Ministry of Defence
Defence R&D Organisation

STEC PAMPHLET - 15

GUIDELINES ON FIRE PROTECTION AND FIRE FIGHTING ARRANGEMENTS IN EXPLOSIVE ESTABLISHMENTS

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PREFACE

Fire protection and firefighting arrangements are essential to maintain the functionality of the explosive establishments. Requirements on various aspects of fire protection and firefighting arrangements contained in this pamphlet have been defined with a total consideration of hazard and consequent risk situation in establishments under Ministry of Defence. Recommended guidelines endeavor to achieve life safety, plant safety, property safety and overall establishment safety to the extent possible.

It is hoped that users will find this revised STEC Pamphlet 2025 simpler, easier to understand and implement, thereby promoting the safe storage and transportation of military explosive. This publication supersedes STEC Pamphlet, 2017 on the subject.

SECTION I

INTRODUCTION

1. From fire safety point of view, the buildings intended for processing, storage, handling (and like activities) of explosives, are categorized as high hazard occupancies. Depending upon the quantity and nature of the explosives, appropriate fire protection and fire fighting measures have to be provided to tackle any emergent fire situation.

2. While measures shall be taken to prevent the occurrence of fire; absolute fire safe situation cannot be attained. Measures on various aspects of fire safety, therefore, need to be taken to ensure life safety and safety to the operational functionality of different activities in the explosive establishment(s).

3. Broadly, measures on following aspects of fire protection and fire fighting arrangements shall be considered and taken as per the hazard and consequent risk situation in the explosive establishment(s).

    (a)First-aid /minor firefighting equipment and extinguishers;

    (b)Major fire fighting and allied equipment;

    (c)Water supply (requirement) for firefighting;

    (d)Fixed type fire protection and fire fighting installation;

    (e)Fire protection to support facilities (like air conditioning facility)

    (f) Miscellaneous measures;

4. **Director, Centre for Fire, Explosive and Environment Safety (CFEES) shall be consulted for the recommendations and accordingly, approval on all major aspects of fire safety in explosive establishments be obtained.**

SECTION II

FIRST AID FIRE EXTINGUISHERS / MINOR FIRE FIGHTING EQUIPMENT

5. It is important that correct type of fire extinguisher / equipment is available within reasonable travel distance from the hazard to be protected so that any fire incident is tackled in the initial stage itself.

6. Each hazardous building (storage, process or like building) in the explosive establishment shall be provided with the arrangement of a fire point with the following types of fire extinguishers / equipment.

(a)	Fire Extinguisher Water (CO_2 / Stored Pressure) Type 9 Litre Capacity (IS 15683: 2018)	2 Nos.
(b)	Fire Extinguisher, Dry Chemical Powder (ABC) Type, 9 Kg Capacity (IS 15683: 2018)	1 No.
(c)	Fire Extinguisher, CO_2 Type, 4.5 Kg. Capacity (IS 15683: 2018)	1 No
(d)	Ceiling Hook (IS 927:1981)	1 No.
(e)	Fire Beater (IS 8096:1992)	2 Nos.
(f)	Fire Buckets (Water/Sand) (IS 2546:1974)	4 Nos.
(g)	Shovel (GS)	1 No.
(h)	Fire Gong / Hand Siren (IS 6026:1985)	1 No.
(i)	Fireman Axe (IS 926:1985)	1 No.

7. Switching off power supply shall be ensured before use of water or water type fire extinguisher on the fires involving electronic or electrical equipment or fitments.

8. FOL Storage, MT Section or like facilities shall be provided with the arrangement of following type of fire extinguishers / equipment at the fire point.

(a)	Fire Extinguisher Mechanical Foam (AFFF) Type, 9 Liter Capacity (IS 15683: 2018)	2 Nos.
(b)	Fire Extinguisher, Dry Chemical Powder Type, 9 Kg Capacity (IS 15683: 2018)	1 No.
(c)	Fire Extinguisher, CO_2 Type, 4.5 Kg. Capacity (IS 15683: 2018)	1 No
(d)	Ceiling Hook (IS 927:1981)	1 No.
(e)	Fire Beater (IS 8096:1992)	2 Nos.
(f)	Fire Buckets (Sand) (IS 2546:1974)	4 Nos.
(g)	Shovel (GS)	1 No.
(h)	Fire Gong / Hand Siren (IS 6026:1985)	1 No.
(i)	Fireman's Axe (IS 926:1985)	1 No.

9. A sand bed 5 cm in thickness should be laid inside the FOL storage room. All lights should be of flame proof type. A drainage pipe may be laid connected with a soak pit, located outside the room.

10. Air-conditioned building (s) / room (s): - To tackle any electrical fire within air-conditioned buildings / rooms, in the ducts or in the electrical fitments during the working hours, Clean Agent (Halon alternative 2.0 kg capacity) and two CO_2 extinguishers of2.0 kg capacity should be installed inside the room. Equal number of extinguishers should also be installed in other air-conditioned rooms of the complex.

11. AC Plant Room, Power House / Sub-Station, Transformer (s) etc.shall be provided with the arrangement of fire extinguishers / equipment of the type and capacity mentioned at paras6 (b) & (c) above. Depending upon the size and capacity of the indicated facilities, provisioning of high capacity fire extinguishers may also be considered.

12. Fire Extinguishers of the following type shall be considered for authorization for use at high altitude areas experiencing sub-zero climatic conditions for a considerable period during the year.

(a)	Fire Extinguisher Stored Pressure (Nitrogen) Dry Chemical Powder (ABC) Type	Suitable upto -50^{0}C
(b)	Fire Extinguisher Carbon-dioxide Type	Suitable upto -10^{0}C
(c)	Fire Extinguishers BCF (Halon) Type (for critical applications only) **	Suitable upto -30^{0}C
(d)	Fire Extinguisher Mechanical Foam (AFFF) Type with 120 gram CO2 gas cartridge (to be used with anti freeze mixture for obtaining depressed freezing point)	Suitable upto -40^{0}C
(e)	Fire Extinguishers Water Stored Pressure Type (to be used with anti freeze mixture for obtaining depressed freezing point)	Suitable upto -40^{0}C

** Halon type fire extinguishers shall be replaced with other suitable extinguishers containing alternative extinguishing clean agent.

13. To make water type and foam type fire extinguishers effective at high altitude areas, having sub-zero climatic conditions, following type and quantity of **anti-freeze mixture** shall be added to obtain depressed freezing point.

14. **Fire Extinguisher Water Type**

Freezing Point(^{o}C)	Quantity of Calcium Chloride(Fused) Minimum 94% Pure gm / liter
-5	113
-10	190
-15	252
-20	300
-25	336
-30	361
-35	395
-40	421

15. To avoid corrosive effect of calcium chloride on the inner surface of the fire extinguisher, sodium chromate (minimum 94% pure) is to be added to the above solution of calcium chloride and water at the rate of 0.5 % of the weight of calcium chloride (anti- freeze).

16. **Fire Extinguisher Mechanical Foam (AFFF) Type**

Freezing Point (^{0}C)	Quantity of Ethylene Glycol (Minimum 95% Pure) In Liters	Quantity of Foam Solution [Water +Foam Concentrate (one liter per extinguisher)] In Liters
-5	2.16	6.84
-10	2.43	6.57
-15	2.79	6.21
-20	3.06	5.94
-25	3.33	5.67
-30	3.87	5.13
-35	4.50	4.50
-40	5.13	3.87

17. The quantities mentioned in above tables are based upon the laboratory tests /studies conducted at CFEES.

18. Location of the fire points shall be so adjusted that a fire extinguisher shall ordinarily be available within a running distance of 15 to 20 meter from the hazard to be protected.

19. Suitable sheds shall be provided to cover and protect the fire extinguishers at the fire points.

These sheds should be so designed that removal of the extinguishers is not hampered in the emergent situation.

20. Regular testing, inspection and maintenance of first-aid fire extinguishers shall be carried out as per the norms laid down in IS 2190:2010.

21. Engine operated High Pressure Water Mist Trolley equipped with water mist gun (Jet & Fog operation) with lancing distance at least 15m for water jet, hose reel (30m), water tank (150 liters), water pump (capacity 20 lpm at 100 bar pressure) capable to operate for 4 hrs with continuous water replenishment from nearby SWT for extended range of operation, inbuilt with light for night operation may be used as additional fire-fighting equipment whenever it is found suitable for fighting fires in area of the explosive establishments.

SECTION III

MAJOR FIRE FIGHTING EQUIPMENT

22. Explosive establishments shall be **authorized** to have the provisioning of **major fire fighting equipment**. Following determinants shall be considered for provisioning of major fire fighting equipment to an explosive establishment.

(a) Quantity of ammunition / explosives authorized (to be held or processed) by the establishment.
(b) Area under coverage
(c) Local hazards associated with storage or process of the ammunition /explosives.
(d) Exposure hazard.
(e) Response time
(f) Any other information considered relevant to hazard in the establishment**.**

23. Army instruction(s) (or similar guidelines issued by respective service organization) on the subject shall be taken as reference document for such authorization.

24. Authorised major fire fighting equipment like Truck Fire Fighting, Large and other pumping units shall be located at the fire station(s) in the establishment. **Design and construction of the fire station shall be as per the requirements defined in Annexure –II.**

25. Siting / location of the fire station shall conform to the requirement of quantity distances and also response time requirement.

SECTION IV

WATER SUPPLY (REQUIREMENT) FOR FIRE FIGHTING

26. For fires involving explosives, water is the main extinguishing medium. Therefore, all explosive establishments necessarily need to be provisioned with adequate arrangement of water supply which can meet firefighting requirements in the event of an emergent fire situation.

Static Water Tanks

27. Ordinarily water requirement for fire fighting in an explosive establishment shall be met by provisioning adequate number of static water tanks (SWTs). Following guidelines shall be considered while 'siting' and working out the required number of SWTs in any explosive establishment. Consideration shall, however, be given to the availability of water in the location while working out the capacity and number of SWTs.

(a) Each hazardous building (magazine / explosive store house, process building or like structures) in the location shall be provided SWT protection / coverage preferably from two sides.
(b) Static water tank shall be available within 100 to 200 meter of the hazard / building to be protected. Under exceptional circumstances (subject to the net explosive quantity) the minimum distance can be adjusted marginally.
(c) Capacity of each static water tank shall invariably be 225 kilo Litre (kl) However, for certain situations, SWT of 110 kilo Litre (kl) or lower capacity can be considered.
(d) The SWT shall remain connected with approach road (3.6 meters width); with hard standing around it to facilitate its proper use by fire fighting appliances.
(e) Arrangements shall exist to fill and replenish the static water tank in the quickest possible time. Irrespective of the distance and location of the feeding source (of water), it shall not take more than 18 hours to completely fill the static water tank. The static water tank shall be constructed as per the drawing given in Annexure-1.

Ground (Yard) Hydrant System

28. Provisioning of ground hydrant system though (under certain situations) is considered to be a useful arrangement. Its provisioning shall be considered only in the situations where required and also if water discharge, pressure and other determinants of utility and application can be assured. As an indicator to the requirement, all process areas such as Ordnance Factories, DRDO Labs, segregated pockets in Ammunition Depots (and like

ammunition storage accommodations) where on account of storage of fuel air explosive, O Fuel and G-Fuel, there is enhanced level of risk, shall be considered for ground hydrant installation.

Where considered for provisioning, following guidelines shall invariably be taken into account.

(a) Hydrant mains should be laid underground, one meter below ground level. In case soil conditions are unsatisfactory, masonry or equal support should be provided.

(b) Hydrant mains should preferably be of cast iron or of type which meets the requirement of pressure and generally remain corrosion resistant.

(c) Hydrant mains be laid in rings or cross-linked rings in a manner that all mains remain interconnected.

(d) Hydrant may be installed on 150 mm feeder main, reduced to 100 mm where it is meant to feed a single hydrant.

(e) Adequate number of sluice valves should be provided for the purpose of isolating any portion of the installation for repairs etc.

(f) Fire fighting mains should not be utilized for any other purpose such as to meet the process or domestic requirement.

(g) Only stand post type hydrants should be provided.

(h) Hydrant point should be located at least 30 meter away from nearest edge of the explosive (hazardous) building proposed to be protected. In the case of non hazardous buildings this distance could be 5 to 15 meter from nearest edge of the building to be protected.

(i) Hydrant points (out-lets) be spaced 30 meter apart along the building (hazardous building) line. In the case of non hazardous buildings this distance (spacing) could be 45 to 60 meter. Advantage, however, be taken of convenient doors or windows or both to locate the hydrant point so that minimum length of hose is required to target the seat of fire. For this purpose, reasonable adjustment of space between the hydrant points could be made.

(j) All hydrants should be so located that these remain accessible to the fire fighting appliances and for firefighting operation.

(k) Appropriate essential accessories should be provided near each hydrant point in hydrant boxes (hose box) of adequate size. Hydrant box (hose box) invariably should have delivery hoses (IS 636:2018), at the scale of two, of 63 mm dia and 30 meter length duly fitted with instantaneous female coupling and one branch pipe fitted with a nozzle (preferably universal branch).

(l) To feed the Hydrant System, an underground Static Water Storage Tank (Sump) of appropriate capacity (not less than 225 Kilo Litre) should be provided. The location of the Tank should be such that it remains accessible to the fire engines/ appliances of fire brigade / services. Provision of man-holes shall be made for inspection, repair, cleaning, insertion of suction hose, etc. The underground sump shall have the facility of (connectivity to) a Pump House with provisioning of two pumps, one electric driven and second (stand by) diesel driven or through an alternate source of power supply. The pumps shall be of appropriate capacity (not less than 2850 lpm water discharge capacity) at a pressure of 7-8 kg/cm^2 to meet the requirement of water discharge @1150 liters per minute, pressure of 5.25 kg./cm^2 (7 kg./cm^2 in case of monitors) at the remotest hydrant point.

(m) One Jockey pump of suitable capacity having an output of 500 litres per minute shall also be provided for maintaining pressure in the network. The leakage through valve glands or joints will result in fall of pressure in the network of hydrant installation. When the pressure falls to a predetermined level (0.5-1.0 kg/cm^2) the jockey pump will come into operation automatically on receiving impulses from the pressure switch and as soon as the pressure is built up, the jockey pump shall stop automatically. In the event of outbreak of fire when the jockey pump is unable to meet the water requirement, there will be further fall of pressure in the feeder to the level of (1.5-1.0 kg/cm^2) with the result that the pump installed at the sump will come into operation through another pressure switch. The fire pumps and the jockey pump should be suitably inter-locked so that the moment the fire pumps come into operation, the jockey pump is automatically cut off.

(n) Hydrant installation should be capable to give an output of 1150 litres per minute from each hydrant at a pressure of 5.25 kg/cm^2, at least when two hydrants are operated simultaneously. In case the supply is tapped from the overhead tank, the hydrant installation should meet the conditions specified above. Nevertheless, when the pump is commissioned into operation, the remotest hydrant should be

able to maintain the pressure of 5.25 bars at the branch fitted with 15 mm / 20 mm nozzle.

(o) Positive suction has to be ensured, whether this is secured by installing the pumps below water level or by charging the suction through a gravity tank or a foot valve mechanism.

(p) To keep the hydrant installation permanently charged by gravity, some means should be provided so that adequate supply could be tapped even in worst remote situations when pumps are found to be non-functional. This could be achieved by connecting the hydrant feeder to the domestic line or with the feeder originating from the overhead tank (if already in existence in that zone) through a non-return valve.

(q) It is an advisable option to provide system connectivity to an Over Head Tank (of minimum capacity of 110 kilo litre) with staging height of at least 30 meter. Provisioning of OHT, however, shall be subject to meeting its requirement of quantity distance.

29**.** **Siting and Protection**

(a) Good siting and protection of all water supplies is essential if they are to be available when required.
(b) The ability to extract water from a water supply is equally essential and to this end, adequate access points should be provided for fire appliances.
(c) Access points to water supplies should not be sited in line with openings in traverses protecting explosives store-houses or process buildings.
(d) Wherever possible, access points should be sited in positions which are afforded protection by existing traverses or adjoining buildings.
(e) Need for parking in the vicinity of access points to be considered to enable fire appliances to fill water, without obstructing other emergency services.

30. **Inspection and Maintenance Guidance**

(a) It is essential that water supplies are inspected, maintained and tested on regular routine basis.

(b) Accurate and comprehensive information regarding the physical lay out of water supplies, their method of operation, types of equipment used, contact names and

addresses and all maintenance schedules should be kept in such a way that it will be readily available to those requiring it.

(c) Maintenance of external hydrant system should be done as per IS: 13039:2014 "Code of practice for provision & maintenance of external hydrant system".

31. Training

(a) An adequate number of personnel should be trained in the testing and maintenance of all water equipment installed.
(b) Refresher training and exercises should be carried out to ensure competence of the personnel.
(c) A viable system for alerting and calling in personnel necessary for the efficient operation of all water equipment during silent hours/closed periods should be instituted and periodically tested by exercises.

SECTION V

FIXED TYPE FIRE PROTECTION AND FIRE FIGHTING INSTALLATIONS

32. Provisioning of fixed type fire protection and firefighting installations envisaging automatic fire detection cum alarm system, fire suppression system etc. for process buildings/ plants and ammunition storage buildings such as those accommodating fuel air explosive, O-Fuel and G-Fuel and like stores in explosive establishments shall be done as per the hazard and consequent risk situation. Each case has to be examined taking into account the gravity of risk. It shall only be after identification of associated hazard and consequent risk situation that suitable fire protection system will be recommended.

33. Use of automatic fire suppression system is not recommended in explosive magazine/store-houses.

34. Any single type of fire detector is considered not suitable for all applications. Since fire detectors are designed to respond to one or more characteristics of fire namely smoke, heat or flame, final choice of detector shall depend upon individual circumstances and on ground hazard situation. Variable factors that define a fire situation and influence the selection of detectors include burning behaviour of combustible contents, structural characteristics of the area to be protected, environmental conditions, nature of the stores and process(es) carried out etc. Detectors working on different principles of operation will respond differently to a given fire situation. Also, a particular type of detector necessarily may not be able to detect a fire equally efficiently in all types of fire situations. Therefore, to ensure and attain effective level of protection, the situation at times may require combined use of different types of detectors.

35. Following types of detectors could be considered for their use and application in different fire situations.

Heat Detectors: There are two types of heat detectors:

i. Fixed temperature detectors, which are designed to operate when the detecting mechanism or element reaches a pre-determined temperature. These can again be subdivided into two types:
   (a) Point detectors, which are small, each protecting a limited area.
   (b) Line detectors, which have a linear sensing device usually protecting a larger area.

ii. Rate-of-rise detectors, designed to operate when the temperature rises abnormally quickly, or when a pre-determined temperature is reached.

The temperature range normally adopted for heat sensitive (point) detectors is from 55 degree C to 180 degree C, inclusive if the rate of rise of the temperature is less than 1 degree C/min.

Smoke Detectors. There are two types:

(a) Ionisation Detector
(b) Optical Detector

While the ionisation detector responds to the invisible products of combustion, including, small particles of smoke, the optical detector, as its name implies, reacts to the visible products of combustion.

Flame Detectors
Apart from producing hot gases, fire releases radiant energy in the form of:

(a) Infra-red radiation
(b) Visible light
(c) Ultra-violet radiation

These forms of energy travel in waves radiating from the point of origin, and radiation detectors (flame detectors) are designed to respond to this radiation.

Multi-sensor fire detectors - These detectors are also under use and they are designed as point type resettable multi-sensor fire detectors installed in buildings, incorporating at least one smoke sensor and another sensor which responds to heat, and in which the signal(s) of the smoke sensor(s) is combined with the signal(s) of the heat sensor(s).

36. Ultra-High Speed UV/IR automatic fire detection cum alarm system may be installed in the explosive storage buildings.

SECTION VI

FIRE PROTECTION TO SUPPORT FACILITIES

Air Conditioning Plants

37. Air conditioning plants that may be there to provide controlled environment for the ammunition and explosives storage accommodation or manufacturing (process) units shall be provided with fire safety measures discussed and explained in the following paras.

38. AC Plant Room shall be provided with the arrangement of automatic fire detection cum alarm system. The fire detection arrangement shall comprise of single unit type detectors which have combination of both heat and smoke detection arrangement. The detectors shall be calibrated as per the hazard situation and provided in the space below false ceiling, above false ceiling, under the raised floors (if any), voids and cable ducts. The system shall be intelligent type using analogue addressable sensors with micro processor based panel.

39. Arrangements associated with the central air-conditioning system, also need to be duly cared from fire safety point of view.

(a) Insulation and lining including vapour barrier and coatings (to be) used in conjunction with ducts shall be of non-combustible type material. All filters for use in the air-conditioning system shall be such that will not burn freely or emit large volume of smoke or other objectionable products of combustion when attacked by flame.

(b) To stop or restrict the flow of hot gases/flame from one room, compartment, zone or section to the other room, compartment, zone or section, the AC ducts shall be provided with the arrangement of fire dampers / stoppers, actuating at a predetermined temperature by means of a fusible link or an electro-magnetic device operated by either a smoke detection system or failure of power supply, thereby activating audio-visual alarm.

(c) Dampers shall be installed in the inlet ducts at the point of origin from AC plant room and at all points of entry or exit where the return ducts pass from one room or compartment to the other room or compartment.

(d) Arrangement shall be made to switch ‘off’ the plant automatically on sounding of alarm and also from the working place manually.

(e) All electrical installations and other electrical fitments must be of flame proof type and should strictly conform to STEC/IEE regulations.

(f) Switch gears and other ancillary fitments for the inflammable storage room or for the premises accommodating LPG empty or filled cylinders, as far as possible should be located outside the room to obviate the chance of occurrence of any spark.

Automatic Detection Devices in the air-conditioned plants

40. Detectors like heat sensitive detectors, flame detectors and Beam Master being unsuitable for air-conditioned buildings, the choice only falls in favour of smoke detectors. This is described below:

(a) Smoke detector working on ionisation principle is very sensitive for detecting invisible smoke but becomes insensitive to heavy smoke particles generally emitted by burning of PVC cables installed in the premises. On the other hand, smoke detector incorporating photo electric cell is highly sensitive towards heavy smoke particles but does not give any response when surrounded by invisible smoke. Therefore, combination of both detectors viz. detector working on ionization principle and smoke detector equipped with photo electric cell is recommended in line with the practice observed in this field.

(b) Combination of smoke detectors as suggested above is to be installed underneath false ceiling, in voids enclosed space between actual ceiling and false ceiling and also in the cable ducts made just beneath the raised floor for laying cables to feed power to the equipment / machinery installed for functional requirements in the premises. As per existing norms on the subject, one detector covers about 80 to 90 sq.m. Area, however, depending upon the change in direction of cable ducts, additional detection devices have to be provided for effective detection.

(c) Combination of smoke detectors as suggested above specifically for air-conditioned premises should properly be coupled with warning system envisaging a response indicator, hooter, zonal panel, central control panel and repeat panel in case if installed at the fire station. On actuation of detection system, signals, apart from warning system should also be fed to the siren installed at the top of the building to alert the emergency services. The siren with an adequate range should emit repeated notes of sharp pitch compatible with audibility despite of the noise produced by the working environment.

41. Other support facilities which may require fire safety arrangements shall be referred to CFEES for their consideration and necessary recommendations.

SECTION VII

MANUAL CALL POINTS AND WARNING SYSTEM

42. It is not considered expedient and economical to provide fixed installation in each and every building to counteract outbreak of fire. Fixed installations are generally provided in high risk areas. As all buildings are not covered with fixed installations, manual call station (call points) should be installed near each building for alerting emergency services. Call points are inter-linked with general warning system. On actuation of call point, signal are transmitted to the siren installed on building top as well as impulses are passed on to zonal panel and central control panel and in some cases to the repeat panel installed in security office and fire station. Salient features of the warning system are given as under:-

(a) Detection devices, call points, etc. would be coupled to the warning system in a manner that on actuation of a detector, a visual indication would appear near the detector wherever it is installed.

(b) Further in relation to the detectors which are installed inside the compartment, response indicator would be visible being fixed outside the room thereby indicating the particular room in which detector has actuated.

(c) A hooter would be coupled in each circuit or each zone, which will indicate the actuation of a particular zone or a circuit in the part of the building.

(d) The impulses from the warning system would be fed to zonal panel / central control panel installed at the entry i.e. on the ground floor of each building. In fire conditions, it would emit audio-visual alarm depicting the particular circuit or zone which has been actuated.

(e) The central control panel / zonal panel would be installed at a place which is being manned round the clock.

(f) The signal from the warning system would also be fed into a repeat panel installed at the fire station so that the fire brigade can respond to the scene of fire without loss of time. The repeat panel on receiving the impulses would also emit audio-visual signals.

(g) Circuit and zone would be coupled to an independent siren installed at the top of the building. In case of actuation of any detector or manual call point in any of the zone / circuit of a particular building, the siren would emit a sharp note thereby raising an alarm. The siren would be of adequate range of at least 1 to 1.5 kms. and should

emit a sharp note / pitch which would be audible irrespective of the noise produced by the working environment.

(h) The audio-visual indication given at the repeat panel which is further being supplemented by the sharp note emitted by the siren installed at the building is essential to guide the service to the point of occurrence. Hence no mechanism should be provided at the fire station to silence the siren which would only be switched off at the zonal panel.

SECTION VIII

MISCELLANEOUS MEASURES

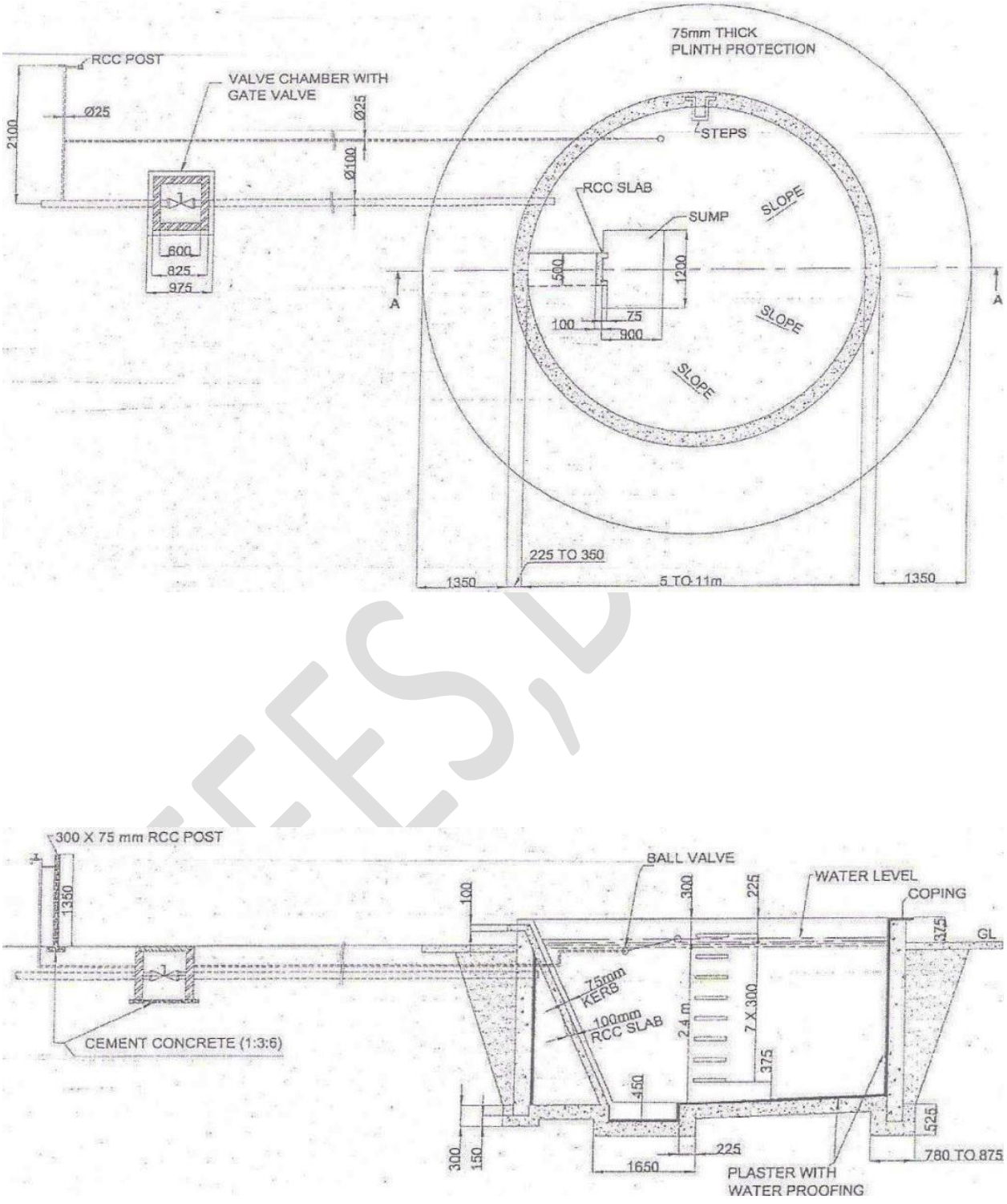
43. Electrical installations like power supply, distribution, lighting, heating, lightning and electro-static protection, electrical and electronic apparatus and air conditioning buildings (or for that purpose every other like facility) which have the potential of causing the fire situation shall be governed by the requirements of relevant STEC pamphlet(s) and the standards indicated therein.

44. Users should be made aware of exact location of alarm points, fire extinguishers, escape routes and emergency power off switches. Staff should receive instructions and training in the fire regulations applicable to their area of work, in the procedure for dealing with minor fires and in the use of first-aid fire extinguishers and consequences of their use.

45. Refresher training and exercises shall be carried out to ensure competence of the personnel manning and operating the installed systems. Establishment / Unit Fire Brigade or the local Civil Fire Brigade should be requested to organize short (in house) training courses for the purpose.

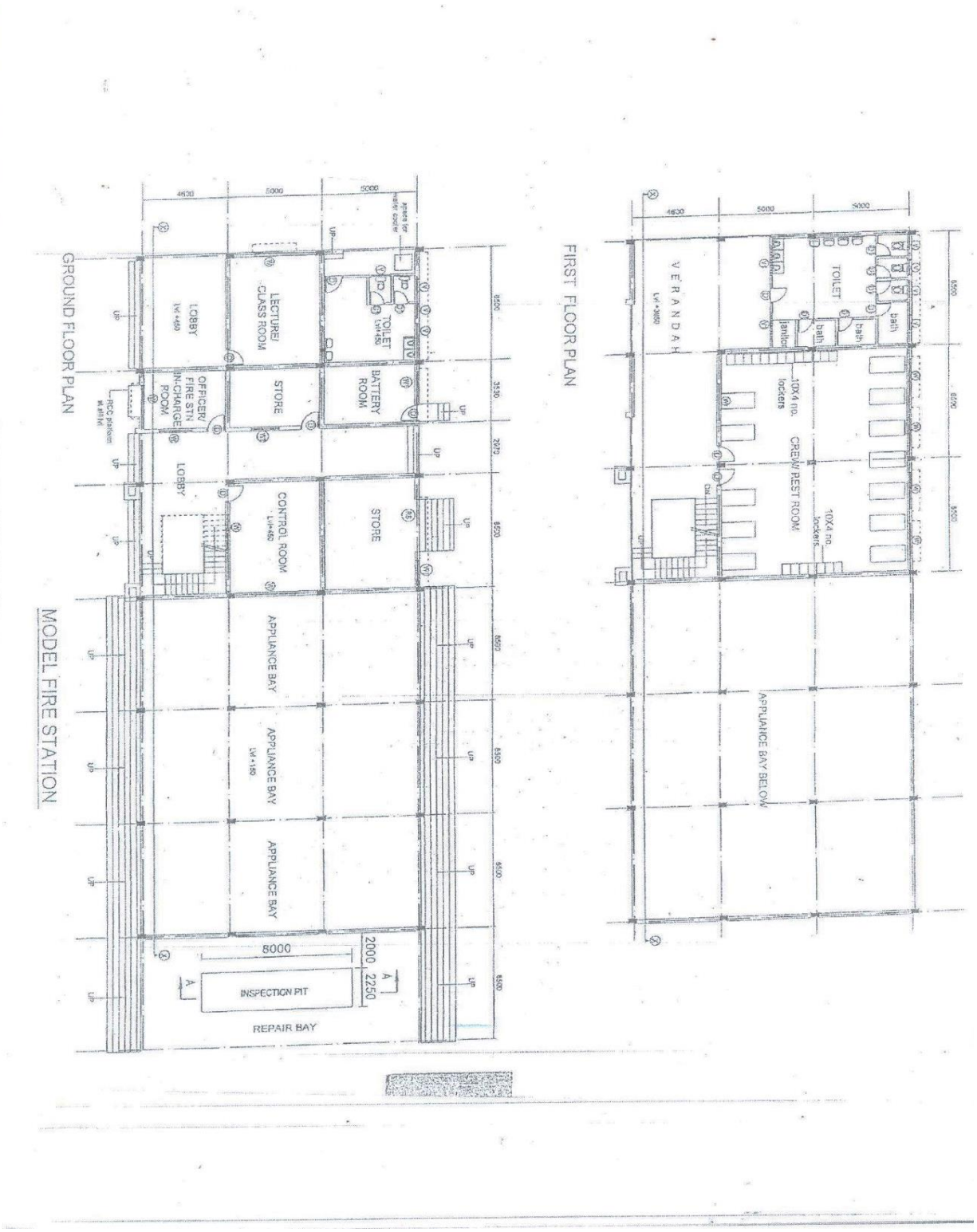
46. User shall ensure and institute an appropriate maintenance agency so that all safety systems and controls work in proper manner. Inspection and maintenance should be done on frequent basis against a checklist by a qualified person to ensure continued safe operation of the installed systems.

Annexure -1



TYPICAL GUIDE PLAN OF STATIC WATER TANK (SWT) FOR FIRE FIGHTING

Annexure -II


MODEL FIRE STATION
GROUND FLOOR PLAN
FIRST FLOOR PLAN
LOBBY
LECTURE/ CLASS ROOM
TOILET
OFFICER/ FIRE STN IN-CHARGE ROOM
STORE
BATTERY ROOM
LOBBY
CONTROL ROOM
STORE
APPLIANCE BAY
APPLIANCE BAY
APPLIANCE BAY
INSPECTION PIT
REPAIR BAY
8000
2000
2250
VERANDAH
TOILET
CREW REST ROOM
APPLIANCE BAY BELOW