

Types of Fire Safety Measures prescribed for issuance of Fire NOCs

Sl.No.	Type of Fire Safety	Reference
1	Electrical Safety	As per Section-2 , Part-8 of NBC, 2016
2	Smoke Management	As per Clause 4.6 of Part-4 & Clause 2.61 of Part-8 of NBC, 2016
3	Breathing Balcony	As per Clause 2.53 of Part-4 of NBC, 2016
4	Kitchen Safety	As per Annexure-G of Part-4 of NBC, 2016
5	Oxygen Cylinder Safety	Introduced as additional safety measures in addition to NBC.
6	Aerosol Suppression system (Gas based)	As per Clause 2.33 of Part-4 of NBC, 2016
7	<p>The following relevant industry experts' reports and recommendations to minimize the human loss and to contain property damage.</p> <ul style="list-style-type: none"> a. HARA- Hazard Analysis and Risk Assessment b. QRA- Quantitative Risk Assessment c. Onsite & Offsite Emergency plans d. PESO - Petroleum and Explosives Safety Organization e. OISD - Oil Industry Safety Directorate f. Mines Safety Officer/ Boiler Inspector g. Solvent handling plants h. Fire and Gas mapping study reports. i. Hazardous area classification study reports. j. Lighting Arrester survey report. k. Exothermic Reactors Safety <ul style="list-style-type: none"> (i) Calorimetric study reports particularly for Hydrogenation / Nitrification/Grignard/ Polymerization reactions. (ii) High level of automation with Distributed Control System (DCS) with minimum human interference and interlocker for terminating reaction. 	<p>Introduced as additional safety measures in addition to NBC as prescribed in MSIHCRules, 1989, concerned OISD Standards and other Safety Rules.</p>
8	Disclosure of information to prevent disasters in industries	As per A.P. Factories Act 1948.

2.50 Psychrometric Chart — A chart graphically representing the thermodynamic properties of moist air.

2.51 Recirculated Air — The return air that has been passed through the conditioning apparatus before being re-supplied to the space.

2.52 Refrigerant — The fluid used for heat transfer in a refrigerating system, which absorbs heat at a low temperature and a low pressure of the fluid and rejects heat at a higher temperature and a higher pressure of the fluid, usually involving changes of state of the fluid.

2.53 Relative Humidity — Ratio of the partial pressure of actual water vapour in the air as compared to the partial pressure of maximum amount of water that may be contained at its dry-bulb temperature.

NOTE — When the air is saturated, dry-bulb, wet-bulb and dew point temperatures are all equal, and the relative humidity is 100 percent.

2.54 Return Air — Air returned from conditioned or refrigerated space.

2.55 Sensible Heat — Heat which is associated with a change in temperature; in contrast to a heat interchange in which a change of state (latent heat) occurs.

2.56 Sensible Cooling — The process of removing sensible heat (lowering the dry-bulb temperature) from the air passing through it under specified conditions of operation.

2.57 Shade Factor — The ratio of instantaneous heat gain through the fenestration with shading device to that through the fenestration.

2.58 Sick Building Syndrome (SBS) — A term used to describe the presence of acute non-specific symptoms in the majority of people, caused by working in buildings with an adverse indoor environment.

NOTE — SBS could be a cluster of complex irritative symptoms like irritation of the eyes, blocked nose and throat, headaches, dizziness, lethargy, fatigue irritation, wheezing, sinusitis, congestion, skin rash, sensory discomfort from odours, nausea, etc. These symptoms are usually short-lived and experienced immediately after exposure; and may disappear when one leaves the building.

2.59 Smoke Barrier — A continuous membrane, either vertical or horizontal, such as a wall, floor, or ceiling assembly, that is designed and constructed to restrict the movement of smoke in conjunction with a smoke control system.

2.60 Smoke Damper — A damper similar to fire damper, however, having provision to close automatically on sensing presence of smoke in air distribution system or in conditioned space.

2.61 Smoke Management — A smoke control method

that utilizes natural or mechanical systems to maintain a tenable environment for the means of egress from a large-volume space or to control and reduce the migration of smoke between the area on fire and communicating spaces.

2.62 Stack Effect — The vertical airflow within buildings caused by the temperature-created density differences between the building interior and exterior or between two interior spaces.

2.63 Static Pressure — The normal force per unit area that would be exerted by a moving fluid on a small body immersed in it if the body were carried along with the fluid. Practically, it is the normal force per unit area at a small hole in a wall of the duct through which the fluid flows (piezometer) or on the surface of a stationary tube at a point where the disturbances, created by inserting the tube, cancel. It is supposed that the thermodynamic properties of a moving fluid depend on static pressure in exactly the same manner as those of the same fluid at rest depend upon its uniform hydrostatic pressure.

2.64 Supply Air — The air that has been passed through the conditioning apparatus and taken through the duct system and distributed in the conditioned space.

2.65 Terminal Devices — Devices fixed in the air conditioned space for distribution of conditioned supply air and return of air such as, supply and return air grilles and diffusers.

2.66 Thermal Adaptation — The gradual diminution of the people's response to repeated environmental stimulation and subsumes all processes which building occupants undergo in order to improve the fit of the indoor climate.

2.67 Thermal Comfort — That condition of mind which expresses satisfaction with the thermal environment and is assessed by subjective evaluation.

2.68 Thermal Insulation Material — A material used over the conducting material to retard the flow of heat energy in the form of heat loss or gain to facilitate the temperature control as the process and prevent permeability of moist vapour and reduces condensation on cold surfaces.

2.69 Thermal Energy Storage — Storage of thermal energy, sensible, latent or combination thereof for use in central system for air conditioning or refrigeration. It uses a primary source of refrigeration for cooling and stored thermal energy for reuse at peak demand or for backup as planned.

2.70 Velocity Pressure — The pressure exerted by movement of air which makes the air to travel to longer

4.5 Compartmentation

4.5.1 General

- a) It is important to limit the spread of a fire in any building. The usual method is to use fire barriers. In some instances these barriers need to be penetrated for ductwork, plumbing and electrical systems, and in such cases, use of passive fire protection measures shall be done so that the integrity of these barriers is not compromised.
- b) Floor(s) shall be compartmented with area as given below.

4.5.2 All floors shall be compartmented/zoned with area of each compartment being not more than 750 m². The maximum size of the compartment shall be as follows, in case of sprinklered basement/building:

Sl No.	Use	Compartmentation Area m ²
(1)	(2)	(3)
i)	Basement car parking	3 000
ii)	Basements (other than car parking)	2 000
iii)	Institutional buildings: Subdivision C-1	1 800
iv)	Institutional buildings: Subdivision C-2 and C-3	1 125
v)	Mercantile and assembly buildings	2 000
vi)	Business buildings	3 000
vii)	All other buildings (Excluding low hazard and moderate hazard industrial buildings and storage buildings) ¹⁾	750

¹⁾ Compartmentation for low hazard and moderate hazard industrial buildings and storage buildings shall be done in consultation with local fire department.

In addition, there shall be requirement of a minimum of two compartments if the floor plate size is equal or less than the areas mentioned above. However, such requirement of minimum two compartments shall not be required, if the floor plate is less than 750 m².

Compartmentation shall be achieved by means of fire barrier having fire resistance rating of 120 min.

4.6 Smoke Control

4.6.1 Smoke Exhaust and Pressurization of Areas Above Ground

Corridors in exit access (exit access corridor) are created for meeting the requirement of use, privacy and

layout in various occupancies. These are most often noted in hospitality, health care occupancies and sleeping accommodations.

Exit access corridors of guest rooms and indoor patient department/areas having patients lacking self preservation and for sleeping accommodations such as apartments, custodial, penal and mental institutions, etc, shall be provided with 60 min fire resistant wall and 20 min self-closing fire doors along with all fire stop sealing of penetrations.

Smoke exhaust system having make-up air and exhaust air system or alternatively pressurization system with supply air system for these exit access corridors shall be required.

Smoke exhaust system having make-up air and exhaust air system shall also be required for theatres/auditoria.

Such smoke exhaust system shall also be required for large lobbies and which have exit through staircase leading to exit discharge. This would enable eased exit of people through smoke controlled area to exit discharge.

All exit passageway (from exit to exit discharge) shall be pressurized or naturally ventilated. The mechanical pressurization system shall be automatic in action with manual controls in addition. All such exit passageway shall be maintained with integrity for safe means of egress and evacuation. Doors provided in such exit passageway shall be fire rated doors of 120 min rating.

Smoke exhaust system where provided, for above areas and occupancies shall have a minimum of 12 air changes per hour smoke exhaust mechanism. Pressurization system where provided shall have a minimum pressure differential of 25-30 Pa in relationship to other areas.

The smoke exhaust fans in the mechanical ventilation system shall be fire rated, that is, 250°C for 120 min.

For naturally cross-ventilated corridors or corridors with operable windows, such smoke exhaust system or pressurization system will not be required.

4.6.2 Smoke Exhaust and Pressurization of Areas Below Ground

Each basement shall be separately ventilated. Vents with cross-sectional area (aggregate) not less than 2.5 percent of the floor area spread evenly round the perimeter of the basement shall be provided in the form of grills, or breakable stall board lights or pavement lights or by way of shafts.

Alternatively, a system of mechanical ventilation system may be provided with following requirements:

- a) Mechanical ventilation system shall be designed to permit 12 air changes per hour in case of fire or distress call. However, for

normal operation, air changes schedule shall be as given in Part 8 'Building Services, Section 3 Air conditioning, Heating and Mechanical Ventilation' of the Code.

- b) In multi-level basements, independent air intake and smoke exhaust shafts (masonry or reinforced concrete) for respective basement levels and compartments therein shall be planned with its make-up air and exhaust air fans located on the respective level and in the respective compartment. Alternatively, in multi-level basements, common intake masonry (or reinforced cement concrete) shaft may serve respective compartments aligned at all basement levels. Similarly, common smoke exhaust/outlet masonry (or reinforced cement concrete) shafts may also be planned to serve such compartments at all basement levels. All supply air and exhaust air fans on respective levels shall be installed in fire resisting room of 120 min. Exhaust fans at the respective levels shall be provided with back draft damper connection to the common smoke exhaust shaft ensuring complete isolation and compartmentation of floor isolation to eliminate spread of fire and smoke to the other compartments/floors.
- c) Due consideration shall be taken for ensuring proper drainage of such shafts to avoid insanitation condition. Inlets and extracts may be terminated at ground level with stall board or pavement lights as before. Stall board and pavement lights should be in positions easily accessible to the fire brigade and clearly marked 'AIR INLET' or 'SMOKE OUTLET' with an indication of area served at or near the opening.
- d) Smoke from any fire in the basement shall not obstruct any exit serving the ground and upper floors of the building.
- e) The smoke exhaust fans in the mechanical ventilation system shall be fire rated, that is, 250°C for 120 min.
- f) The smoke ventilation of the basement car parking areas shall be through provision of supply and exhaust air ducts duly installed with its supports and connected to supply air and exhaust fans. Alternatively, a system of impulse fans (jet fans) may be used for meeting the requirement of smoke ventilation complying with the following:
- 1) Structural aspects of beams and other down stands/services shall be taken care of in the planning and provision of the jet fans.

- 2) Fans shall be fire rated, that is, 250°C for 120 min.
- 3) Fans shall be adequately supported to enable operations for the duration as above.
- 4) Power supply panels for the fans shall be located in fire safe zone to ensure continuity of power supply.
- 5) Power supply cabling shall meet circuit integrity requirement in accordance with accepted standard [4(13)].

The smoke extraction system shall operate on actuation of flow switch actuation of sprinkler system. In addition, a local and/or remote 'manual start-stop control/switch' shall be provided for operations by the fire fighters.

Visual indication of the operation status of the fans shall also be provided with the remote control.

No system relating to smoke ventilation shall be allowed to interface or cross the transformer area, electrical switchboard, electrical rooms or exits.

Smoke exhaust system having make-up air and exhaust air system for areas other than car parking shall be required for common areas and exit access corridor in basements/underground structures and shall be completely separate and independent of car parking areas and other mechanical areas.

Supply air shall not be less than 5 m from any exhaust discharge openings.

4.7 Gas Supply

4.7.1 Town Gas/LPG Supply Pipes

Where gas pipes are run in buildings, the same shall be run in separate shafts exclusively for this purpose and these shall be on external walls, away from the staircases. Gas distribution pipes shall always be below the false ceiling. The length of these pipes shall be as short as possible. In the case of kitchen cooking range area, hood should have grease filters using metallic grill to trap oil vapours escaping into the fume hood

NOTE — For detailed information on gas pipe installations, reference may be made to Part 9 'Plumbing Services, Section 4 Gas Supply' of the Code.

4.7.2 Thermal detectors

These shall be installed into fume hoods of large kitchens for hotels, hospitals, and similar areas located in high rise buildings. Arrangements shall be made for automatic tripping of the exhaust fan in case of fire. If gas is used, the same shall be shut off. The voltage shall be 24 V or 100 V d.c. operated with external rectifier. The valve shall be of the hand re-set type and shall be located in an area segregated from cooking ranges. Valves shall be easily accessible. The hood shall have manual facility for steam or suitable hood extinguishing gas released depending on duty condition.

- 2.51 Public Way** — A street, alley, or other similar parcel of land essentially open to the outside air, dedicated, or otherwise permanently appropriated to the public for public use and having a clear width and height of not less than 3 m.
- 2.52 Ramp** — The construction, in the form of an inclined plane that is steeper than or equal to 1 : 20 (5 percent) from the horizontal, together with any intermediate landing, that makes it possible to pass from one level to another.
- 2.53 Refuge Area** — An area within the building for a temporary use during egress. It generally serves as a staging area which is protected from the effect of fire and smoke.
- 2.54 Roof Exits** — A means of escape on to the roof of a building, where the roof has access to it from the ground through alternative stair case or adjacent building.
- 2.55 Site (Plot)** — A parcel (piece) of land enclosed by definite boundaries.
- 2.56 Smoke Barrier** — A continuous membrane, or a membrane, where such membrane is designed and constructed to restrict the movement of smoke.
- 2.57 Smoke Compartment** — A space within a building enclosed by smoke barriers on all sides.
- 2.58 Stack Pressure** — Pressure difference caused by a temperature difference creating an air movement within a duct, chimney or enclosure.
- 2.59 Travel Distance** — The distance to be travelled from any point in a building to a protected exit or external escape route or final exit measured along the line of travel.
- 2.60 Ventilation** — Supply of outside air into, or the removal of inside air from an enclosed space.
- 2.61 Venting Fire** — The process of facilitating heat and smoke to leave a building as quickly as possible by such paths so that lateral spread of fire and heat is checked, firefighting operations are facilitated and minimum fire damage is caused.
- 2.62 Visual Strobes/Flashing** — It is an audio-visual fire alarm for alerting persons with hearing impairment with flashing light. The strobe frequency should be from 0.5 Hz to 4.0 Hz.
- NOTE — Care should be taken to ensure that overlapping strobes do not combine to result in a higher frequency of flashing.
- 2.63 Volume to Plot Area Ratio (VPR)** — The ratio of volume of building measured in cubic metre to the area of the plot measured in square metre and expressed in metre.

2.64 Water Based Systems

- 2.64.1 Hydrant System** — A distribution system having a network of piping installed underground/above-ground around and/or through inside of a building with internal and/or external hydrants fitted with landing valves at regular intervals according to the occupancy. The distribution system is connected to water supply system for firefighting.
- 2.64.2 Automatic Sprinkler System** — A system of water pipes fitted with sprinkler heads at suitable intervals and heights and designed to actuate automatically, control and extinguish a fire by the discharge of water.
- 2.64.3 Automatic Water Spray Systems** — A special fixed pipe system connected to a reliable source of fire protection water supply and equipped with water spray nozzles for specific water discharge and distribution over the surface or area to be protected. The piping system is connected to the water supply through an automatically actuated deluge valve which initiates flow of water. Automatic actuation is achieved by operation of automatic detecting equipment installed along with water spray nozzles. There are two types of systems namely high velocity and medium velocity systems.
- 2.64.4 Water Mist Systems** — A distribution system connected to a pumping and water supply system that is equipped with nozzles capable of delivering water mist to the part/entire enclosure or area, intended to control, suppress, or extinguish fire and is capable of meeting the specified performance requirements.
- 2.64.5 Foam Protection System** — Firefighting systems where foam is made by mechanically mixing air with a solution consisting of fresh water to which a foaming agent (liquid concentrate) has been added. Firefighting foam is a stable aggregation of small bubbles of density lower than oil or water, and shows tenacious qualities for covering horizontal surfaces. There are three types of foam applications that is, low, medium and high expansion foams depending upon the application.
- 2.65 Wet Riser** — An arrangement for firefighting within the building by means of vertical rising mains not less than 100 mm nominal diameter with landing valves on each floor/landing for firefighting purposes and permanently charged with water from a pressurized supply.

NOTE — For definition of other terms, reference shall be made to accepted standards [4(3)].

3 FIRE PREVENTION

3.1 Classification of Buildings Based on Occupancy

3.1.1 General Classification

All buildings, whether existing or hereafter erected shall be classified according to use or the character of

NATIONAL BUILDING CODE OF INDIA 2016

ANNEX G

(Clause 6)

COMMERCIAL KITCHENS

G-0 GENERAL

The provisions given herein are applicable to those commercial kitchens serving in centrally air conditioned buildings such as kitchens of starred hotels, food courts, malls, banquet halls and restaurants.

Electricity, gas and in some cases solid fuels such as wood or charcoal are the energy sources used to power a commercial kitchen.

The potential hazards posed by the commercial cooking facilities are as follows:

- a) *On cooking appliances using oil as fuel* — The oil can self-ignite due to overheating of the cooking appliances or through open flames.
- b) Full grease residues trapped in the hoods due to non-cleaning of filters and dusts periodically and exhaust ventilation system can ignite through overheated air flues or open flames.
- c) Faulty electrical equipment and electrical installation are more likely to spark, and failure of thermostat and safety switches that may lead to overheat and consequent fire.
- d) Flammable materials in the vicinity of open flames or heat sources

G-1 TERMS ASSOCIATED WITH COOKING OPERATIONS

- a) *Types of restaurants/food preparation facilities* — Buffet restaurants, cafeterias, coffee shops, entertainment facilities (nightclubs, dinner theatres), and ethnic, fast food, speciality and traditional restaurants, corporate canteens, casinos, educational facilities, schools and universities, hospitals, care homes, mental homes and prisons.
- b) *Ventilation/grease extraction equipment* — Exhaust hoods, grease removal devices, exhaust ductwork, exhaust fans, dampers and other ancillary components or systems that are involved in the capture, containment, and control of grease-laden cooking effluent.
- c) *Cooking appliances* — Ranges, deep fat fryers, microwave ovens, griddles, grills, pressurized fryers, potato chip fryers, woks, broilers, doughnut fryers, barbecue/smokers, ovens. *Tandoors*, steam kettles, appliances initializing grease and cooking oils, etc.

PART 4 FIRE AND LIFE SAFETY

G-2 FIRE PROTECTION SYSTEMS

- a) A kitchen fire suppression system needs to be installed whenever cooking appliances are using LPG/PNG/oil/electricity and/or dry fuel like wood or charcoal for cooking and/or can ignite the exhaust or fat for cooking and/or can ignite the ventilation system. Cooking equipment that produces grease-laden vapours and that might be a source of ignition of grease in the hood, grease removal device, or duct shall be protected by fire-suppression equipment.
- b) The initial fire hazard is the cooking appliance itself. However, once the exhaust ventilation system is involved in fire due to propagation from the appliances, the exhaust system becomes the more severe hazard due to the potential of fire propagation outside the cooking space.
- c) The requirement for kitchen fire suppression systems shall be directly linked to measurements that actually represent the risk. Some other contributory factors could be but not necessarily — connected load (kW), area occupied by kitchen equipment, volume of cooking oil and other flammables, inter distances between equipment, cooking media, etc.
- d) Grease laden hoods can be ignited by heat penetrating the outside of the kitchen hood. Any penetration to the outside of a hood, shall be either welded or fitted with an approved sealing device so as not to allow cooking grease and oil to migrate to the outer portion of the hood.
- e) If sprinkler protection is specified for a building, it needs careful consideration of the likely consequences if certain portion of the building is omitted from the scope of protection, for example, no water should get on the cooking appliances (especially the fryer). Removing this protection from a high hazard area logically requires this area to be protected by a more suitable solution, dedicated to this special hazard.

G-3 FIRE SEPARATION REQUIREMENTS

- a) Where a kitchen is required for the preparation of food and/or where 'open flame' cooking appliances are used and/or where fryers

(with no open flames) are used, the kitchen shall be separated from other parts of the same building by compartment wall and floor having fire resistance of at least 60 min.

- b) Food serving areas shall be fire separated from the kitchens/cooking areas by fire rated elements having a resistance of at least 60 min. Doors shall have fire resistance of 60 min rating and fitted with automatic self-closing device.
- c) In open type kitchen cooking area, sitting area needs to be segregated by 60 min fire rated glass or drop fire curtains [see also G-3(d) and G-5.2(b)].
- d) Where the flue or exhaust duct passes through the compartment wall or floor, the flue or duct shall be encased by non-combustible construction and no damper shall be permitted to be installed in such flue or duct. Also such flue or ductwork shall be clear from combustible materials.
- e) If the commercial kitchen/cooking is situated in a building that is not sprinkler protected, the floor area of the kitchen/cooking shall not exceed 50 m².
- f) Commercial kitchen/cooking using LPG as fuel for the 'open flame' cooking activities shall not be allowed to be located at the basements. As regards LPG cylinder storage, attention is drawn to good practice [4(14)] and Part 8 'Building Services, Section 2 Electrical and Allied Installations' of the Code for compliance requirements
- g) It is advisable to locate the kitchen/cooking operations on the external periphery of the building so that in the event of mechanical ventilation failure, it can be naturally ventilated.

G-4 Life safety and egress requirements shall be governed by the requirements under life safety (see 4). In case the requirements under this annex differs from those under 4, this annex shall take precedence.

G-5 FIRE SAFETY REQUIREMENTS

G-5.1 General

- a) The following equipment must always be kept in working condition:
 - 1) Cooking equipment,
 - 2) Hoods,
 - 3) Exhaust ducts (if provided),
 - 4) Fans,

- 5) Fire extinguishing systems,
- 6) Fire detection and alarm system, and
- 7) Gas leakage detectors (if gas is used as fuel).

- b) An automatic fixed suppression system shall be installed to protect all cooking equipment producing grease laden vapours and that might be a source of ignition of grease in the hood, grease removal device.
- c) Fire-suppression equipment shall be provided for the protection of grease removal devices, hood exhaust plenums, and exhaust duct systems.
- d) All fire suppression systems and components installed shall be in accordance with relevant Indian and/or International Standards.

G-5.2 Protection of Cooking Equipment (General)

- a) Cooking equipment shall be protected with the following:
 - 1) Automatic wet chemical fire suppression system for the protection of hoods (OR) other equivalent approved systems like water mist applications for kitchen fires.
 - 2) Automatic sprinkler system for non-cooking areas (not in the vicinity of cooking areas or inside hoods).
 - 3) Exhaust ducts shall be protected by automatic high temperature sprinklers designed as per good practice [4(20)].
- b) Due diligence shall be exercised before considering protection with sprinkler/water mist installation particularly for the protection of fryers. No sprinklers shall be provided within 3 m of cooking equipment and kitchen hoods. Area sensitive to sprinklers shall be protected with wet chemical suppression systems or other approved systems for the type of protection. Water mist systems, if approved for use for the type of application (that is, commercial cooking equipment) by fire tests, may also be considered.
- c) Kitchen hoods independent suppression systems shall discharge wet chemicals to all areas of a kitchen range extract hood that is potentially coated in grease. The system shall also discharge over deep fat cooking pans or other potential fire source. The system shall be activated by heat detectors located above the appliances/within hoods and in the entrance to exhaust duct. Additional detectors behind equipment in the duct may be

necessary. These may be of fusible link type. Extinguishing systems shall also incorporate manually actuating devices which shall be located in easily accessible locations in the means of egress.

- d) The operational sequence shall be as follows:
- 1) On detection of fire in the hood and upon actuation of fire suppression system, any power or gas supplies serving the kitchen equipment must be cut-off and isolated automatically.
 - 2) Pressure regulating stations shall be designed and installed at critical locations for excess flow shut off valves.
 - 3) Seismic shut off valve at the main distribution point shall also be provided.
 - 4) The exhaust fan shall not stop and continue operating, even after activation of the system. The supply fan shall switch off.
 - 5) Gas leakage detectors shall be provided in all kitchens that link to a gas solenoid valve for emergency shut off. Suitable gas detection system (based on type of gas used LPG or PNG) integrated with fire detection and alarm system must be provided in addition to heat/multi-criteria detectors and sprinklers.
 - 6) Manually operating devices shall immediately activate fire suppression system, which in turn shall shut off other systems like fuel supply/power supply, etc. Manual system shall operate mechanically and not rely on electrical power for activation, unless this is from an emergency power source as described in this Code.
 - 7) In the event of the kitchen hood system being activated, an alarm should be sounded. The system must also be interfaced with the fire detection and alarm system.
- e) Fire extinguishers in the vicinity of cooking area and the hoods shall be suitable for the type of fire.

G-5.3 Cooking Equipment Exhaust Ventilation

- a) Hoods/ducts containing automatic fire suppression systems are protected areas; therefore, these hoods are not considered obstructions to overhead sprinkler systems and shall not require floor coverage underneath thereof.
- b) Sprinkler installation shall comply with various provisions contained in accepted

standard [4(28)]. The temperature rating of sprinklers shall be so selected that it is 30°C above the anticipated maximum temperature within cooking/kitchen areas. Sprinklers provided inside the exhaust ducts shall be of 141°C temperature.

- c) Provision of cleaning of the kitchen exhaust every six months to ensure that the carbon soot accumulated in the exhaust duct is cleaned to avoid the chances of outbreak of fire shall be made.
- d) Independent exhaust ducts shall be provided for equipment using dry fuel like wood/charcoal which produce spark and are likely to ignite the grease which might have accumulated in the common duct. Alternatively, approved spark arrestors may be provided before the duct from equipment using dry fuel meets the main duct. These spark arrestors shall be so provided that these are easily accessible and removable for cleaning.

G-5.4 Cooking Equipment

- a) Cooking equipment (such as deep fat fryers, rangers, griddles, and broilers) that may be a source of ignition shall be provided in accordance with the provision of G-5.2(a).
- b) The operation of any sprinkler within the kitchen or cooking area shall automatically shut off all sources of fuel and heat to all equipment requiring protection. Any gas appliance not requiring protection but located under ventilating equipment shall also be shut off. All shutdown devices shall be of the type that requires manual resetting prior to fuel or power being restored.
- c) An approved indicating valve (flow indicating switch) shall be installed in the water supply line feeding to the sprinklers protecting the cooking and extraction ventilating system.
- d) A system test connection shall be provided to verify proper operation of equipment specified in item G-5.2(d)(4).
- e) Sprinklers shall be inspected at least twice in a year and cleaned, if found coated with grease and other particles during their use and thus their thermal sensing elements desensitized.
- f) Any penetrations to the outside of a hood, be either welded or fit with a sealing device (certified by national/international approval bodies) to not allow cooking grease, oil to migrate to the outer portion of the hood. The fitment arrangements shall be of approved type. Gaskets for the panels shall be certified to withstand a temperature of 815.6°C (1 500°F).

- g) Grease strip shall be readily available for efficient and regular cleaning of concrete or paved floors of kitchen and restaurant and also the drainage areas.
- h) The hood or that portion of a primary collection means designed for collecting cooking vapours and residues shall be constructed of and be supported by steel not less than 1.09 mm (No. 18 MSG) in thickness or stainless steel not less than 0.94 mm (No. 20 MSG) in thickness or other approved material of equivalent strength and fire and corrosion resistance.
- j) All seams, joint, and penetrations of the hood enclosure that direct and capture grease-laden vapours and exhaust gases shall have a liquid tight continuous external weld to the hood's lower outermost perimeter.
- k) Grease filters shall be of steel rigid construction that will not distort or crush under normal operation handling and cleaning conditions. They shall be so arranged that all exhaust air passes through the grease filters. Filters shall be easily accessible and removable for periodic cleaning.
- m) Grease filters shall be installed at an angle not less than 45° from the horizontal.
- n) Grease filters shall be equipped with a grease drip tray beneath their lower edges and shall have a suitable minimum depth needed to collect grease. The grease drip trays shall be pitched to drain into an enclosed metal container having a capacity not exceeding 3.8 litre.
- p) The exhaust ducts shall be constructed of and supported by carbon steel not less than 1.37 mm (No. 16 MSG) in thickness or stainless steel not less than 1.09 mm (No. 18 MSG) in thickness.

G-5.5 Rooftop Terminations — Exhaust Systems

- a) The exhaust system shall terminate either outside the building with a fan or duct or through the roof or to the roof from outside with minimum 3 m of horizontal clearance from the outlet to the adjacent buildings, property lines and air intakes.
- b) There shall be a minimum of 1.5 m of horizontal clearance from the outlet (fan housing) to any combustible structure.
- c) There shall be a vertical separation of 1.0 m below any exhaust outlets for air intakes within 3.0 m of the exhaust outlet.

ANNEX H

[Clauses 6.4.2.2 and 6.8.1.5]

CAR PARKING FACILITIES

H-1 The provisions given in **H-2** to **H-5** shall apply to parking structures of the closed or open type, within buildings above or below grade.

H-2 GENERAL

- a) Where both parking and repair operations are conducted in the same building, the entire building shall comply with the requirements for Group G occupancies, unless the parking and repair sections are effectively separated by separation walls of 120 min.
- b) Floor surfaces shall be non-combustible, sloping towards drains to remove accumulation of water.
- c) Those parts of parking structures located within, immediately above or below, attached to, or less than 3 m away from a building used for any other purpose shall be separated by fire resistant walls and floors having fire resistance rating of not less than 120 min. This shall exclude those incidental spaces which are occupied by cashier, attendant booth or those spaces used for toilets, with a total area not exceeding 200 m².
- d) Vehicle ramps shall not be considered as exits unless pedestrian facilities are provided.
- e) Other occupancies like fuel dispensing, shall not be allowed in the building. Car repair facilities, if provided, shall be separated by 120 min fire resistant construction.

the floor to the lowest point of the ceiling (bottom of slab). In the case of pitched roof, the average height of rooms shall not be less than 2.75 m. The minimum clear head room under a beam, folded plates or eaves shall be 2.4 m. In the case of air conditioned rooms, a height of not less than 2.4 m measured from the surface of the floor to the lowest point of air conditioning duct or the false ceiling shall be provided.

12.2.F.1 The requirements of **12.2.1** apply to residential, business and mercantile buildings. For educational and industrial buildings, the following minimum requirements apply :

- a) Educational buildings : Ceiling height 3.6 m for all regions; in cold regions, 3 m
- b) Industrial buildings : Ceiling height 3.6 m, conditioned, 3 m (*Factory Act, 1948* and rules therein shall govern such heights, where applicable)

12.2.2 Size

The area of habitable room shall not be less than 9.5 m², where there is only one room with a minimum width of 2.4 m. Where there are two rooms, one of these shall not be less than 9.5 m² and the other not less than 7.5 m², with a minimum width of 2.1 m.

12.3 Kitchen

12.3.1 Height

The height of a kitchen measured from the surface of the floor to the lowest point in the ceiling (bottom slab) shall not be less than 2.75 m, except for the portion to accommodate floor trap of the upper floor.

12.3.2 Size

The area of a kitchen where separate dining area is provided, shall be not less than 5.0 m² with a minimum width of 1.8 m. Where there is a separate store, the area of the kitchen may be reduced to 4.5 m². A kitchen, which is intended for use as a dining area also, shall have a floor area of not less than 7.5 m² with a minimum width of 2.1 m.

12.3.3 Other Requirements

Every room to be used as kitchen shall have,

- a) unless separately provided in a pantry, means for the washing of kitchen utensils which shall lead directly or through a sink to a grated and trapped connection to the waste pipe;
- b) an impermeable floor;

- c) a flue, if found necessary; and
- d) a window or ventilator or opening of size not less than as specified in **20.1.1** subject to increase in area of opening in accordance with **20.1.2** (Note 3).

12.4 Bathrooms and Water-Closets

12.4.1 Height

The height of a bathroom or water-closet measured from the surface of the floor to the lowest point in the ceiling (bottom of slab) shall not be less than 2.1 m.

12.4.2 Size

The area of a bathroom shall not be less than 1.8 m² with a minimum width of 1.2 m. The floor area of water-closet shall be 1.1 m² with a minimum width of 0.9 m. If bath and water-closet are combined, its floor area shall not be less than 2.8 m² with a minimum width of 1.2 m.

12.4.3 Other Requirements

Every bathroom or water-closet shall,

- a) be so situated that at least one of its walls shall open to external air;
- b) not be directly over or under any room other than another water-closet, washing place, bath or terrace, unless it has a water-tight floor;
- c) have the platform or seat made of water-tight non-absorbent material;
- d) be enclosed by walls or partitions and the surface of every such wall or partition shall be finished with a smooth impervious material to a height of not less than 1 m above the floor of such a room;
- e) be provided with an impervious floor covering, sloping towards the drain with a suitable grade and not towards *Verandah* or any other room; and
- f) have a window or ventilator, opening to a shaft or open space, of area not less than 0.3 m² with side not less than 0.3 m.

12.4.4 No room containing water-closets shall be used for any purpose except as a lavatory and no such room shall open directly into any kitchen or cooking space by a door, window or other opening. Every room containing water-closet shall have a door completely closing the entrance to it.

12.5 Ledge or Tand/Loft

12.5.1 Height

The minimum head-room of ledge or *Tand*/loft shall be 2.2 m. The maximum height of loft shall be 1.5 m.

2.25 Fire Load — Calorific energy, of the whole contents contained in a space, including the facings of the walls, partitions, floors and ceilings.

2.26 Fire Load Density — Fire load divided by floor area.

2.27 Fireman's Lift — A lift or a group of lifts invariably associated with all the features and requirements of a fire-fighting shaft. Such lift(s) are installed to enable fire services personnel to reach different floors with minimum delay, and shall meet the additional features as required in accordance with this Part. This lift also serves the purpose of meeting the requirement of evacuation lift for assisted evacuation.

2.28 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) *Load bearing capacity (Stability) (R)* — The ability of a load bearing element to withstand fire exposure without any loss of structural stability.
- b) *Integrity (E)* — Resistance to penetration of flame and hot gases.
- c) *Insulation (I)* — Resistance to temperature rise on the unexposed face up to a maximum of 180°C at any single point and average temperature of 140°C.

2.29 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 as per the accepted standard [4(2)].

NOTES

1 The requirement of rating of various building elements as given in this Part shall be applicable in accordance with the provisions given in the accepted standard [4(2)].

2 The fire resistance rating shall be specified in terms of minutes.

3 Fire resistance rating for non-structural material/assembly shall bear a label of compliance to such rating as per the approval of competent authority based on testing and evaluation. The label shall be permanently affixed to the material/assembly and may carry other relevant details such as name and type of the product, and manufacturer's details.

2.30 Fire Resistant Wall — Fire resistance rated wall, having opening(s) with specified fire resistant rating, which restricts the spread of fire from one part of a building to another part of the same building.

2.31 Fire Separation — The distance in metre, measured from the external wall of the building concerned to the external wall of any other building on the site, or from other site, or from the opposite side of street or other public space for the purpose of preventing the spread of fire.

2.32 Fire Stop — A fire resistant material, or construction, having a fire resistance rating of not less than the fire separating elements, installed in concealed spaces or between structural elements of a building to prevent the spread/propagation of fire and smoke through walls, ceilings and the like as per the laid down criteria.

NOTES

1 Fire stop assembly for through penetrations is a combination of firestop compatible for use with the penetrant, penetration items such as cables, cable tray, conduits, ducts, pipes, etc, and their means of support through the wall or opening that together restores the fire resistance rating of the fire separating elements in terms of its integrity and/or insulation properties.

2 Fire stop assembly for joints is the one where fire stop with movement capability is used to seal the linear joints between adjacent fire separating elements, to maintain the fire resistance of the separating elements, which should be installed within its tested design limits with regard to size of the joint, type of assembly, and anticipated compression and extension of the joint.

2.33 Fire Suppression Systems

- a) *Gas based systems* — Systems that use gaseous agents as fire suppression media, such as, all agents alternate to Halon gases, listed and approved for use by relevant Indian Standards; other methods/types of gas based systems where their protection is equal to or better than what is suggested above for the type of application subject to the acceptance of Authorities concerned may also fall under such systems.
- b) *Water based systems* — Systems that use mainly water as firefighting media such as hydrant system, sprinkler system, water spray system, foam system and water mist system.

2.34 Fire Wall or Fire Separating Wall — A fire resistance rated wall having fire protected openings, which restricts the spread of fire and extends continuously from the foundation to the roof (and through the roof at least 1m above the roof in case of combustible roof), with sufficient structural stability under fire conditions to allow collapse of construction on one side or either side without collapse of the wall.

2.35 Floor Area (Gross) — The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage-ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.

2.36 Floor Area Ratio (FAR) — The quotient obtained by dividing the total covered area (plinth area) on all

41B. Compulsory disclosure of information by the occupier.—(1) The occupier of every factory involving a hazardous process shall disclose in the manner prescribed all information regarding dangers, including health hazards and the measures to overcome such hazards arising from the exposure to or handling of the materials or substances in the manufactures, transportation, storage and other processes, to the workers employed in the factory, the Chief Inspector, the local authority within whose jurisdiction the factory is situate and the general public in the vicinity.

(2) The occupier shall, at the time of registering the factory involving a hazardous process, lay down a detailed policy with respect to the health and safety of the workers employed therein and intimate such policy to the Chief Inspector and the local authority and, thereafter, at such intervals as may be prescribed, inform the Chief Inspector and the local authority of any change made in the said policy.

(3) The information furnished under sub-section (1) shall include accurate information as to the quantity, specification and other characteristics of wastes and the manner of their disposal.

(4) Every occupier shall, with the approval of the Chief Inspector, draw up an on-site emergency plan and detailed disaster control measures for his factory and make known to the workers employed therein and to the general public living in the vicinity of the factory the safety measures required to be taken in the event of an accident taking place.

(5) Every occupier of a factory shall,—

(a) if such factory engaged in a hazardous process on the commencement of the Factories (Amendment) Act, 1987 (20 of 1987), within a period of thirty days of such commencement; and

(b) if such factory proposes to engaged in a hazardous process at any time after such commencement, within a period of thirty days before the commencement of such process,

inform the Chief Inspector of the nature and details of the process in such form and in such manner as may be prescribed.

(6) Where any occupier of a factory contravenes the provisions of sub-section (5), the licence issued under section 6 to such factory shall, notwithstanding any penalty to which the occupier or factory shall be subjected to under the provisions of this Act, be liable for cancellation.

(7) The occupier of a factory involving a hazardous process shall, with the previous approval of the Chief Inspector, lay down measures for the handling, usage, transportation and storage of hazardous substances inside the factory premises and the disposal of such substances outside the factory premises and publicise them in the manner prescribed among the workers and the general public living in the vicinity.

41C. Specific responsibility of the occupier in relation to hazardous processes.—Every occupier of a factory involving any hazardous process shall—

(a) maintain accurate and up-to-date health records or, as the case may be, medical records, of the workers in the factory who are exposed to any chemical, toxic or any other harmful substances which are manufactured, stored, handled or transported and such records shall be accessible to the workers subject to such conditions as may be prescribed;

(b) appoint persons who possess qualifications and experience in handling hazardous substances and are competent to supervise such handling within the factory and to provide at the working place all the necessary facilities for protecting the workers in the manner prescribed:

Provided that where any question arises as to the qualifications and experience of a person so appointed, the decision of the Chief Inspector shall be final;

(c) provide for medical examination of every worker—

(a) before such worker is assigned to a job involving the handling of, or working with, a hazardous substance, and

(b) while continuing in such job, and after he has ceased to work in such job, at intervals not exceeding twelve months, in such manner as may be prescribed.