SCOPE OF WORK

Name of Work: Annual maintenance contract for fire alarm, fire fighting, PA system, refilling of fire extinguisher installed in various buildings at IISER TVM

No	Installation Details	Scope of work
1	Electrical driven main fire pumps & Fire panels	Proper Checking for functioning of the pumps, pressure testing, maintenance etc. complete. (Excluding Electrical Repairs but necessary assistance to get the system in order if required)
2	Fire Jockey Pump	checking and testing of pump (In both auto & manual operation)
	Diesel Engine driven fire pump	1. Checking of diesel & oil level 2. Checking of any leakages 3. Checking the condition of the battery 4. Servicing as and when required from the authorized agency of OEM. 5. Periodical operation of the pump/regular check up
3	Fire Hydrant System	1. Checking of system leakage & line pressure in all gauges 2. Checking of hoses and Branches pipes & operation of all auxiliary units 3. Checking the setting of the pressure switches and all the pumps by operating. 4. Checking of hydrant valves washers and Brass lock 5. Starting the Pump manually through the control panels 6. Operating the pumps in Auto Mode and checking the System 7. Checking of isolation valves for glands leakages
4	Fire Sprinkler system	1. Checking of system leakage & line pressure in all gauges 2. Checking of alarm valve and all the pumps 3. Cleaning of sprinkler if accumulated by dust 4. Checking of isolation valves and operation of all auxiliary unit 5. Checking of sprinkler Bulb head for proper conditions
5	Fire Extinguisher	Refilling, Servicing, checking, validating etc. complete as required 1. All fire extinguishers and refills and spare parts must confirm to performance and construction specifications as laid down IS 15683:2006 as amended from time to time by BIS. 2. For Dry Power or ABC type fire extinguisher (4Kg/6Kg/9Kg): a) The extinguisher shall be filled with ABC Grade 40, Mono Ammonium Phosphate (MAP base) from approved manufacturer/dealer/firm. b) The Capacity of the extinguisher when filled with Dry Chemical Powder (First

		filling) as per IS 4308, part II 8/ IS 15683, shall be same capacity. c) It shall be pressurized with Dry Nitrogen, as expelling. The Nitrogen is to be charged at a pressure of 15 kg / cm2. d) The pressure gauge shall be suited for the purpose to discharge powder during use. 3. For water type extinguisher (Gas pressure type) (09 Litters), Mechanical Form Type (50 Litter): a) The cartridge shall be as per IS, and have 60 gm net carbon dioxide gas for expelling. b) Discharge should be not less than 06 meters and continue so far at least for 60 sec. The capacity of the Extinguisher, when filled up to the indicated level, shall be 9 litters. 4. For carbon dioxide type extinguisher (2Kg/4.5kg/22Kg): a) 1. The gas shall be conforming to IS: 307 and shall be stored at about 85 kg/cm2. The expansion ratio between stored liquid carbon dioxide to expanded gas shall be 1:9 times and total discharge time shall be minimum 10 sec. and Maximum 25 sec. 5. Refilling work would be carried out in consultation with the Office of Estate & Engineering Department at IISER TVM 6. The Fire Extinguisher should be examined internally for any damage & corrosion before re-filling. 7. All Fire Extinguishers must be discharged/emptied before re-filling of fire extinguishers. 8. Checking of nozzles, porthole, vent hole, cap assembly, siphon tube, safety pin/clip, discharge pipe etc. 9. After refilling, paste the inspection card to the body of fire extinguishers indicating the serial number, date of re-filling, next due date of re-filling, the due date for hydraulic testing etc. whatsoever required. 10. Ensure that all joints are fully tightened. And the nozzle and vent hole etc. are free from dust/dirt. 11. The contractor/vendor shall refill and repair the fire extinguisher free of cost within warranty time period of re-fill, if weight loss is noticed in the fire extinguishers which have been refilled by the contractor. 12. The refilling of fire extinguishers shall have a warranty of 01 year from the date of refilling.

		13. Random testing of the quality MAP powder at the time of refilling may be carried out by the IISER TVM authority at any authorized laboratory. If testing found fail, no payment will be made to the contractor for the work done. One or two fire extinguishers of each category should be tested to ensure satisfactory compliance and the testing costs shall be borne by the contractor/vendor. 14. Replacement of small spares like rings/washers etc. to be done by the contractors at free of cost.
6	Fire Hydrant cabinet with hose reel	Checking including hose pipe, hose reel drum, jet shut off Nozzle, Branch pipe nozzle, cabinet door servicing, door glass replacement, cleaning, drying of RRL hose, painting, changing of gasket/ nut bolts if required.
7	Fire Hydrant point	Checking and operation of valve, closing interlock mechanism, cleaning, painting, changing of gasket/ nut bolts if required.
8	Air vessel	Checking including servicing, cleaning of pressure gauge, pressure switches, ball valves, piping servicing, installation and painting
10	Pipe Line (Including all risers)	For Hydrant pump, Sprinkler pump, Jockey Pump, Booster pump, including butter fly valves, NRV, CI Brackets and hook bolts,/ sprinkler system, alarm Bell, Servicing, checking, greasing and painting and replacement of gaskets if required attending minor leakages, Flushing, testing, commissioning both system.
11	Inspection Reports	1. All above installation and their reports Monthly with counter signature of agency's responsible person 2. Annual report based on Monthly report with counter signature of agency's responsible person. 3. Demonstration of fire fighting system quarterly to the institute personals. 4. Maintaining inspection register based on CPWD fire manual. 5. Complaint to be attended within 24 hours. 6. Emergency call shall be attended immediately. 7. Required spare/components shall be arranged/ supplied on urgent basis without disturbing the regular services and invoices shall be submitted in actual. 8. All the consumables such as lubricants, paints, primers, cotton waste, tools etc required for the maintenance work will be under the contractors scope.
12	PA system/Fire detection system/Fire protection system/ Fire Alarm Panel	Must be operational 24 hours. The following works / checks shall be carried out to keep the system perfectly in working

		order and a record for the same shall be maintained in a logbook. 1. Checking of power supply position of all the fire alarm and indication panels installed at various locations in the building. 2. Checking of battery backup power supply and to keep it in proper working conditions. Repairing of backup power supply shall be the responsibility of the contractor except replacement of worn out batteries due to normal wear and tear. Decision of Engineer-in charge shall be final in this regard. 3. Periodical checking of performance and working of hooters / talk back unit / manual call point / smoke and heat detectors. 4. Checking of working of each zone from main panel. 5. The schedule and activities for daily / weekly / monthly testing and checking would be done as per instructions of Engineer-in-charge. 6. In case of any fire, staff deputed at site shall provide all necessary help to take necessary steps and action for extinguishing the fire and to inform to Fire Services at phone No. 101 as well as to EIC and Civil Engineer In-charge without loss of any time and shall be recorded in Log Book. 7. Replacement of broken glass of MCP, talk back units, topping of battery water etc. shall be the firm's responsibility for which nothing extra shall be paid. 8. Dust from all the accessories and panels etc. shall be removed with the help of vacuum cleaner once in 3 months. 9. All the fire alarm installation and fire control room shall be kept neat and clean for which duster, and other cleaning materials, vacuum cleaner etc. shall be arranged by the contractor and nothing extra shall be paid in this regard.

B Periodical Testing and maintenance Chart

Sl. No	*System Component*	*Activity*	*Duration*
1	Water tanks	(i) Level Check	Daily
		(ii) Cleaning	Once in a year
2	Pumps	(i) Running	Daily
		(ii) Test Flow	Anually
		(iii) Lubrication	Quarterly
3	Engine	(i) Running	Daily
		(ii) Lubrication	Quarterly
		(iii) Battery	Weekly
		(iv) Fuel tank	Daily
		(v) Servicing	As per engine manufacturer's recommendation
4	Motor	(i) Running	Daily
		(ii) Starter	Weekly
		(iii) Insulation resistance	Once in a year
5	Piping	(i) Pressure	Daily
		(ii) Flushing	Once in a year
6	Valves (Landing and isolation)	(i) Operation	Monthly
7	Control System	(i) Operation	Monthly
		(ii) Connections and system components	Quarterly
8	Hose Reel and Hose Pipes	(i) Physical check	Monthly
		(ii) Operation check	Anually
		(iii) Replacement	Depending upon physical condition
9	Fire Brigade Connections/inl	(i) Physical check	Montjly
		(ii) Operation check	Anually
10	Instantaneous Coupling	(i) Physical check	Montjly
		(ii) Lubrication	Once in six months

For achieving the objective and meeting the requirement of periodical testing and checking the system is essential. Various activities and their duration have been tabulated in periodical testing and maintenance schedule.

- Water for firefighting purpose shall be changed/cleaned as per exigencies, if engineer in charge will give the permission for this, otherwise it is not applicable.
- Maintaining diesel engine is very important for the system operation. Maintenance shall be through authorised service centre.
- Adequate diesel should be either be available in the pump house or nearby so that operation is not discontinued for want of Diesel-Management is required.
- If any outlet is found to be defective and replacement is not easily available the whole assembly should be removed and be replaced by bank off plate so that the system remain operational.
- Hose reel shall be subjected to regular inspection to ensure that all valves are functional, out let nozzle not checked.
- The valves in closed position be opened and closed couple of times and the hose pipes and their coupling shall be checked to ensure there is no leakage during their use.
- The female coupling cum tooth mechanism be operated and lubricated for ensuring ease of operation.

C MAINTENANCE AND OPERATION OF WET RAISER SYSTEM

C.1 INTRODUCTION

This appendix covers suggestive guidelines for maintenance and operation of the Wet Riser System.

C.1.1 **OBJECTIVE:-**

(i) To keep the entire system fully operational and functional at all times.

(ii) In case full system cannot be kept functional for unavoidable reason, as much as possible, the installation shall be retained functional by isolating the defective section.

C.2 MAINTENANCE REQUIREMENT OF SYSTEM COMPONENTS

For maintaining firefighting system following points are to be taken care of:-

C.2.1 To ensure availability of water in UG tank and terrace tank all the time and to maintain the tanks in clean condition.

C.2.2 To ensure that the piping system is free from leakage. Any portion found to be leaking is to be isolated, rectified and connected with healthy system in shortest possible time.

C.2.3 To ensure that all pumps are in good running condition. Any pump found to be defective is to be isolated by closing valves and attended immediately and put in to service in minimum time. All pump glands shall be maintained in efficient working condition and the packing renewed as required to maintain the efficiency. All working parts shall be kept clean and lightly oiled. Any necessary repairs shall be put in hand and carried out immediately.

C.2.4 To ensure availability of power for electrical pumps, working of starters, switch gear and other electrical components.

C.2.5 To ensure healthiness of diesel engine starting system, battery voltage, battery charger and availability of adequate diesel for engine operation. C.2.6 To check all landing valves of internal and external hydrants, isolating valves and replace the defective ones whenever necessary

C.2.7 To check automatic operation of entire system by opening landing valves at different locations.

C.2.8 To conduct fire drill at regular interval.

C.3 PERIODICAL TESTING

For achieving the objectives of Para C.1.1 and meeting the requirement of Para C.2 periodical testing and checking the system is essential. Various activities and their duration have been tabulated in Table C.1.

C.4 PROCEDURE

C.4.1 Though the firefighting system operation is automatic, however for daily checking and attending to the system in case of operation, a trained pump operator shall be available round the clock.

C.4.2 Operation and Maintenance instructions shall be available in the pump room and fire control room.

C.4.3 Water for firefighting purpose is not to be used for any other purpose. However in order to avoid stagnation, the same shall be changed / cleaned regularly.

C.4.4 Maintaining Diesel Engine is very important for the system operation since during fire, power supply is deliberately or un-deliberately switched off. Annual Maintenance Contract (AMC) of engine shall be given to the authorized service centre of engine manufacturer. Adequate diesel should either be available in the pump house or nearby so that operation is not discontinued for want of diesel.

C.4.5 Hydrant Mains / Ring Mains shall be tested once a fortnight with a pump delivering at its maximum pressure. A running test with two or more hose lines each 30m long operating shall be carried out.

C.4.6 If any out let is found to be defective and replacement is not easily available the whole assembly should be removed and be replaced by blank off plate so that the system remains operational.

C.4.7 Hose reels shall be subjected to regular inspection to ensure that all valve are functional, out let nozzle not choked. At least once in a year the same shall be subjected to operation to ensure that hose reel isin good condition and that the coupling joints are water tight. Flow should also be checked for the leakage of hose reel.

C.4.8 All hydrants shall be examined systematically once a week to ensure that valves and spring catches are maintained in good condition. Spare washers shall be kept for hydrant valve seats.

C.4.9 Cut-off valves shall be thoroughly overhauled annually to remove sludge and other foreign matter collected in the valve seating.

C.4.10 All isolating valves shall be checked for operation. The valves in closed position be opened and closed couple of times and the valves in open position be closed and opened couple of times so that when required, the valves perform their function.

C.4.11 All hose boxes/hose stations shall be inspected externally once every week to ensure that the equipment installed therein is intact. Further, the hose boxes/hose stations shall be cleaned internally and externally once a month. When the hose gets worn out at the tail end of the coupling(s), it is permissible to cut the end(s) of the hose. However should the lengths of the hose after cutting(s) fall below 90 percent of its original, the hose shall be discarded. A hose register shall be kept showing Information such as date purchased, date brought into use, date cut (if reduced in length), is useful. Any hose becoming inefficient through use, neglect or from any other cause, shall be discarded. Fire protection hose shall 'not be used for purposes other than fire protection and drill. Hose pipes and their couplings shall be checked to ensure there is no ppedc 98 leakage during their use. The female coupling cam tooth mechanism be operated and lubricated for ensuring ease of operation.

C.4.12 Power supply to the pump house is not to be discontinued for any reason. Alternative arrangement shall be made in case any feeding switch gear is under repair / replacement.

C.4.13 It has to be ensured that there are no obstructions in front of the hydrants impending accessibility

D MAINTENANCE OF AUTOMATIC SPRINKLER SYSTEM

D1. Maintenance of other fire fighting installation has been described in Appendix 'C' which hold good for sprinkler installation also.

D.1.1 Sprinkler shall not be re-conditioned or repaired. Used and/or defective sprinklers shall be replaced by new ones.

D.1.2 Sprinklers shall not be painted after installation.

D.1.3 Spare sprinklers – A stock of spare sprinklers shall be kept in Fire Control Room so that prompt replacement is possible after operation/damage of a sprinkler head. A minimum of 5% of the installed capacity or 25 sprinklers of all types whichever is more shall be kept in stock.

Spanners for sprinklers and teflon tape shall also be kept along with spare sprinklers in readiness.

D.1.4 As far as possible, the installation shall be maintained in operating condition by blanking of pipe work feeding the in operative part or parts where work is taking place.

D.1.5 The inoperative part, if defective shall be attended to and connected with the operative system.

D.1.6 Action following sprinkler operation

D.1.6.1 Following the operation of sprinklers, the operated head shall be replaced with new ones and water supply shall be restored.

D.1.6.2 The sprinklers in the vicinity of the operated sprinklers shall also be checked for damage by heat or any other cause and replaced if necessary.

D.1.6.3 The sprinkler pump shall not be shut off until complete extinguishment of the fire. The starting of the pump shall be automatic but the stopping of the pump after an extinguishment shall be manual.

D.1.7 All piping shall be examined to determine its conditions at least once a year.

D.1.8 All installation valves and associated equipment shall be serviced and tested annually.

D.1.9 Discharge test of sprinklers shall be carried out at least once in six months.

D.1.10 Manual testing of the system shall be carried out once in six months.

D.1.11 When normally opened valves are closed following system operation or test, suitable procedure shall be instituted to ensure that they are re-opened.

D.1.12 The entire system shall flushed at least once in a year.

D.1.13 The sprinkler bulb shall be kept free from paint or dust.

D2 MAINTENANCE GUIDELINES

Following guidelines shall be followed for sprinkler maintenance.

D.2.1 Maintenance and testing shall be carried out in a planned and systematic manner and records kept.

D.2.2 only trained personnel shall be engaged in the work. Contract with qualified agency for service, test and operation is recommended.

D.2.3 Other fire fighting installations are operated manually ie, to operated a first aid hose reel or internal/external hydrant a person is required. As such during fire, when the system is in operation, somebody in the building is aware of it. In case of sprinkler operation, no one will come to know. For looking after sprinkler installation following personnel shall be available at all hours.

(a) A trained pump operator shall be available in the pump room.

(b) Depending upon the size of installations at least two or more trained personnel shall be available in fire control room.

E FIRE DRILL

For making the users familiar with the system, Fire Drills shall be conducted for high rise buildings, in accordance with the fire safety plan, at least once every three months for buildings during the first two years. Thereafter, fire drills shall be conducted at least once every six months. All occupants of the building shall participate in the fire drill. However, occupants of the building, other than building service employees are not required to leave the floor or use the exits during the drill. A written record of such drill shall be kept on the premises for a three years period and shall be readily available for fire brigade inspection. For other buildings, fire drill shall be carried out once in six months. Local fire service and nodal officer-in-charge of various parts of the building shall be involved in conducting fire drill. Operation of the system shall be demonstrated so that all users are confident of the system and aware of their duties and responsibilities during fire.