

**Section-38. Precautions in case of fire.-** (1) In every factory, all practicable measures shall be taken to prevent outbreak of fire and its spread, both internally and externally, and to provide and maintain-

(a) safe means of escape for all persons in the event of a fire, and

(b) the necessary equipment and facilities for extinguishing fire.

(2) Effective measures shall be taken to ensure that in every factory all the workers are familiar with the means of escape in case of fire and have been adequately trained in the routine to be followed in such cases.

(3) The State Government may make rules, in respect of any factory or class or description of factories, requiring the measures to be adopted to give effect to the provisions of sub- sections (1) and (2).

(4) Notwithstanding anything contained in clause (a) of sub- section (1) or sub- section (2), if the Chief Inspector, having regard to the nature of the work carried on in any factory, the construction of such factory, special risk to life or safety, or any other circumstances, is of the opinion that the measures provided in the factory, whether as prescribed or not, for the purposes of clause (a) of subsection (1) or sub-section (2), are inadequate, he may, by order in writing, require that such additional measures as he may consider reasonable and necessary, be provided in the factory before such date as is specified in the order.

## MEANS OF ESCAPE IN CASE OF FIRE

### [SECTION 38(7)]

#### **61-Fire. (1) Processes, equipment, plant, etc., involving serious explosion and serious fire hazards -**

- (a) All processes, storages, equipments, plants etc. involving serious explosion and flash fire hazards shall be located in segregated buildings where the equipment shall be so arranged that only a minimum number of employees are exposed to such hazards at any one time.
- (b) All industrial processes involving serious fire hazard should be located in buildings or work places separated from one another by walls of fire-resistant constructions.
- (c) Equipment and plant involving serious fire or flash fire hazard shall, wherever possible, be so constructed and installed that in case of fire, they can be easily isolated.
- (d) Ventilation ducts, pneumatic conveyors and similar equipments involving a serious fire risk should be provided with flame arresting or automatic fire extinguishing appliances.
- (e) In all workplaces having serious fire or flash fire hazards, passages between machines, installations or piles of materials should be at least 90cm wide.

#### **(2) Access for fire fighting :-**

Buildings and plant shall be so laid and roads, passage ways etc. so maintained as to permit unobstructed access for fire fighting.

#### **(3) Protection against lightning:-** Protection from lightning shall be provided for-

- (i) buildings in which explosive or highly flammable substances are manufactured, used handled or stored;
- (ii) storage tanks containing oils, paints, or other flammable liquids
- (iii) grain elevators ; and

(iv) buildings, tall chimneys or stacks where flammable gases, fumes, dust or lint are likely to be present.

**(4) Explosive :-** All explosives shall be handled, transported, stored and used in accordance with the provisions in the Indian Explosives Act, 1884.

**(5) Precautions against ignition.-** Wherever there is danger of fire or explosion from accumulation of flammable or explosive substances in air-

(a) all electrical apparatus shall either be excluded from the area of risk or they shall be of such construction and so installed and maintained as to prevent the danger of their being a source of ignition ;

(b) Effective measures shall be adopted for prevention of accumulation of static charges to a dangerous extent ;

(c) workers shall wear shoes without iron or steel nails or any other exposed ferrous materials which is likely to cause sparks by friction ;

(d) smoking, lighting or carrying of matches, lighters or smoking materials shall be prohibited;

(e) transmission belts with iron fasteners shall not be used ; and

(f) all other precautions as are reasonably practicable shall be taken to prevent initiation of ignition from all other possible sources such as open flames, frictional sparks overheated surfaces of machinery or plant, chemical or physical-chemical reaction and radiant heat.

**(6) Spontaneous ignition:-** Where materials are likely to induce spontaneous ignition, care shall be taken to avoid formation of air pocket and to ensure adequate ventilation.

**(7) Cylinders containing compressed gas :-** Cylinders containing compressed gas may only be stored in open if they are protected against excessive variation of temperature, direct rays of sun, or continuous dampness. Such cylinders shall never be stored near highly flammable substances, furnaces or hot processes. The room where such cylinders are stored shall have adequate ventilation.

## **(8) Storage of flammable liquids:-**

- (a) The quantity of flammable liquids in any work room shall be the minimum required for the process or processes carried on in such room. Flammable liquids shall be stored in suitable containers with close fitting covers :

Provided that not more than 20 litres of flammable liquids having a flash point of 21deg C or less shall be kept or stored in any work room.

- (b) Flammable liquids shall be stored in closed containers and in limited quantities in well ventilated rooms of fire resisting constructions which are isolated from the remaining of the building by fire walls and self closing fire doors.
- (c) Large quantities of such liquids shall be stored in isolated adequately ventilated building or fire resisting construction or in storage tanks, preferably under ground and at a distance from any building as required in the Petroleum Rules, 1976.
- (d) Effective steps shall be taken to prevent leakage of such liquids into basements, sumps or drains and to confine any escaping liquid within safe limits.
- (e) Coal, oil, gasoline, or other flammable materials shall not be poured in any sewer or drain.
- (9) Accumulation of flammable dust, gas, fume or vapour in air or flammable waste material on the floors-
  - (a) Effective steps shall be taken for removal or prevention of the accumulation in the air of flammable dust, gas, fume or vapour to an extent which is likely to be dangerous.
  - (b) No waste material Of a flammable nature shall be permitted to accumulate on the floors and shall be removed at least once in a day or shift, and more often, when possible, such materials shall be placed in suitable metal containers with covers wherever possible.

**(10) Fire exits:- (a) In this rule -**

- (i) "horizontal exit" means an arrangement which allows alternative egress from a floor area to another floor at or near the same level in an adjoining building or an adjoining part of the same building with adequate separation ; and
- (ii) "travel distance" means the distance an occupant has to travel to reach an exit.
- (b) An exit may be a doorway, corridor, passage way to any internal or external stair way or to a verandah. An exit may also include a horizontal exit leading to an adjoining building at the same level.
- (c) Lifts, escalators and revolving doors shall not be considered as exits for the purpose of this sub-rule.
- (d) In every room of a factory exits sufficient to permit safe escape of the occupants in case of fire or other emergency shall be provided which shall be free of any obstruction.
- (e) The exits shall be clearly visible and suitable illuminated with suitable arrangement, whatever artificial lighting is to be adopted for this purpose, to maintain the required illumination in case of failure of the normal source of electric supply.
- (f) The exits shall be marked in a language understood by the majority of the workers.
- (g) Fire resisting doors or roller shutters shall be provided at appropriate places along the escape routes to prevent spread of fire and smoke, particularly at the entrance of lifts or stairs where funnel or flue effect may be created inducing an upward spread of fire.
- (h) All exits shall provide continuous means of egress to the exterior of a building or to an exterior open space leading to a street.
- (i) Exits shall be so located that the travel distance on the floor shall not exceed 30 metres.
- (j) In case of those factories where high hazard materials are stored or used, the travel distance to the exit shall not exceed 22.5 metres and there shall be at

least two ways of escape from every room, however small except toilet rooms, so located that the points of access thereto are out of or suitably shielded from areas of high hazard.

- (k) Wherever more than one exit is required for any room space or floor, exits shall be placed as remote from each other as possible and shall be arranged to provide direct access in separate directions from any point in the area served.
- (l) The unit of exit width used to measure capacity of any exit shall be 50 cm. A clear width of 25 cm shall be counted as an additional half unit. Clear width of less than 25 cm shall not be counted for exit width.
- (m) Occupants per unit width shall be 50 for stairs and 75 for doors.
- (n) For determining the exits required, the occupant load shall be reckoned on the basis of actual number of occupants within any floor area or 10 square metres per person, whichever is more.
- (o) There shall not be less than two exits, serving every floor area above and below the ground floor, and at least one of them shall be an internal enclosed stairway.
- (p) For every building or structure used for storage only, and every section thereof considered separately, shall have access to at least one exit so arranged and located as to provide a suitable means of escape for any person employed therein, and in any such room wherein more than 10 persons as may be normally present at least two separate means of exit shall be available, as remote from each other as practicable.
- (q) Every storage area shall have access to at least one means of exit which can be readily opened.
- (r) Every exit door way shall open into an enclosed stairway, a horizontal exit on a corridor or passage way providing continuous and protected means of egress.
- (s) No exit doorway shall be less than 100 cm. in width Doorways shall be not less than 200 cm. in height.

- (t) Exit doorways shall open outwards, that is, away from the room but shall not obstruct the travel along any exit. No door when opened, shall reduce the required width of stairway or landing to less than 90 cm. Overhead or sliding doors shall not be installed for this purpose.
- (u) An exit door shall not open immediately upon a flight of stairs. A landing atleast the width of the doorway shall be provided in the stairway at each doorway. The level of landing shall be the same as that of the floor which it serves.
- (v) The exit doorways shall be openable from the side which they serve without the use of a key.
- (w) Exit corridors and passage ways shall be of a width not less than the aggregate required width of exit doorways leading from there in the direction of travel to the exterior.
- (x) Where stairways discharge through corridors and passageways the height of the corridors and passageways shall not be less than 2.4 metres.
- (y) Internal stairs shall be constructed of non-combustible materials throughout and at least one of the external stairs, which affords a means of access in case of fire, shall be of non-combustible material throughout.
- (a) Internal stairs shall be constructed as a self-contained unit with at least one side adjacent to an external wall shall be completely enclosed.
- (aa) A staircase shall not be arranged round a lift shaft unless the latter is totally enclosed by a materials having a fire resistance rating not lower than that of the type of construction of the former.
- (bb) Hollow combustible construction shall not be permitted.
- (cc) The minimum width of an internal staircase shall be 115 cm.
- (dd) The minimum width of treads without nosing shall be 25 cm for an internal staircase. The treads shall be constructed and maintained in a manner to prevent slipping.
- (ee) The maximum height of a riser shall be 19 cm. and the number of risers shall be limited to 12 per flight.

- (ff) Hand rails shall be provided with a minimum height of 100 cm and shall be firmly supported : and where necessary shall be provided on both sides of the staircase.
- (gg) The use of spiral staircase shall be limited to low occupant load and to a building of height of 9 metres, unless they are connected to platforms such as balconies and terraces to allow escapes to pause. A spiral staircase shall be not less than 300 cm in diameter and have adequate headroom.
- (hh) The width of a horizontal exit shall be same as for the exit doorways.
- (ii) The horizontal exit shall be equipped with at least one fire door of self-closing type.
- (jj) The floor area on the opposite or refuge side of a horizontal exit shall be sufficient to accommodate occupants of the floor areas served, allowing not less than 0.3 square metre per person. The refuge area shall be provided with exits adequate to meet the requirements of this sub-rule. At least one of the exits shall lead directly to the exterior or street.
- (kk) Where there is difference in level between connected areas for horizontal exit, ramps not more than 1 in 8 slope shall be provided. For this purpose steps shall not be used.
- (ll) Doors in horizontal exits shall be openable at all time.
- (mm) Ramps with a slope of not more than 1 to 10 may be substituted for the requirements of staircase. For all slopes exceeding 1 to 10 and wherever the use in such as to involve danger of slipping, the ramp shall be surfaced with non-slipping material.
- (nn) In any building not provided with automatic fire alarm a manual fire alarm system shall be provided if the total capacity of the building is over 500 persons, or if more than 25 persons are employed above or below the ground floor, except that no manual fire alarm shall be required in one-storey buildings where the entire area is undivided and all parts thereof are clearly visible to all occupants.



## **(11) First-aid fire fighting arrangements :-**

- (a) In every factory there shall be provided and maintained adequate and suitable fire fighting equipment for fighting fires in the early stages, those being referred to first-aid fire fighting equipment in this rule.
- (b) The types of first-aid fire fighting equipment to be provided shall be determined by considering the different types of fire risks which are classified as follows :-
  - (i) "Class A fire" - Fire due to combustible materials such as wood, textiles, paper, rubbish and the like.
    - (1) "Light hazard" - Occupancies like offices, assembly halls, canteens, rest-rooms, ambulance rooms and the like;
    - (2) "Ordinary hazard" - Occupancies like saw mills, carpentry shop, small timber yards, book binding shops, engineering workshop and the like;
    - (3) "Extra hazard" - Occupancies like large timber yards, godowns storing fibrous materials, flour mills, cotton mills, jute mills, large wood working factories and the like ;
  - (ii) "Class B fire" - Fire in flammable liquids like oil, petroleum produces, solvents, grease, paints etc.
  - (iii) "Class C fire" - Fire-arising out of gaseous substances.
  - (iv) "Class D fire" - Fire from reactive chemicals, active metals and the like.
  - (v) "Class E fire" - Fire involving electrical equipment and delicate machinery and the like.
- (c) The number and types of first-aid fire-fighting equipment to be provided shall be as per the following scale :-

### **(i) Class-A Fire :-**

- 1. Light Hazard :- One 9 litre water bucket for every 100 square meters of floor area or part thereof and one 9 litre water type (soda acid or gas pressure or bucket pump) extinguisher shall be provided for each

6 buckets or part thereof with a minimum of one extinguisher and two buckets per compartment of the building. These equipments shall be so distributed over the entire floor areas that a person shall have to travel not more than 25 metres from any point to reach the nearest equipment.

2. Ordinary Hazard :- One 9 litre water bucket for every 100 square meters of floor area or part thereof and one 9 litre water type (soda acid or gas pressure or bucket pump) extinguisher shall be provided for each six buckets or part thereof, with a minimum of 2 extinguishers and 4 buckets per compartment of the building. These equipments shall be so distributed over the entire floor areas that a person shall have to travel not more than 15 metres from any point to reach the nearest equipment.
3. Extra hazard :- The scale of equipment would be what is prescribed for ordinary hazard and, in addition, such extra equipments as, in the opinion of the Inspector are necessary having regard to the special nature of occupancy :

Provided that in special cases, the Inspector, after taking into consideration the circumstances, authorise that the buckets prescribed in this clause may be dispensed with provided the number of the extinguishers provided in double of that what is prescribed.

- (ii) Class-B Fire :- There shall be at least one fire-extinguisher either, foam type or carbon dioxide or dry power type per 50 square metres of floor area and shall be so distributed that no person is required to travel more than 15 meters from any point to reach the nearest equipment. In addition to the requirements, extinguishers specified here, requirements as laid down in clause (1) shall also be provided.
- (iii) Class C Fire :- Carbon dioxide or dry chemical power extinguishers shall be provided near each plant or group of plants.
- (iv) Class D Fire :- Special dry power (Chloride based) type of extinguisher shall be provided near each plant or group of plants depending upon the risk involved.

- (v) Class E Fire :- Carbon dioxide or dry power type extinguisher shall be provided near each plant or group of plants depending upon the risk involved.
- (d) The first-aid fire fighting equipments shall conform to the relevant Indian Standards.
- (e) As far as possible the first-aid fire fighting equipments shall all be similar in shape and appearance and shall have the same method of operation.
- (f) All first-aid fire fighting equipments shall be placed in a conspicuous position and shall be readily and easily accessible for immediate use. Generally, these equipments shall be placed as near as possible to the exits or stair landing of normal routes of escape.
- (g) All water buckets and pump type extinguishers shall be filled with clean water. All sand buckets shall be filled with clean, dry and fine sand. All water and sand buckets shall be painted red.
- (h) All other extinguishers shall be charged appropriately in accordance with the instructions of the manufacturer.
- (i) Each first-aid fire-fighting equipment shall be allotted a serial number by which it shall be referred to in the records. The following details shall be painted with white paint on the body of each equipment :
  - (1) Serial number ;
  - (2) Date of last refilling ; and
  - (3) Date of last inspection.
- (j) First-aid fire-fighting equipments shall be placed on platforms or cabinets in such a way that their bottom is 750 mm above floor level. Fire buckets shall be placed on books attached to a suitable stand or wall in such a way that their bottom is 750 mm above the floor level. Such equipments if placed outside the building, shall be under sheds or covers.
- (k) All extinguishers shall be thoroughly cleaned and re-charged immediately after discharge. Sufficient refill material shall be kept readily available for this purpose at all times.

- (l) All first-aid fire fighting equipments shall be subjected to routine maintenance, inspection, and testing to be carried out by properly trained persons. Periodicity of the routine maintenance, inspection and test shall conform to the relevant Indian Standards.
- (m) In case the fire is caused by electrical equipment, the connected switches be pulled out.
- (12) Other fire fighting arrangements : (a) In every factory adequate provisions of water supply for fire fighting shall be made and where the amount of water required in litres per minute as calculated from the formula  $A+B+C+D$  divided by 20 in 550 or more, power driven trailer pumps of adequate capacity to meet the requirement of water as calculated above shall be provided and maintained.

In the above formula:-

- A - the total area in square meters of all floors including galleries in all buildings of the factory :
- B - the total area in square meters of all floors and galleries including open spaces in which combustible materials are handed or stored :
- C - the total area in square meters of all floors over 15 meters above ground level ; and
- D - The total area of square meters of all floors of all buildings other than those of fire resisting construction :

Provided that in area where the fire risk involved does not require use of water, such areas under B, C or D may, for the purpose of calculation, be halved:

Provided further that where the areas under B, C or D are protected by permanent automatic fire fighting installations approved by any fire association or fire insurance company such areas may, for the purpose of calculation, be halved:

Provided also that where the factory is situated at not more than 3 kilometers from an established city or town fire service the pumping capacity based on the amount of water arrived at by the formula above may be reduced by 25% but no account shall be taken of this reduction in calculating water supply required under this clause.

- (b) Each trailer pump shall be provided with equipment as per scheduled appended to this rule. Such equipment shall conform to the relevant Indian Standards.
  - (c) Trailer pump shall be housed in a separate shed or sheds which shall be sited close to a principal source of water supplies in the vicinity of the main risks for the factory.
  - (d) In factories where the area is such as cannot be reached by man-hauling of trailer pumps, within reasonable time, vehicles with towing attachment shall be provided at the scale of one for every four trailer pumps with a minimum of one such vehicle kept available at all times.
  - (e) Water supply shall be provided to give flow of water as required under clause (a) for at least 100 minutes. At least 50% of this water supply or 450,000 litres whichever is less, shall be in the form of static tanks of adequate capacities (not less than 450,000 litres each) distributed round the factory with due regard to the potential fire risks in the factory. Where piped supply is provided, the size of the main shall not be less than 15 cms in diameter and it shall be capable of supplying a minimum of 4,500 litres per minute at a pressure of not less than 7 kilograms per square centimetre.
  - (f) All trailer pumps including the equipment provided with them and the vehicles for towing them shall be maintained in good condition and subjected to periodical inspection and testing as required.
- (13) Personnel in charge of equipment and for fire fighting, fire drills, etc :- (a) The first-aid and other fire fighting equipment to be provided as required in sub-rules (11) and (12) shall be in charge of a trained responsible person.
- (b) Sufficient number of persons shall be trained in the proper handling of fire-fighting equipment as referred to in clause (a) and their use against number of persons are available for fire fighting both by means of first-aid fire fighting equipment and others. Such persons shall be provided with clothing and equipment including helmets, belts and boots, preferably gumboots. Wherever vehicles with towing attachment are to be provided as required in clause (d) of sub-rule(11) sufficient number of persons shall be trained in driving these vehicles to ensure the trained persons are available for driving them whenever the need arises.
  - (c) Fire fighting drills shall be held at least once in every 3 months.

- (14) Automatic sprinklers and fire hydrants shall be in addition and not in substitution of the requirements in sub rules (11) and (12).
- (15) If the Chief Inspector is satisfied in respect of any factory or any part of the factory that owing to the exceptional circumstances such as inadequacy of water supply or infrequency of the manufacturing process or for any other reason, to be recorded in writing, all or any of the requirements of the rules are impracticable or not necessary for the protection of workers, he may by order in writing (which he may at his discretion revoke) exempt such factory or part of the factory from all or any of the provisions of the rules subject to conditions as he may by such order prescribe.

## **SCHEDULE**

### **EQUIPMENT TO BE PROVIDED WITH TRAILER PUMP**

#### **For light trailer pump of a capacity of 680 litres / minute**

- 1 Armoured suction hose of 9 m length, with wrenches.
- 1 Metal suction strainer.
- 1 Basket strainer.
- 1 Two-way suction collecting-head.
- 1 Suction adapter.
- 10 Unlined or rubber lined 70 mm delivery hose of 25 metres, length complete with quick-release couplings.
- 1 Dividing breaching-piece.
- 2 Branch-piece with 15 mm nozzles.
- 1 Diffuser nozzle
- 1 Standpipe with blank cap.
- 1 Hydrant key.
- 4 Collapsible canvas buckets.
- 1 Fire hook (preventer) with cutting edge.
- 1 25 mm manila rope of 30 meters length.
- 1 Extension ladder of 9 m length (where necessary).
- 1 Heavy axe.
- 1 Spade.
- 1 Pick axe.
- 1 Crowbar.
- 1 Saw.
- 1 Hurricane lamp.

- 1 Electric torch.
- 1 Pair rubber gloves.

**For large trailer pump of a capacity of 1800 litres/minute**

- 1 Armoured suction hose of 9 m length, with wrenches.
- 1 Metal suction strainer.
- 1 Basket strainer.
- 1 Three-way suction collecting-head.
- 1 Suction adapter.
- 14 Unlined or rubber lined 70 mm delivery hose of 25 m, length complete with quick-release couplings
- 1 Dividing breaching piece.
- 1 Collecting breaching-piece.
- 4 Branch pipes with one 25 mm two 20 mm and one diffuser nozzle.
- 2 Standpipes with blank caps.
- 2 Hydrant keys.
- 6 Collapsible canvas buckets.
- 1 Ceiling hook (preventer) with cutting edge.
- 1 50 mm manila rope of 30 m length.
- 1 Extension ladder of 9 m length (where necessary).
- 1 Heavy axe.
- 1 Spade.
- 1 Pick axe.
- 1 Crowbar.
- 1 Saw.
- 1 Hurricane lamp.
- 1 Electric torch.
- 1 A pair of rubber gloves

**Note** - If it appears to the Chief Inspector that in any factory the provision of breathing apparatus is necessary he may by order in writing require the occupier to provide suitable breathing apparatus in addition to the equipment for light trailer pump or large trailer pump as the case may be.