

## Chapter 6

### FIRE FIGHTING SYSTEMS

#### 6.1 PORTABLE EXTINGUISHERS

##### 6.1.1 General

- (a) All buildings, except Purpose Group I and II (residential floors) shall be provided with portable fire extinguishers.
- (b) Portable fire extinguishers where required to be provided shall be constructed in conformity with specifications stipulated under SS 232 Specification for Portable Extinguishers.
- (c) All portable fire extinguishers where required to be provided shall be charged, tested and maintained in fully operational conditions and properly tagged in conformity with requirements in SS CP 55 Code of Practice for Use and Maintenance of Portable Fire Extinguishers.

(No illustration)

*Once a fire extinguisher has been installed in a building, it becomes the responsibility of the building owner to maintain it.*

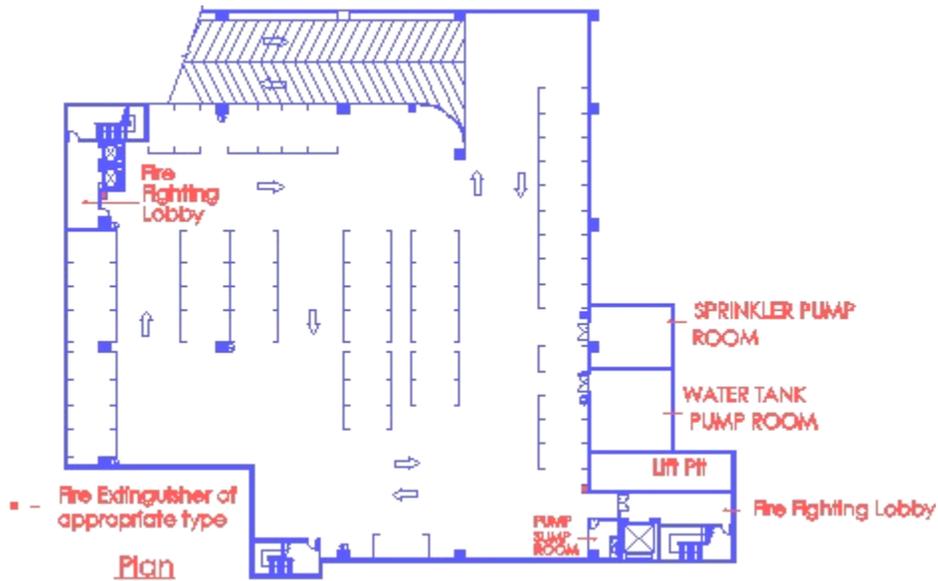
*Proper and adequate maintenance comprise the following:*

- a) periodically inspecting each extinguisher;*
- b) recharging each extinguisher following discharge; and*
- c) performing hydrostatic tests as required.*

*Maintenance of fire extinguisher shall only be carried out by approved servicing agency or company. Maintenance shall be carried out periodically, but at least once a year. A maintenance check covers the disassembling the extinguisher, examine all its parts, cleaning and replacing any defective parts, and reassembling, recharging and, where necessary, repressuring the extinguisher.*

##### 6.1.2 Type, size and siting

Classification of portable fire extinguishers provided shall be selected in accordance with criteria specified under SS CP 55 such that the nature of processes and contents within the building concerned can be effectively protected. The size, quantity and siting of these portable fire extinguishers shall comply with the requirements in SS CP 55 under the respective class of occupancy hazard.



The type, size, quantity and siting of the portable fire extinguishers shall comply with the requirements in SS CP 55.

6.1.3 Portable fire extinguishers provided shall be installed and conspicuously marked in accordance with requirements by SS CP 55.

Portable fire extinguisher should be sited next to the exit, outside the special purpose rooms as shown in diagram 6.1.3 – (a). This would allow occupants to ready themselves with the extinguishers before opening the door to the room where the fire is raging.

Special purpose rooms

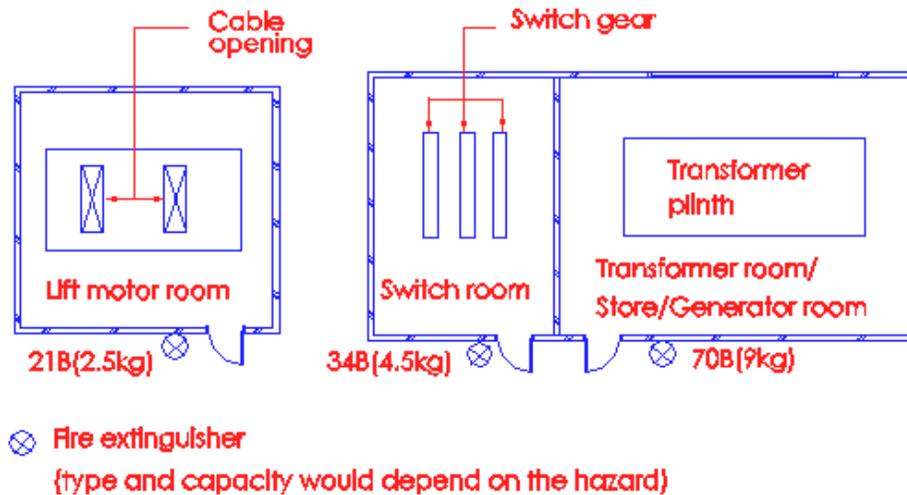


Diagram 6.1.3 – (a)

(1) Installation requirements

- (a) Portable extinguishers shall be installed in every building except dwelling units.
- (b) Portable extinguishers with a gross weight not greater than 20kg shall be installed so that the extinguisher shall be mounted 1m above the floor level.
- (c) Portable extinguishers having a gross weight of 20 kg or less shall be installed so that the top of the extinguisher is not more than 1.5m above the floor.
- (d) The operating instructions of portable extinguishers shall face outward when the extinguishers are located in cabinets, in wall recesses or on shelves.

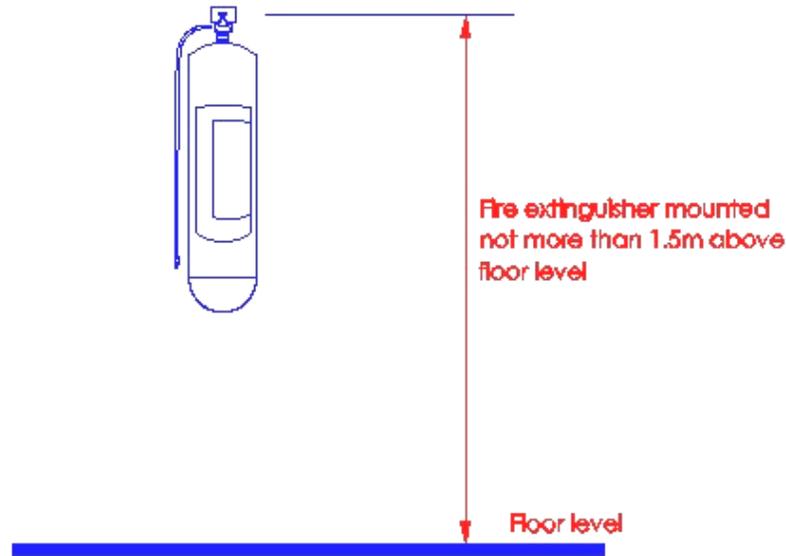


Diagram 6.1.3 – (b)

## 6.2 RISING MAIN AND HOSE REEL SYSTEMS

### 6.2.1 Type of Rising Main

- (a) The type of rising main system shall be provided appropriate to the building as follows:
  - (i) dry rising main shall be installed in buildings where the habitable height is more than 10m, but does not exceed 60m,
  - (ii) wet rising main shall be installed in buildings with habitable height exceeding 60 m.
  - (iii) Separate dry and wet rising mains systems in a buildings are permitted.

## Provision of Dry Rising Mains

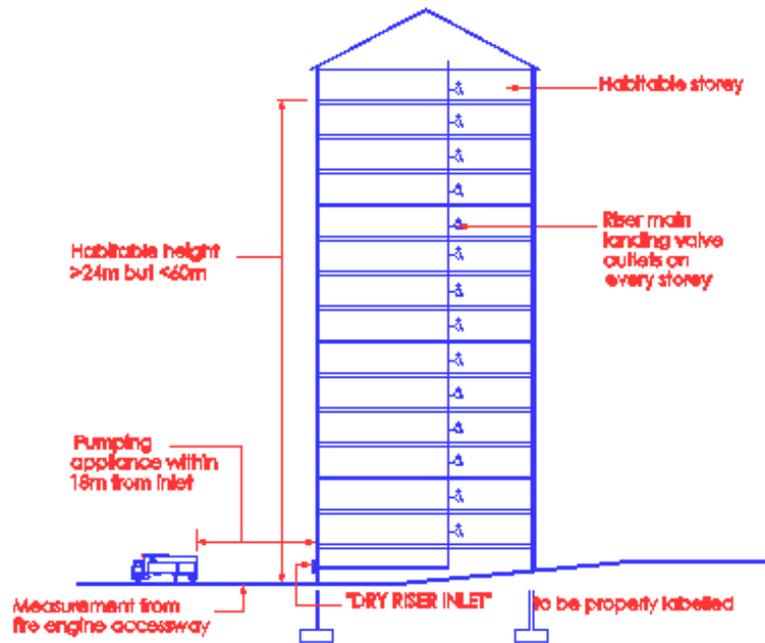


Diagram 6.2.1 (a)(i)

*Rising Main, Dry (Dry Riser). A vertical pipe installed in a building for fire fighting purposes, fitted with inlet connections 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.*

## Provision of Wet Rising Mains

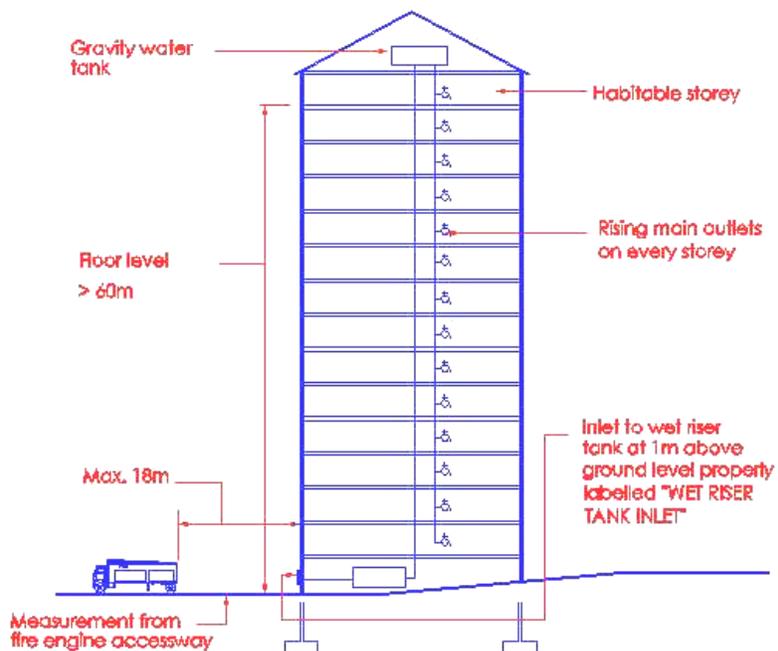


Diagram 6.2.1 (a)(ii)

Rising Main, Wet (Wet Riser). A vertical pipe installed in a building for fire fighting purposes and permanently charged with water from a pressurized supply, and fitted with landing valves on various floors.

Separate dry and wet rising main system

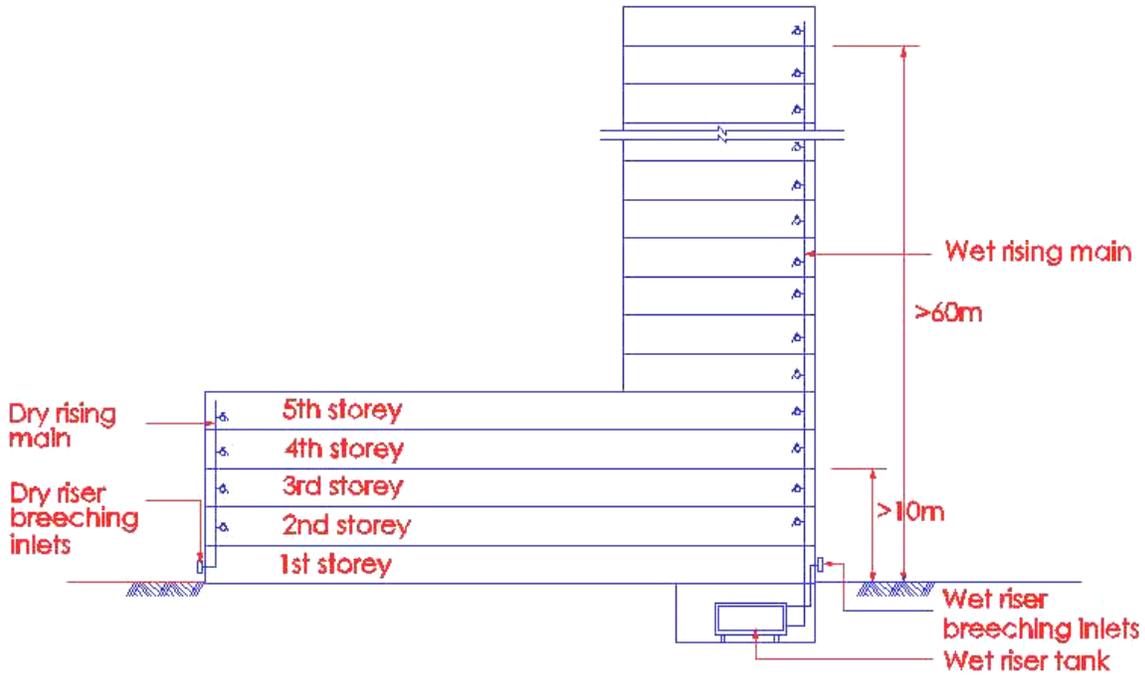


Diagram 6.2.1(a)(iii)

Where a block of building has podium and tower blocks integrated

- (1) Tower block exceeding 60m in habitable height shall be provided with wet rising main.
- (2) Podium block needs to be provided with dry rising main only.

6.2.1 (b) Notwithstanding the requirements in sub-clause (a), dry rising main conforming to SS CP 29 shall be provided to any part of a single or multiple level basement.

## Rising main in basements

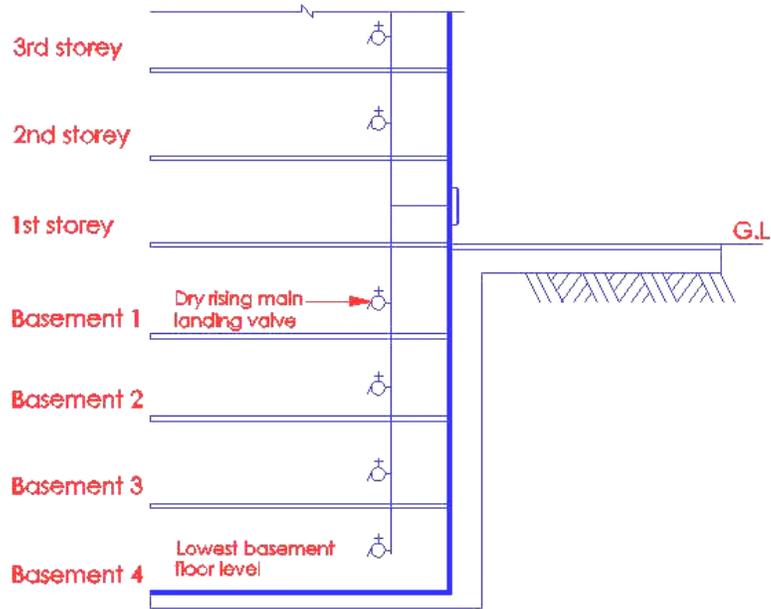


Diagram 6.2.1 (b)

All basements except those under Purpose Group 1 are required to be covered by dry rising main, irrespective of the depth and number of basements below ground level. Rising main would help to provide steady supply of water required by fire fighters during emergency. The provision would eliminate the tedious process of laying fire hoses from ground level into the basement floors to tackle any outbreak of fire.

Where breaching inlets are provided at the foot of the riser stack, landing valve is not required to be provided at the 1<sup>st</sup> storey level.

## Type of Rising Mains to be installed in high rise buildings

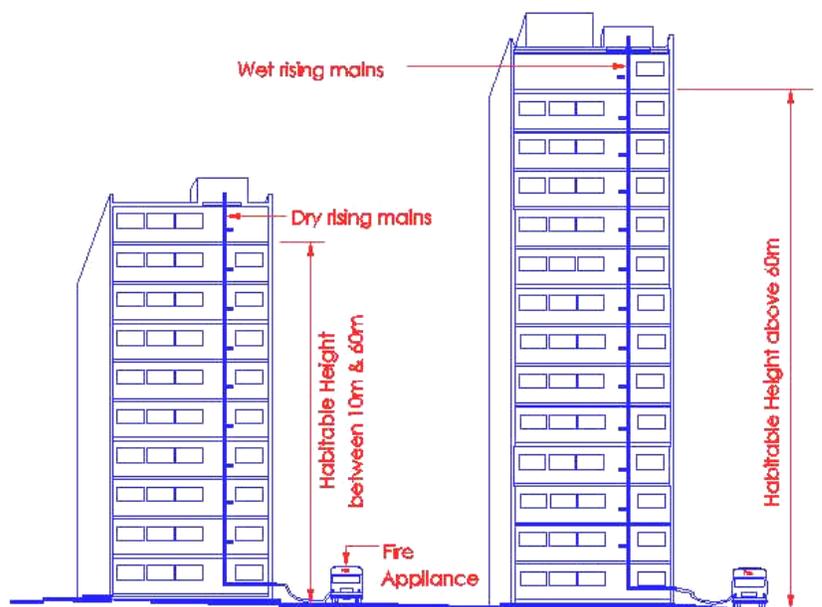


Diagram 6.2.1(c)

- (1) For the purpose of determining the provision of rising main to factory/warehouse building, the habitable height shall be taken from the level of the fire engine accessway where breaching inlets are provided.
- (2) Dry rising mains are basically dry water pipes. The empty mains need to be charged with water through the breaching inlets by fire appliance. The dry rising mains should not exceed 60m to avoid excessive pumping pressure.
- (3) Wet rising mains are constantly charged with water that provide the required flow rate and pressure for fire fighting and equipped with water storage capacity for a given duration of 60 minutes. The breaching inlets which are usually provided at ground level are meant for replenishing the water tank.

## 6.2.2 Number, Location and Size of Rising Mains

- (a) The number and distribution of rising mains shall comply with the requirements stipulated in SS CP 29 Code of Practice for Fire Hydrant systems and Hose Reels.

Under normal circumstances, a building below 24m in habitable height would not require rising mains. However, if such buildings have very large floor area or footprint, whereby its internal areas are outside the coverage of a fire hose length of 38m from the fireman access panels, it is recommended that the internal rising mains to be incorporated to cover these areas. Otherwise, consultation with the relevant authority ought to be sought. The conditions for the number of rising mains required are:

- (i) All buildings with habitable height exceeding 24m would require one or more rising mains. Each rising main shall not serve more than 930 m<sup>2</sup> of any floor space subject to all parts of the floor to be within 38m from a landing valve.

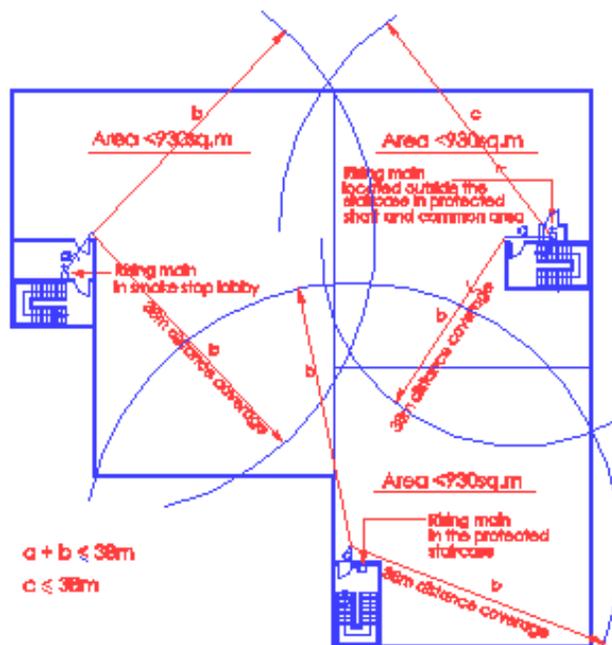
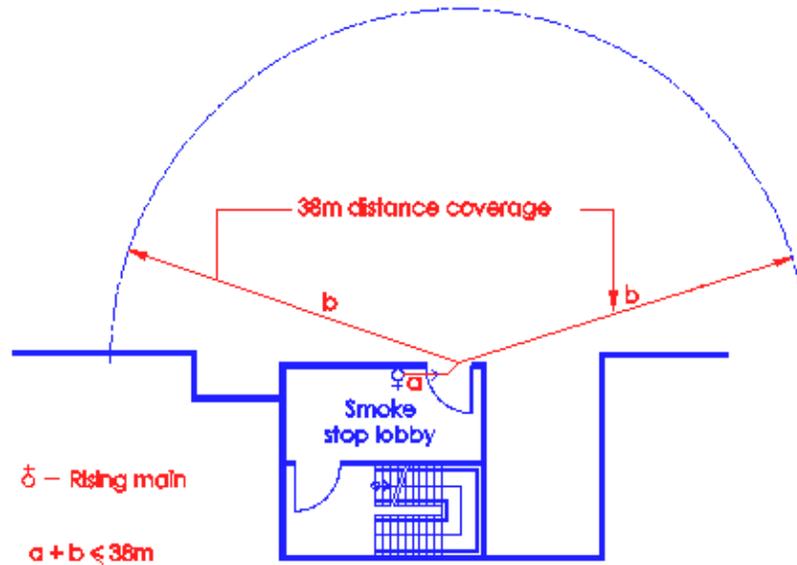


Diagram 6.2.2(a)- 1

- (ii) Maximum coverage distance of 38m for floor that are below a habitable height of 24m.



The provision of rising main shall be such that all parts of any floor are within 38m from a landing valve, measured along a route suitable for hoselines.

- (b) Position of rising mains and the associated landing valves shall be located in the following order of priority:
- (i) within smoke-stop lobby;
  - (ii) in the common area and within a protected shaft, immediately outside the exit staircase if there is no smoke-stop lobby;
  - (iii) inside exit staircase where smoke-stop lobby and common area are not provided.

## Siting of rising mains

- (i) Rising main in protected lobby



Diagram 6.2.2(b)(i) - 1

### Factory/warehouse block

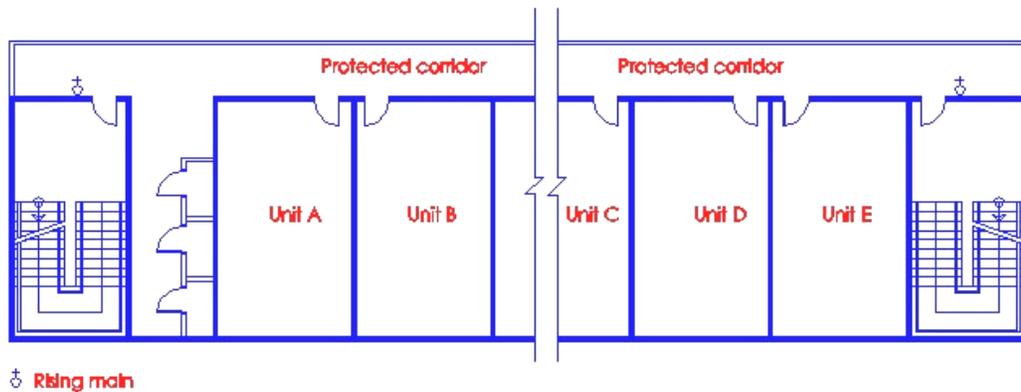


Diagram 6.2.2(b)(i) - 2

*In the above situation where the rising mains are located outside the staircases and along external exit passageway/external corridor which is naturally ventilated, there is no need to protect the main and landing valve separately.*

(ii) Rising main outside protected staircase

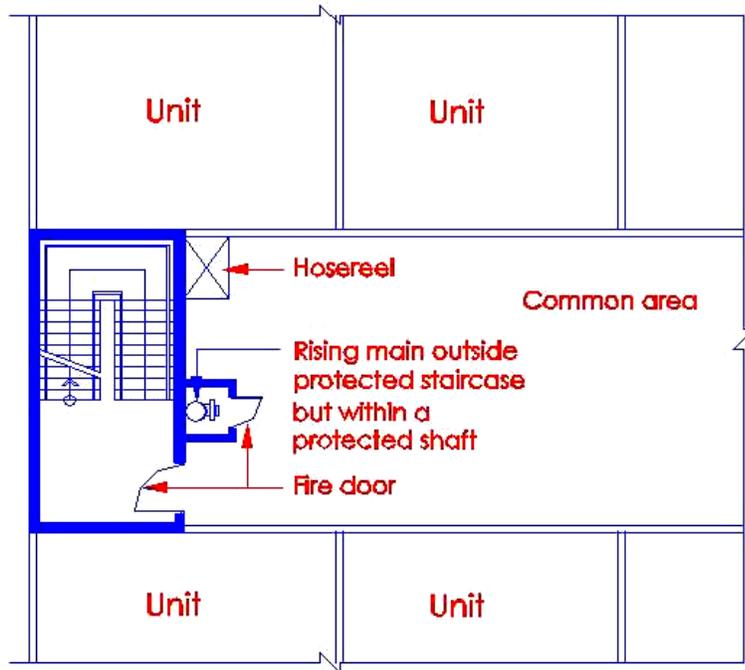


Diagram 6.2.2(b)(ii)

(iii) Rising main inside protected staircase

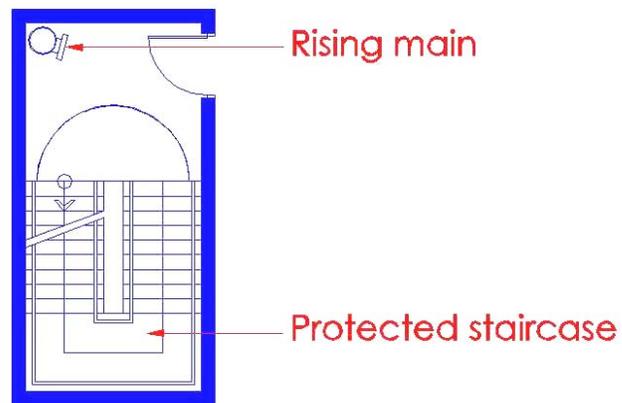


Diagram 6.2.2(b)(iii)

(iv) Rising mains situated at various positions within same building

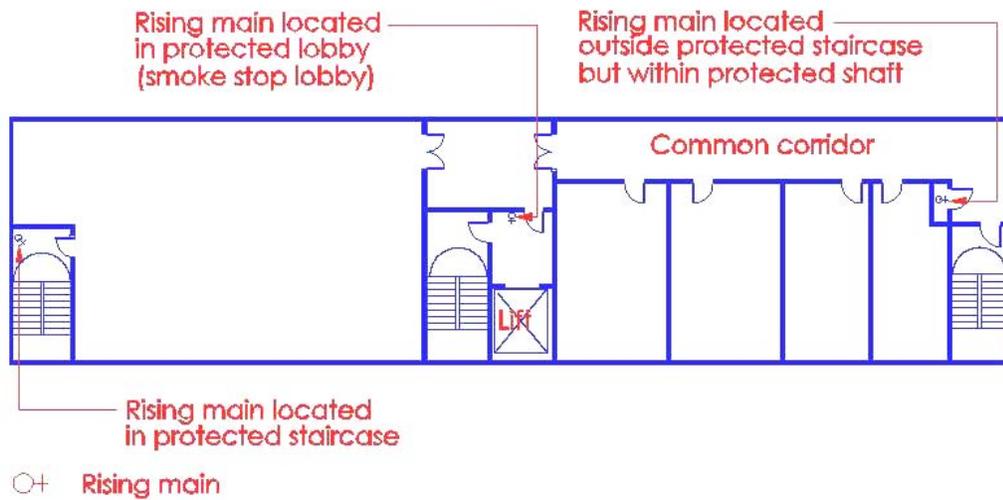


Diagram 6.2.2(b)(i), (ii) & (iii)

As rising mains provide the ready water supply to fire fighters in the building, the main and its landing valve should be protected from fire or mechanical damage if they are located inside the building and exposed to fire risk.

(c) Size of rising mains shall comply with SS CP 29.

(i) Size of rising mains. The minimum nominal bore of a rising main shall be:

(a) 100mm where the rising main does not exceed 45m in height and only one landing valve is provided at each floor.

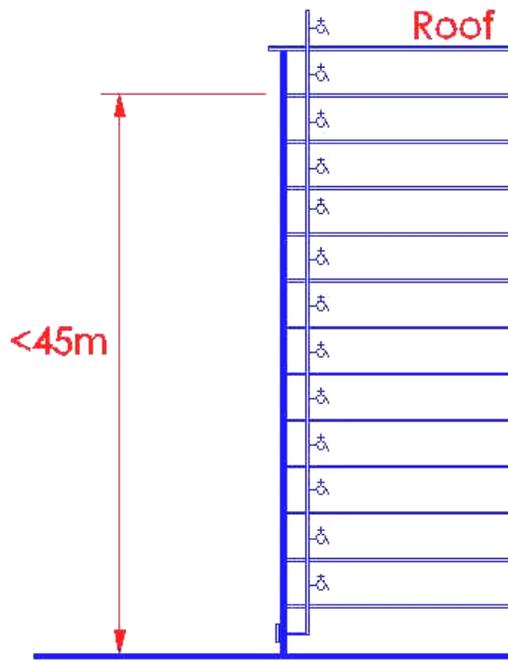


Diagram 6.2.2 (c)(i)(a)

(b) 100mm minimum nominal bore

150mm where the rising main either (i) exceeds 45m in height or (ii) is permitted to have two landing valves on any floor.

Figure (i)

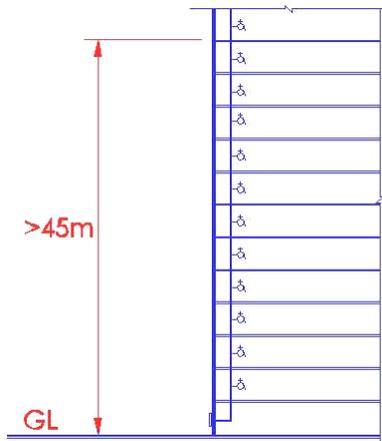


Figure (ii)

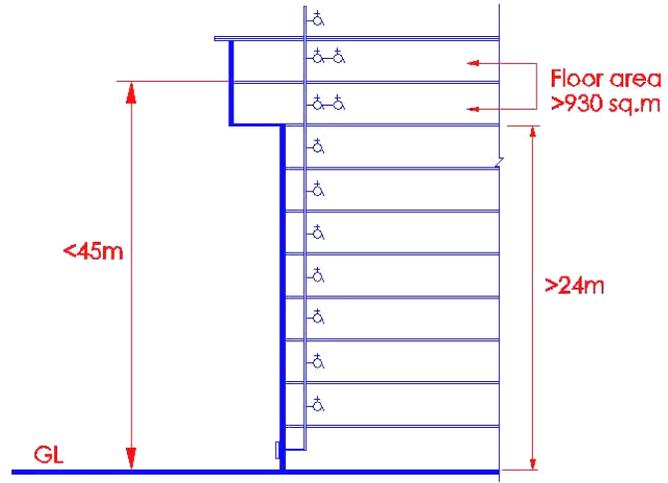


Diagram 6.2.2 (c)(i)(b)

150mm min. nominal bore rising main

The height of rising main is the habitable height measured from the fire engine access level to the finished floor level of the topmost floor served by the rising main, irrespective whether or not the main is extended above roof level. The above figure (ii) in diagram 6.2.2(c)(i)(b) shows two landing valves being installed in the top 2 floors though the height of rising main does not exceed 45m, the minimum nominal bore of the rising main shall not be less than 150mm. See cl.2.4.12.2 of SS CP 29 which allows that where "one rising main is permitted for a floor area exceeding 930m<sup>2</sup>, two landing valves shall be provided per floor, in which case the nominal bore of the rising main shall be 150mm". However, this requirement shall not be applicable to any floor exceed 1400m<sup>2</sup>.

6.2.2 (d) Location and provisions for landing valves shall comply with SS CP 29. However, all buildings, other than purpose groups I & II, there is no need to provide landing valve to any rising main at 1<sup>st</sup> storey level if any part of that storey is not more than 38m from the external wall of the building.

(i) Location of rising mains

The entire pipe work and landing valves comprising each rising main system inside the building shall be confined:

- (a) within a ventilated lobby of a protected lobby approach stairway, where this is provided, or
- (b) in such other protected areas as may be agreed with the Fire Authority.

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

- (iii) No part of a rising main shall be placed in any shaft containing a gas, steam or fuel pipelines or electrical cables and wirings.
- (iv) Where passing through other than protected area e.g. protected lobby shaft, pipe need to be encased or protected by and fire rating material with 2-hour fire resistance rating.

Factory/warehouse block

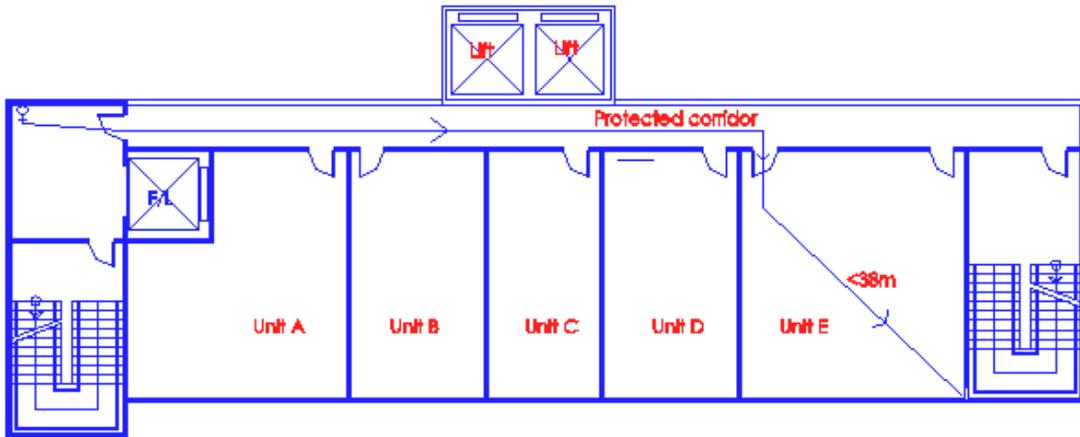


Diagram 6.2.2(d) – 1

A single rising main is provided in the above diagram as the total floor area per storey is less than 930 sq m. In-addition the distance from the most remote point in any unit to the rising main landing valve shall not exceed 38m, measured along the route of travel.

Not acceptable

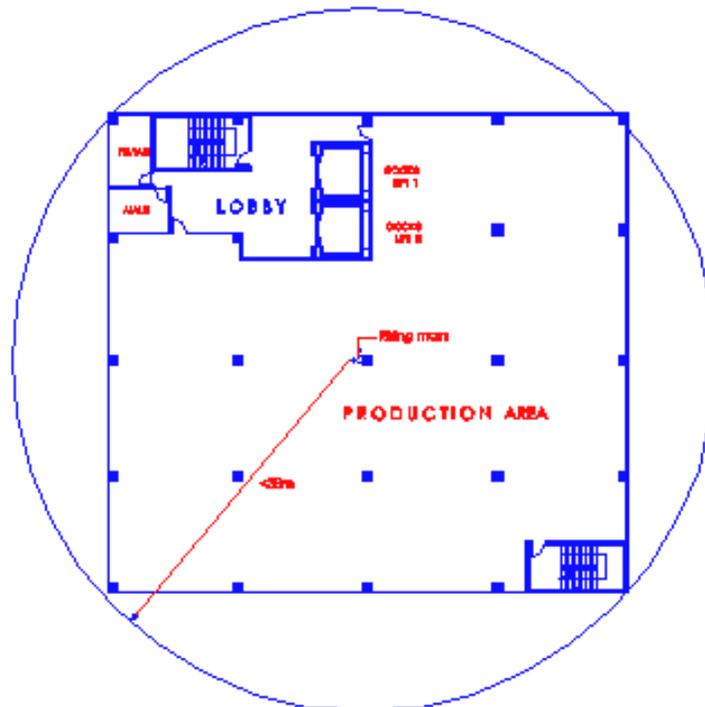


Diagram 6.2.2(d) – 2

The above diagram shows rising main installed in the core of a building, both meeting the requirements of floor area (930m<sup>2</sup>) and distance coverage (38m). Such arrangement is deemed not acceptable to SCDF (FSSD). The position of rising mains shall be located in the following area (see clause 6.2.2(b)) by order of priority.

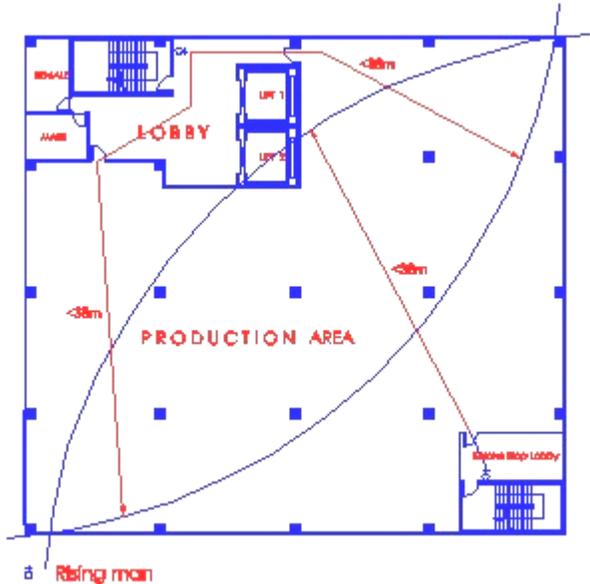


Diagram 6.2.2(d) - 3

The above diagram is an acceptable arrangement of positioning rising mains in the order of priority. Two stacks of rising main are required if the floor area exceeds 930m<sup>2</sup> and the distance exceeds 38m distance measured from the landing valve to the remote points.

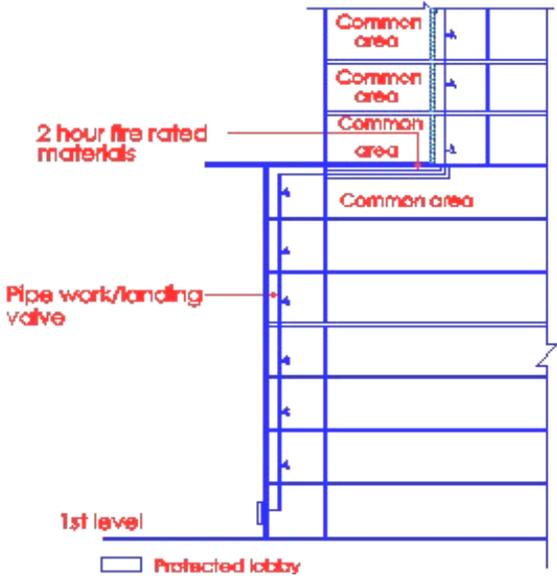


Diagram 6.2.2(d) - 4

Where the pipe work and landing valve are located outside protected lobby or area allowed by the Relevant Authority, they shall be protected by approved 2 hour fire rated enclosures.

Provision of landing valve to any rising main at 1<sup>st</sup> storey is not required if

any part of that storey is not more than 38m from the external wall of the building.

- (v) A Landing valve with an instantaneous female coupling for connecting to SCDF's 63.5mm diameter standard hose shall be provided for each rising main on every floor above the ground, including the first storey, every basement floor and on the roof for testing purposes. External walls refer to the external walls of the building that are facing or adjoining the boundaries. Where any part of the floor space in the building is less than 38m from the external wall, fire fighters could connect multiple hose lengths to the fire pumper for the supply of water. As it is time consuming and laborious to connect additional multiple hose lengths, landing valve shall be provided to the rising mains at 1<sup>st</sup> storey if any part of the floor space in the building exceeds 38m from the external wall of the building.

6.2.2 (e) Installation of rising main shall comply with SS CP 29

(No illustration)

6.2.3 Breeching inlets and Access Roads

- (a) All buildings fitted with rising mains shall have access ways for pumping appliances within 18 m of the breeching inlet. The breeching inlets shall be visible from the accessways.

Distance between breeching inlets and pumping appliances

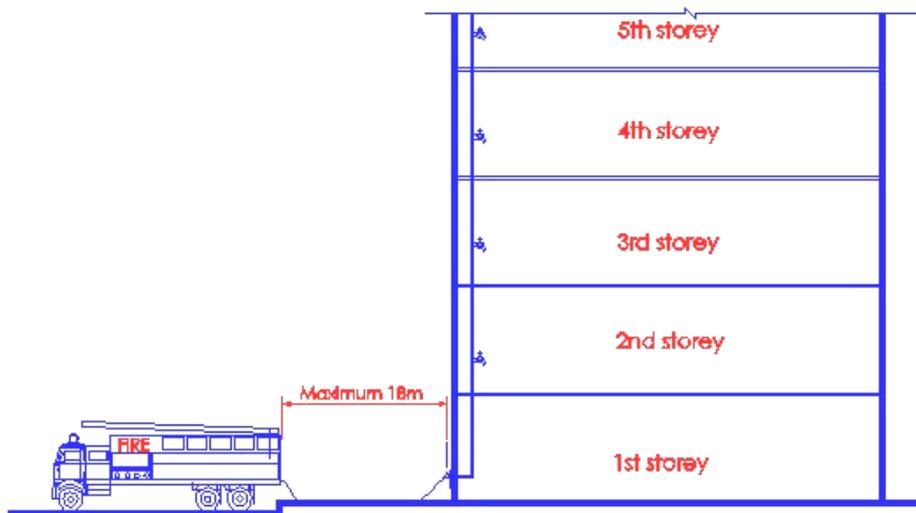


Diagram 6.2.3(a)

- (i) The breeching inlets would be located on the external wall of the building and to be within 18m of the fire engine accessway. The breeching inlets shall be visible from the adjacent accessway.
- (ii) Thus, an accessway may serve more than one rising main to one or more buildings, provided (iii) is complied with.

- (b) Requirements and provisions for breeching inlets for the rising main system shall be in accordance with the SS CP 29 Code of Practice for Fire Hydrant systems and Hose Reels. Connecting pipe between the inlets and the vertical run of the rising main, where applicable, shall be kept as short as possible. *(to the nearest external wall/facade of the building)*

(No illustration)

*The inlets and the vertical run of the rising main shall be kept as short as possible. The total pressure loss of the dry rising main shall not exceed 6 bar based on the design water flow rate. This is to correspond with the maximum habitable height of 60m.*

#### 6.2.4 Wet Rising Main

- (a) Wet rising main

(No illustration)

- (1) *The water supply to the rising mains should be kept entirely independent of water supplies feeding other installations including those for other fire fighting systems.*
- (2) *Means of supply for wet rising mains*
  - (i) *Each wet rising main shall be fed from a suction or storage tank having a minimum effective storage capacity capable of supplying water at the rate of 38 l/s for a period of at least 30 minutes.*
  - (ii) *The storage tank(s) shall be automatically supplied either directly or indirectly via other tanks from a PUB main(s). The pipe drawing water from PUB mains to the tank shall be at least 150mm in diameter.*
  - (iii) *Break tanks not serving as storage tanks shall have an effective holding capacity of not less than 11.5m<sup>3</sup> for each wet rising main.*
- (3) *Water tanks for wet rising mains*  
*Tanks supplying water for domestic purposes shall not be used as suction tanks for wet rising mains.*

- b) Flow

Flow requirements for wet rising main system shall comply with those stipulated in SS CP 29.

(No illustration)

- (1) *The minimum water supply flow rate shall be maintained in the wet rising system when 3 landing valves within the system are in the fully open position, should yield not less than an aggregate flow of 38 l/s for a non-residential building.*
- (2) *When more than one wet rising main is required in any zone in a building, the minimum common water supply shall be as stated below. Where the total maximum supply rate exceeds those stated in below, another common water supply system shall be used.*
  - (i) *For a non-residential or any mixed occupancy building 38 l/s for the first rising main and 19 l/s for each additional rising main, subject to a total maximum supply rate of 190 l/s.*

(c) Running pressure

Running pressure at each discharging landing valve on the wet rising main system shall be maintained between the minimum and maximum values as stipulated in SS CP 29.

(No illustration)

*A minimum running pressure of 3.5 bar and a maximum of 5.5 bar shall be maintained at each landing valve when any number, up to three, are fully opened.*

(d) Static pressure

Static pressure in any line of hose connected to a landing valve in a wet rising main system shall not exceed the specified value in SS CP 29.

(No illustration)

- (i) *To reduce the risk of hose bursting, arrangements shall be made in accordance with BS 5041: Pt 1 so that when the water is shut off at the nozzle the static pressure in any line of hose connected to a landing valve does not exceed 8 bar.*
- (ii) *To dispose of excess flows and pressures over and above those required (ie when only one jet is in use) a pressure control valve shall be incorporated in the body of the landing valve which is then permanently connected into the relief pipe. This relief pipe should run throughout the length of the wet rising main installation and should terminate either back into the suction tank or to drain.*

- (e) The location of storage tank and capacity of break tank where required shall comply with the requirements in SS CP 29.

(For illustration see diagrams 6.2.4(e)(1) and (2))

- (1) *The location and number of storage tank would be determined by the design of the wet rising main system and the height of the building. SS CP 29 should be fully complied with.*
- (2) *It is important that at early design stage of the building, the type of design of the wet rising main system should be drawn up to allow allocation of space for pumps and water tanks.*
- (3) *Usually, storage tanks and pumps are located in mechanical service floor in upper storey and basement, and on the roof of the building.*
- (4) *The capacity of break tank shall have an effective holding capacity of not less than 11.5m<sup>3</sup> for each wet rising main.*

Footnote:

- (1) *Storage tank is water tank having a minimum effective wet rising main storage capacity capable of supplying water at a given rate for a period of at least 30 minutes.*
- (2) *Break tank is either (a) a tank into which the incoming supply connection from the PUB water mains discharge, or (b) an intermediate tank for limiting the system pressure.*
- (3) *Suction tank is a tank from which a pump can draw water.*

Wet Rising Mains system for building heights exceeding 60m

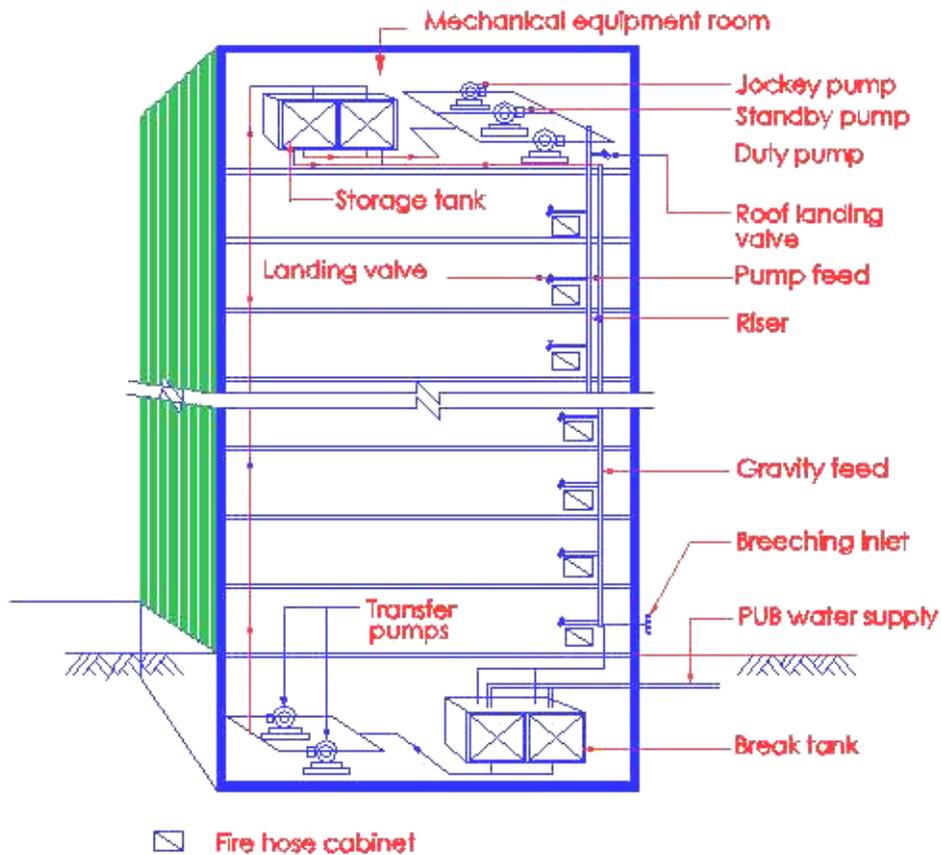


Diagram 6.2.4(e) - 1

Wet rising mains system

- (1) "Wet rising mains" function similarly to dry rising mains. However, the pipes are permanently charged with water from a pressurised supply, and fitted with landing valves on various floors.
  - (2) The breaching inlets act as an alternative source of supply should the incoming PUB water supply pipes be damaged or the water supply is inadequate.
- (f) Where pumps are required for the wet rising main system, requirements specified in SS CP 29 shall be incorporated. Arrangements for the power supplies, both normal and emergency, shall be in accordance with the CP.

Pump room in basement

- (1) Pumps, which are part of the wet rising main system, must be properly protected from the effect of heat and fire. As pumps are the vital nerves of the system, they should be installed in a room having the necessary fire rated enclosures and door (min 2-hr fire resistance rating).

Example of pump room in basement:

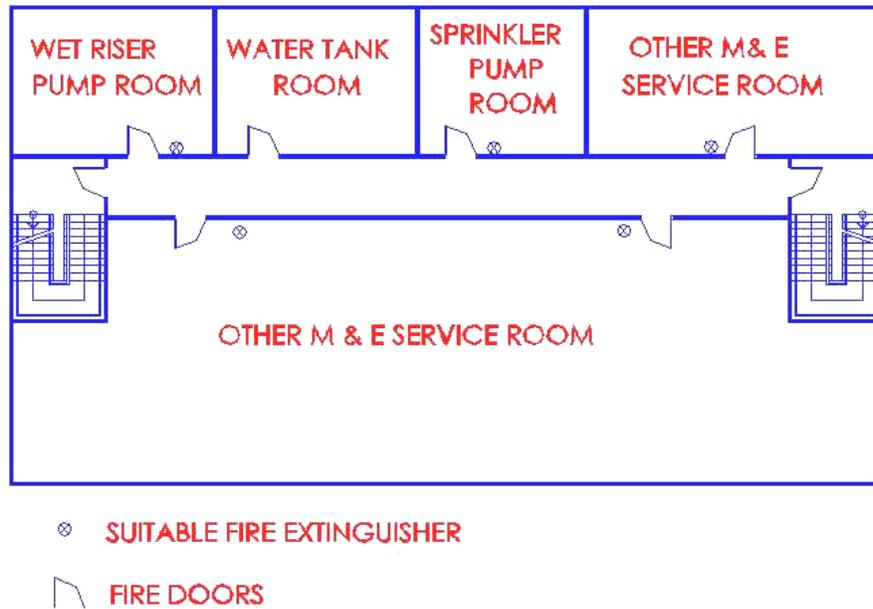


Diagram 6.2.4(f)

- (2) *Pumps shall be selected to meet the design requirements of the rising main system and be listed by recognised institution such as Underwriters' Laboratories (UL) or Productivity & Standards Board (PSB). The pump here include transfer pump.*
- (3) *There should be a voice communication system to provide intercommunication among all pump rooms.*
- (4) *Mechanical ventilation and electrical lighting in the pump room shall be equipped with emergency power supply.*

### 6.2.5 Standby Fire Hose For Rising Main

Standby fire hose shall be required for every rising main, except those in buildings under purpose group II. The following requirements shall be complied with:

- (a) Type and Folding Method
  - (i) The standby fire hose shall be of 63.5mm nominal internal diameter in order to ensure that the hose coupling will fit existing coupling tail pieces. The hose shall be rugged and capable of carrying water under substantive pressure in accordance with BS 6391. The fire hose shall be of Type 3 as stipulated in the BS 6391.
  - (ii) The fire hose couplings shall be manufactured to BS specification or equivalent and of light alloy or gunmetal. The coupling shall be of type 63.5mm male and be of the

female instantaneous type with standard (double-pull) release mechanism. The couplings shall be tied in by binding with galvanised mild steel wire and applied over a hose guard of synthetic fibre. It shall be able to withstand a minimum working pressure of 15 bars.

(iii) Each hose shall have a standard length of 30m and shall be kept stowed in a Dutch Rolled position and housed in a glass fronted cabinet. The Dutch Roll shall be rolled in the manner shown in Diagram 6.2.5(a).

(b) Position

(i) The fire hose shall be installed just next to, but not more than 2 meters from the landing valve as shown in Diagram 6.2.5(b).

(ii) The entire fire hose and cabinet shall be out of direct sunlight.

c) Mounting

The wall mounted fire hose cabinet requirement shall be as follows:

(i) The cabinet shall be firmly mounted on the wall and rigid to take either one or two fire hose weight.

(ii) The cabinet shall be constructed of non-combustible material and maintenance free.

(iii) The cabinet lock, if provided, shall be of the type that could be operated manually from the inside without the use of a key when the front plain glass/plastic (minimum 300mm x 300mm) is broken by the fire fighter.

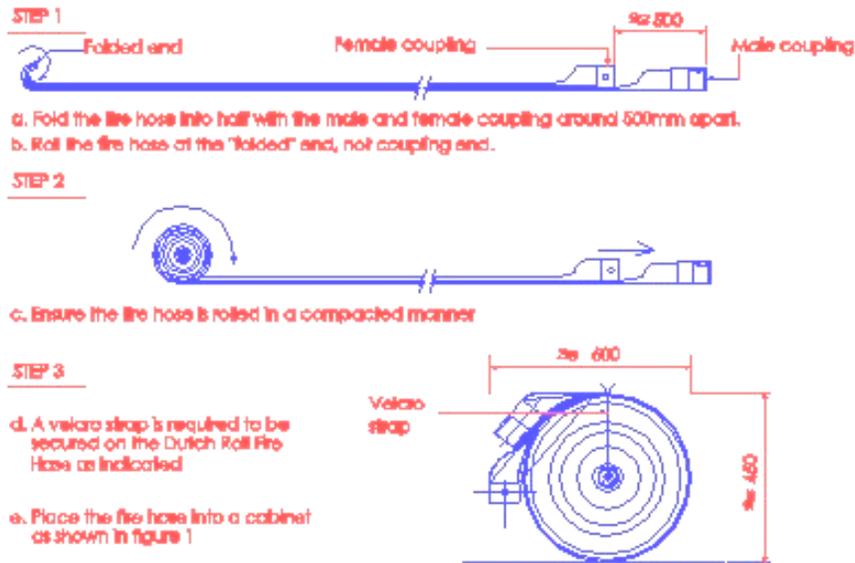
(iv) The cabinet swing door shall be made openable such that it will not obstruct the retrieving of the fire hose by the fire fighter.

(v) The depth of the cabinet shall not exceed 250mm for one fire hose or 350mm for two fire hoses.

(vi) The cabinet shall be painted in a contrasting colour such that it is conspicuous and easily identified.

- (vii) The wording, "FIRE HOSE", with letter height of at least 50mm and shown in contrasting colour, shall be painted directly on the front panel as shown in Diagram 6.2.5(b).
  - (viii) In lieu of the cabinet, a simple wall mounted cradle for the fire hose can be provided, but only in the riser main shaft. The cradle shall be constructed and positioned to facilitate the retrieving of fire hose by the fire fighter.
  - (ix) The cradle (in lieu of the cabinet) shall be maintenance free. The fire hose installation height shall be limited as indicated in Diagram 6.2.5(b).
- d) General
- (i) Only clean, dry and compact rolled (Dutch Roll with the Velcro strap secured as shown in the Diagram 6.2.5(a) and (b)) hose shall be placed in the cabinet.
  - (ii) Two length of spare fire hoses shall be kept in stock and ready for replacement.
  - (iii) BS 6391 stipulates the technical requirements for quality acceptance standards of the fire hose. In addition, the abovementioned requirements shall be applicable for acceptance of the standby fire hose.

*Standby hose provides the fire fighter greater hose length connection in situation where the floor space is extensive. The hose from other floors could be transferred to fire floor quickly when required by fire fighters. Standby hose shall be kept locked in a cabinet, when placed along escape corridor, in common area and circulation space. The hose is allowed to be left mounted on hook or cradle inside the riser main shaft.*



**Figure 2 Dutch Roll Folding Method**

Diagram 6.2.5(a)

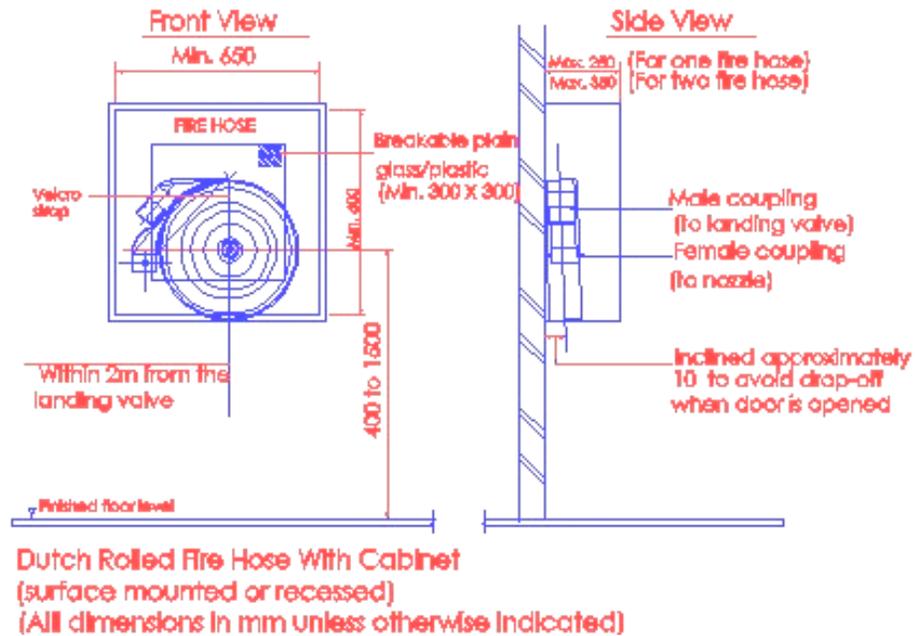


Diagram 6.2.5(b)

## 6.2.6 Building under construction

When a building in pursuance of Cl.6.2.1, is required to be equipped with rising mains, such rising mains shall be installed progressively as the building attains height during the course of construction. All outlets, landing valves and inlets, water tanks and pumps, and hydrants as may be required for the system, shall be properly installed as directed by the Relevant Authority so as to be readily operational in case of fire.

Building under construction

Provision of wet rising main is required when building exceeds a habitable height of 60m.

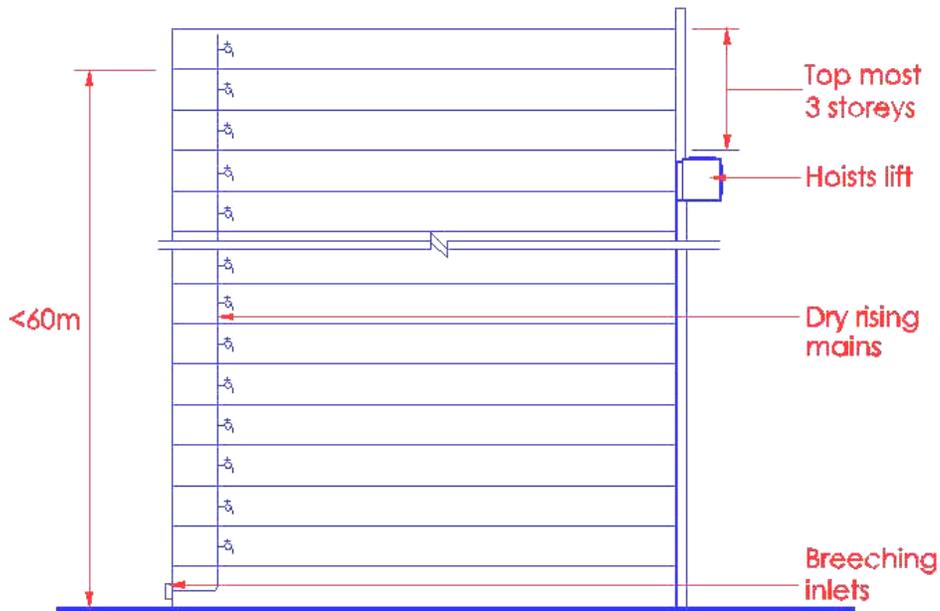


Diagram 6.2.6 - 1

Rising main is dry type before the habitable height of 60m is reached

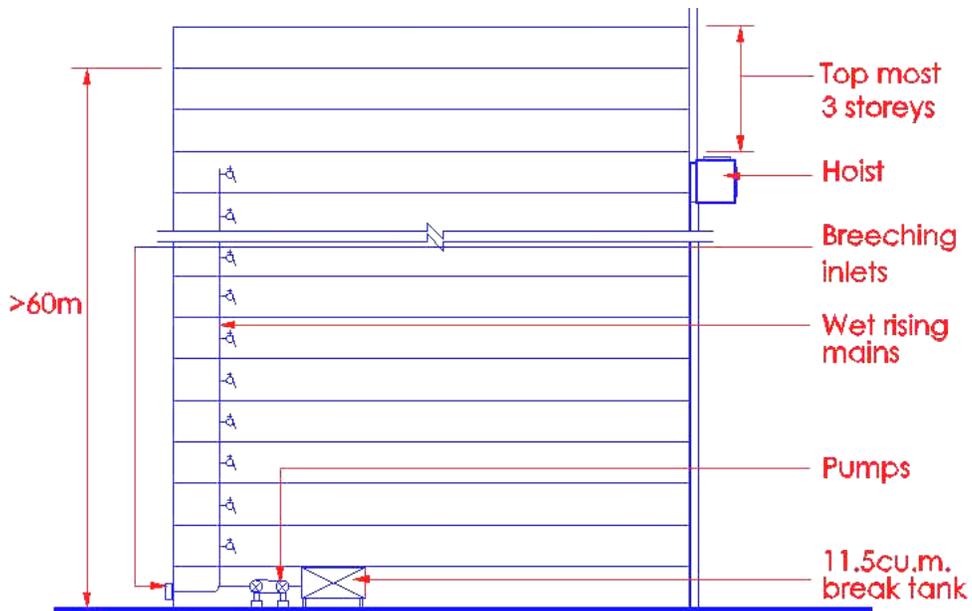


Diagram 6.2.6 - 2

Rising main is converted to wet type with the installation of pump and water tank

(a) *Breeching inlets*

*Breeching inlets (2-way or 4-way) should be provided as per approved building plan.*

(b) *Fire lift*

*As it is not feasible to provide fire lift for use by fire fighters, a passenger hoist, which is usually installed at site could be used. The hoist need not serve the topmost 3 floors, until the roof is being completed.*

(c) *Electrical power supply*

*Supply from power grid or generator set could be acceptable.*

(d) *Fire engine accessway*

*During construction stage, there could be other works involving laying of services, excavation work etc that would prevent provision of accessway and the space available would not permit the maneuverability of fire engine.*

*However, every opportunity should be taken to put in the accessway in place. This is necessary for the purpose of conducting effective fire fighting operations should a fire occur at any time. In view of the above, additional portable fire extinguishers should be provided at each floor level instead.*

(e) *Rising main landing valve*

*Rising main and landing valve shall be provided to every floor, except the topmost 3 floors as the building gains height, and made operational.*

(f) *Rising main pressure & flow*

*As it is not feasible to provide a full-sized water tank and pump to meet the flow and pressure required for 45 mins of fire fighting, a break tank of minimum 11.5m<sup>3</sup> should be provided, instead for fire fighting of 5 mins duration. Upon the arrival of fire engine the tank could be replenished via the public hydrant. The break tank must be constructed before the building reaches the 60m height.*

(g) *Responsibility/Accountability*

*The main contractor for the project shall be responsible and accountable for the provision and maintenance of the rising main in the building under construction.*

(h) *Checklist*

*Inspection and testing checklists of rising mains are attached for ease of reference.*

INSPECTION CHECKLIST FOR RISING MAINS IN BUILDINGS UNDER CONSTRUCTION

S/N	Description	Yes	If no, remedy action/comments
<i>Part A</i>			
1	All rising mains (dry & wet) shall be made operational for all floors except the uppermost 3 floors as soon as any completed floor of the building reaches 24m in height.		
2	Wet rising mains shall be installed progressively when the building attains a height of 60m during the course of construction. All outlets, landing valves and inlets as well as water tanks and pumps shall be provided and made readily operational.		
3	Provision of *2-way/4-way breeching inlet as per approved plan.		
4	Lift/passenger hoist ready for firemen's use.		
5	Generator set or adequate PUB power supply for fire-fighting purposes.		
6	Provision of adequate fire engine accessway (where practicable) for fire-fighting purposes.		
7	Adequate portable fire extinguishers to be provided on each floor.		

Date inspected: \_\_\_\_\_ by \_\_\_\_\_ Signature \_\_\_\_\_

\*Delete as appropriate

S/N	Description	Yes	If no, remedy action/comments	
<i>Part B: Checklist for the testing of rising mains</i>				
<i>Breeching inlet</i>		<i>In order</i>	<i>Not in order</i>	<i>Remarks</i>
1	Inlet housed in protective enclosure			
2	Rigidly supported			
3	Labelled "dry/wet riser inlet" and numbered accordingly			
4	Clear of obstruction			
<i>Riser</i>				
5	Air relief valve provided			
6	Labelled & numbered accordingly			
7	Earthing provided			
<i>Landing valve</i>				
8	Blank cap provided			
9	Strapped & padlocked in closed position			
10	Clear of obstruction			
<i>Testing of pressure/flow</i>				
11	<u>Dry rising mains</u> a Pressure constant at 300 psi (20.7 bar) for 30 mins b Regularly tested			
12	<u>Wet rising mains</u> a Static pressure shall be less than 8 bar b Topmost landing valve fully opened (under pump/gravity feed) with flow rate at 27 L/S c Provide break tank with minimum water capacity of 11.5m <sup>3</sup>			

Date inspected: \_\_\_\_\_ by \_\_\_\_\_ Signature \_\_\_\_\_

\*Delete as appropriate

## 6.2.7

### Foam inlets

Where boiler room/s or storage room/s containing highly combustible materials are located in basement or not easily accessible for fire fighting, foam inlets and pipeworks shall be provided for the purpose of delivering foam solution to an area close to the room/s concerned. A 2-way breeching inlet shall be provided at ground level with pipe run of minimum 100mm bore terminating in landing valve just outside the high fire risk room/s. The provision of the breeching inlet shall comply with the relevant clauses of SS CP 29 Code of Practice for Fire Hydrant Systems and Hose Reels.

In situations where such rooms have access openings along accessway, provision of foam solution inlets and outlets may be waived.

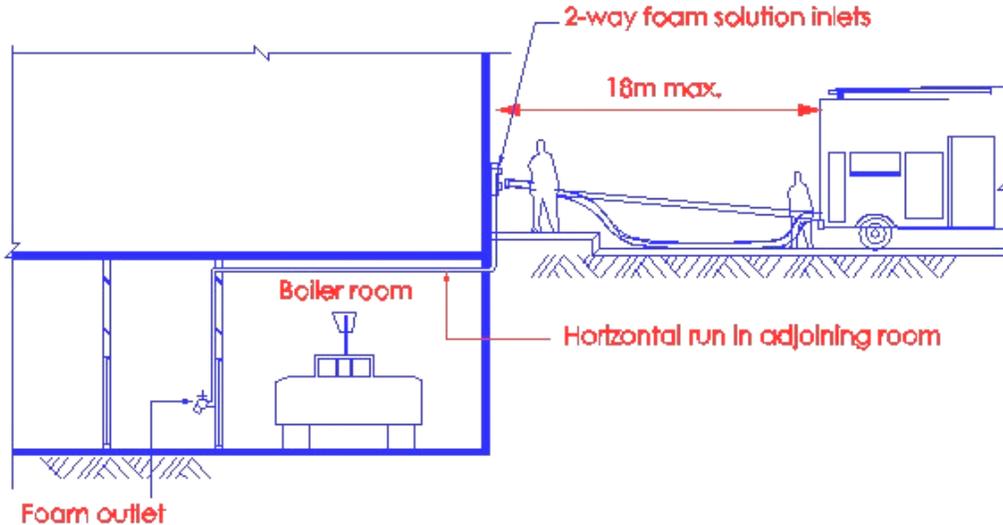


Diagram 6.2.6

The above diagram shows the foam supply pipe being run through an adjoining room. Other alternatives of routing the pipe works through room space are acceptable. The pipes are required to be encased in masonry or enclosed with fire rated materials having the necessary fire resistance rating if it is located inside the boiler room.

Foam inlets pipe works are provided for the purpose of delivering foam solution to the lobby or circulation area close to the room/s contain highly combustible materials. This arrangement is similar to a rising main system, except that it is meant to deliver foam solution instead of water. Under this arrangement, ready mixed foam solution would be pumped into the 2-way breeching inlets at ground level. Fire fighter would carry the necessary hoses with foam making branch to tap the foam solution from the landing valve and to jet in the foam at the seat of the fire in the room.

- (a) At least one hydraulic hosereel conforming to the requirements in SS CP 29 Code of Practice for Fire Hydrant Systems and Hose Reels shall be provided in every storey of every building except the following:

- (iii) Any other small building which at the discretion of the Relevant Authority does not require a hose reel.

(No illustration)

*Small buildings, refer to detach building and it must be standalone, such as guardhouse, pump house, bin centre, electrical substation etc would not be required to provide hydraulic hosereel. However, suitable type of fire extinguisher should be provided instead.*

- (b) Size and type

The hose reel should be of 20mm or 25mm nominal diameter, non-kinking reinforced rubber or reinforced PVC to either BS3169 Type A or AS1221, not exceeding 30 m in length and terminating in "shut-off" branches with 4 mm or 6 mm nozzles.

*(No illustration) Extracts from CP 29*

- (1) *The reel or drum should be of adequate size to wind up the 30m length hose.*
- (2) *The length of the hose should not exceed 30m. The main reasons are:*
- (a) *an occupant using the hose reel to fight an incipient fire need not traverse more than 30m. Consideration must be given that the occupant needs to retrace his path to a safe exit if the incipient fire could not be put out. Thus, the aggregate travel distance of to and from the incipient fire should not be excessive;*
- (b) *longer than 30m hose would require a bigger reel which would create some difficulties in running out the hose and that jamming of tubing could occur when in use.*
- (3) *An operating instruction notice plate should be provided next to the stop valve. The hose reel operating instructions shall be:*
- "Turn on the inlet valve before running out the hose"*
- (4) *All hose reels should be tested at least once a year to check that they are in working order and produce a satisfactory jet of water.*

- (5) Hose reels located in recesses or cabinets shall bear the appropriate sign in accordance with BS 5499 Pt 1 but with a letter height of at least 50mm.

(c) Water supply

Water supply for hose reels in terms of flow rate and minimum running pressure shall comply with the requirements in SS CP 29.

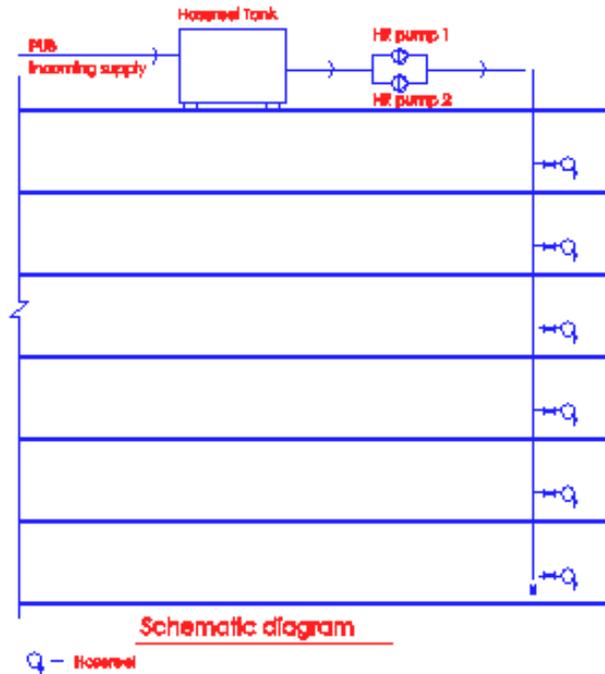


Diagram 6.2.8(c)

Extracts from CP 29

(1) Minimum requirements

- (a) As a minimum, the water supply to hose reels shall be such that when the two topmost hose reels with the least hydraulic head in a building are operating simultaneously, each will provide a jet of at least 6m in length at a flow rate of at least 0.4 l/s. For example, when a length of 30m hose reel tubing (Type A of BS 3169) is in use with a 6.5mm nozzle, a minimum running pressure of 1.5 bar will be required at the entry to each reel and similarly for a 4.5mm nozzle where a minimum running pressure of 4 bar will be required.
- (b) Pipework shall not be less than 50mm nominal bore and feeds to individual hose reels shall be at least 25mm nominal bore.

(2) *Hosereel pumps*

- (a) *Where the water pressure in hosereel main needs to be boosted, the provision of an electrically driven pump is usually a convenient method. A duplicate standby pump shall also be provided.*
- (b) *Both motors and pumps shall be sited in positions where they are protected against tampering and physical and fire damage and the electrical supply to them shall be by an exclusive circuit with the cables following a route of negligible fire risk or be provided with adequate protection.*
- (c) *The booster pumps system shall come into operation automatically with a drop in pressure or a flow of water. Both pumps shall be automatically primed at all times.*
- (d) *All pumps shall also be capable of being started or stopped manually. The standby pump shall be so arranged that it will operate automatically on failure of the duty pump. Where more than one source of electrical supply is available, the duty and standby pump shall be connected to the different sources.*
- (e) *Connection for boosted supplies. Pumps shall be fed from a suction tank or inter-connected tanks having a minimum capacity of 1100 l. The tanks shall be automatically supplied from a town main or a reliable source, controlled by a ball valve of minimum diameter 50mm.*
- (f) *Use of domestic water tanks. Tanks supplying water for domestic purposes shall not be used as suction for hosereel installations unless arrangements have been made for domestic supplies to be drawn off in such a manner that the requisite reserve of water for the hosereel installation is always preserved.*

(d) Siting and installation

Not acceptable

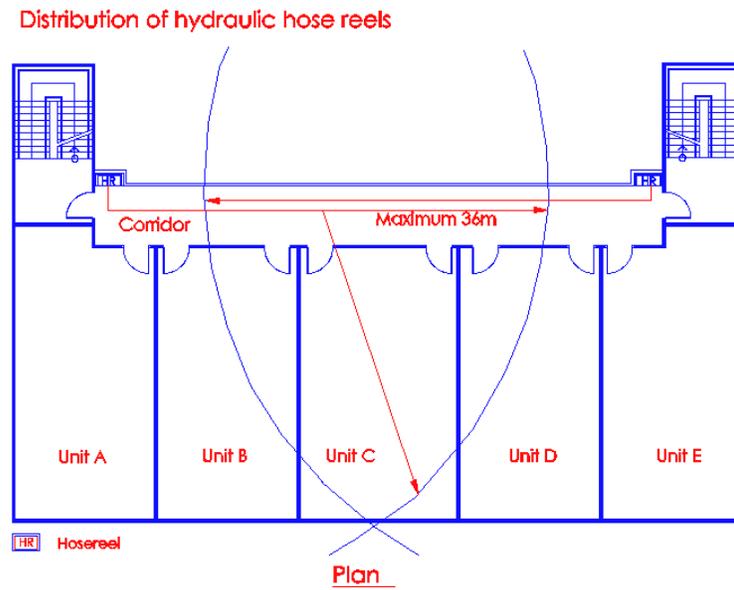


Diagram 6.2.8(d) - 1

Acceptable

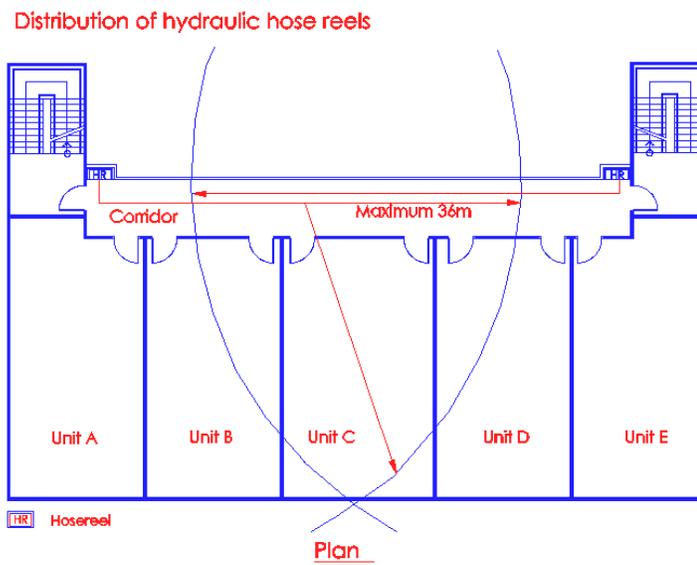


Diagram 6.2.8(d) - 2

Extracts from CP 29

## Distribution of hydraulic hosereel

### (1) *Siting*

- (a) *Hosereels shall be sited in prominent and accessible positions adjacent to exits, preferably just outside protected corridors, lobbies or staircases on exit routes, but not inside staircases.*
- (b) *In planning the location of hosereels, consideration should be given to the following points:*
  - (i) *Access to hosereels should not be obstructed by the parking, loading and unloading of vehicles or by the location of furniture, equipment or other material.*
  - (ii) *Protection of hosereels from mechanical damage by vehicular impact, fork lifts and unauthorised use.*
  - (iii) *The location of internal walls, partitions, doorways, storage racking, stored heights of goods and other obstructions, which could restrict normal hose coverage through the building.*

### (2) *Installation of hose reels*

*References shall be made to CP 29 for details on installation of the hosereel.*

- (e) *The use of copper or stainless steel pipings are permissible for the connection of the hose reel to the PUB mains.*

*(No illustration)*

*The above sub-clause now allows the flexibility of using alternative material for the water supply pipe of the hosereel system.*

## 6.3 ELECTRICAL FIRE ALARM SYSTEM

### 6.3.1 General

- (a) Every building or part of a building, except that of purpose group I or II (residential floors), having a total floor area of more than that specified in Column B of Table 6.3A having regard to the purpose group of the building or part of the building, shall be installed with a fire alarm system, either of the automatic or manual type as indicated in Column C, which shall be an electrically supervised system complying with the requirements of the SS CP 10 Code of Practice for The Installation and Servicing of Electrical Fire Alarm Systems and shall be connected to a fire station through an approved alarm monitoring station if required under Cl 6.3.7.

#### Warehouse

*Single storey warehouse not exceeding 2000sq.m is not required to be provided with fire alarm system unless otherwise specified by the Relevant Authority. The main reason is that the building is small, hence escape to the exterior via exit doors would be straight- forward.*

*Warehouse building of 2 to 4 storeys and having a total floor area (per storey) of greater than 1000sq.m is required to provide manual type of fire alarm system. This manual fire alarm system (break glass type) is not required to be connected to an approved alarm monitoring station.*

*Warehouse building which is more than 4 storeys is required to be provided with automatic fire alarm system such as smoke or heat detection types, irrespective of the floor area per storey.*

#### Factory

*Single storey factory building not exceeding 400sq.m is not required to be provided with fire alarm system unless otherwise specified by the Relevant Authority. The main reason is that the building is small, hence escape to the exterior via exit doors would be straight- forward.*

*Factory building of 2 to 4 storeys and having a total floor area (per storey) of greater than 200sq.m is required to be provided with manual type of fire alarm system. This manual fire alarm system (break glass type) is not required to be connected to an approved alarm monitoring station.*

*Factory building which is more than 4 storeys is required to be provided with automatic fire alarm system such as smoke or heat detection system, irrespective of the floor area per storey.*

Example of factory/warehouse usage

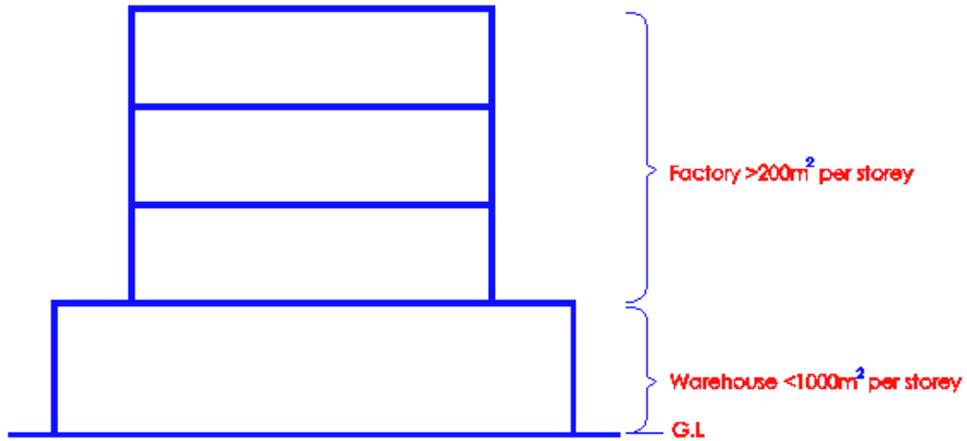


Diagram 6.3.1(a) - 1

Even though the warehouse floor has less than 1000sq.m, the whole building is required to be provided with manual fire alarm system as the factory floor (per storey) exceeds 200sq.m.

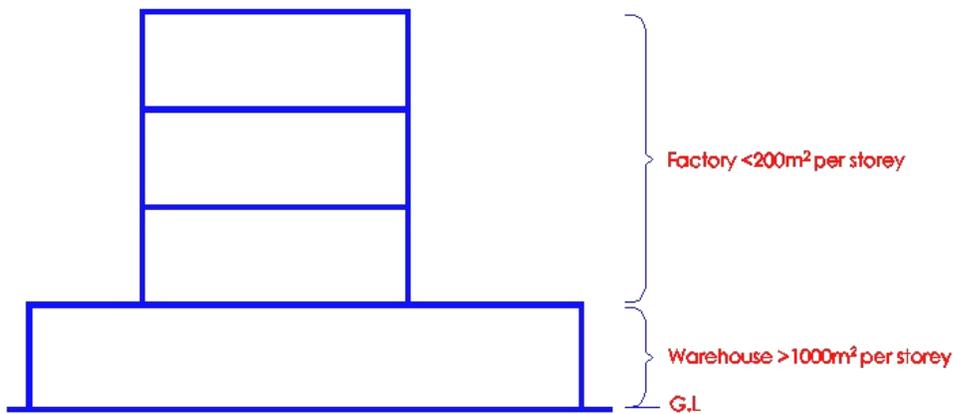


Diagram 6.3.1(a) - 2

Although the floor area of each factory floor is less than 200sq.m, the building is required to be provided with manual fire alarm system as the warehouse located at 1<sup>st</sup> storey exceeds 1000sq.m.

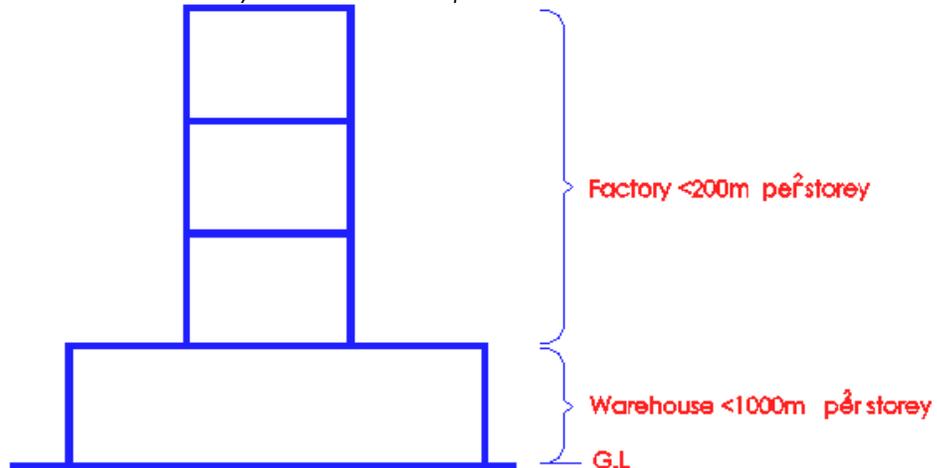


Diagram 6.3.1(a) - 3

As the factory floor area per storey is less than 200sq.m and the warehouse floor area is less than 1000sq.m there is no need to provide fire alarm system unless requested by the Relevant Authority. It should be noted that if in the event that warehouse floor is granted change of use to factory, a manual fire alarm system will be required to be provided to the whole building. The main reasons for the different in floor area between factory and warehouse are:

- a) occupants load of factory is higher than warehouse;
- b) occupants would be working for long hours in factory as compared to warehouse where workers would only be involved when there is movement of goods in/out of the building.

Owners of factory or warehouse installed with manual fire system could opt for connection to the approved alarm monitoring station. Approved alarm monitoring stations are private monitoring companies. Owing to excessive false alarm signals being received by fire stations in the past, such monitoring was introduced to screen and verify the activation of automatic fire alarm signals.

- (c) Notwithstanding (a) above, if the total floor area per storey of a 2 to 4 storey building of any of the Purpose Group III to VIII exceeds the sizes as stipulated in Column (2) of Table 3.2A, the building shall be provided with an automatic fire alarm system.

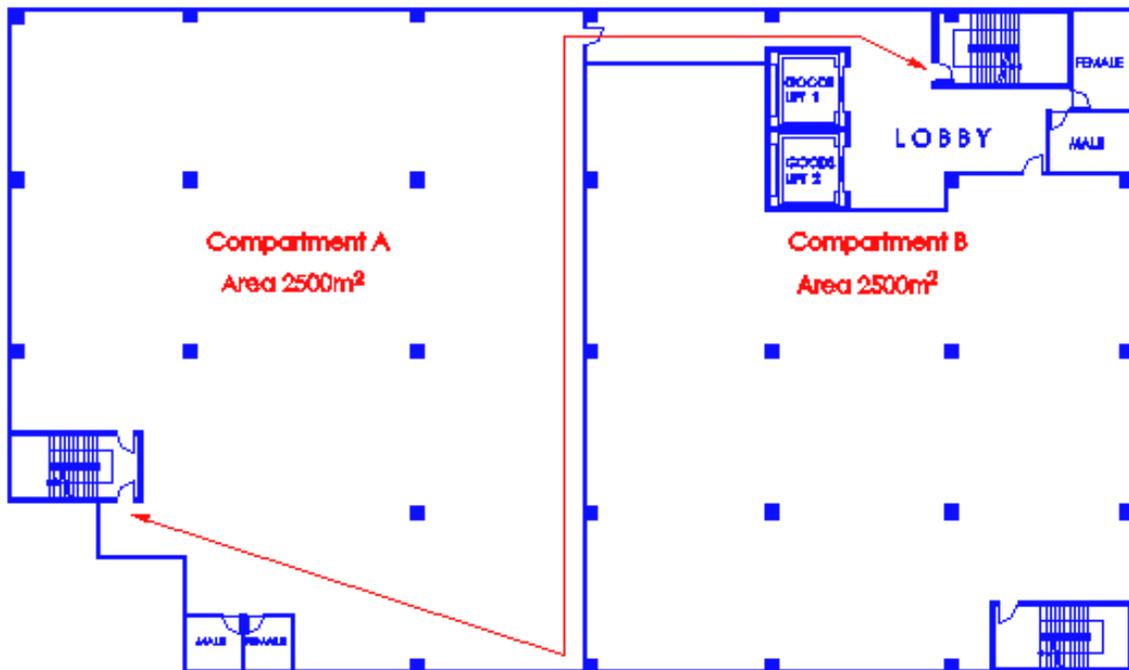


Diagram 6.3.1(c)

The above diagram shows a factory/warehouse having a floor area exceeding 5000m², accordingly it requires sprinkler protection for such excessive floor area. By compartmentalising the floor area with each compartment not exceeding 4000m², sprinkler installation will be waived. In its place, automatic fire alarm system is required to be provided. Therefore, notwithstanding the provision of compartmentation, if the total floor area per storey of a 2 to 4 storey building of factory or warehouse exceeds 4000m², the building shall be

*provided with automatic fire alarm system. This requirement will not apply to a single storey building. The automatic fire alarm system serves to provide early detection to the occupants. Hence, it allows more time for occupants to evacuate.*

### 6.3.2 Fire Indicator Board

- (a) An electrical fire alarm system of the automatic or manual type shall be provided with a fire indicator board to indicate the location of the alarm which has been actuated or operated. Such indication of location shall be accurate to the maximum allowed alarm group area limitations specified in SS CP 10.

(No illustration)

- (1) *Fire fighters responding to a fire call would first, on arrival at the scene, need to check the fire indicator board to confirm the location of the alarm, which has been actuated or operated before proceeding to the fire site.*
- (2) *The FIB monitors the actuation of detectors, call-points and sprinkler flow switch.*
- (3) *A permanent fire zone chart or minic panel shall be displayed at the Fire Indication Board (FIB) location to provide information on originality of the alarm. The fire zone chart or minic panel shall be installed in accordance with the floor or building orientation. All the alarm zones and FIB zones if provided should be clearly depicted on the fire zone chart/minic panel. Additional information such as, fire engine accessway/hardstanding spaces, location of breaching inlets, fire hydrant, sprinkler control valve, hosereel and fire extinguisher should be provided on the fire zone chart/minic panel where applicable. This would help the fire fighters to identify the location of hardstanding spaces, breaching inlets etc, when they arrived at the fire site.*
- (4) *Where addressible fire alarm system is used, fire alarm indicators shall be provided additional to the programmable message on display.*
- (b) The associated control and supervisory equipment, indicating equipment, wiring and arrangement of power supplies for the fire indicator board shall comply with the requirements in SS CP 10.
- (c) All automatic systems, which are activated via the general building alarm, shall be connected directly to the fire indicator board.
- (d) The fire indicator board should be located near the main entrance of the building, in the fire command centre, in the guardhouse or in the fire fighting lobby, if provided, or as may be required by the Relevant Authority.

- (e) Sub-fire indicator board, where provided, shall comply with the requirements in SS CP 10.

(No illustration)

*Where fire command centre is not provided, the FIB is usually near the main entrance of the building or in the guardhouse.*

### 6.3.3 Manual Alarm Call Points

- (a) In a manual alarm system, except as otherwise exempted in Cl. 6.3.1, the manual call points shall be provided on every storey of the building or part of the building and shall be so located that no person need travel more than 30m from any position within the building to activate the alarm.
- (b) Manual call points should be located on exit routes preferably next to hosereels and in particular on the floor landings of exit staircases and at exits to the street. In the case where an automatic fire alarm system is provided, grouping for indication of location of the manual call points shall comply with the requirements in SS CP 10.
- (c) Manual call points should be fixed at a height of 1.4 m above the floor and shall be located at easily accessible and conspicuous positions free from obstructions. The installation of the sounding device shall be in accordance with SS CP 10.
  - (1) *Manual call points should be located:*
    - (a) *Along exit routes leading to exit staircase;*
    - (b) *Adjacent to hosereels;*
    - (c) *At floor landing of open staircases; and*
    - (d) *At exits to the street.*
  - (2) *Manual call points shall be so located such that no occupant needs to run more than 30m , measured at any position of the floor to the nearest manual call point.*

Locating manual call point in Factory/warehouse

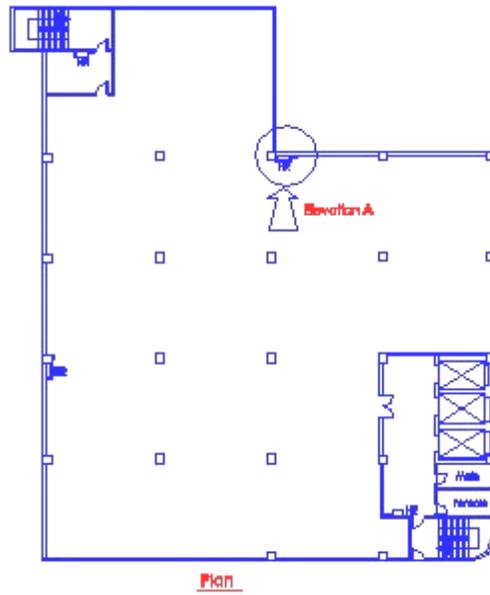


Diagram 6.3.1(c)

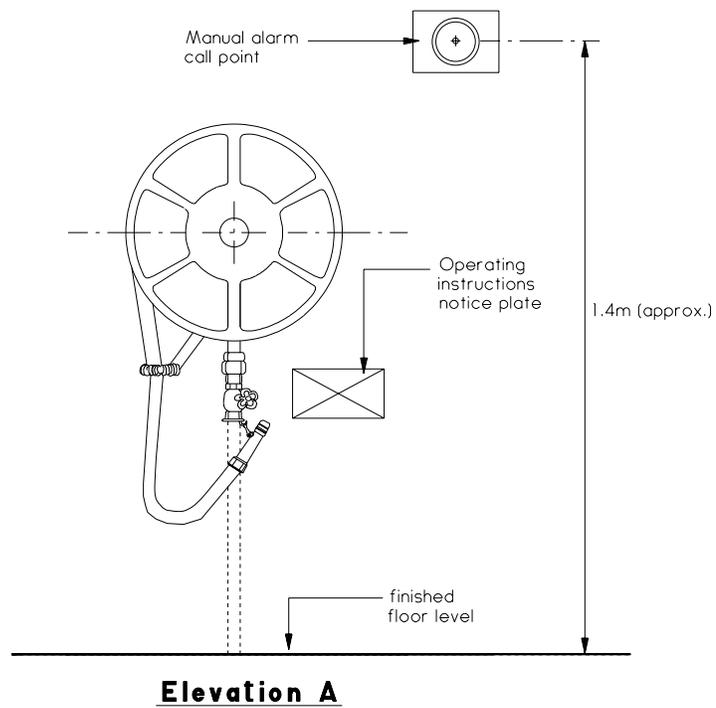


Diagram 6.3.3 - 2

- 6.3.3 (d) Manual break-glass alarm call points may be omitted in car parks, irrespective whether the parking facility is stand-alone type or forms part of a building.

(No illustration)

See also Cl. 6.3.7(d)(ii)

#### 6.3.4 Automatic Fire Alarm

Where an automatic fire alarm system is required by this Code, the type, location, spacing and installation of the detectors shall comply with the requirements in SS CP 10.

(No illustration)

*Appendix A of SS CP 10 gives general guidance for selection of detectors. When selecting the type of detectors, the likely fire behaviour of the contents of each part of the building, the processes taking place and the design of the building should be considered. The effective coverage of each type of detectors differs from each other. The location of placing the detectors and the spacing between detectors shall apply with the requirements in SS CP 10. Detectors shall be zoned into alarm group and be properly wired to achieve electrical supervision of the alarm circuit.*

#### 6.3.5 Alarm Device

- (a) The alarm device, which should normally issue an audible signal unless specifically allowed or required otherwise by the Relevant Authority, shall be actuated if the electrical fire alarm system is activated or operated. The type, number and location of the alarm device shall comply with the requirements in SS CP 10.
- (b) The fire alarm sounder shall have a sound that is readily distinguishable from any other alarm system.
- (c) All sounders in the building should be actuated simultaneously in the event of an activation. However, in cases permitted or required by the Relevant Authority where the operation of alarm sounders are grouped or activated in stages, the arrangement shall comply with the requirements in SS CP 10.

(No illustration)

*It is important that the sounding from the electrical fire alarm system, for example, installed in the factory or warehouse floors, should be audible and readily distinguishable to all occupants. The number of fire alarm sounders used should be sufficient to produce a minimum sound level of either 65 db, or 5 db*

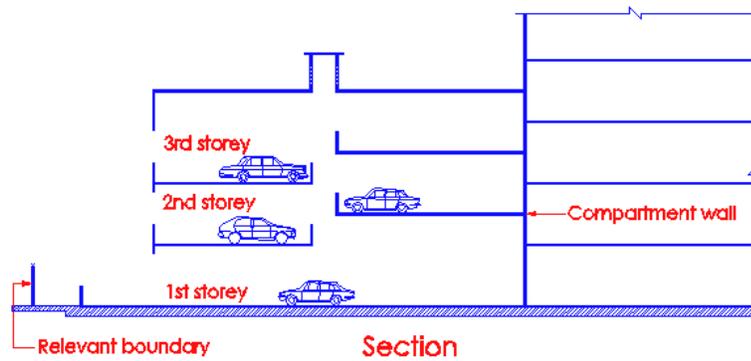
above any other noise likely to persist for a period longer than 30 seconds, whichever is greater, in all parts of the buildings which are normally occupied. .

In areas where a normal type of sounder may be ineffective, eg. Where the background noise is excessive, where the occupants are deaf or where hearing protection is likely to be worn, visual signals shall be provided. In general, visual signals shall not be used in place of audible alarms. The intensity of the light shall be sufficient to draw the attention of people in the vicinity.

### 6.3.7 Connection to fire station

The electrical fire alarm system required to be installed in a building or premises under this clause shall be connected to a fire station through an approved alarm monitoring station when the building or premises is-

- (b) An oil refinery, oil depot, general warehouse, chemical plant or other high hazard factory or premises.
- (d) (i) A building required under the provisions of this code to be protected by an automatic fire alarm or fire extinguishing system.
- (d) (ii) Notwithstanding the provision in cl.6.3.3(d) if a carpark in a building is provided with both manual and automatic fire alarm system, then the manual fire alarm need not be connected to the fire station through an approved alarm monitoring company



Car parking forming part of the factory or warehouse building.

Diagram 6.3.7(d)

General warehouse refers to general storage other than explosive or flammable storage. In the above building, which is only provided with manual fire alarm system, the system is to be connected through an approved alarm monitoring company. Where a building is not the abovementioned premises, the owner can opt to connect the alarm system to the approved alarm monitoring station.

*Relaxation is only granted to carpark building where both manual and automatic fire alarm system are provided, the manual fire alarm need not be connected to the fire station through an approved alarm monitoring company.*

*Under Cl. 6.3.3(d) manual call point is not required to be provided in carpark, irrespective whether it is a stand alone or forms part of a building.*

*The main reasons for the above relaxation are that carparks are only used when people need to park or retrieve their cars. The occupant load in carparks would be very low and normally transient in nature. If there is a fire in a carpark, there might not be any occupant around to activate the fire alarm call point. In addition, in many carparks, fire alarm call points were frequently activated by mischievous people during the night.*

### 6.3.8 Sprinkler protected building

Where sprinkler system is required by this Code, provision of automatic thermal/smoke detectors in sprinkler protected premises will be exempted except where such detectors are required to activate or operate the sprinkler or other systems.

(No illustration)

*Where sprinkler system is provided in any building, there is no necessity to provide automatic detectors such as heat or smoke detectors, except in certain situations, for example, electrical rooms, AHU room, lift motor room, battery room, MDF room, PABX room, where sprinklers are replaced by detectors. Smoke detectors are also required to be installed in sprinkler protected buildings to operate the smoke control system in atria, smoke purging system or control system in basement occupancies.*

## **6.4 SPRINKLER INSTALLATION**

6.4.1 The following shall be provided with an automatic sprinkler system:

- (a) Whenever compartmentation requirements under Chapter 3 of this Code cannot be complied with.
- (b) Every storey of a building, except that of group I or II, the habitable height of which is more than 24m above average ground level irrespective of whether or not the compartmentation requirements are complied with.

The provision of automatic sprinkler system is required in factory or warehouse under the following conditions:

- (1) Compartmentation requirements under Chapter 3 of the Fire Code cannot be complied with, a building not exceeding 24m in habitable height having more than 3 –levels or excessive cubical extent or floor area.
- (2) Engineered smoke control system is required to be installed.
- (3) High bay storage warehouse

Clause 3.2.4(a) of the fire code permits max. 3 storeys to form a single compartment up to a habitable height of 24m. In designing more than 3 floors per compartment, it would be breaching the compartmentation requirement. To overcome the problem, automatic sprinkler system should be provided to the whole building. However, building owners are at liberty to provide the sprinkler system to their buildings as an added fire safety. The system could be used as a trade-off for extended travel distances.

Situation where sprinkler system is not required in Purpose Group VI & VIII

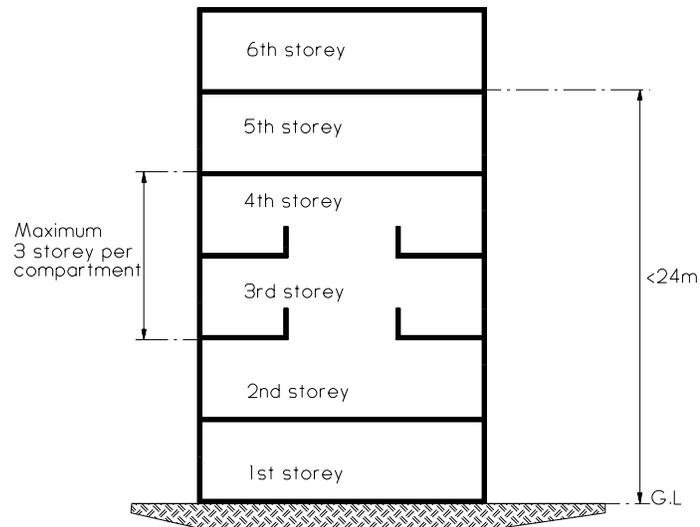


Diagram 6.4.1 - 1

No sprinkler system is required if all of the following is satisfied :

- (i) habitable height < 24m
- (ii) compartment area < 4000m<sup>2</sup>
- (iii) cubical extent of each compartment < 15000m<sup>3</sup>
- (iv) not more than 3 storeys interconnected.

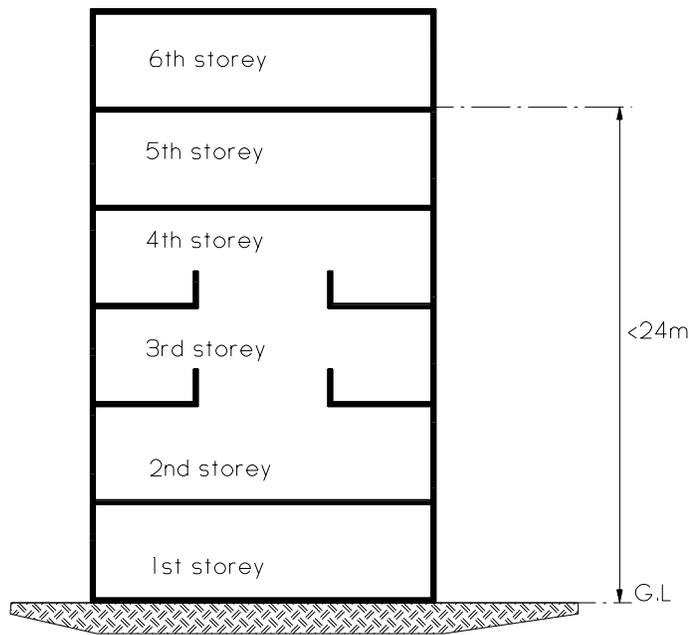


Diagram 6.4.1-2

Not more than 3 storey per compartment.  
 Area of compartment  $< 4000\text{m}^2$  & cubicle extent  $< 15000\text{m}^3$

Floor area per compartment does not exceed  $4000\text{m}^2$

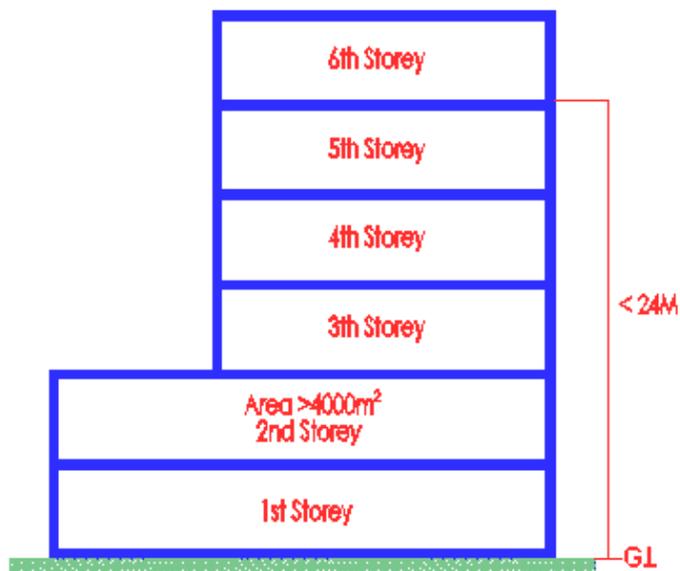


Diagram 6.4.1 - 3

Cubicle extent per compartment does not exceed 15000m<sup>3</sup>

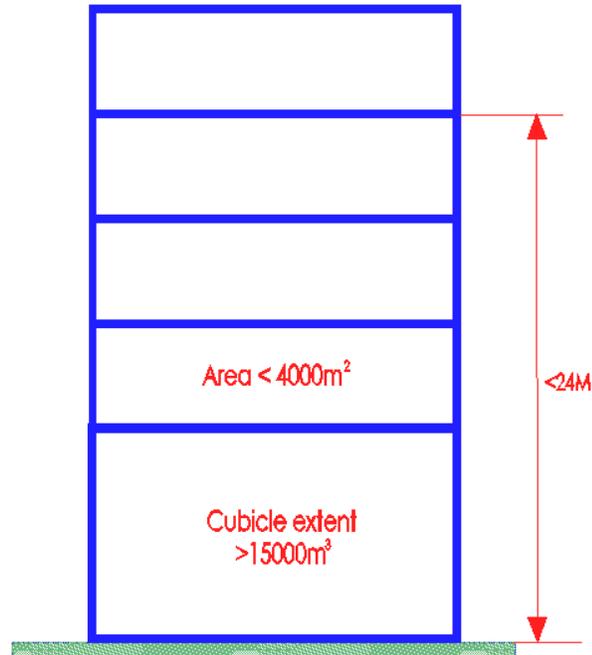


Diagram 6.4.1- 4

Habitable height exceeds 24m

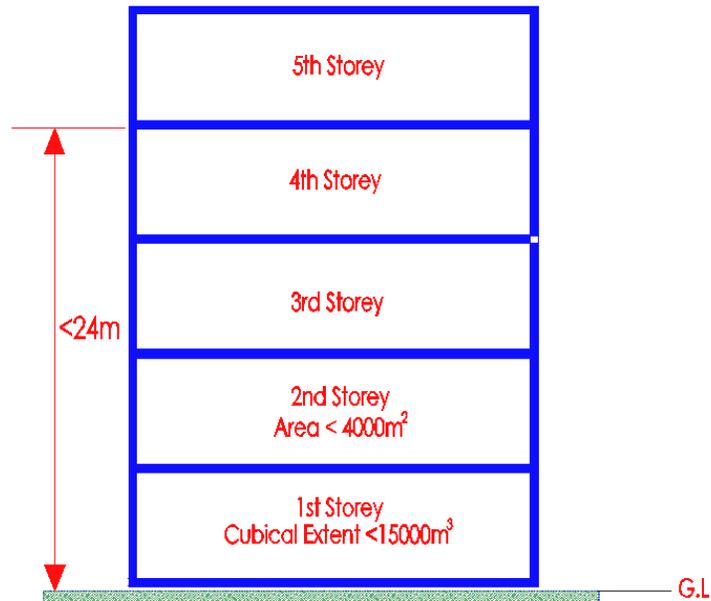


Diagram 6.4.1- 5

(d) (i) Basement

All basement storeys, except for those used as purpose groups I or II, shall be provided with an automatic sprinkler system irrespective of compartment size. Where the upper storeys of the building is fully compartmented from the basement

storey, the requirement for provision of an automatic sprinkler system for floors above the basement shall be considered separately and in accordance with sub.cl.(a), (b) and (c).

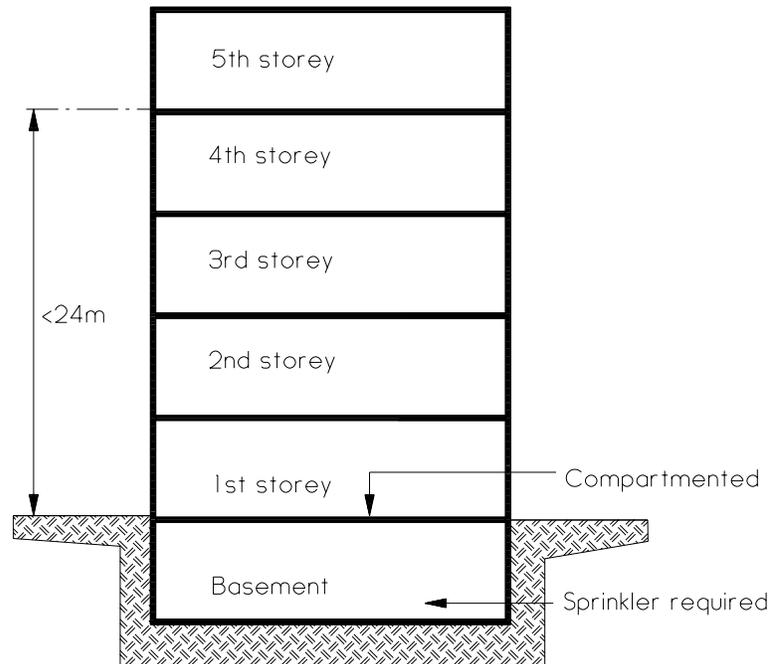


Diagram 6.4.1(d)(i)

All basement storeys shall be provided with automatic sprinkler system irrespective of the compartment size.

Extension of sprinkler system to upper storeys is not required as:

- a) floor area and cubical extent of each storey do not exceed  $4000\text{sq.m}$  and  $15000\text{m}^3$  respectively;
- b) habitable height of the highest floor does not exceed  $24\text{m}$ .
- c) Upper storeys are fully compartmented from the basement storey.

(ii) Exemption

Where the basement storey is effectively cross-ventilated such as to avoid smoke logging conditions, the basement storey may be exempted from the requirements of provision of an automatic sprinkler system, at the discretion of the Relevant Authority.

(No illustration)

*Applicable only to residential development. The clause is also not applicable to factory car parks due to the nature of usage or other activities that may be taking place in its car parks.*

#### 6.4.2 Installation

Installation of the sprinkler system and its associated water supply, control and testing requirements shall comply with the SS CP 52 Code of Practice for Automatic Fire Sprinkler System.

(No illustration)

*In view of other system not covered under CP 52 for example like Early Suppression Fast Response Sprinkler System could be adopted provided it is over and above the mentioned CP 52.*

#### 6.4.3 Connection to fire station

The sprinkler system shall be electrically monitored so that on the operation of any sprinkler head, the fire signal is automatically transmitted to a fire station through an approved alarm monitoring station.

(No illustration)

*Where the provision of the sprinkler system to a building is a requirement under the fire code or at the direction of the Relevant Authority, the system shall be linked to an approved alarm monitoring station or company. All transmitting equipment shall be approved by the telecommunication authority. The transmitting equipment shall have at least the following features :*

- (a) Transmission of signal via "leased-line"*
- (b) Alternative transmission path via telephone which serve as back-up*
- (c) Indications for status of "leased-line", phone line, system test, alarm, power supply, and unauthorised opening of the panel box*

*"Leased- line" shall be the primary means of signal transmission with an automatic switch over to normal telephone line upon leased-line failure. For further references/details, please refer to CP 10.*

#### 6.4.4 Special purpose rooms

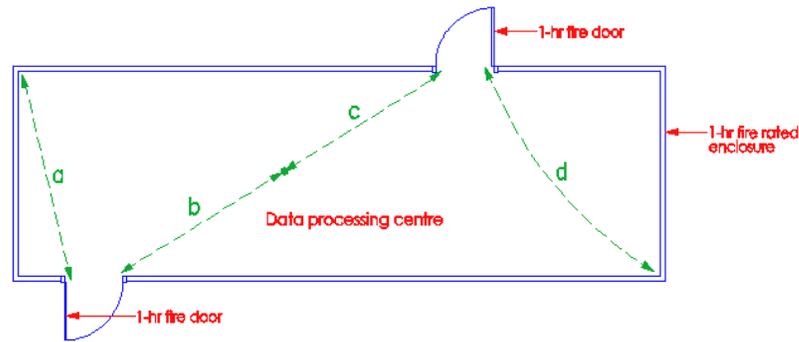
- (a) Where a building is required to be provided with an automatic sprinkler system under this Code, parts of the building which are used for purposes stipulated in Table 6.4A shall be compartmented in accordance with columns 3(a) and 3(b) of the table. Exemptions of sprinkler provision for such rooms or spaces are indicated (Ex) in column 3(c) of the table.

*(No illustration. Table 6.4A is attached). Openings of these special purpose rooms for example lift motor room at the roof top need not to be provided with fire resistance door as stipulated in Table 6.4A. This arrangement is allowed only if the door is located at the external wall and opened directly to the exterior and subject to compliance with Clause 3.5 to be unprotected opening. In addition there is no possible fire risk to other room usage.*

- (b) Where a building is not required to be provided with an automatic sprinkler system under this Code, special purpose rooms stipulated in Table 6.4A shall be compartmented in accordance with columns 2(a) and 2(b).

(No illustration. See Table 6.4A)

- (c) Where automatic sprinklers are to be replaced by an automatic fire extinguishing system to protect special purpose rooms for the use as communication nerve centres, data process centres and process control rooms composing of high value computers or telecommunication equipment, the enclosure to the hazard or occupancy shall comply with the following :
  - (i) it shall be constructed to have minimum 1-hour fire resistance rating;
  - (ii) any door opening shall be protected with minimum 1-hour fire door;
  - (iii) it shall not be provided with more than 2 exits;
  - (iv) the direct travel distance to any exit door of the enclosure shall not exceed 15m; and
  - (v) The fire extinguishing system using clean agent shall conform to Cl.6.5.2



Direct travel distances for a, b, c and d shall not exceed 15m

Diagram 6.4.4(c)

Since the sprinkler heads in the room would be omitted, it is necessary to use the direct one-way travel distance requirement to limit the room size, hence the direct one-way travel distance of maximum 15m shall be strictly complied with.

6.4.5 Water mist system may be permitted as a substitute of automatic sprinklers in sprinkler protected buildings provided that the following requirements are complied with :

- (a) Water mist system shall be a propriety design that has been tested to meet the performance requirements of a standard acceptable to the relevant authority;
- (b) Design and installation of water mist system shall conform to NFPA 750 (Standard for the Installation of Water Mist System) or AS 4587 (Water Mist Protection System – System Design, Installation and Commissioning); and
- (c) Components of water mist system shall be listed by a recognised testing laboratory.

(No illustration)

6.4.7 The “Guidelines on Reduced Water Storage For Automatic Fire Sprinkler system in Buildings” are given in Appendix H. It provides an alternative design approach for the installation of sprinkler systems in both new and existing buildings under ordinary hazard category classification under SS CP 52: Code of Practice For Automatic Sprinkler system.

*Please see the guidelines under Appendix H.*

## 6.5 FIXED AUTOMATIC FIRE EXTINGUISHING SYSTEMS

- 6.5.1 Installation of any fixed automatic fire extinguishing systems which are not deemed to be required by this Code shall not be accepted as substitute of any provision stipulated in this Code unless otherwise approved as such by the Relevant Authority. Such systems will be considered as additional protection for property safety and their installation shall not adversely affect the performance of the stipulated systems.
- 6.5.2 Design and installation of such automatic fire extinguishing systems shall comply with corresponding Code of Practice acceptable to the Relevant Authority.

*(No illustration)*

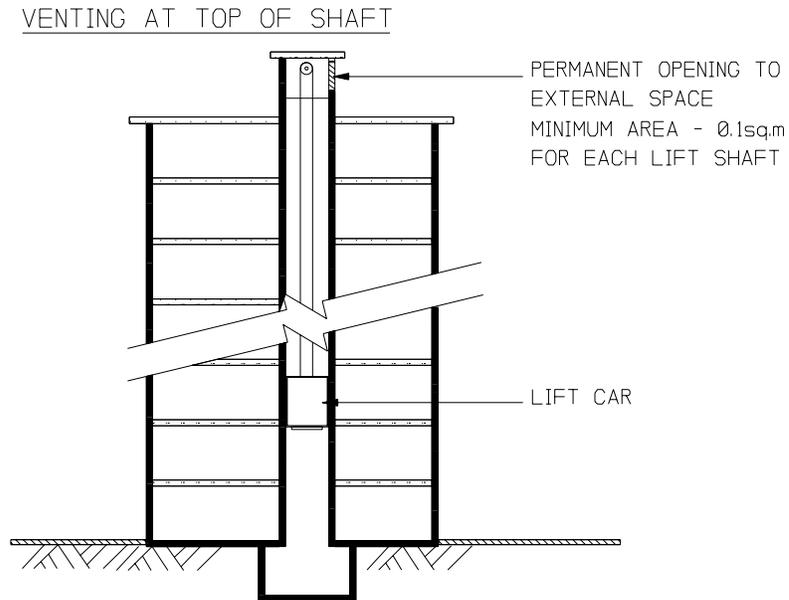
*Fixed automatic fire extinguisher systems include, fixed water spray, gas flooding system & wet chemical suppression system for kitchen hood etc. Where a building is provided with automatic sprinkler system, the provision of any of the above system for added protection to property shall not affect the operation and performance of the sprinkler system in the building. For example, a computer room is provided with gas flooding system, in-addition to the sprinkler system.*

*Any fixed automatic fire extinguishing system such as gas flooding system which are not deemed to be a requirement under the fire code for a particular building shall not be accepted as replacement or substitute of any system required by the fire code unless approved by SCDF "FSSD".*

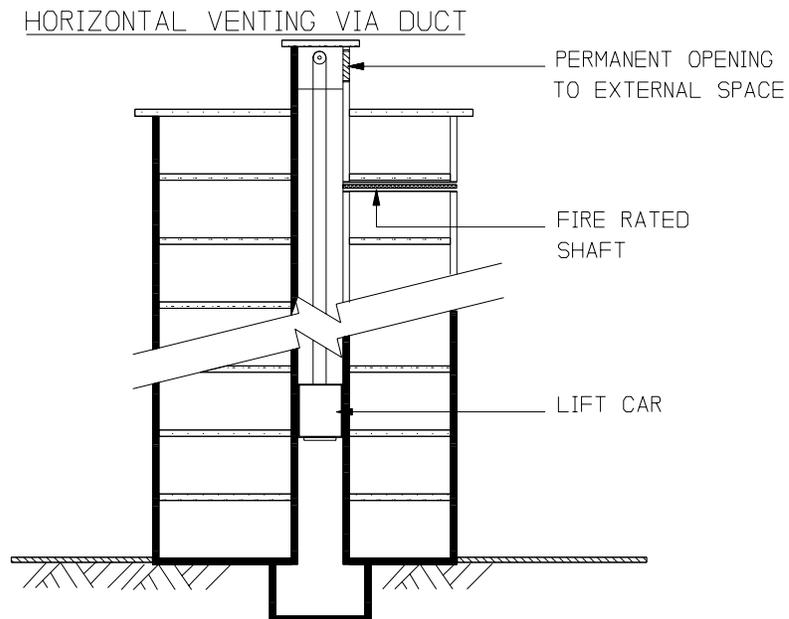
*Such automatic fire extinguishing systems if not properly installed or incorrectly maintained could pose additional hazard to the occupants. Warning signs are to be visibly displaced at strategic position. Features such as stopping of air handling units or other safety features are needed to be incorporated in the installing of the above. Qps are to seek clarification/consultation with SCDF "FSSD" before carrying out any such installation in their development.*

## 6.6 LIFTS HOISTWAY VENTILATION

6.6.1 Lift hoistways shall be vented in accordance with the SS CP 2 Code of Practice for Installation, Operation and Maintenance of Electric Passenger and Goods Lifts.



Drawing 6.6.1- 1



Drawing 6.6.1- 2

*If the duct is not to be fire rated, fire damper shall be provided at the wall of the lift shaft at location indicated as 'D' in diagram. The provision of duct to ventilate the lift shaft shall not apply to lift shaft containing fire lift. The main*

purpose of the vents or ducts are to provide exhaust ventilation for the shaft.

## 6.6.2 Emergency power supply

- (a) Emergency power supply for lighting, ventilation and alarm systems for all passenger lifts shall comply with the requirements in SS CP 2 Code of Practice for Installation, Operation and Maintenance of Electric Passenger and Goods Lifts.

*(No illustration)*

*Emergency power supply (EPS) from a separate rechargeable source shall be provided for all passenger lifts. This emergency supply shall comply with SS 209. EPS for lighting, ventilation, ventilation and alarm system for the lift cars is to allow the passengers in the lift car to activate the alarm bell for help, and to ensure adequate lighting/ventilation while they wait for rescue during a power failure.*

### Emergency Operations for lifts

- 1) *Lifts that are commonly found in buildings under Purpose Group VI and VIII are electrical passenger lifts, fire lifts and good lifts.*
- 2) *Although the current SS CP 2 does not specifically require the installation of generator set to provide secondary power supply to the above lifts, however in the case of multi-storey industrial buildings exceeding 24m in habitable height, it is recommended that the generator set be provided to operate the lifts during emergency. If emergency generator is not available, power supply to passenger lift and fire lift shall be provided via a sub-main circuit to enhance reliability.*
- 3) *For lifts not powered by emergency generator, an Automatic Rescue Device (ARD) should be incorporated in the lift system to bring the lifts to the nearest lift landing and open its door upon power failure.*
- 4) *Where an automatic mains failure standby generating system is installed, it shall have sufficient capacity to cover the special emergency operations of passenger lifts, such as:*

#### *(a) In the event of power failure in buildings*

*In the event of power failure or power interruption, the supply to the lift(s) shall be automatically switched over to emergency power supply and the lift(s) shall be brought to the designated floor commencing with the fire lift(s), and park there with their door(s) remaining open until all lift(s) have been brought down to the designated floor. Thereafter, one or more lift may resume operation depending on the capacity of the emergency generating plant. In addition to the fire lift, normal operation of the lift shall be automatically reset on the return of normal power supply.*

(b) In the event of fire in buildings

*In the event of fire when any one of the fire detection devices is activated, the lift(s) shall be brought to the designated floor and shall park there with door(s) remaining open. In the event there is fire on the designated floor, the lift will be brought to the second designated floor. The lift(s) shall automatically be rendered inoperative after it has been brought to the designated floor or where applicable, the second designated floor. Normal operation of the lift(s) shall be automatically reset after the deactivation of the fire detectors and the resetting of the fire alarm panel or by the operation of a key switch, if such a switch is provided.*

(c) In the event of power failure and fire in buildings

*In the event of power failure and fire, the operation of the lift(s) shall be in accordance with para4(b) and the power supply shall be from the "mains failure" generating plant.*

*Footnote: where lifts serve basement occupancies, homing of lifts to designated floor by generator supply is required.*

(b) Buildings which require the provision of standby generating plant for special emergency operations.

Provision for special emergency operation for lifts shall comply with the requirements in SS CP 2 for the following :

- (v) Industrial buildings under purpose group VI, which are multi-storey.
- (vi) All basement occupancies.

(No illustration)

### 6.6.3 Provision of Fire Lift

- (a) In any building or part thereof, in which the habitable height exceeds 24m, or the depth of the basement is more than 9m below the average ground level, there shall be provided at least one fire lift, which shall be contained within a separate protected shaft or a common protected shaft containing other lifts subject to such other lifts being served at each storey by the fire fighting lobby, which is required by the provisions of Cl.2.2.13(b) of this Code.

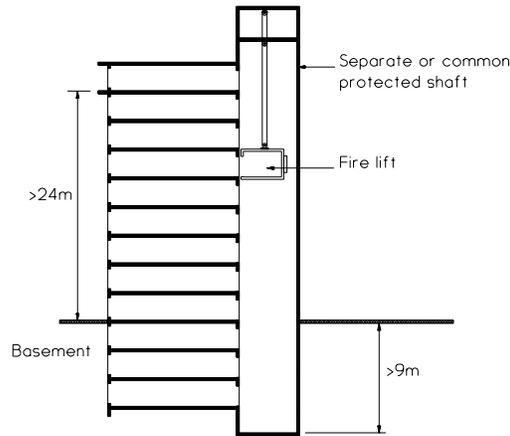


Diagram 6.6.3(a)- 1

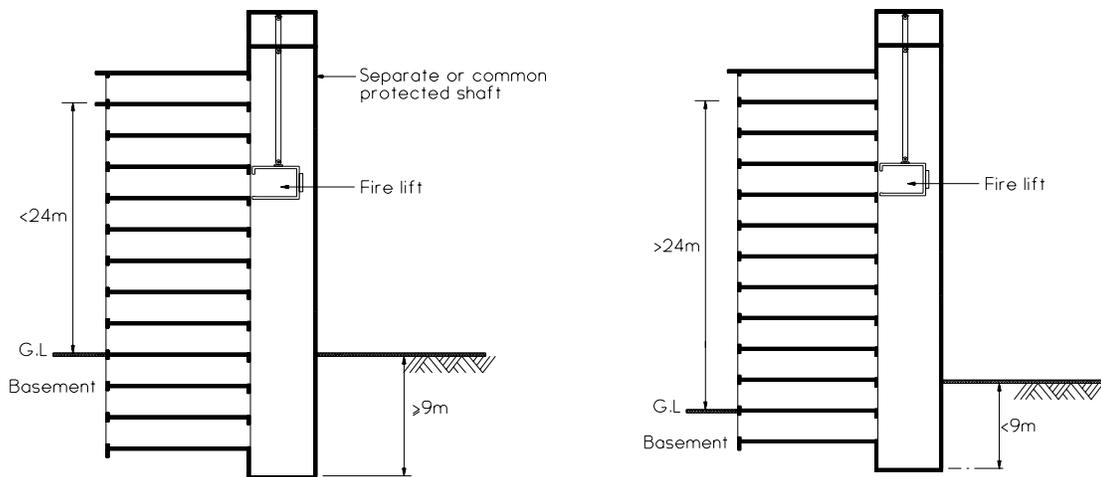


Diagram 6.6.3(a) -2

- (1) Fire lift is now required to be brought down into the basement floors if the depth of the basement is more than 9m below the average ground level.
  - (2) It is not necessary for floors above and below the average ground level to be served by the same lift.
  - (3) In diagram 6.3.3(a) – 2 above, the fire lift is required to serve the basement. See subclause 6.3.3(b).
- (b) A fire lift shall have access to every habitable floor above or below the designated floor and shall be adjacent and accessible to an exit staircase and be approached by a fire fighting lobby at each storey.

a) Typical service core

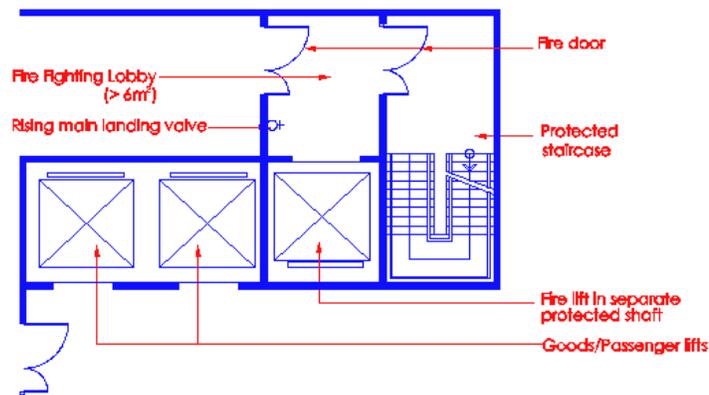


Diagram 6.6.3(b)- 1

b) Fire lift in common lift shaft

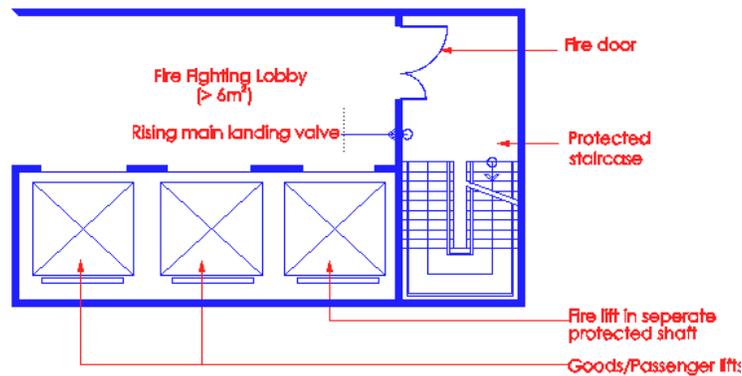


Diagram 6.6.3(b)- 2

Fire lift is located in a protected shaft.

The fire fighting lobby as shown in the two situations above, shall be served by a protected staircase located adjacent to it, and directly accessible from it. Where a fire lift is provided to the upper storeys of a building with basement storey(s), the lift shall be extended to serve the basement storey(s).

- (c) Fire lift shall be provided with an operational feature that would enable firemen to cancel first or earlier call which had been inadvertently made to the fire lift during an emergency.

(No illustration)

This additional feature would provide better control of the lift as it could permit cancellation of call made earlier.

- (d) A lift mainly intended for the transport of goods shall not be designated as a fire lift.

(No illustration)

*It is common to find goods being stacked in lobby outside goods lifts. This would affect the fire fighters while carrying out fire fighting operations during emergencies.*

- (e) The installation of the fire lift shall be in accordance with SS CP 2 Code of Practice for Installation, Operation and Maintenance of Electric Passenger and Goods Lifts.

(No illustration)

*The above clause serves to remind code users that SS CP 2 Code of Practice should be complied with to ensure that reliability and performance standards being achieved.*

- (f) The power supply to the lift shall be connected to a sub-main circuit exclusive to the lift and independent of any other main or sub-main circuit. The power cables serving the lift installation shall be routed through an area of negligible fire risk.

(No illustration)

*The above clause makes it clear that power supply to the fire lift should be independent of other main or sub-main circuit serving accommodation areas or other services.*

#### 6.6.4 Homing of lifts

- (a) Homing of lifts for buildings which are required to be provided with fire alarm system.

In a fire emergency when any one of the fire detection devices or fire alarm systems is activated, all the passenger lifts shall be brought to the designated floor (usually) 1<sup>st</sup> storey) and park there with the lift landing doors remaining opened.

- (b) Homing of lifts for buildings which are required to have standby generating plant.

In the event of power failure or power interruption in the building, the supply to the lifts shall be automatically switched over to the emergency power supply from the generating plant and the lifts shall be brought to the designated floor and park there with the lift landing doors remaining open until all the lifts have been brought down to the designated floor. Thereafter, one or more lifts may resume operation depending on the

capacity of the emergency generating plant, in addition to the fire lift. Normal operation of the lift shall be automatically reset on the return of normal power supply.

- (c) Homing of lifts for buildings which are not required to have standby generating plant.

All passenger lifts, including hydraulic lifts, shall be provided with Automatic Rescue Device (ARD). The ARD shall permit the lifts to move and park at the nearest lift landing floor with the lift/landing doors in the opened position in the event of power failure. Homing any of the lifts to a basement storey is not permitted.

- (d) Homing of lifts for Mixed developments comprising residential and non-residential components

- (i) All passenger lifts which serve the residential and non-residential floors shall be required to home to the designated or alternative designated floor in the event of power failure and / or fire. The lifts shall be provided with secondary power supplies from standby generating plant of sufficient capacity.

- (ii) Where the passenger lifts serve only the residential floors and by-pass the non-residential floors in a protected shaft, the lifts shall be required to be installed with Automatic Rescue Device (ARD), provided the habitable height of the highest floor does not exceed 60m.

- (iii) Where the passenger lifts serve the upper residential floors and the basement non-residential floor/s, including car parks, the lifts shall be provided with emergency power supply from standby generating plant for homing to the designated floor when there is a power failure in the building. In a fire emergency, the passenger lifts shall be brought to the designated floor when any of the fire alarm system in the basement non-residential floor/s is activated.

