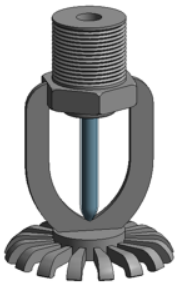
Type of Sprinkler Head

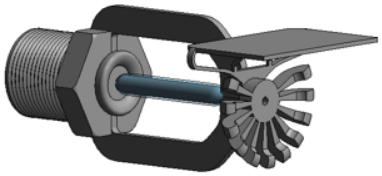

Upright Sprinklers

Recessed Sprinkler


Concealed Sprinklers

Pendent Sprinklers

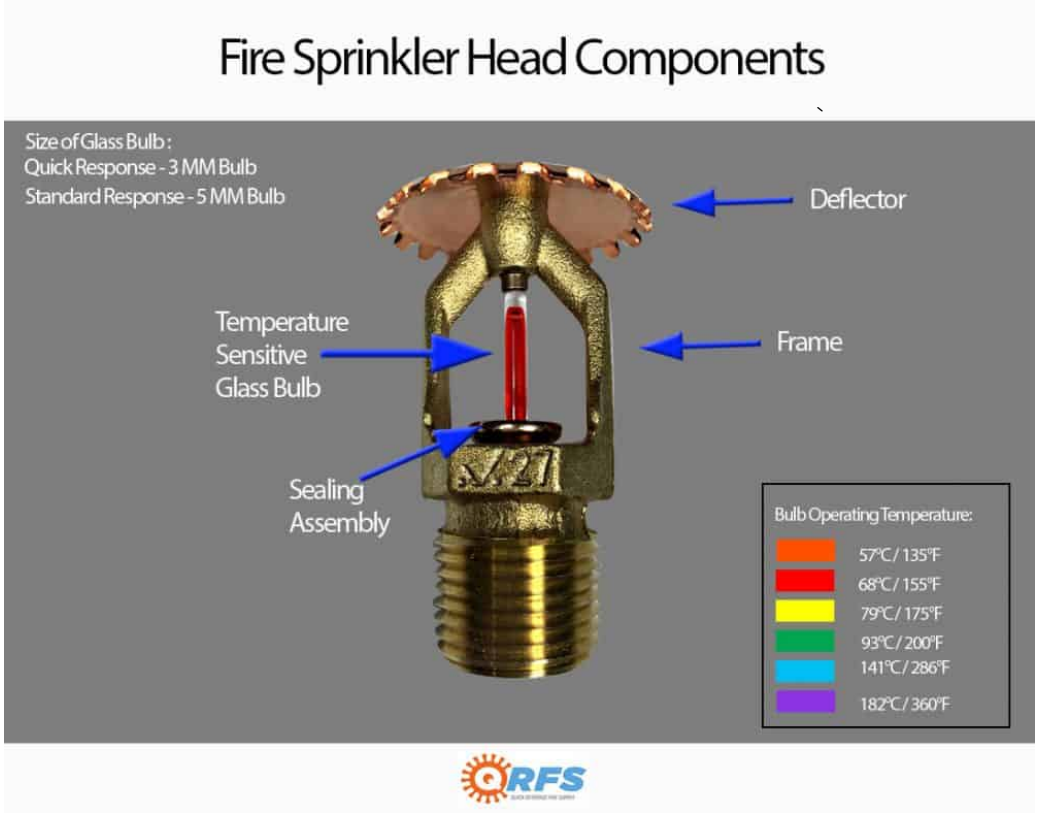



Side Wall Sprinklers

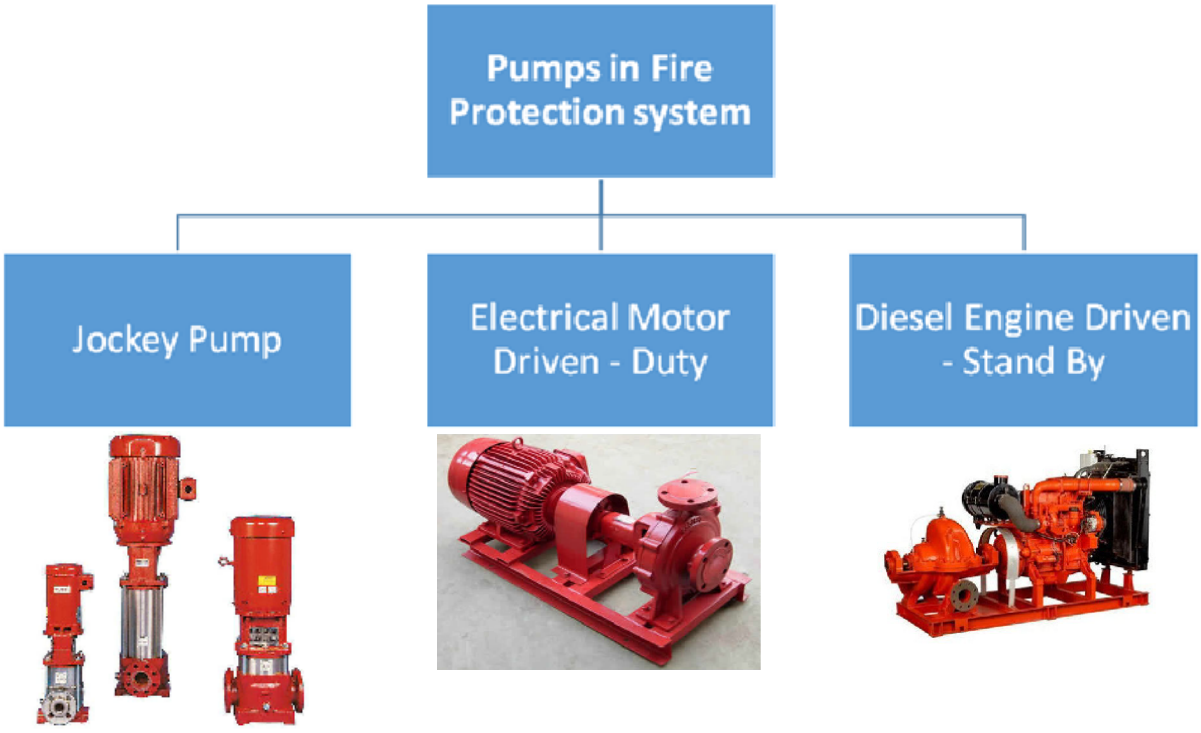
Open Sprinklers

Glass Bulb Sprinklers

Fusible Link Sprinklers



Pumps Are Used in Fire Protection System



Know your Fire Extinguisher

Symbols found on fire extinguishers and what they mean	WATER	FOAM SPRAY	ABC POWDER	CARBON DIOXIDE	WET CHEMICAL
Wood, paper & textiles (A)	✓	✓	✓	✗	✓
Flammable Liquids (B)	✗	✓	✓	✓	✗
Flammable Gases (C)	✗	✗	✓	✗	✗
Electrical Contact	✗	✗	✓	✓	✗
Cooking oils & fats (F)	✗	✗	✗	✗	✓

Valves

Gate Valve

Swing Check Valve

Butterfly Valve

Wafer Check Valve

Ball Valve

Water Check Valve

OS&Y Gate Valve

Alarm Valve

Dry Pipe Valve

Flow Valve

Retard Chamber

Test & Drain Valve

Water Motor Alarm Gong

Preaction Valve

Pressure Reducing Valve

2 Way Breeching Inlet

4 Way Breeching Inlet

Dry Riser Landing Valve

Deluge Valve

Automatic Air Release Valve

Solenoid Control Valve

Two types of Automatic Sprinklers-

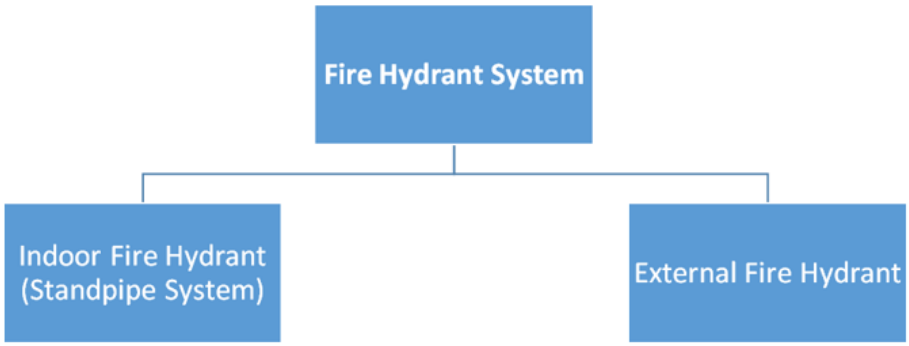
1. Fusible Link Sprinklers
2. Glass Bulb Sprinklers

Fusible Link Sprinklers

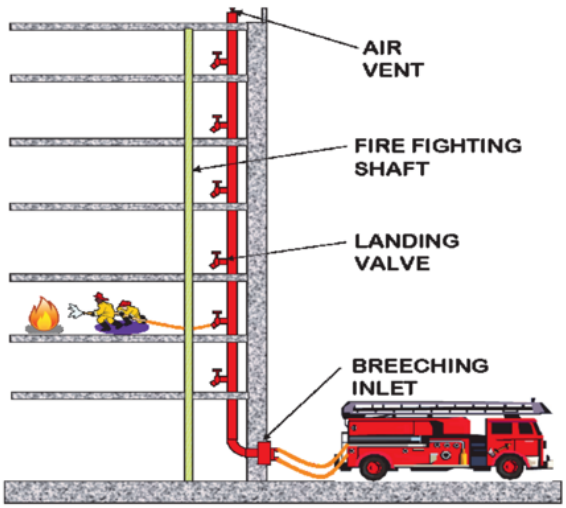
Glass Bulb Sprinklers

Fire Hydrant System

- A connection point by which firefighters can tap into a water supply
- It is a component of active fire protection



Indoor Fire Hydrant (Standpipe System):



Landing Valves on Stair/Shaft

Fire Hose Cabinet

Fire Hose Cabinet

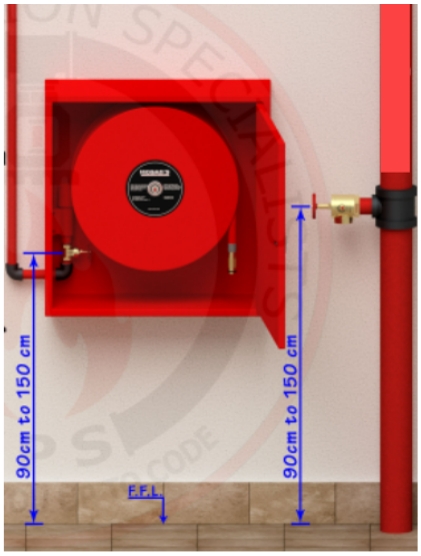
- Fire hose reels are located to provide a reasonably accessible and controlled supply of water to combat a potential fire risk.
- The length of a fully extended fire hose is **36 meters** with a diameter of **19mm** (outside diameter).
- These appliances are designed to deliver, as a minimum, **0.33L** of water per second.
- Fire cabinet is designed for theft and vandalism protection in public areas and buildings to safely store fire equipment such as fire hose rack assembly, fire hose reel and fire extinguisher.

Components of Fire Hose Cabinet-

- ✓ Fire Hose Rack
- ✓ Hose Reels
- ✓ Hose Nozzles
- ✓ Hose Connection

- **Location of Hose Connection-**

✓ Hose connections and hose stations shall be unobstructed and shall be located not less than **3ft (0.9m)** or more than **5ft (1.5m)** above the floor.



- **Number & Size of Standpipe-**
  - ✓ Separate standpipes shall be provided in each required exit stairway.
  - ✓ Standpipes shall be at least 4 inch (100 mm) in size.
  - ✓ Standpipes that are part of a combined system in a building that is partially sprinklered shall be at least 6 inch (150 mm) in size.

External Fire Hydrant

Design Criteria for Stand Pipe & Hose Reel

Class I Stand Pipe System-

- 2 ½ in. (65 mm) hose connection with a flow rate of 500 gpm (1893 L/min)
- Hose Reel distance - 61m for sprinklered area
  39.7m for non-sprinklered area

Class II Stand Pipe System-

- 1½ inch (40mm) hose connection
- Hose Reel distance - 39.7m (130 ft) for 40mm connection
  36.6m (120 ft) for less then 40mm connection

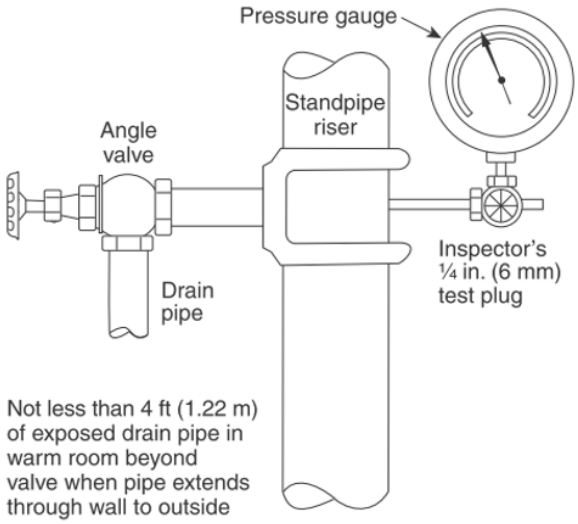
Class III Stand Pipe System-

- For trained person
- 2 ½ in. (65 mm) hose connection

Maximum required pressure- 100 psi
if static exceed - 175 psi, **PRV required

- Drain Connection for System Riser-
  A main drain shall be provided on the standpipe system side of the system control valve.

Standpipe Size	Size of Drain Connection
Up to 2 in. (50 mm)	¾ in. (20 mm) or larger
2½ in. (65 mm), 3 in. (80 mm), or 3½ in. (90 mm)	1¼ in. (32 mm) or larger
4 in. (100 mm) or larger	2 in. (50 mm) or larger



Provision of Fire Hydrants (IS 13039)

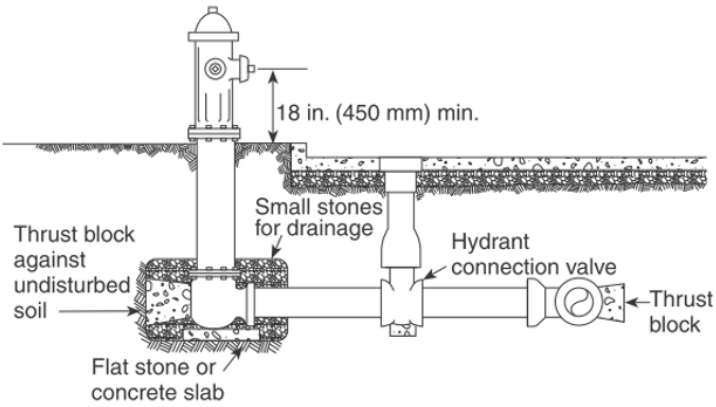
Design Criteria for Fire Hydrant (Indian Standard):-

- Underground mains should be laid not less than 1 meter below ground level.
- Hydrants should be located at a distance from the face of the buildings-
  - Min. Distance- 2 meter
  - Max. Distance- 15 meter
- Hydrant Interval for different Hazard Categories-
  - High Hazard (Gr G-3, H and J) - 30 meter
  - Moderate Hazard (Gr G-2) - 45 meter
  - Normally in towns/cities - 100 meter
- For Light(Group A to F) and Moderate hazard minimum pressure - 3.5 kg/cm².
- In the most vulnerable area enroute a minimum pressure of 5.25 kg/cm².
- No portion of a protected building should be more than 45 m from an external hydrant, and where this requirement cannot be met, internal hydrants/landing valves should be provided.

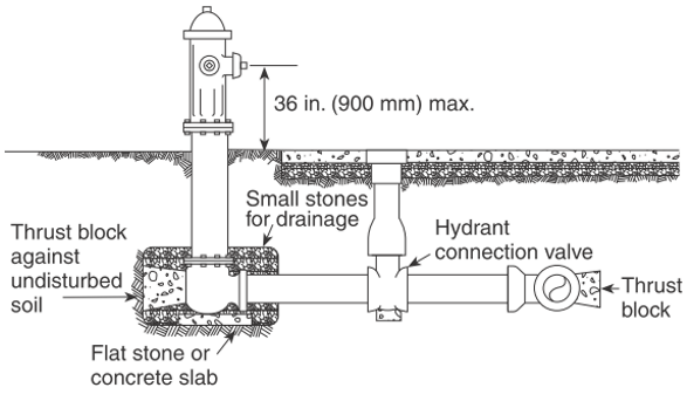
D.4 Classification of Hydrants. Hydrants should be classified in accordance with their rated capacities [at 20 psi (1.4 bar) residual pressure or other designated value] as follows:

(1) Class AA — Rated capacity of 1500 gpm (5700 L/min) or greater
(2) Class A — Rated capacity of 1000 to 1499 gpm (3800 to 5700 L/min)
(3) Class B — Rated capacity of 500 to 999 gpm (1900 to 3800 L/min)
(4) Class C — Rated capacity of less than 500 gpm (1900 L/min)

Height Requirement for Fire Hydrant:-



Typical Hydrant Connection with minimum height requirement



Typical Hydrant Connection with maximum height requirement

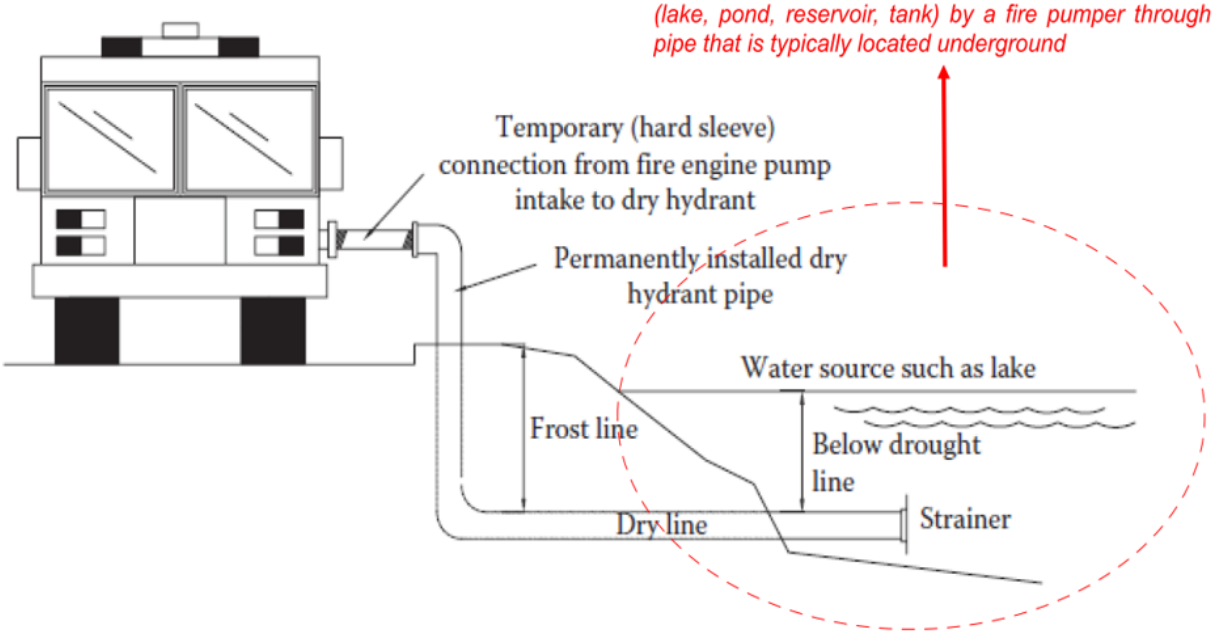
Types of Fire Hydrant

- Dry Hydrant
- Wet Hydrant
  - Wet Barrel
  - Dry Barrel

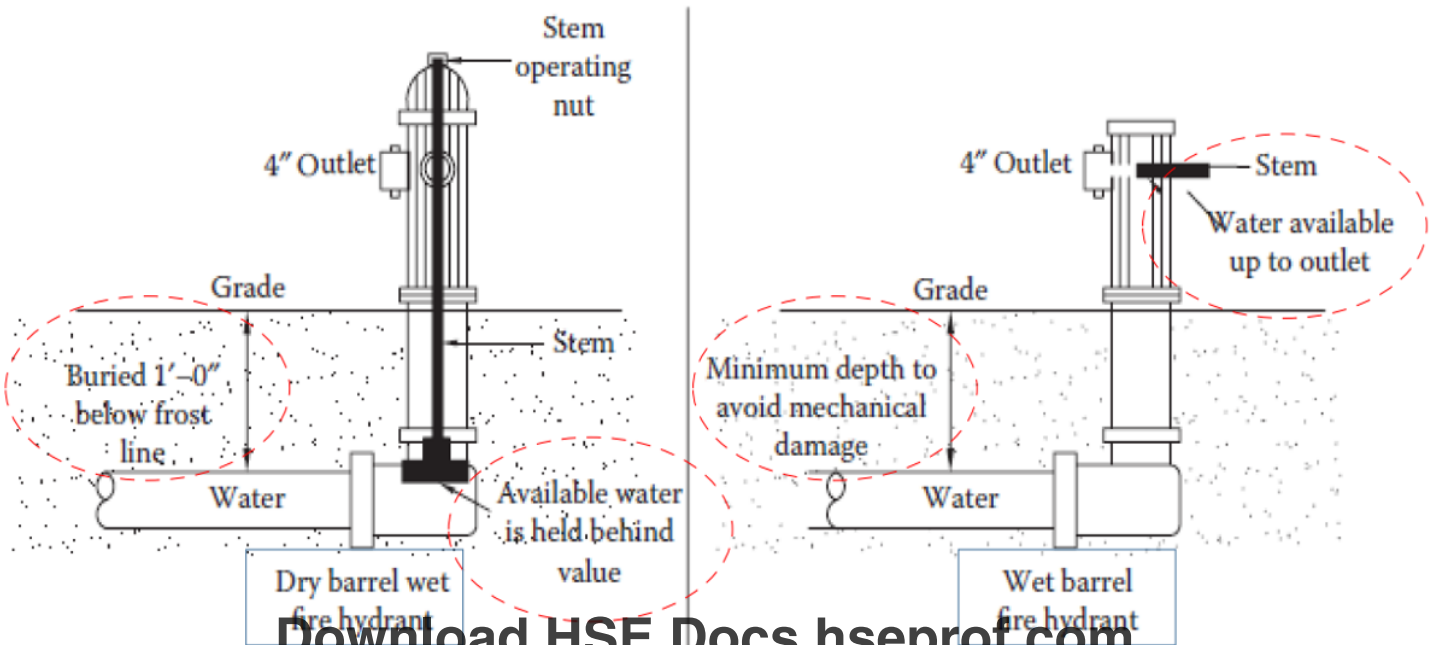
According to **NFPA 1142 Standard** on water supplies for Suburban and Rural Fire Fighting:

"Dry hydrant is an arrangement of pipe permanently connected to a water source other than a piped, pressurized water supply system that provides a ready means of water supply for fire-fighting purposes and that utilizes the drafting (suction) capability of a fire department pump."

In dry hydrant water has to be drawn from the supply (lake, pond, reservoir, tank) by a fire pumper through a pipe that is typically located underground



Wet Fire Hydrants



Building Type	Maximum Distance between Hydrants(feet)
Industrial buildings and warehouses	250
Schools, day care centers	300
Offices, commercial establishments, church, hospitals, nursing homes	350
Apartments, multifamily dwellings, town houses	350
Single-family dwellings	500

What Exactly these distances means ..?

These measurements indicate what one fire hydrant can cover along the fire access road depending on building type, fire load and no. of fire streams required

Types of Fire Hydrant System

Classification of Fire Extinguisher

NFPA-10

Class of Fire Extinguisher	Hazards	Max Travel Distance
Class A	Ordinary combustible materials (cloth, wood, paper, rubber, plastic, etc.)	75 feet
Class B	Flammable liquids or gasses (gasoline, natural gas, etc.)	50 feet
Class C	Electrical (machinery, electrical cables)	Based on the Class A or B hazard
Class D	Flammable metals	75 feet from the hazard
Class K	Cooking oils and fats	30 feet

Classification of Hazard-

- **Light hazard**- Light hazard occupancies shall be classified as locations where the quantity and combustibility of Class A combustibles and Class B flammables are low and fires with relatively low rates of heat release are expected.
- **Ordinary Hazard-** Ordinary hazard occupancies shall be classified as locations where the quantity and combustibility of Class A combustible materials and Class B flammables are moderate and fires with moderate rates of heat release are expected.
- **Extra Hazard-** Extra hazard occupancies shall be classified as locations where the quantity and combustibility of Class A combustible material are high or where high amounts of Class B flammables are present and rapidly developing fires with high rates of heat release are expected.

Installation of Fire Extinguisher

Table 6.2.1.1 Fire Extinguisher Size and Placement for Class A Hazards

Criteria	Light Hazard Occupancy	Ordinary Hazard Occupancy	Extra Hazard Occupancy
Minimum rated single extinguisher	2-A	2-A	4-A
Maximum floor area per unit of A	3000 ft^2	1500 ft^2	1000 ft^2
Maximum floor area for extinguisher	11,250 ft^2	11,250 ft^2	11,250 ft^2
Maximum travel distance to extinguisher	75 ft	75 ft	75 ft

For SI units, 1 ft = 0.305 m; 1 ft^2 = 0.0929 m^2.
Note: For maximum floor area explanations, see E.3.3.

Table 6.3.1.1 Fire Extinguisher Size and Placement for Class B Hazards

Type of Hazard	Basic Minimum Extinguisher Rating	Maximum Travel Distance to Extinguishers	
		ft	m
Light	5-B	30	9.14
	10-B	50	15.25
Ordinary	10-B	30	9.14
	20-B	50	15.25
Extra	40-B	30	9.14
	80-B	50	15.25

Note: The specified ratings do not imply that fires of the magnitudes indicated by these ratings will occur, but, rather, they are provided to give the operators more time and agent to handle difficult spill fires that have the potential to occur.

If extinguisher weighs
more than 40 lb (18.14 kg) ...

- **Top of extinguisher** cannot be more than **3.5 ft (1.07 m)** from the ground
- **Bottom of extinguisher** must be at least **4 in. (102 mm)** off the ground

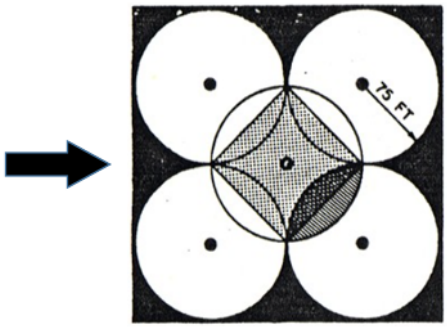
If extinguisher weighs
less than 40 lb (18.14 kg) ...

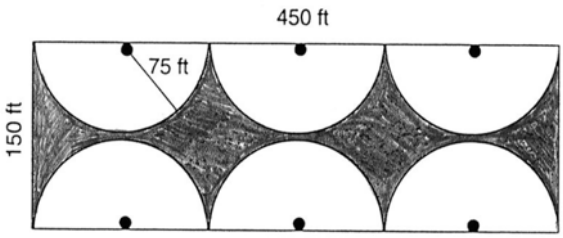
- **Top of extinguisher** cannot be more than **5 ft (1.53 m)** from the ground
- **Bottom of extinguisher** must be at least **4 in. (102 mm)** off the ground

In both cases, this includes extinguishers in cabinets, but it does not include wheeled extinguishers.

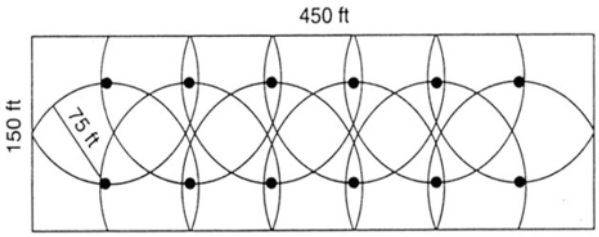
Coverage Area of Fire Extinguisher

The Dotted Squares Show the Maximum Area (11250 sq ft/ 1045 m²) that an Extinguisher can protect within the Limits of the 75 ft (22.7 m) Radius.

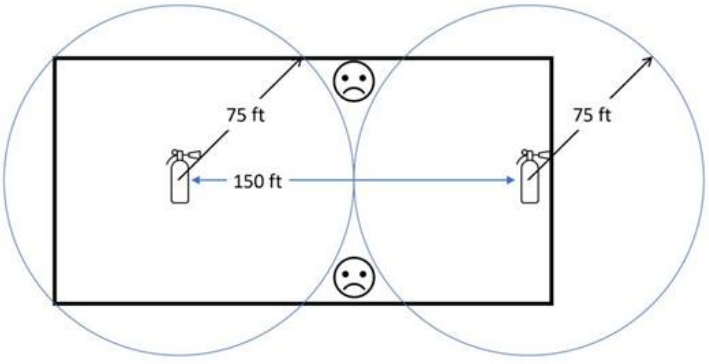




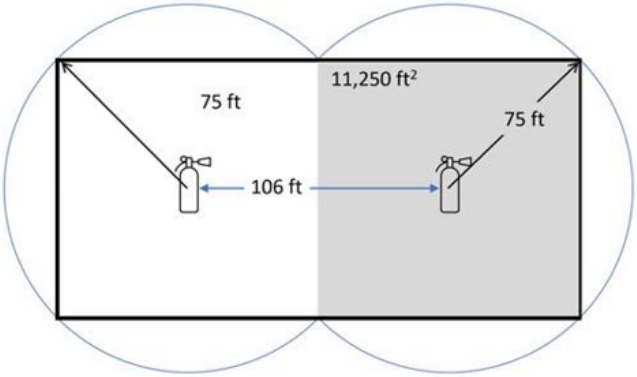
Wrong Way to place Extinguisher
Black Filled area is not in coverage area



Right Way to place Extinguisher
fulfill all the criteria & Cover whole area



Example of improperly spaced extinguisher

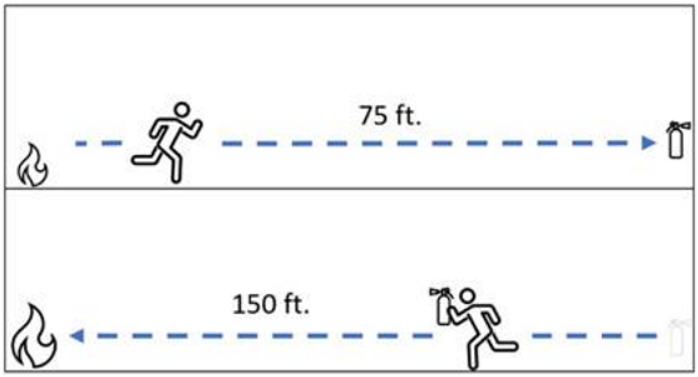


Example of correctly spaces extinguisher

Coverage Area of Fire Extinguisher

If Class A extinguishers are placed at the limit of their maximum travel distance then people might have to travel the entire 75 ft to get the extinguisher and then back another 75 ft to return to the fire in order to extinguish it.

Let's say the average person travels 3.5 mph, this means it would take them 30 seconds to travel the 150 ft it could take to grab the extinguisher and get back to the fire. A lot can happen in 30 seconds.



Components of Fire Alarm System