-preservation. This group shall include, but not be limited to, the following:

Child care facilities

Detoxification facilities

Hospitals

Mental hospitals

Nursing homes

Definitions - The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

CHILD CARE FACILITIES - Facilities that provide care on a 24-hour basis to more than five children, 2½ years of age or less.

DETOXIFICATION FACILITIES - Facilities that serve patients who are provided treatment for substance self-preservation or who are harmful to themselves or others.

HOSPITALS AND MENTAL HOSPITALS - Buildings or portions thereof used on a 24-hour basis for the medical, psychiatric, obstetrical or surgical treatment of inpatients who are incapable of self-preservation.

NURSING HOMES - Nursing homes are long-term care facilities on a 24-hour basis, including both intermediate care facilities and skilled nursing facilities, serving more than five persons and any of the persons are incapable of self-preservation.

Group 1-3

This occupancy shall include buildings and structures that are inhabited by more than five persons who are under restraint or security. An 1-3 facility is occupied by persons who are generally incapable of self-preservation due to security measure not under the occupant's control. This group shall include, but not be limited to, the following:

Detention centers

Jails

Reformatories

Building of Group 1-3 shall be classified as one of the occupancy conditions indicated in Sections 308.4.1 through 308.4.5 (see Section 408.1).

Condition 1 - This occupancy condition shall include buildings in which free movement is allowed from sleeping areas, and other spaces where access or occupancy is permitted, to the exterior via means of egress without restraint. A Condition 1 facility is permitted to be constructed as Group R.

Condition 2 - This occupancy condition shall include building in which free movement is allowed from sleeping areas and any other occupied smoke compartment to one or more other smoke compartments. Egress to the exterior is impeded by locked exits.

Condition 3 - This occupancy condition shall include buildings in which free movement is allowed within individual smoke compartments, such as within a residential unit comprised of individual sleeping units and group activity spaces, where egress is impeded by remote-controlled releases of means of egress from such a smoke compartment to another smoke compartment.

Condition 4 - This occupancy condition shall include buildings in which free movement is restricted from an occupied space. Remote-controlled release is provided to permit movement from sleeping units, activity spaces and other occupied areas within the smoke compartment to other smoke compartments.

Condition 5 - This occupancy condition shall include buildings in which free movement is restricted from an occupied space. Staff-controlled manual release is provided to permit movement from sleeping units, activity spaces and other occupied areas within the smoke compartment to other smoke compartments.

Group 1-4 day care facilities

This group shall include buildings and structures occupied by persons of any age who receive custodial care for less than 24 hours by individuals other than parents or guardians, relatives by blood, marriage or adoption, and in a place other than the home of the person cared for. A facility such as the above with five or fewer persons shall be classified as a Group R-3. Places of worship during religious functions are not included.

Adult care facility

A facility that provides accommodations for less than 24 hour for more than five unrelated adults and provides supervision and personal care services shall be classified as Group I-4.

Exception: A facility where occupants are capable of responding to an emergency situation without physical assistance from the staff shall be classified as Group R-3.

Child care facility

A facility that provides supervision and personal care on less than a 24-hour basis for more than five children 2½ years of age or less shall be classified as Group I-4.

Exception: A child day care facility that provides care for more than five but no more than 100 children 2½ years or less of age, where the rooms in which the children are cared for are located on a level of exit discharge serving such rooms and each of these child care rooms has an exitdoor directly to the exterior, shall be classified as Group E.

MERCANTILE GROUP M

5E.2.1.10 Mercantile Group M occupancy includes, among others, the use of a building or structure or a portion thereof, for the display and sale of merchandise and involves stocks of good, wears or merchandise incidental to such purpose and accessible to the public. Mercantile occupancies shall include, but not be limited to, the following:

1) Department stores
2) Drug stores
3) Markets
4) Motor fuel-dispensing facilities
5) Sale rooms

RESIDENTIAL GROUP R

5E.2.1.11 Residential Group R

Residential Group R includes, among others, the use of a building or structure, or a portion thereof, for sleeping purposes when not classified as an Institutional Group I or when not regulated by the International Residential Code in accordance with Section 101.2. Residential occupancies shall include the following:

R-1 Residential occupancies containing sleeping units where the occupants are primarily transient in nature, including:

Boarding houses (transient)

Hotels (transient)

Motels (transient)

Congregate living facilities (transient) with 10 or fewer occupants are permitted to comply with the construction requirements for Group R-3.

R-2 Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanents in nature, including:

Apartment houses

Boarding house (nontransient)

Convents

Dormitories

Hotels (nontransient)

Live/work units

Monasteries

Motels (nontransient)

R-3 Residential occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, including:

Buildings that do not contain more than two dwelling units. Adult care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.

Child care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.

Congregate living facilities with 16 or fewer persons.

Adult care and child care facilities that are within a single-family home are permitted to comply with the International Residential Code.

R-4 Residential occupancies shall include buildings arranged for occupancy as residential care/assisted living facilities including more than five but not more than 16 occupants, excluding staff.

Group R-4 occupancies shall meet the requirements for construction as defined for Group R-3, except as otherwise provided for in this code.

Definitions

The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

BOARDING HOUSE - A building arranged or used for lodging for compensation, with or without meals, and not occupied as a single-family unit.

CONGREGATE LIVING FACILITIES - A building or part thereof that contains sleeping units where residents share bathroom and /or kitchen facilities.

DORMITORY - A space in a building where group sleeping accommodations are provided in one room, or in a series of closely associated rooms, for persons not members of the same family group, under joint occupancy and single management, as in college dormitories or fraternity houses.

PERSONAL CARE SERVICE - The care of residents who do not require chronic or convalescent medical or nursing care. Personal care involves responsibility for the safety of the resident while inside the building.

RESIDENTIAL CARE/ASSISTED LIVING FACILITIES - A building of age, mental disability or other reasons, live in a supervised residential environment which provides personal care services. The occupants are capable of responding to an emergency situation without physical assistance from staff. This classification shall include, but not be limited to, the following: residential board and care facilities, assisted living facilities, halfway houses, group homes, congregate care facilities, social rehabilitation facilities, alcohol and drug abuse centers and convalescent facilities.

TRANSIENT - Occupancy of a dwelling unit or sleeping unit for not more than 30 days.

STORAGE GROUP

5E.2.1.12 Storage Group S

Storage Group S occupancy includes, among others, the use of a building or structure, or a portion thereof, for storage that is not classified as a hazardous occupancy.

5E.2.1.13 Moderate-hazard storage, Group S-I

Buildings occupied for storage uses that are not classified as Group S-2 including, but not limited to, storage of the following:

Aerosols, Levels 2 and 3

Aircraft hangar (storage and repair)

Bags: cloth and paper

Bamboos and rattan

Baskets

Belting: canvas and leather

Books and paper in rolls or packs

Boots and shoes

Buttons, including cloth covered, pearl or bone

Cardboard and cardboard boxes

Clothing, woolen wearing apparel

Dry boat storage (indoor)

Furniture

Furs

Glues, mucilage, pastes and size

Grains

Horns and combs, other than celluloid

Leather

Linoleum

Lumber

Motor vehicle repair garages complying with the maximum allowable quantities of hazardous materials listed in

Photo engravings

Resilient flooring

Silk

Soaps

Sugar

Tire, bulk storage of

Tobacco, cigars and cigarettes

Upholstery and mattresses

Wax candles

5E.2.1.14 Low-hazard storage, Group S-2

Includes, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness division; or in paper wrappings. Such products are permitted to have a negligible amount of plastic trim, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of the following:

Asbestos

Beverages up to and including 16-percent alcohol in metal, glass or ceramic containers

Cement in bags

Chalk and crayons

Dairy products in nonwaxed coated paper containers

Dry cell batteries

Electrical coils

Electrical motors

Empty cans

Food products

Foods in noncombustible containers

Fresh fruits and vegetables in nonplastic tray or containers

Frozen foods

Glass

Glass bottles, empty or filled with noncombustible liquids

Gypsum board

Inert pigments

Ivory

Meats

Metal cabinets

Metal desks with plastic tops and trim

Metal parts

Mirrors

Oil-filled and other types of distribution transformers

Parking garages, open or enclosed

Porcelain and pottery

Stoves

Washers and dryers

UTILITY AND MISCELLANEOUS GROUP

5E.2.1.15 General

Table 3.1.5

Buildings and structures of an accessory character and miscellaneous structures not classified in any specific occupancy shall be constructed, equipped and maintained to conform to the requirements of this code commensurate with the fire and life hazard incidental to their occupancy.Group U shall include, but not be limited to, the following:

1) Agricultural buildings
2) Barns
3) Carports
4) Grain silos, accessory to a residential occupancy
5) Greenhouses
6) Livestock shelters
7) Private garages
8) Retaining walls
9) Sheds
10) Stables
11) Tanks
12) Towers

Part -3

MEANS OF EGRESS

General

Buildings or portions thereof shall be provided with a means of egress system required by this chapter. The provisions of this chapter shall control the design, construction and arrangement of means of egress components required to provide an approved means of egress from structures and portions thereof. The provisions of this chapter shall apply to new construction.

Exception : Detached one- and two- family dwellings and multiple single-7family dwelling (townhouses) not more than three stories above grade plane in height with a separate means of egress.

Occupant Load

5E.3.1.1 Actual number

The actual number of occupants for whom each occupied space, floor or building is designed.

5E.3.1.2 Number by combination

Where occupants from accessory spaces egress through a primary area, the calculated occupant load for the primary space shall include the total occupant load of the primary space plus the number of occupants egressing through it from the accessory space.

5E.3.1.3 Posting of occupant Load

Every room or space that is an assembly occupancy shall have the occupant load of the room or space posted in a conspicuous place, near the main exit or exit access doorway from the room or space. Posted signs shall be of an approved legible permanent design and shall be maintained by the owner or authorized agent.

Exit Access Travel Distance

Occupancy	Without sprinkler system (feet)	With Sprinkler system (feet)
A,E,F-1,I-1,M,R,S1	200	250
B	200	300
F-2, S-2,U	300	400
H-1	Not Permitted	75
H-2	Not Permitted	100
H-3	Not Permitted	150
H-4	Not Permitted	175
H-5	Not Permitted	200
I-2,I-3,I-4	150	200

5E.3.1.4 Egress convergence

Where means of egress from floors above and below converge at an intermediate level the capacity of the means of egress from the point of covergence shall not be less than the sum of the two floors.

EGRESS WIDTH

5E.3.1.5 Minimum required egress width

The means of egress width shall not be less than required by this section. The total width of means of egress in inches (mm) shall not be less than the total occupant load served by the means of egress multiplied by the factors in Table 1005.1 and not less than specified elsewhere in this code.

Exception: Means of egress complying with Assembly Group.

Table 5E.3.1.6

5E.3.1.6 Egress width per occupant served

Occupancies	Without Sprinkler system		With Sprinkler system	
	stairway (inches per occupant)	other egress (components occupant)	stairway (inches per occupant)	other egress (components occupant)
Occupancies other than those listed below	0.3	0.2	0.2	0.15
Hazardous H-1 H-2,H-3 and H-4	0.7	0.4	0.3	0.2
Institutional 1-2	Not Applicable	Not Applicable	0.3	0.2

Area Of Refuge

5E.3.1.7 For buildings more than 24m in height, refuge area of 15m2 or an area equivalents to 0.3 m2 per person to accommodate the occupants of two consecutive floors, whichever is higher, shall be provided as under:

The refuge area shall be provided on the periphery of the floor or preferably on a cantilever projection and open to air at least on one side protected with suitable railings.

a) For floors above 24m and Up to 39m One refuge area on the immediately above 24m.

b) For floors above 39m One refuge area on the floor immediately above 39 m and so on after every 15m.

Note: Residential flats in multi-storied buildings with balcony, need not be provided with refuge area however flats without balcony shall provide refuge area as given above.

Doors and Gates

5E.3.1.8 Doors

Means of egress doors shall be readily distinguishable from the adjacent construction and finishes such that the doors are easily recognizable as doors. Mirror or similar reflecting materials shall not be used on means of egress doors. Means of egress doors shall not be concealed by curtains, drapes, decorations or similar materials.

5E.3.1.9 Size of doors

The minimum width of each door opening shall be sufficient for the occupant load thereof and shall provide a clear width of not less than 32 inches (813mm). Clear openings of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees. (1.57 rad). Where this section requires a minimum clear width of 32 inches (813 mm) and a door opening includes two door leaf without a mullion, one leaf shall provide a clear opening width of 32 inches (813mm). The maximum width of swinging door leaf shall be 48 inches (1219mm) nominal. Means of egress doors in an occupancy in Group I-2 used for the movement of beds shall provide a clear width not less than 41½ inches (1054 mm). The height of doors shall not be less than 80 inches (2032mm).

Exceptions:

1) The minimum and maximum width shall not apply to door openings that are not part of the required means of egress in occupancies in Groups R-2 and R-3 as applicable in Section 101.2.

2) Door openings to resident sleeping units in occupancies in Group I-3 shall have a clear width of not less than 28 inches (711mm).

3) Door openings to storage closets less than 10 square feet ($0.93m^2$) in area shall not be limited.

4) Door openings within a dwelling units and sleeping units shall not be less than 76 inches (1981mm) in height.

5) Exterior door openings in dwelling units and sleeping units, other than the required exit door shall not be less than 76 inches (1930mm) in height.

6) Interior egress doors within a dwelling unit or sleeping unit which is not required to be adaptable or accessible.

7) Door openings required to be accessible within Type B dwelling units shall have a minimum clear width of 31¾ inches (806 mm).

5E.3.1.10 Door swing

Egress doors shall be side-hinged swinging.

Exceptions:

1) Private garages, office areas, factory and storage areas with an occupant load of 10 or less.

2) Group I-3 occupancies used as a place of detention.

3) Door within or serving a single dwelling unit in Groups R-2 and R-3.

Doors shall swing in the direction of egress travel where serving an occupant load of 50 or more persons or a Group H occupancy.

5E.3.1.11 Hardware height

Door handles, pulls latches, locks and other operation devices shall be installed 34 inches (864 mm) minimum and 48 inches (1219mm) maximum above the finished floor. Locks used only for security purposes and not used for normal operation are permitted at any height.

5E.3.1.12 Locks and latches

Locks and latches shall be permitted to prevent operation of doors where any of the following exists:

1) Places of detention or restraint.
2) In building in occupancy Group A having an occupant load of 300 or less, Groups B,F,M and S and in churches, the main exterior door or door are permitted to be equipped with key-operated locking devices from the egress side provided.
   2.1- The locking device is readily distinguishable as locked.
   2.2- A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN BUILDING IS OCCUPIED. The sign shall be in letters 1 inch (25mm) high on a contrasting background.
   2.3- The use of the key-operated locking device is revokable by the fire code official for due cause.

Stairways and Handrails

5E.3.1.13 Stairway width

The width of stairways shall be determined as specified in Section 3.1.6 but such width shall not be less than 44 inches (1118mm).

Exceptions;

1) Stairways serving an occupant load of 50 or less shall have a width of not less than 36 inches (914 mm).0

2) Spiral stairways as provided for in Section 5E.3.1.31.

5E.3.1.14 Headroom

Stairways shall have a minimum headroom clearance of 80 inches (2032 mm) measured vertically from a line connecting the edge of the nosings. Such headroom shall be continuous above the stairway to the point where the line intersect the landing below, one tread depth beyond the bottom riser. The minimum clearance shall be maintained the full width of the stairway and landing.

Exception: Spiral stairways complying with Section 5E.3.1.31 are permitted a 78 inch (1981mm) headroom clearance.

5E.3.1.15 Stair treads and risers

Stair riser heights shall be 7 inches (178mm) maximum and 4 inches (102mm) minimum. Stair tread depths shall be 11 inches (279mm) minimum.

Exceptions:

1) Circular stairways in accordance with Section 5E.3.1.30.

2) Spiral stairways in accordance with Section 5E.3.1.31.

5E.3.1.16 Handrail Height

Handrail height measured above stair tread nosings, or finish surface of ramp slope , shall be unit form, not less than 34 inches (864mm) and not more than 38 inches (965 mm).

5E.3.1.17 Dimensional uniformity

Stair treads and risers shall be of uniform size and shape. The tolerance between the largest and smallest riser or between the largest and smallest tread shall not exceed 0.375 inch (9.5mm) in any flight of stairs.

5E.3.1.18 Vertical rise

A flight of stairs shall not have a vertical rise greater than 12 feet (3658mm) between floor levels or landings.

Exception: Aisle stairs complying with Section 5E.3.1.69.

5E.3.1.19 Circular stairways

Circular stairways shall have a minimum tread depth and a maximum riser height in accordance with Section 5E.3.1.26 and the smaller radius shall not be less than twice the width of the stairway. The minimum tread depth measured 12 inch (305 mm) from the narrower end of the tread shall not be less than 11 inches (279 mm). The minimum tread depth at the narrow end shall not be less than 10 inches (254 mm).

5E.3.1.20 Spiral stairways

Spiral stairways are permitted to be used a component in the means of egress only within dwelling units or from a space not more than 250 square feet (23 m2) in area and serving not more than five occupants, or from galleries, catwalks and gridirons in accordance with Section 1014.6.

A spiral stairway shall have a 7.5 inch (191 mm) minimum clear tread depth at a point 12 inches (305mm) from the narrow edge. The risers shall be sufficient to provide a headroom of 78 inches (1918mm) minimum, but riser height shall not be more than 9.5inches (241mm). The minimum stairway width shall be 26 inches (660 mm).

5E.3.1.21 Handrail graspability

Handrails with a circular cross section shall have an outside diameter of at least 1.25 inches (32mm) and not greater than 2 inches (51mm) or shall provide equivalent graspability . If the handrail is not circular, it shall have a perimeter dimension of at least 4 inches (102mm) and not greater than 6.25 inches (160mm) with a maximum cross-section dimension of 2.25 inches (57 mm).

The difference between spiral staircase and circular staircase:

A spiral staircase has all steps coming off a central pole.

The handrail is only on the outside and, the staircase is narrower than a circular stair.

A circular staircase has handrails on each side.

A circular staircase can be made wider and straighter since it does not need to conform to the pole. It takes up more space but the curve can be customized to fit the environment. Circular stairs are easier to bring furniture up and down compared to spiral stairs.

RAMPS

5E.3.1.22 Slope

Ramps used as part of a means of egress shall have a running slope not steeper than one unit vertical in 12 units horizontal (8-percent slope). The slope of other ramps shall not be steeper than one unit vertical in eight units horizontal (12.5 percent slope).

Exception : Aisle ramp slope in occupancies of Group A shall comply.

5E.3.1.23 Width

The clear width of a ramp and the clear width between handrails, if provided shall be 36 inches (914mm) minimum.

5E.3.1.24 Headroom

The minimum headroom in all parts of the means of egress ramp shall not be less than 80 inches (2032mm).

5E.3.1.25 Ramp surface

The surface of ramps shall be of slip-resistant materials that are securely attached.

5E.3.1.26 Handrails

Ramps shall have handrails on both sides complying with Section 3.1.27.

5E.3.1.27 EMERGENCY AND ESCAPE LIGHTING

a) Emergency lighting shall be powered from a source independent of that supplying the normal lighting.

   Escape Lighting shall be capable of:

   1) Indicating clearly and unambiguously the escape routes.

   2) Providing adequate illumination along such routes to allow safe movement of persons towards and through the exits.

   3) Ensuring that fire alarm call points and fire fighting equipments provided along the escape routes can be readily located.

(b) The horizontal luminance at floor level on the centerline of an escape route shall be not less than 10 lux. In addition, for escape routes up to 2 m wide, 50 percent of the route width shall be lit to a minimum of 5 lux.

(c) The emergency lighting shall be provided to be put on within 1 s of the failure of the normal lighting supply.

(d) Escape lighting luminaries should be sited to cover the following locations:

1) Near each intersection of corridors
2) at each exit door,
3) Near each change of direction in the escape route,
4) Near each staircase so that each flight of stairs receives direct light,
5) Near any other change of floor level,
6) Outside each final exit and close to it,
7) Near each fire alarm call point,
8) Near fire-firefighting equipment, and
9) To illuminate exit and safety sings as required by the enforcing authority.

Note- For the purpose of this clause ' near ' is normally considered to be within 2 m measured horizontally.

(e) Emergency lighting systems shall be designed to ensure that a fault or failure in any one luminaire does not further reduce the effectiveness of the system.

(f) The luminaires shall be mounted as low as possible, but at least 2 m above the floor level.

(g) Emergency lighting luminaries and their fittings shall be of non-flammable type.

(h) It is essential that the wiring and installation of the emergency lighting systems are of high quality so as to ensure their perfect serviceability at all times.

(i) The emergency lighting system shall be well maintained by periodical inspections and tests so as to ensure their perfect service ability at all times.

5E.3.1.36 Illumination of Means of Exit

Staircase and corridor lights shall conform to the following:

a) The staircase and corridor lighting shall be on separate circuits and shall be independently connected so that it could be operated by one switch installation on the ground floor easily accessible to fire fighting staff at any time irrespective of the position of the individual control of the light points, if any. It should be of miniature circuit breaker type of switch so as to avoid replacement of fuse in case of crisis:

b) Staircase and corridor lighting shall also be connected to alternative supply. The alternative source of supply may be provided by battery continuously trickle charged from the electric mains; and

5E.3.1.37 Illumination Level

The means of egress illumination level shall not be less than I foot-candle (11 lux) at the floor level.

5E.3.1.38 Exit Signs

Where required. Exits and exit access doors shall be marked by an approved exit sign readily visible from any direction of egress travel. Access to exits shall be marked by readily visible exit signs in cases where the exit or the path of egress travel is not immediately visible to the occupants. Exit sign placement shall be such that no point in an exit access corridor is more than 100 feet (30480 mm) or the listed viewing distance the sign. Whichever is less, from the nearest visible exit sign.

Exception

1) Exit signs are not required in rooms or areas which require only one exit or exit access.
2) Main exterior exit doors or gates which obviously and clearly are identifiable as exits need not have exit signs where approved by the fire code official.
3) Exit signs are not required in occupancies in Group U and individual sleeping units or dwelling units in Group R-1, R-2 or R-3.
4) Exit signs are not required in sleeping areas in occupancies in Group I-3.
5) In occupancies in Groups A-4 and A-5, exit signs are not required on the seating side of vomitories or openings into seating areas where exit signs are provided in the concourse that are readily apparent from the vomitories. Egress lighting is provided to identify each vomitory or opening within the seating area in an emergency.

5E.3.1.39 Illumination

Exit signs shall be internally or externally illuminated.

5E.3.1.40 Internally illuminated exit signs

Internally illuminated exit signs shall be illuminated at all times.

5E.3.1.41 Externally illuminated exit signs

Graphics

Every exit sign and directional exit sign shall have plainly legible letters not less than 6 inches (152 mm) high with the principal strokes of the letters not less than 0.75 inch (19.1 mm) wide. The word "EXIT" shall have letters having a width not less than 2 inches (51 mm) wide except the letter "I", and the minimum spacing between letters shall not be less than 0.375 inch (9.5 mm). Signs larger than the minimum established in this section shall have letter widths, strokes and spacing in proportion to their height.

The word "EXIT" shall be in high contrast with the background and shall be clearly discernible when the exit sign illumination means is or is not energized. If an arrow is provided as part of the exit sign, the construction shall be such that the arrow direction cannot be readily changed.

5E.3.1.42 Exit sign illumination

The face of an exit sign illuminated from an external source shall have an intensity of not less than 5 foot-candles (54 lux)

5E.3.1.43 Power source

Exit signs shall be illuminated at all times. To ensure continued illumination for a duration of not less than 90 minutes in case of primary power loss, the sign illumination means shall be connected to an emergency power system provided from storage batteries, unit equipment or an on-site generator.

Exit Access Travel Distance

5E.3.1.44 Travel distance limitations

Exits shall be so located on each story such that the maximum length of exit access travel measured from the most remote point within a story to the entrance to an exit along the

natural and unobstructed path of egress travel shall not exceed the distance given in Table 1015.1.

Corridor

5E.3.1.45 Corridor width

The minimum corridor width shall be as determined in Section 1005.1 but not less than 44 inches (1118 mm).

Exceptions:

1) Twenty -four inches (610mm) For access to and utilization of electrical mechanical or plumbing systems or equipment.
2) Thirty-six inches (914mm) within a required occupant capacity of 50 or less.
3) Thirty -six inches (914mm) within a dwelling unit.
4) Seventy -two inches (1829mm) . In Group E with a corridor having capacity of 100 or more.
5) Seventy-two inches (1829mm). In corridors serving surgical Group I, health care centers for ambulatory patinets receiving outpatient medical care, which causes the patient to be not capable of self -preservation.
6) Ninety-six inches (2438mm). In Group I-2 in areas where required for bed movement.

Number of Exits

5E.3.1.46 Minimum number of exits

All rooms and spaces within each story shall be provided with and have access to the minimum number of approved independent exits as required minimum number of approved independent exits as required by Table 1018.1 based on the occupant load. The required number of exits from any story, basement or individual space shall be maintained until arrival at grade or the public way.

Table 3.1.47

5E.3.1.47 Minimum number of exits for occupant load

Occupant Load	Minimum Number of Exits
1-500	2
501-1,000	3
More than 1,000	4

5E.3.1.48 Buildings with one exit.

Only one exit shall be required in buildings as described below.

1) Buildings described in Table 3.1.58, provided that the building has not more than one level below the first story above grade plane.

2) Buildings of Group R-3 occupancy.

Table 3.1.48

Buildings with one exit

Occupancy	Maximum High of Building Above Grade Plane	Maximum Occupancy Floor
A,B,E,F,M,U	1Story	50 occupants and 75 feet travel distance
H-2,H-3	1 Story	3 Occupants and 75 feet travel distance
H-4,H-5,I,R	1Story	10 Occupants and 75 feet travel distance
S	1 Story	30 Occupants and 75 feet travel distance
B,F,M,S	2 Stories	30 Occupants and 75 feet travel distance
R-2	2 Stories	4 Dwelling units and 75 feet travel distance

Two-way Escape

5E.3.1.49 If the distance between the two exits or exit access doors is less than half the length of the maximum overall diagonal dimension of the building or area to be served, it shall be considered as a one-way escape arrangement; and

5E.3.1.50 Three or more exits

where access to three or more exits is required, at least two exits doors or exit access door ways shall be placed a distance apart equal to not less than one-half of the length of the maximum over all diagonal dimension of the area served measured in a straight line between such exit doors or exit access doorways. Additional exits or exit access doorways shall be arranged a reasonable distance a part so that if one become blocked, the other will be available.

5E.3.1.51 Stairway floor number signs

A sign shall be provided at each floor landing in interior vertical exit enclosures connecting more than three stories designating the floor level, the terminus of the top and bottom of the stair enclosure and the idenfification of the stair. The signage shall also state the story of and the direction to the exit discharge. The sign shall be located 5 feet (1524 mm) above the floor landing in a position which is readily visible when the doors are in the open and closed positions.

Exit Passageways

5E.3.1.52 Exit passageway

Exit passageways serving as an exit component in a means of egress system shall comply with the requirements of this section. An exit passageway shall not be and for any purpose other than as a means of egress.

5E.3.1.53 Width

The width of exit passageways shall be determined as specified in Section **3.1.6** but such width shall not be less than -inches (1118mm), except that exit passageways serving occupant load of less than 50 shall not be less than 36 inches (914mm) in width.

The required width of exit passageways shall be unobstructed.

Exception:

Door, when fully opened , and handrails, shall not reduce the required width by more than 7 inches (178mm). Other nonstructural projections such as trim and similar decorative features are permitted to project into the required width 1.5 inches (38mm) on each side.

Exit Discharge

5E.3.1.54 General

Exits shall discharge directly to the exterior of the building. The exit discharge shall be at grade or shall provide direct access to grade.

5E.3.1.55 Exit discharge capacity

The capacity of the exit discharge shall be not less than the required discharge capacity of the exits being served.

Assembly

5E.3.1.56 General

Occupancies in Group A which contain seats, tables, displays, equipment or other material shall comply with this section.

5E.3.1.57 Assembly main exit

Group A occupancies that have on occupant load of greater than 300 shall be provided with a main exit. Where the building is classified as a Group A occupancy, the main exit shall front on at least one street or an unoccupied space of not less than 10 feet (3048mm) in width that adjoins a street or public way.

Exception

In assembly occupancies where there is no well-defined main exit or where multiple main exits are porvided, exits shall be permitted to be distributed around the perimeter of the building.

5E.3.1.58 Interior balcony and gallery means of egress

For balconies or galleries having a seating capactiy of over 50 located in Group A occupancies, at least two means of egress shall be provided, one from each side of every balcony or gallery, with at least one leading directly to an exit.

5E.3.1.59 Minimum aisle width

The minimum clear width of aisles shall be as shown as shown:

1) Forty-eight inches (1219mm) for aisle stairs having seating on each side.

   Exception: Thirty - six inches (914mm) where the aisle does not serve more than 50 seats.

2) Thirty - six inches (914mm) for aisle stairs having seating on only one side.

3) Twenty-three inches (584 mm) between an aisle stair handrail or guard and seating where the aisle is subdivided by a handrail.

4) Forty-two inches (1067 mm) for level or ramped aisles having seating on both sides.

Exceptions

1) Thirty-six inches (914 mm) where the aisle does not serve more than 50 seats.

5) Thirty-six inches (914mm) for level or ramped aisles having seating on only one side.

Exception: Thirty inches (762 mm) where the aisle does not serve more than 14 seats.

6) Twenty-three inches (584 mm) between an aisle stair handrail and seating where an aisle does not serve more than five rows on one side.

5E.3.1.60 Clear width of aisle accessways serving seating.

a) Where seating rows have 14 or fewer seats, the minimum clear aisle accessway width shall not be less than 12 inches (305 mm) measured as the clear horizontal distance from the back of the row ahead and the nearest projection of the row behind.

b) For rows of seating served by aisles or doorways at both ends, there shall not be more than 100 seats per row. The minimum clear width of 12 inches (305 mm) between rows shall be increased by 0.3 inch (7.6mm) for every additional seat beyond 14 seat, but the minimum clear width is not required to exceed 22 inches (559 mm).

5E.3.1.61 Emergency Escape and Rescue

General

In addition to the means of egress required by this chapter, provisions shall be made for emergency escape and rescue in Group R as applicable in Section 1001.1 and Group I-1 occupancies. Basements and sleeping rooms below the fourth story above grade plane shall have at least one exxterior emergency escape and rescue opening in accordance with this section. Where basements contain one or more sleeping rooms, emergecy egress and rescue openings shall be required in each sleeping room,but shall be required in adjoining areas of the basement. Such opening shall open directly into a public street, public alley, yard or court.

5E.3.1.62 Minimum dimensions

The minimum net clear opening height dimension shall be 24 inches (610mm). The minimum net clear opening width dimesion shall be 20 inches (508mm). The net clear opening dimensions shall be the result of normal operation of the opening.

5E.3.1.63 Maximum height from floor

Emergency escape and rescue openings shall have the bottom of the clear opening not greater than 44 inches (1118 mm) measured from the floor.

5E.3.1.64 Window wells

An emergency escape and rescue opening with a finished sill height below the adjacent ground level shall be provided with a window well in accordance with Section 3.1.76 and 3.1.77.

5E.3.1.65 Minimum size

The minimum horizontal area of the window well shall be 9 square feet (0.84m2) with a minimum dimension of 36 inches (914mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

5E.3.1.66 Ladders or Steps

Window wells with a vertical dept of more than 44 inches (1118 mm) shall be equipped with an approved permanently affixed ladder or steps. Ladders or rungs shall have an inside width of at least 12 inches (305mm), vertically for the full height of the window well. The ladder or steps shall not encroach into the required dimensions of the window well by more than 6 inches (152 mm). The ladder or steps shall not be obstructed by the emergency escape and resue opening. Ladders or steps required by this section are exempt from the stairway requirements.

5E.3.1.68 Minimum Period of Fire Resistance (In minutes)

Type of Building and Element	Basement		Gorund Floor and Upper Floor			
	Bldg. Height up to 33 ft	Bldg. Height Over 33 ft	Bldg. Height up to 16.5 ft	Bldg. Height Over 65.5ft	Bldg. Height up to 96.5 ft	Bldg. Height Over 96.5ft
Residential apartment buildings	90	60	30	60	90	120
Detached houses	_	30	30	60	_	_
Offices	90	60	30	60	90	x
Shops and Shopping Centres	90	60	60	60	90	x
Cinema halls/Theatres	90	60	60	60	90	x
Industrial buildings	120	90	60	90	120	x
Warehouse buildings	120	90	60	90	120	x
Vehicle parking building	90	60	30	60	x	x
Walls at various buildings						
Lift walls	90	90	90	90	90	120
Restaurant/ hotel kitchen walls	120	120	120	120	120	120
Car workshop walls	120	120	120	x	x	x
Walls at welding workshops	120	120	120	x	x	x
Walls of rooms with fuel storage functions	120	120	120	x	x	x

X means not permitted

Part - 4

FIRE PROTECTION SYSTEMS

DEFINITIONS

The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

AUDIBLE ALARM NOTIFICATION APPLIANCE

A notification appliance that alerts by the sense of hearing.

AUTOMATIC

As applied to fire protection devices, is a denecessity for human intervention and activated as a result of a predetermined temperature rise, rate of temperature rise, or combustion products.

AUTOMATIC FIRE-EXTINGUISHING SYSTEM

An approved system of devices and equipment which automatically detects a fire and discharges an approved fire-extinguishing agent onto or in the area of a fire.

AUTOMATIC SPRINKLER SYSTEM

A sprinkler system, for fire protection purposes, is an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply. The portion of the system above the ground is a network of specially sized or hydraulically designed piping installed in a structure or area, generally overhead, and to which automatic sprinklers are connected in a systematic pattern. The system is usually activated by heat from a fire and discharges water over the fire area.

AVERAGE AMBIENT SOUND LEVEL

The root mean square. A-weighted sound pressure level measured over a 24-hour period.

DETECTOR, HEAT

A fire detector that senses heat produced by burning substances. Heat is the energy produced by combustion that causes substances to rise in temperature.

EMERGENCY ALARM SYSTEM

A system to provide indication and warning of emergency situations involving hazardous materials.

EMERGENCY VOICE/ALARM COMMUNICATIONS

Dedicated manual or automatic facilities for originating and distributing voice instructions, as well as alert and evacuation signals pertaining to a fire emergency, to the occupants of a building.

FIRE ALARM BOX, MANUAL

See “Manual fire alarm box”.

FIRE ALARM SIGNAL

A signal initiated by a fire alarm-initiating device such as a manual fire alarm box, automatic fire detector, water-flow switch, or other device whose activation is indicative of the presence of a fire or fire signature.

FIRE ALARM SYSTEM

A system or portion of a combination system consisting of components and circuits arranged the monitor and annunciate the status of fire alarm or supervisor signal-initiating devices and to initiate the appropriate response to those signals.

FIRE AREA

The aggregate floor area enclosed and bounded by fire walls, fire barriers, exterior walls, or fire-resistance-rated horizontal assemblies of a building.

FIRE DETECTOR, AUTOMATIC

A device designed detect the presence of a fire signature and to initiate action.

FIRE PROTECTION SYSTEM

Approved devices, equipment and systems or combinations of systems used to detect fire, activate an alarm, extinguish or control a fire, control of manage smoke and products of a fire or any combination thereof.

FIRE SAFETY FUNCTIONS

Building and fire control functions that are intended to increase the level of life safety for occupants or to control the spread of the harmful effects of fire.

MANUAL FIRE ALARM BOX

A manually operated device used to initiate an alarm signal.

SLEEPING UNIT

A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.

SMOKE ALARM

A single-or multiple-station alarm responsive to smoke and not connected to a system.

SMOKE DETECTOR

A listed device that senses visible or invisible particles of combustion.

TIRES, BULK STORAGE OF

Storage of tires where the area available for storage exceeds 20,000 cubic feet (566 m^3).

ZONE

A defined area within the protected premises. A zone can define an area from which a signal can be received, an area to which a signal can be sent, or an area in which a form of control can be executed.

AUTOMATIC SPRINKLER SYSTEMS

5E.4.1.1 General

Automatic sprinkler systems shall comply with this section.

5E.4.1.2 Where required

Approved automatic sprinkler systems in new buildings and structures shall be provided in the locations described in this section.

Exception: Spaces or areas in telecommunications buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided those spaces or areas are equipped throughout with an automatic fire alarm system and are separated from the remainder of the building by a wall with a fire-resistance rating of not less than 1 hour and a floor/ceiling assembly with a fire-resistance rating of not less than 2 hours.

5E.4.1.3 Group A

An automatic sprinkler system shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. For Group **A-1,A-2, A-3** and **A-4** occupancies, the automatic sprinkler system shall be provided throughout the floor area where the Group **A-1, A-2, A-3** or **A-4** occupancy is located, and in all floors between the Group A occupancey and the level of exit discharge. For group **A-5** occupancies, the automatic sprinkler system shall be provided in the spaces indicated in Section 5E.4.1.8.

5E.4.1.4 Group A-1

An automatic sprinkler system shall be provided for Group A-1 occupancies where one of the following conditions exists:

1) The fire area exceeds 12,000 square feet (1115m2);
2) The fire area has an occupant load of 300 or more;
3) The fire area is located on a floor other than the level of exist discharge: or
4) The fire area contains a multitheater complex.

5E.4.1.5 Group A-2

An automatic sprinkler system shall be provided for Group A-2 occupancies where one of the following conditions exists:

1) The fire area exceeds 5,000 square feet (464.5m^2);
2) The fire area has an occupant load of 300 or more; or
3) The fire area is located on a floor other than the level of exit discharge.

5E.4.1.6 Group A-3

An automatic sprinkler system shall be provided for Group A-3 occupancies where one of the following conditions exists:

1) The fire area exceeds 12,000 square feet (1115m^2);
2) The fire area has an occupant load of 300 or more; or
3) The fire area is located on a floor other than the level of exit discharge.

Exception: Areas used exclusively as participant sports areas where the main floor area is located at the same level as the level of exit discharge of the main entrance and exit.

5E.4.1.7 Group A-4

An automatic sprinkler system shall be provided for Group A-4 occupancies where one of the following conditions exists:

1) The fire area exceeds 12,000 square feet (1115m^2);
2) The fire area has an occupant load of 300 or more; or

3) The fire area is located on a floor other than the level of exit discharge.

Exception: Areas used exclusively as participant sports areas where the main floor area is located at the same level as the level of exit discharge of the main entrance and exit.

5E.4.1.8 Group A-5

An automatic sprinkler system shall be provided in concession stands, retail areas, press boxes, and other accessory use areas in excess of 1,000 square feet (93 m^2).

5E.4.1.9 Group E

An automatic sprinkler system shall be provided for Group E occupancies as follows:

1) Throughout all Group E fire areas greater than 20,000 square feet(1858 m^2) in area.

2) Throughout every portion of education buildings below the level of exist discharge.

Exception: An automatic sprinkler system is not required in any fire area or below the level of exit discharge where every classroom throughout the building has at least one exterior exit door at ground level.

5E.4.1.10 Group F-1

An automatic sprinkler system shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1) Where a Group F-1 fire area exceeds 12,000 square feet (1115 m^2);

2) Where a Group F-1 fire area is located more than three stories above grade; or

3) Where the combined area of all Group F-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).

5E.4.1.11 Woodworking operations

An automatic sprinkler system shall be provided throughout all Group F-1 occupancy fire areas that contain woodworking operations in excess of 2,500 square feet in area (232 m^2) which generate finely divided combustible waste or which use finely divided combustible materials.

5E.4.1.12 Group H-5 occupancies

An automatic sprinkler system shall be installed throughout buildings containing Group H-5 occupancies.

5E.4.1.13 Pyroxylin plastics

An automatic sprinkler system shall be provided in buildings, or portions thereof, where cellulose nitrate film or pyroxylin plastics are manufactured, stored or handled in quantities exceeding 100 pounds (45 kg).

5E.4.1.14 Group I

An automatic sprinkler system shall be provided throughout buildings with a Group-I fire area.

5E.4.1.15 Group M

An automatic sprinkler system shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1) Where a Group M fire area exceeds 12,000 square feet (1115m^2);

2) Where a Group M fire area is located more than three stories above grade: or

3) Where the combined area of all Group M fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230m^2).

5E.4.1.16 High-piled storage

An automatic sprinkler system shall be provided in all buildings of Group M where storage of merchandise is in high-piled or rack storage arrays.

5E.4.1.17 Group R

An automatic sprinkler system shall be provided throughout all buildings with a Group-R fire area.

5E.4.1.18 Group S-1

An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1) Where a Group S-1 fire area exceeds 12,000 square feel (1115 m^2);

2) Where a Group S-1 fire area is located more than three stories above grade; or

3) Where the combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).

5E.4.1.19 Repair garages

An automatic sprinkler system shall be provided throughout all buildings used as repair garages as follows:

1) Buildings two or more stories in height, including basements, with a fire area containing a repair garage exceeding 10,000 square feet (929 m^2).

2) One-story buildings with a fire area containing a repair area exceeding 12,000 square feet (1115 m^2).

3) Buildings with a repair garage servicing vehicles parked in the basement.

5E.4.1.20 Bulk storage of tires

Buildings and structures where the area for the storage of tires exceeds 20,000 cubic feet (566 m^3) shall be equipped with an automatic sprinkler system.

5E.4.1.21 Group S-2

An automatic sprinkler system shall be provided throughout buildings classified as an enclosed parking garage.

Exception: Enclosed parking garages located beneath Group R-3 occupancies.

5E.4.1.22 Commercial parking garages

An automatic sprinkler system shall be provided throughout buildings used for storage of commercial trucks or buses where the fire area exceeds 5,000 square feet (464 m^2).

5E.4.1.23 All occupancies except Groups R-3 and U

An automatic sprinkler system shall be installed in the locations set forth in Section 4.1.25 through 4.1.27.

Exception: Group R-3 and Group U.

5E.4.1.24 Stories and basements without openings

An automatic sprinkler system shall be installed in every story or basement of all buildings where the floor area exceeds 1,500 square feet (139.4 m^2).

5E.4.1.25 Opening dimensions and access

Openings shall have a minimum dimension of not less than 30 inches (762 mm). Such openings shall be accessible to the fire department from the exterior and shall not be obstructed in a manner that fire fighting or rescue cannot be accomplished from the exterior.

5E.4.1.26 Openings on one side only

Where openings in a story are provided on only one side and the opposite wall of such story is more than 75 feet (22 860 mm) from such openings, the story shall be equipped throughout with an approved automatic sprinkler system or openings as specified above shall be provided on at least two sides the story.

5E.4.1.27 Basements

Where any portion of a basement is located more than 75 feet (22 860 mm) from openings required by Section 4.1.24, the basement shall be equipped throughout with an approved automatic sprinkler system.

5E.4.1.28 Rubbish and linen chutes

An automatic sprinkler system shall be installed at the top of rubbish and linen chutes and in their terminal rooms. Chutes extending through three or more floors shall have additional sprinkler heads installed within such chutes at alternate floors. Chute sprinklers shall be accessible for servicing.

5E.4.1.29 Buildings more than 55 feet in height

An automatic sprinkler system shall be installed throughout buildings with a floor level having an occupant load of 30 or more that is located 55 feet (16764 mm) or more above the lowest level of fire department vehicle access.

Exceptions:

1) Airport control towers.
2) Open parking structures.
3) Occupancies in Group F-2.

5E.4.1.30 During construction

Automatic sprinkler systems required during construction, alteration and demolition operations.

5E.4.1.31 Ducts conveying hazardous exhausts

Where required. Automatic sprinklers shall be provided in ducts conveying hazardous exhaust, flammable or combustible materials.

Exception: Ducts where the largest cross-sectional diameter of the duct is less than 10 inches (254 mm).

5E.4.1.32 Commercial cooking operations

An automatic sprinkler system shall be installed in a commercial kitchen exhaust hood and duct system where an automatic sprinkler system is used.

Table 4.1.32 Additional Required Fire-Extinguishing Systems

SECTION	SUBJECT
1	Spray booths and rooms
2	Dip-tank rooms
3	Dip tanks
4	Hardening and tempering tanks
5	Lumber production conveyor rooms
6	Storage fire protection
7	Storage
8	Gas rooms
9	Exhausted enclosures
10	Indoor storage of hazardous materials
11	Indoor dispensing of hazardous materials
12	Aerosol warehouses
13	Storage of more than 1,000 cubic feet of loose combustible fibers
14	Flammable and combustible liquid storage rooms
15	Flammable and combustible liquid storage warehouses
16	Flammable and combustible liquid Group H-2 or H-3 areas
17	Gas cabinets for highly toxic and toxic gas
18	Exhausted enclosures for highly toxic and toxic gas
19	Gas rooms for highly toxic and toxic and toxic gas
20	Outdoor storage for highly toxic and toxic gas
21	Exhausted enclosures or gas cabinets for silane gas
22	Pyroxylin plastic storage cabinets
23	Pyroxylin plastic storage vaults
24	Pyroxylin plastic storage and manufacturing

5E.4.1.33 Exempt locations

Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an approved automatic fire detection system in accordance with Section 5E.4.4.25 that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from any room merely because it is damp, of fire-resistance rated construction or contains electrical equipment.

1) Any room where the application of water, or flame and water, constitutes a serious life or fire hazard.
2) Any room or space where sprinklers are considered undesirable because of the nature of the contents, when approved by the fire code official.
3) Generator and transformer rooms separated from the remainder of the building by walls and floor/ceiling or roof/ceiling assemblies having a fire-resistance rating of not less than 2 hours.
4) In rooms or areas that are of noncombustible construction with wholly noncombustible contents.

5E.4.1.34 Balconies

Sprinkler protection shall be provided for exterior balconies and ground floor pations of dwelling units where the buildings is of Type V construction. Sidewall sprinklers that are used to protect such areas shall be permitted to be located such that their deflectors are within 1 inch(25 mm) to 6 inches (152 mm) below the structural members, and a maximum distance of 14 inches (356 mm) below the deck of the exterior balconies that are constructed of open wood joist construction.

5E.4.1.35 Quick-response and residential sprinklers

Where automatic sprinkler systems are required by this code, quick-response or residential automatic sprinklers shall be installed in the following areas;

1) Throughout all spaces within a smoke compartment containing patient sleeping units in Group I-2.
2) Dwelling units and sleeping units in Group R and I-1 occupancies.

5E.4.1.36 Obstructed locations

Automatic sprinklers shall be installed with due regard to obstructions that will delay activation or obstruct the water distribution pattern. Automatic sprinklers shall be installed in or under covered kiosks, displays, booths, concession stands, or equipment that exceeds 4 feet (1219 mm) in width, Not less than a 3-foot (914 mm) clearance shall be maintained between automatic sprinklers and the top of piles of combustible fibers.

Exception: Kitchen equipment under exhaust hoods protected with a fire- extinguishing system.

5E.4.1.37 Hose threads

Fire hose threads used in connection with automatic sprinkler systems shall be approved and shall be compatible with fire department hose threads.

5E.4.1.38 Sprinkler system monitoring and alarms

All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, and water-flow switches on all sprinkler systems shall be electrically supervised.

Exceptions:

1) Automatic sprinkler systems protecting one and two-family dwellings.
2) Limited area systems serving fewer than 20 sprinklers.
3) Jockey pump control valves that are sealed or locked in the open position.
4) Control valve to commercial kitchen hoods, paint spray booths or dip tanks that are sealed or locked in the open position.
5) Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
6) Trim valves to pressure switches in dry, preaction and deluge sprinkler systems that are sealed or locked in the open position.

5E.4.1.39 Alarms

Approved audible devices shall be connected to every automatic sprinkler system. Such sprinkler water-flow alarm devices sall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Alarm devices shall be provided on the exterior of the building in an approved location. Where a fire alarm system is installed, actuation of the automatic sprinkler system shall actuate the building fire alarm system.

5E.4.1.40 Floor control valves

Approved supervised indicating control valves shall be provided at the point of connection to the riser on each floor in high-rise buildings.

5E.4.1.41 Pyroxylin plastics

All structures occupied for the manufacture or storage of articles of cellulose nitrate (pyroxylin) plastic shall be equipped with an approved automatic fire-extinguishing system. Vaults located within buildings for the storage of raw pyroxylin shall be protected with an approved automatic sprinkler system capable of discharging 1.66 gallons per minute per square foot (68 L/ min/m^2) over the area of the vault.

Provision of Rising Mains

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5E.4.1.42

1) Dry Rising Main, (Dry Riser)

   A vertical pipe installed in a building for fire fighting purposes, fitted with inlet connection at fire engine access level and landing valves on various floors, which is normally dry but is capable of being charged with water usually by pumping from fire engine pumps.

2) Dry rising main shall be installed in buildings the habitable height is more than 10 m, but does not exceed 60 m.
3) Wet Rising Main (Wet Riser)

A vertical pipe installed in a building for fire fighting purposes and permanently charged with water from a pressuized supply, and fitted with landing valves on various floors.

4) Wet rising main shall be installed in buildings with habitable height exceeding 60 m.

5E.4.1.43 Separate dry and wet rising main system

Where a block of residential building has podium and tower blocks integrated

1) Tower block exceeding 60 m in habitable height shall be provided with wet rising main.

2) Podium block needs to be provided with dry rising main only.

Breeching inlets and Access ways

5E.4.1.44

All building fitted with rising mains shall have access ways or fire engine access road for pumping appliances within 18 m of the breeching inlet. The breeching inlets shall be visible from the access ways or fire engine access road.

Location of Rising Mains

5E.4.1.45

Position of rising mains and the associated landing valves shall be kept free of obstruction both physically and visually and located:

a) within smoke-stop lobby or external corridor immediately outside the door of the exit staircase;

b) in the case where there are no smoke stop lobby or external corridor, it shall be located inside exit staircase, or in the common area and within a protected shaft, immediately outside the door of the exit staircase.

c) Rising mains shall be so located that they are protected against mechanical and fire damage.

d) No part of a rising main shall be placed in any shaft containing a gas, steam or fuel pipelines or electrical cables and wirings.

e) The size of rising main shall be approved of the size of hose using in Myanmar Fire Brigade.

f) The installation of number and location of Landing valve shall comply with the instruction of Fire code official.

g) Fire code official is authorized to installation of dry risers and wet risers.

Portable Fire Extinguishers

5E.4.1.46 Where are required

Portable fire extinguishers shall be installed in the following locations:

1) In all Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

Exception: In all Group A, B and E occupancies equipped throught with quick-response sprinklers, fire extinguishers shall be required only in special-hazard areas.

2) Within 30 feet (9144 mm) of commercial cooking equipment.

3) In areas where flammable or combustible liquids are stored, used or dispensed.

4) On each floor of structures under construction, except Group R-3 occupancies.

5) Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the fire code official.

Table 4.1.6 Additional Required Protable Fire Extinguishers

Section	Subject
1	Open burning
2	Open flames
3	Powered industrial trucks
4	Aircraft towing vehicles
5	Aircraft welding apparatus
6	Aircraft fuel-servicing tank vehicles
7	Aircraft hydrant fuel-servicing vehicles
8	Aircraft fuel-dispensing stations
9	Buildings under construction or demolition
10	Roofing operations
11	Spray-finishing operations
12	Dip-tank operations
13	Lumberyards/woodworking facilities
14	Recycling facilities
15	Exterior jumber storage
16	Organic-coating areas
17	Industrial ovens
18	Motor fuel-dispensing facilities
19	Marine motor fuel-dispensing facilities
20	Repair garages
21	Tire rebuilding/storage

22	Welding and other hot work
23	Combustible fibers
24	Fireworks
25	Flammable and combustible liquids, general
26	Indoor storage of flammable and combustible liquids
27	Liquid storage rooms for flammable and combustible liquid
28	Solvent distillation units
29	Farms and constructions sites flammable and combustible liquids storage.
30	Bulk plants and terminals for flammable and combustible liquids
31	Commercial, industrial, governmental or manufacturing establishments fuel dispensing
32	Tank vehicles for flammable and combustible liquids
33	Flammable solids
34	LP-gas

5E.4.1.47 Conspicuous location

Extinguishers shall be located in conspicuous locations where they will be readily accessible and immediately available for use. These locations shall be along normal paths of travel, unless the fire code official determines that the hazard posed indicates the need for placement away from normal paths of travel.

5E.4.1.48 Unobstructed and unobscured

Fire extinguishers shall not be obstructed or obscured from view. In rooms or areas in which visual obstruction cannot be completely avoided, means shall be provided to indicate the locations of extinguishers.

5E.4.1.49 Hangers and brackets

Hand-held portable fire extinguishers, not housed in cabinets, shall be installed on the hangers or brackets supplied. Hangers or brackets shall be securely anchored to the mounting surface in accordance with the manufacture's installation instructions.

5E.4.1.50 Cabinets

Cabinets used to house fire extinguishers shall not be locked.

Exceptions:

1) Where fire extinguishers subject to malicious use or damage are provided with a means of ready access.

2) In Group I-3 occupancies and in mental health areas in Group I-2 occupancies, access to portable fire extinguishers shall be permitted to be locked or to be located in staff locations provided the staff has keys.

5E.4.1.51 Height above floor

Portable fire extinguishers having a gross weight not exceeding 40 pounds (18kg) shall be installed so that its top is not more than 5 feet (1524 mm) above the floor. Hand-held portable fire extinguishers having a gross weight exceeding 40 pounds (18 kg) shall be installed so that its top is not more than 3.5 feet (1067 mm) above the floor.

5E.4.1.52 Wheeled units

Wheeled fire extinguishers shall be conspicuously located in a designated location.

Fire Alarm and Detection Systems

5E.4.1.53 General

This section covers the application, installation, performance and maintenance of fire alarm systems and their components in new and existing buildings and structures.

5E.4.1.54 Construction documents

Construction documents for fire alarm systems shall be submitted for review and approval prior to system installation. Construction documents shall include, but not be limited to, all of the following:

1) A floor plan which indicates the use of all rooms.

2) Locations of alarm-initiating and notification appliances.

3) Alarm control

5) Power connection.

6) Battery calculations.

7) Conductor type and sizes.

8) Voltage drop calculations.

9) Manufactures, model numbers and listing information for equipment, devices and materials.

10) Details of ceiling height and construction.

11) The interface of fire safety control functions.

5E.4.1.55 Equipment

Systems and their components shall be listed and approved for the purpose for which they are installed.

5E.4.1.56 Group A

A manual fire alarm system shall be installed in Group A occupancies having an occupant load of 300 or more. Portions of Group E occupancies occupied for assembly purposes shall be provided with a fire alarm system as required for the Group E occupancy.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an automatic sprinkler system and the alarm notification appliances will activate upon sprinkler water flow.

5E.4.1.57 System initiation in Group A occupancies with an occupant load of 1,000 or more

Activation of the fire alarm in Group A occupancies with an occupant load of 1,000 or more shall initial a signal using an emergency voice/alarm communications system.

Exception: Where approved, the prerecorded announcement is allowed to be manually deactivated for a period of time, not to exceed 3 minutes, for the sole purpose of allowing a live voice announcement from an approved, constantly attended location.

5E.4.1.58 Emergency power

Emergency voice/alarm communications systems shall be provided with an approved emergency power source.

5E.4.1.59 Group B

A manual fire alarm system shall be installed in Group B occupancies having an occupant load of 500 or more persons or more than 100 persons or more than 100 persons above or below the lowest level of exit discharge.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an automatic sprinkler system and the alarm notification appliances will activate upon sprinkler water flow.

5E.4.1.60 Group E

A manual fire alarm system shall be installed in Group E occupancies. When automatic sprinkler systems or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

Exception:

Group E occupancies with an occupant load of less than 50.

5E.4.1.61 Group F

A manual fire alarm system shall be installed in Group F occupancies that are two or more stories in height and have an occupant load of 500 or more above or below the lowest level of exist discharge.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an automatic sprinkler system and the alarm notification appliances will activate upon sprinkler water flow.

5E.4.1.62 Group H

A manual fire alarm system shall be installed in Group H-5 occupancies and in occupancies used for the manufacture of organic coatings. An automatic smoke detection system shall be installed for highly toxic gases, organic peroxides and oxidizers.

5E.4.1.63 Group I

A manual fire alarm system and an automatic fire detection system and automatic fire detection system shall be installed in Group I occupancies. An electrically supervised, automatic smoke detection system shall be provided in waiting areas that are open to corridors.

Exception: Manual fire alarm boxes in patient sleeping areas of Group I-1 and I-2 occupancies shall not be required at exits if located at all nurses control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 4.2.4 are not exceeded.

5E.4.1.64 Group I-2

Corridors in nursing homes (both intermediate care and skilled nursing facilities), detoxification facilities and spaces open to the corridors shall be equipped with an automatic fire detection system.

Exception:

1) Corridor smoke detection is not required in smoke compartments that contain patient sleeping rooms where patient sleeping units are provided with smoke detectors. Such detectors shall provide a visual display on the corridor side of each patient sleeping unit and shall provide an audible and visual alarm at the nursing station attending each unit.

2) Corridor smoke detection is not required in smoke compartments that contain patient sleeping rooms where patient sleeping unit doors are equipped with automatic door-closing devices with integral smoke detectors on the unit sides installed in accordance with their listing, provided that the integral detectors perform the required alerting function.

5E.4.1.65 System initiation

Actuation of an automatic fire-extinguishing system, a manual fire alarm box or a fire detector shall initiate an approved fire alarm signal which automatically notifies staff. Presignal systems shall not be used.

5E.4.1.66 Manual fire alarm boxes

Manual fire alarm boxes are not required to be located where the fire alarm boxes are provided at staff-attended locations having direct supervision over areas where manual fire alarm boxes have bee omitted.

Manual fire alarm boxes are allowed to be locked in areas occupied by detainees, provided that staff members are present within the subject area and have keys readily available to operate the manual fire alarm boxes.

5E.4.1.67 Smoke detectors

An approved automatic smoke detection system shall be installed throughout resident housing areas, including sleeping areas and contiguous day rooms, group activity spaces and other common spaces normally accessible to residents.

Exceptions:

1) Other approved smoke-detection arrangements providing equivalent protection, including, but not limited to, placing detectors in exhaust ducts from cells or behind protective guards listed for the purpose, are allowed when necessary to prevent damage or tampering.

2) Smoke detectors are not required in sleeping units with four or fewer occupants in smoke compartments that are equipped throughout with an approved automatic sprinkler system.

5E.4.1.68 Group M

A manual fire alarm system shall be installed in Group M occupancies, other than covered mall buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an automatic sprinkler system and the alarm notification appliances will activate upon sprinkler water flow.

5E.4.1.69 Occupant notification

During times that the building is occupied, in lieu of the automatic activation of alarm notification appliances, the manual fire alarm system shall be allowed to activate an alarm signal at a constantly attended location from which evacuation instructions shall be initiated over an emergency voice/alarm communication system installed in accordance with Section 5E.4.1.78.

5E.4.1.70 Manual fire alarm system

A manual fire alarm system shall be installed in Group R-1 occupancies.

Exceptions:

1) A manual fire alarm system is not required in buildings not more than two stories in height where all individual guestrooms and contiguous attic and crawl spaces are separated from each other and public or common areas by at least 1 hours fire partitions and each individual guestroom has an exit diretly to a public way, exit court or yard.

2) Manual fire alarm boxes are not required throughout the building when the following conditins are met:

   2.1 The building is equipped throughout with an automatic sprinkler system.
   2.2 The notification appliances will activate upon sprinkler water flow; and
   2.3 At least one manual fire alarm box is installed at an approved location.

5E.4.1.71 Automatic fire alarm system

An automatic fire alarm system shall be installed throughout all interior corridors serving guestrooms.

Exception: An automatic fire detection system is not required in buildings that do not have interior corridors serving guestrooms and each guestroom has a means of egress door opening directly to an exterior exit access that leads directly to an exit.

5E.4.1.72 Smoke alarms

Smoke alarms shall be installed in buildings that are not equipped throughout with an automatic sprinkler system. The smoke alarm in guestrooms shall be connected to an emergency electrical system and shall be annunicated by guestroom at a constantly attended location from which the fire alarm system is capable of being manually activated

5E.4.1.73 Group R-2

A manual fire alarm system shall be installed in Group R-2 occupancies where:

1) Any dwelling unit or sleeping unit is located three or more stories above the lowest level of exit discharge;

2) Any dwelling unit or sleeping unit is located more than one story below the highest level of exit discharge of exits serving the dwelling unit or sleeping unit; or

3) The building contains more than 16 dwelling units or sleeping units.

Exceptions:

1) A fire alarm system is not required in buildings not more than two stories in height where all dwelling units or sleeping units and contiguous attic and crawl spaces are separated from each other and public or common areas by at least 1-hour fire partitions and each dwelling unit or sleeping unit has an exit directly to a public way exit court or yard.

2) Manual fire alarm boxes are not required throughout the building when the following conditions are met:

2.1 The building is equipped throughout with an automatic sprinkler system: and

2.3 At least one manual fire alarm box is installed at an approved location.

3) A fire alarm system is not required in buildings that do not have interior corridors serving dwelling units and are protected by an approved automatic sprinkler system, provided that dwelling units either have a means of egress door opening directly to an exterior exit access that leads directly to the exits or are served by open-ended corridors.

5E.4.1.74 Alarm

Activation of any single smoke detector, the automatic sprinkler system or any other automatic fire detection device shall immediately sound an alarm at the building at a constantly attended location from which emergency action can be initiated, including the capability of manual initiation of requirements in Section 5E.4.1.73 .

5E.4.1.75 System response

The activation of two or more smoke detectors, a single smoke detector with alarm verification, the automatic sprinkler system or other approved fire detection device shall automatically:

1) Cause illumination of the means of egress with light of not less than 1 foot- candle (11 lux) at the walking surface level;

2) Stop any conflicting or confusing sounds and visual distraction: and

3) Activate an approved directional exit marking that will become apparent in an emergency.

Such system response shall also include activation of a prerecorded message, clearly audible throughout the special amusement building, instructing patrons to proceed to the nearest exit. Alarm signals used in conjunction with the prerecorded message shall produce sound which is distinctive from other sounds used during normal operation.

5E.4.1.76 High-rise buildings

Buildings having floors used for human occupancy located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access shall be provided with an automatic fire alarm system and an emergency voice/alarm communication system.

Exceptions:

1) Airport traffic control towers in accordance with Section 5E.4.1.91.

5E.4.1.77 Automatic fire detection

Smoke detection shall be provided in accordance with this section. Smoke detectors shall be connected to an automatic fire alarm system. The activation of any detector required by this section shalloperate the emergency voice/ alarm communication system. Smoke detectors shall be located as follows:

1) In each mechanical equipment, electrical, transformer. telephone equipment or similar room which is not provided with sprinkler protection, elevator machine rooms, and in elevator lobbies.

2) In the main return air and exhaust air plenum of each air-conditioning system having a capacity greater than 2,000 cubic feet per minute (cfm) (0.94 $m^{3/}s$). Such detectors shall be located in a serviceable area downstream of the last duct inlet.

3) At each connection to a vertical duct or riser serving two or more stories from a return air duct or plenum of an air-conditioning system. In Group R-1 and R-2 occupancies, a listed smoke detector is allowed to be used in each return-air riser carrying not more than 5,000 cfm(2.4 m^3/s) and serving not more than 10 air-inlet openings.

5E.4.1.78 Emergency voice/alarm communication system

The operation of any automatic fire detector, sprinkler water-flow device or manual fire alarm box shall automatically sound an alert tone followed by voice instructions giving approved information and directions on a general or selective basis to the following terminal areas on a minimum of the alarming floor, the floor above, and the floor below in accordance with the building's fire safety and evacuation plans.

1) Elevator lobbies.

2) Corridors

3) Rooms and tenant spaces exceeding 1,000 square feet (93 m^2) in area.

4) Dwelling units and sleeping units in Group R-2 occupancies.

5) Sleeping units in Group R-1 occupancies.

6) Areas of refuge.

Exception: In Group I-1 and I-2 occupancies, the alarm shall sound in a constantly attended area and a general occupant notification shall be broadcast over the overhead page.

5E.4.1.79 Manual override

A manual override for emergency voice communication shall be provided for all paging zones.

5E.4.1.80 Live voice messages

The emergency voice/alarm communication system shall also have the capability to broadcast live voice messages through speakers located in elevators, exit stairways, and throughout a selected floor or floors.

5E.4.1.81 Atriums connecting more than two stories

A fire alarm system shall be installed in occupancies with an atrium that connects more than two stories. Such occupancies in Group A, E or M shall be provided with an emergency voice/alarm communication system complying with the requirements of Section 5E.4.4.27.

5E.4.1.82 High-piled combustible storage areas

An automatic fire detection system shall be installed throughout high-piled combustible storage areas.

5E.4.1.83 Aerosol storage uses

Aerosol storage rooms and general-purpose warehouses containing aerosols shall be provided with an approved manual fire alarm system where required by this code.

5E.4.1.84 Lumber, plywood and veneer mills

Lumber, plywood and veneer mills shall be provided with a manual fire alarm system.

5E.4.1.85 Underground buildings with smoke exhaust systems

Where a smoke exhaust system is installed in an underground building automatic fire detectors shall be provided in accordance with this section.

5E.4.1.86 Smoke detectors

A minimum of one smoke detector listed for the intended purpose shall be installed in the following areas:

1) Mechanical equipment, electrical, transformer, telephone equipment, elevator machine or similar rooms.
2) Elevator lobbies.
3) The main return and exhaust air plenum of each air-conditioning system serving more than one story and located in a serviceable area downstream of the last duct inlet.
4) Each connection to a vertical duct or riser serving two or more floors from return air ducts or plenums of heating, ventilating and air-conditioning systems, except that in Group R occupancies, a listed smoke detector is allowed to be used in each return-air riser carrying not more than 5,000 cfm (2.4 m^3/s) and serving not more than 10 air inlet openings.

5E.4.1.87 Alarm required

Activation of the smoke exhaust system shall activate an audible alarm at a constantly attended location.

5E.4.1.88 Underground buildings

Where the lowest level of a structure is more than 60 feet (18 288 mm) below the lowest level of exit discharge, the structure shall be equipped throughout with a manual fire alarm system, including an emergency voice/alarm communication system installed in accordance with Section 5E.4.4.27.

5E.4.1.89 Public address system

Where a fire alarm system is not required, a public address system shall be provided which shall be capable of transmitting voice communications to the highest level of exit discharge serving the underground portions of the structure and all levels below.

5E.4.1.90 Covered mall buildings.

Covered mall buildings exceeding 50,000 square feet (4645 m^2) in total floor area shall be provided with an emergency voice/alarm communication system. An emergency voice/alarm communication system serving a mall, required or otherwise, shall be accessible to the fire department. The system shall be provided in accordance with Section 5E.4.1.78.

5E.4.1.91 Airport traffic control towers

An automatic fire detection system shall be provided in airport traffic control towers.

5E.4.1.92 Battery rooms

An approved automatic smoke detection system shall be installed in areas containing stationary lead-acid battery systems having a liquid capacity of more than 50 gallons (189 L). The detection system shall be supervised by an approved central, proprietary, or remote station service or a local alarm which will sound an audible signal at a constantly attended location.

5E.4.1.93 Group E

A fire alarm system shall be installed in existing Group E occupancies in accordance with Section 5E.4.1.60.

Exception:

1) A building with a maximum area of 1,000 square feet(93 m^2) that contains a single classroom and is located no closer than 50 feet (15 240 mm) from another building.
2) Group E with an occupant load less than 50.

5E.4.1.94 Group I-1

A fire alarm system shall be installed in existing Group I-1 residential care/assisted living facilities.

Exception: Where each sleeping room has a means of egress door opening directly to an exterior egress balcony that leads directly to the exits and the building is not more than three stories in height.

5E.4.1.95 Group I-2

A fire alarm system shall be installed in existing Group I-2 occupancies in accordance with Section 5E.4.1.63.

5E.4.1.96 Group I-3

A fire alarm system shall be installed in existing Group I-3 occupancies in accordance with Section 5E.4.1.63.

5E.4.1.97 Group R-1 hotels and motels

A fire alarm system shall be installed in existing Group R-1 hotels and motels more than three stories or with more than 20 guestrooms.

Exception: Buildings less than two stories in height where all guestrooms, attics and crawl spaces are separated by 1-hour fire-resistance-rated construction and each guestroom has direct access to a public way, exit court or yard.

5E.4.1.98 Group R-2

A fire alarm system shall be installed in existing Group R-2 occupancies more than three stories in height or with more than 16 dwelling units or sleeping units.

Exceptions:

1) Where each living unit is separated from other contiguous living units by fire barriers having a fire-resistance rating of not less than 0.75 hour, and where each living unit has either its own independent exit or its own independent stairway or ramp discharging at grade.
2) A separate fire alarm system is not required in buildings that are equipped throughout with an approved supervised automatic sprinkler system and having a local alarm to notify all occupants.
3) A fire alarm system is not required in buildings that do not have interior corridors serving dwelling units and are protected by an approved automatic sprinkler system, provided that dwelling units either have a means of egress door opening directly to an exterior exit access that leads directly to the exits or are served by open-ended corridors.

5E.4.1.99 Group R-4

A fire alarm system shall be installed in existing Group R-4 residential care/assisted living facilities.

Exceptions:

1) Where there is at least one manual fire alarm box per floor arranged to sound continuously the smoke alarms.
2) Other manually activated, continuously sounding alarms approved by the fire code official.

5E.4.2.1 General

Existing Group R occupancies not already provided with single- station smoke alarms shall be provided with approved single-station smoke alarms.

5E.4.2.2 Interconnection

Where more than one smoke alarm is required to be installed within an individual dwelling unit in Group R-2, R-3, R-4 or within an individual sleeping unit in Group R-1, the smoke alarms shall be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

5E.4.2.3 Power source

In Group R occupancies. Single-station smoke alarms shall receive their primary power from the building wiring provided that such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for over current protection.

Exception: Smoke alarms are permitted to be solely battery operated: in existing buildings where no construction is taking place: in buildings that are not served from a commercial power source; and in existing areas of buildings undergoing alterations or repairs that do not result in the removal of interior walls or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for building wiring without the removal of interior finishes.

5E.4.2.4 Location

Manual fire alarm boxes shall be located not more than 5 feet (1524 mm) from the entrance to each exit. Additional manual fire alarm boxes shall be located so that travel distance to the nearest box does not exceed 200 feet (60 960 mm).

Exception: Manual fire alarm boxes shall not be required in Group E occupancies where the building is equipped throughout with an approved automatic sprinkler system, the notification appliances will activate on sprinkler water flow and manual activation is provided from a normally occupied location.

5E.4.2.5 Height

The height of the manual fire alarm boxes shall be a minimum of 42 inches (1067 mm) and a maximum of 48 inches (1372 mm) measured vertically, from the floor level to the activating handle or lever of the box.

5E.4.2.6 Color

Manual fire alarm boxes shall be red in color.

Where fire alarm systems are not monitored by a supervising station, an approved permanent sign shall be installed adjacent to each manual fire alarm box that reads**: WHEN ALARM SOUNDS__CALL FIRE DEPARTMENT.**

Exception: Where the manufacturer has permanently provided this information on the manual fire alarm box.

5E.4.2.7 Protective covers

The fire code official is authorized to require the installation of listed manual fire alarm box protective covers to prevent malicious false alarms or provide the manual fire alarm box with protection from physical damage. The protective cover shall be transparent or red in color with a transparent face to permit visibility of the manual fire alarm box. Each cover shall include proper operating instructions. A protective cover that emits a local alarm signal shall not be installed unless approved.

5E.4.2.8 Power supply

The primary and secondary power supply for the fire alarm system shall be provided.

5E.4.2.9 In Hazardous Warehouse, Symbols for Firefighters

According to The Hazard Categories

HAZARD CATEGORY	designation
Combustible liquid II	F2
Combustible liquid III A	F2
Combustible liquid III B	F1
Combustible dust	F4
Combustible fiber	F3

Cryogenic flammable	F4, H3
Cryogenic oxidizing	OX, H3
Explosive	R4
Flammable gas (gaseous)	F2
Flammable gas (liquefied)	F4
Flammable liquid IA	F4
Flammable liquid IB	F4
Flammable liquid IC	F3
Organic peroxide, UD	F3
Organic peroxide, I	R4
Organic peroxide,II	F4, R3
Organic peroxide,III	F3, R3
Organic peroxide,IV	F2, R2
Organic peroxide,V	F1, R1
Oxidizing gas (gaseous)	Nonhazard
Oxidizing gas (liquefied)	OX
Oxidizer 4	OX
Oxidizer 3	OX
Oxidizer 2	OX
Pyrophoric gases	OX
Pyrophoric solids, liquids	F4
Unstable reactive 4D	F3
Unstable reactive 3D	R4
Unstable reactive 3N	R4
Unstable reactive 2	R2
Water reactive 3	W, R3
Water reactive 2	W, R2
Corrosive	H3,COR
Toxic	H 3
Highly toxic	H 4

F__Flammable category.
R__Reactive category
H__Health category.
W__Special hazard: water reactive.

OX__Special hazard: oxidizing properties.

COR__ Corrosive.
UD__Unclassified detonable material.
4D__ Class 4 detonable material.
3D__ Class 3 detonable material.

3N__ Class 3 nondetonable material.

HAZARD CATEGORY	**Designation**
Combustible liquid II	F2
Combustible liquid III A	F2
Combustible liquid III B	F1
Combustible dust	F4
Combustible fiber	F3
Cryogenic flammable	F4, H3
Cryogenic oxidizing	OX, H3
Explosive	R4

Flammable gas (gaseous)	F2
Flammable gas (liquefied)	F4
Flammable liquid IA	F4
Flammable liquid IB	F4
Flammable liquid IC	F3
Organic peroxide, UD	F3
Organic peroxide, I	R4
Organic peroxide,II	F4, R3
Organic peroxide,III	F3, R3
Organic peroxide,IV	F2, R2
Organic peroxide,V	F1, R1
Oxidizing gas (gaseous)	Nonhazard
Oxidizing gas (liquefied)	OX
Oxidizer 4	OX
Oxidizer 3	OX
Oxidizer 2	OX
Pyrophoric gases	OX
Pyrophoric solids, liquids	F4
Unstable reactive 4D	F3
Unstable reactive 3D	R4
Unstable reactive 3N	R4
Unstable reactive 2	R2
Water reactive 3	W, R3
Water reactive 2	W, R2
Corrosive	H3,COR
Toxic	H 3
Highly toxic	H 4

F__Flammable category.

R__Reactive category

H__Health category.

W__Special hazard: water reactive.

OX__Special hazard: oxidizing properties.

COR__ Corrosive.

UD__Unclassified detonable material.

4D__ Class 4 detonable material.

3D__ Class 3 detonable material.

3N__ Class 3 nondetonable material.

Minimum Requirements for the fighting installations

Type of Installations, Table (A)

No	Type of Buildinbg	Hose Reel	Emergency Generatars	Emergency Lighting	Exit Signs	Fireman's Lifts	Fire Fighting and Rescue Stairways	Fixed Foam Systems	Gas Detection Systems	Pressurization of Staircases	Ventilation/Air conditioning Control Systems	Underground Static Water Storage Tank	Terrace Static water storage Tank
		1	2	3	4	5	6	7	8	9	10	11	12
1	**Assebly Groups (Group A)**												
	A-1	✔	✔	✔	✔							✔	✔
	A-2	✔	✔	✔	✔				✔			✔	✔
	A-3	✔	✔	✔	✔							✔	✔
	A-4												
	A-5	✔	✔	✔								✔	✔
2	**Business Group (Group B)**												
	Airport traffic control towers	✔	✔	✔									
	Ambulatory health care facilities	✔	✔	✔	✔	✔	✔		✔			✔	✔
	Banks	✔	✔	✔	✔	✔	✔		✔			✔	✔
	Barber and beauty shops		✔										
	Car wash		✔										
	Dry cleaning and laundries		✔										
	Education occupancies for students above 12th grade	✔	✔	✔	✔							✔	✔
	Laboratories	✔	✔	✔	✔				✔			✔	✔
	Motor vehicle showrooms	✔	✔	✔	✔				✔			✔	✔
	Post office												
	Print shops	✔	✔	✔	✔				✔			✔	✔
	Radio and television stations	✔	✔	✔	✔				✔			✔	✔
	Telephone exchanges	✔	✔	✔	✔				✔			✔	✔
	Training and skill developments not within a school or academic		✔	✔	✔								

Minimum Requirements for the fighting installations

Type of Installations, Table (B)

No	Type of Buildinbg	Hose Reel	Emergency Generatars	Emergency Lighting	Exit Signs	Fireman's Lifts	Fire Fighting and Rescue Stairways	Fixed Foam Systems	Gas Detection Systems	Pressurization of Staircases	Ventilation/Air conditioning Control Systems	Underground Static Water Storage Tank	Terrace Static water storage Tank
		1	2	3	4	5	6	7	8	9	10	11	12
3	**Educational Group**	✔	✔	✔	✔							✔	✔
4	**Factory Group**	✔	✔	✔	✔	✔	✔		✔			✔	✔
5	**Group H**												
	H-1	✔	✔	✔	✔		✔		✔			✔	✔
	H-2	✔	✔	✔	✔		✔	✔				✔	✔
	H-3		✔	✔	✔		✔	✔	✔				
	H-4	✔	✔	✔	✔		✔	✔	✔			✔	✔
	H-5	✔	✔	✔	✔		✔	✔	✔			✔	✔
6	**Institutional Group (Group I)**												
	I-1	✔	✔	✔	✔	✔	✔					✔	✔
	I-2	✔	✔	✔	✔	✔	✔		✔			✔	✔
	I-3	✔	✔	✔	✔							✔	✔
	I-4		✔	✔	✔								
7	**Mercantile Group (Group M)**												
	Department Stores	✔	✔	✔	✔				✔			✔	✔
	Drug stores	✔	✔	✔	✔							✔	✔
	Markets	✔	✔	✔	✔				✔			✔	✔
	Motor fuel-dispensing facilities	✔	✔	✔	✔			✔				✔	✔
	Sale rooms	✔	✔	✔	✔							✔	✔

Minimum Requirements for the fighting installations
Type of Installations, Table (C)

No	Type of Buildinbg	Hose Reel	Emergency Generatars	Emergency Lighting	Exit Signs	Fireman's Lifts	Fire Fighting and Rescue Stairways	Fixed Foam Systems	Gas Detection Systems	Pressurization of Staircases	Ventilation/Air conditioning Control Systems	Underground Static Water Storage Tank	Terrace Static water storage Tank
		1	2	3	4	5	6	7	8	9	10	11	12
8	**Residential Group (Group R)**												
	R-1		✔	✔	✔							✔	✔
	R-2	✔	✔	✔	✔	✔	✔		✔			✔	✔
	R-3		✔	✔	✔							✔	✔
	R-4		✔	✔	✔							✔	✔
9	**Stroestorage Group (Group S)**	✔	✔	✔	✔		✔	✔				✔	✔
10	**Utility and Miscellaneous Group (Grou**												
	Agricultural buildings	✔	✔	✔	✔		✔					✔	✔
	Grain silos, accessory to a residential	✔										✔	✔
	occupancy												
	Green houses	✔	✔	✔	✔				✔			✔	✔
	Livestock Shelters	✔										✔	✔
	Shed												
	Stables												
	Tanks								✔			✔	✔
	Towers												

Notes

a). Installation of automatic sprinkler systems shall comply with through section 4.1.1 to 4.1.36 .