

III FIRE PROTECTION SYSTEM

1 FIRE ALARM SYSTEM

1.1 Monthly Servicing

- (a) Notify Airport Fire Services of the intention to shut down the fire alarm system.
- (b) Simulate fire conditions by operating the test switches on all groups and re-setting the installation to normal after the completion of the test.
- (c) Check the battery voltage by operating the battery test switch and record the "voltage under local condition" in the log book.
- (d) Check the condition of the storage batteries including the terminals and maintain them in a serviceable condition.
- (e) Check the condition of the battery cabinet for corrosion and ensure that the batteries are stored in a secure condition.
- (f) Check to ensure that all twin indicating lights are operating correctly and replace them if they are faulty.
- (g) Check the operation of the external alarm bell and equipment shut down on sequence.
- (h) Check individual detector and manual station by sequence for proper response as indicated by the lighting of the test lamp, trouble light and alarm light. The detector must be cleared and the system must be reset at the control unit after each individual detector is tested.
- (i) Check the operation of the direct Airport Fire Service alarm transmitter and ensure the transmitter hollies correctly to the reset position.
- (j) Check the power supply failure facility by disconnecting the battery and main supply.
- (k) Check the initiation facilities to operate remote control functions in accordance with the appropriate codes. Where the air handling plant shut down facilities are provided, these should be operated at least on a monthly basis. The Authorised Representative should, however, be notified prior to the shut-down and the Employer shall provide the personnel to be in attendance and to re-start the plant.
- (l) Check that the fire indicator board is in a clean and operative condition and ensure that the enclosure is maintaining a satisfactory dust seal.
- (m) Visually inspect the condition of all components, including resistors, capacitors and cable.
- (n) Inform the Authorised Representative any circuits which are subject to repair, alteration or extension.

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- (o) Record monthly details of the routine test together with emergency visits, if any.
- (p) Check that all switches are returned to their normal operating position.
- (q) Notify Airport Fire Service on completion of the tests.

1.2 Annual Testing

- (a) Notify Airport Fire Service of the intention to shut down the fire alarm system.
- (b) Combustion Product Detectors should be cleaned annually by blowing clean, dry air through the opening between the collector plate and the well where the radium sensor is located. If the foreign material is difficult to remove, it may be cleaned with a swab saturated with alcohol.
- (c) With the system operating, remove one lead from each of the detector circuits, one circuit at a time, at the control unit, or at a detector if more convenient and ascertain that the trouble alarm is activated.
- (d) Shutdown the unit by switching off the mains supply and disconnecting the batteries.
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- (e) Thoroughly check the whole unit for loose connections, terminals, fray wires, etc.
- (f) Check all switches and push buttons for smooth accurate operation and function.
- (g) Check all lamp globes for correct voltage and operation.
- (h) Replace any broken or suspect equipment as may be required.
- (i) Re-assemble.
- (j) Reconnect the batteries and switch the mains supply on.
- (k) Check any relays for correct adjustment and quick effective operation.
- (l) Check the battery charge operation and output.
- (m) Check the operation of all shutdown sequences and reset required.
- (n) Test the unit in accordance with steps 1. 1 to 1. 11 of the monthly test.
- (o) Enter the results of the tests in the Log Book.
- (p) Notify Airport Fire Service on completion of the tests.

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1 FIRE PROTECTION SYSTEM (MONTHLY) (Cont'd)

1.2 Fire Alarm Panel

- a. Check all the panel power supplies.
- b. Ensure all wires and properly terminated.
- c. Check and tighten, if necessary, all wiring contacts and terminations.
- d. Check battery chargers.
- e. Check batteries voltage and functionality.
Disconnect battery connection and confirm LED alarm indicators are- in operation.
- h. Ensure all the electronic cards are properly secured.
- i. Check and test all the LEDs display
- j. Check proper bus communication between panels
- k. Clean excessive dust/heat.
- l. Verify that the programme is functioning.
- m. Activate a smoke detector zone.
- n. Stimulate a call point alarm.

1.3 Functional Test

- h. Functional test to ensure signal is received at Fire Station (Cisco Monitoring Centre).
- i. Functional test on breakglass call point and fire alarm bell
- j. Functional test of smoke detector
- k. Functional test on Ventilation Fans, AHUs, Lifts which are interlocked with Fire Alarm.

1.4 Printer

- a. Visual check on system printout.
- b. Check alarm printout.
- c. Check line feed and form feed function.
- d. Check and ensure proper gap for the printhead.
- e. Check and ensure smooth carriage motions.
- f. Run printer self test.
- g. Clean excessive dust.
- h. Check proper cable and tighten if necessary.
 - i. Replace printer paper.

2 AUTOMATIC SPRINKLER SYSTEM

2.1 General

- 2.1.1 After any servicing, alterations or repairs, inspection should be made to make sure that the valves are in fully open position, sealed and the system in operational condition.

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2 AUTOMATIC SPRINKLER SYSTEM (Cont'd)

2.1 General (Cont'd)

- 2.1.2 When any alterations, additions or repairs are to be made involving interruption of the sprinkler protection in whole or part, the Maintenance Engineer-in-charge should be notified and proper recording is done to reflect the changes in the system. Submission to FSB by PE may be necessary.
- 2.1.3 When building extensions, new partitions or enclosures are erected, the required extension of the sprinkler system in the new areas should be completed promptly.
- 2.1.4 When repairs or alterations affecting the sprinkler system are in progress, special provisions should be made to keep the sprinkler system in service in all areas not affected. When the sprinkler system is turned off during the day to allow for work in progress, it should be restored at night.
- 2.1.5 If the sprinkler system is necessarily need to be turned off in any portion overnight, then precautionary measures should be taken to post a specially instructed personnel to guard the portions without sprinkler protection.
- 2.1.6 Sprinkler valves are sometimes inadvertently left closed after alterations or repairs have been completed. A responsible person should be made to check the condition of the system following any such work to make sure that all the control valves are in fully open position and properly sealed.

2.2 Sprinkler Heads

- 2.2.1 Sprinkler heads should be checked regularly to make sure that they are in good condition, clean, free from corrosion, not painted or whitewash and not be bent or damaged. It should be replaced when they are painted, corroded or damaged.
- 2.2.2 Sprinkler should be protected against mechanical injury. Where there is danger of injury, approved sprinkler guards should be provided.
- 2.2.3 Always use the special sprinkler wrench in removing or installing sprinklers. Other types of wrenches may injure the sprinkler.
- 2.2.4 An adequate supply of extra sprinklers should be on hand.

2.3 Piping

- 2.3.1 Piping should be kept in good condition and free from mechanical injury.
- 2.3.2 Sprinkler piping should not be used for support for ladders, stock or other material.

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2 AUTOMATIC SPRINKLER SYSTEM (Cont'd)

2.4 Piping Hangers

- 2.4.1 Hangers should be kept in good condition. Broken or loose hangers should be replaced or refastened.
- 2.4.2 Broken or loose hangers may put undue strain on piping and fittings, causing breaks and interfere with proper drainage.

2.5 Water-Flow Alarm Devices

- 2.5.1 Water-flow alarm devices should be tested annually.

2.6 Sprinkler Tank

- 2.6.1 Periodic inspections should be made to ensure that the water level are at its maximum capacity level.
- 2.6.2 Constant maintenance of a full supply of water in sprinkler tanks is necessary so as to ensure proper performance of the sprinkler system in the event of a fire.

2.7 Sprinkler Pump

- 2.7.1 The pump should be started once a month. Regular inspection should be made, checking the maintenance of ample pressure, proper supply of lubricating oil, operative condition of valves, etc.
- 2.7.2 The pump room should be kept clean and accessible at all times.
- 2.7.3 The suction pipes, intakes, valves and screens of fire pumps should be examined frequently to make sure that they are free from any obstruction. Mud, gravel, leaves and other foreign materials entering the suction pipe may cause damage to the pump or obstruction of the piping of the sprinkler system. The automatically controlled pumping units should be tested monthly by manual means at least one start should be accomplished by reducing the water pressure.
- 2.7.4 This may be done with the test drain on the sensing line or with a flow from the fire sprinkler systems. The examination should be extended to include the condition and reliability of the electric power supply.

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2 AUTOMATIC SPRINKLER SYSTEM (Cont'd)

2.8 Procedure On Test Running Of Sprinkler Pumpset

- (a) Close sprinkler pumpset discharge valve of the pumpset under testing.
- (b) Slowly release the pressure switch sensing line pressure by opening the drain cocks until the preset pressure and the pumpset start up. Close the drain cocks. Record the-cut-in pressure and the no-flow churning pressure.
- (c) Obtain churning pressure of sprinkler pump with discharge valve closed.
- (d) Stop the pumpset and open the discharge valve.
- (e) Repeat the same procedures for the other pumpset.

2.9 Monthly Service And Maintenance Checklist For Sprinkler System

2.9.1 Inspect the Sprinkler Pumps; and

- (a) Check all seals, glands and pipe lines for leaks and rectify as necessary,
- (b) Check all pump bearings and lubricate with oil or grease as necessary.
- (c) Check the alignment and condition of all rubber couplings between pumps and drive motors and rectify as necessary.
- (d) Check all bolts and nuts for tightness and tighten as necessary.

2.9.2 Inspect the electric motors; and

- (a) Check all motor bearings and lubricate with grease as necessary.
- (b) Check carbon brushes and clip rings of all motors and clean as necessary. Renew carbon brushes as necessary.
- (c) Check safety devices fitted to all motors and clean, adjust and lubricate as necessary.

2.9.3 Inspect and check the routine operation of all electrical starters, electrical control gears and ancillary electrical apparatus, and

- (a) Clean, adjust and lubricate all bearings, pivots and other moving parts as necessary.
- (b) Clean or renew electric contactors as necessary.
- (c) Renew electric fuses as necessary.

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2 AUTOMATIC SPRINKLER SYSTEM (Cont'd)

- 2.9.4 Check and adjust all float switches and sequence starting for the pump control panel.
- 2.9.5 Inspect all water storage tanks and drains and clean and flush out the tanks as necessary. Check that stop valves at tank inlet, interconnecting pipes and pump suction pipes are secured and fully open. Verify the operation of the automatic tank filling mechanism. Visually check that tank contains requisite amount of water and verify operation of floatless level control units.
- 2.9.6 Check and verify that sprinkler installation control valves are strapped and padlocked in open position.
- 2.9.7 Check and verify that isolating valve to water alarm motor and gong is secured and fully open.
- 2.9.8 Check and verify that installation drain and test valves are secured and fully closed.
- 2.9.9 Check and verify that all other isolating valves are secured in their normal open position.
- 2.9.10 Check and inspect fire services breeching inlets.
- 2.9.11 Check and inspect water alarm motors and gong mechanisms.
- 2.9.12 Check and verify operation of water level indicators.
- 2.9.13 Testing of sprinkler pumps:
 - (a) Check and verify the automatic starting of each pump by actuating the drain and test valve in a manner to reduce the applied water pressure to the starting device and simulate a fire condition. Record pressure is correct. Keep each pump running for a period of at least five (5) minutes and verify the operation of the relief valve.
 - (b) Check and verify pump running alarm and phase failure alarm.
 - (c) Check pump starting equipment including fuses, circuit breakers and starters.
 - (d) Simulate failure on one of the pumps and verify the operation of the duty-standby changeover mechanism.

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2 AUTOMATIC SPRINKLER SYSTEM (Cont'd)

- 2.9.14 The entire sprinkler system should be inspected to ensure that they are free from damage, corrosion, grease, dust, paint or whitewash and should be replaced where necessary as a result of such conditions.
- 2.9.15 Valve systems shall be oiled or greased at least once a month.
- 2.9.16 Visual inspection and checking of the sprinkler heads for leakages, damages, obstruction and paint.
- 2.9.17 Check and repair all valves which are found leaking or defective.
- 2.9.18 Test flow switches by drawing out water at the drain valve of each floor.
- 2.9.19 Flushing out water for the system to test the sprinkler alarm bells.
- 2.9.20 Check correct operation of alarm control valve and alarm gong by discharging water from the drain valve.

- 2.10 Annual Test
 - 2.10.1 Simulated mechanical or electrical failure of duty pump and the ability of the standby pump to come in automatically and maintain the required output should be tested. Check and verify that local and remote pump failure warning function properly.
 - 2.10.2 Every pump suction tank should be completely flushed out and thoroughly cleaned.
 - 2.10.3 The water in the whole sprinkler pipework system should be completely drained out and filled with fresh water again.

3 HOSEREEL SYSTEM - QUARTERLY SERVICING

- 3.1 Check the hosereels and rubber hose for damage.
- 3.2 Check the operation for the nozzles for blockage.
- 3.3 Check and verify the operation of the 25 mm stop valve at the hosereel feed pipework and ensure that the valve is secured and fully closed.
- 3.4 Check and verify that the hose guide rollers move freely with the hose (N.B. This is to be determined by running out a few metres of the hose from reel).

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3 HOSEREEL SYSTEM - QUARTERLY SERVICING (Cont'd)

- 3.5 Check and verify all pump suction.
- 3.6 Check and verify all pump suction and delivery valves are fully open.
- 3.7 After checking, the hose shall be rewound in level layers, the valve shut off and the hose depressurised (where possible).
- 3.8 Check that the main water supply gate valves are locked and strapped in the open position.
- 3.9 Check that access to fire hosereel is not obstructed by the location of furniture, equipment or other such materials.

4 ELECTRIC MOTOR DRIVEN PUMP - MONTHLY SERVICING

- 4.1 Check and verify all pump suction and delivery valves are fully open.
- 4.2 Check and verify the pump starting by actuating the test valve in a manner to stimulate fire conditions. Record the pressure at which the pump starts. Ensure that this pressure is correct as per the pump operating instructions.
- 4.3 Run the pump for a minimum period of two (2) minutes.
- 4.4 Check and verify the pump running alarm.
- 4.5 Check the pump starting equipment including fuses and breaker starters.
- 4.6 Check and verify the phase failure alarm.
- 4.7 Check and verify, where appropriate, the pump priming arrangements.
- 4.8 Check and verify no excessive noise or vibration of the pump and motor while the unit is running.
- 4.9 Run the pump under full load for 60 minutes if practical.

5 UNDERGROUND HYDRANT - MONTHLY SERVICE

- 5.1 Check all Hydrant to be in serviceable condition.
- 5.2 Check and service Hydrant pump and Jockey pump as per item 2.
- 5.3 Check and repair Hydrants at site for any defects and leakage pipe line.

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7 PREACTION SYSTEM

The following inspection and/on maintenance procedure should be scheduled as listed below on performed upon the occurrence of any event which might bias the reliability of the system.

WARNING : DO NOT TURN OFF THE WATER SUPPLY TO MAKE REPAIRS WITHOUT PLACE A ROVING FIRE PATROL IN THE AREA COVERED BY THE SYSTEM. THE PATROL SHOULD CONTINUE UNTIL THE SYSTEM IS BACK IN SERVICE.

Prior to turning off any valves or activating any alarms, notify local security guards so that a false alarm will not be signaled.

7.1 Normal Conditions

- i) All main control valves must be opened
- ii) .The alarm test valve is in the ON position
- iii) The priming-line valve closed
- iv) The magnetic by-pass light is OFF

7.2 Monthly Maintenance

- i) The system should checked for normal condition
- ii) Test the water-motor alarm or turning the alarm test valve to the test position. The alarm should sound
- iv) Depress the drip check (significant water accumulation indicates a possible seat leak).

7.3 Semi-Annual Test

- i) Perform the weekly test
- ii) Conduct a water-flow test
 - a) Record the static water-pressure appearing on the priming-line pressure gauge

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7 PREACTION SYSTEM

7.3 Semi-Annual Test (Cont'd)

- b) Open the flow test valve-fully and record the residual water-pressure appearing on the priming line pressure gauge
- c) If the residual water-pressure reading is considerably lower than the previously recorded reading, place the system out of service, clear all supply lines and priming line strainers, and check for a partially-closed valve or supply-line obstruction.
- d) Trip the release-line system clean all strainers and priming-line restriction.

7.4 Monthly Maintenance of Air Compressor

- i) Check for normal operation
- ii) Change oil if necessary
- iii) Check the air filter and the dehydrator
- iv) Annual inspection by relevant authority and obtain Certificate of fitness.

8 HALON SYSTEM

Halon 1301 Total Flooding System Equipment - Monthly Service

WARNING : THE ACTUATION DEVICE MUST BE DISCONNECTED EITHER AT THE CONTROL PANEL OR ACTUATION DEVICES BEFORE PERFORMING THE MAINTENANCE WORK.

8.1 Defection And Actuation System

- i) To check and clean smoke detectors
- ii) To check effectiveness of gas actuation devices including the condition of the gas initiator
- iii) To check effectiveness of bells, smoke detectors, manual breakglass push buttons and time delay unit for discharge of gas

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8 HALON SYSTEM

8.1 Defection And Actuation System (Cont'd)

iv) To check all function key on the control panel that they are operating correct as follows:-

- . Acknowledgement of alarm and trouble
- . Disable actuation of EXTINGUISHING
- . RESETTING of alarm
- . Enable ACTUATION OF EXTINGUISHING
- . Switching OFF/ON of detector zone
- . Lamp test

v) To check performance of remote alarm to main fire alarm panel

vi) To check performance of interlock to shut down process.

8.2 Agent Supply

i) To check pressure of gas in spheres (Pressure must not be higher and lower than the blue mark shown in the pressure gauge)

ii) To check for damages or corrosions of the spheres

iii) To check all brackets, supports, etc for holding the spheres

iv) To check the weight of gas content in the spheres. This shall be done annually before the expiry of the annual contract.

8.3 Electrical System

8.3.1 To check condition of battery and battery charger unit in good operational order. Check also water level in the battery and top up battery water level as and when it is necessary.

8.3.1.1 To check voltage level of battery.

8.3.2 To check all indicators and warning lights for proper functioning equipment

8.3.3 To check emergency lighting, if any

8.3.4 To check shutdown of electrical power supply for air conditioner during discharge of Halon gas.

8.3.5 To check and visually inspect condition of all electrical components in the control panel including resistors, capacitors cable and wire connections.

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8 HALON SYSTEM

8.3 Electrical System (Cont'd)

8.3.5.1 To check proper functioning of supervisory circuits including for fault in the external circuit.

8.3.6 To check operation and effectiveness of power supply failure facility by disconnecting the mains supply from the battery charger.

8.4 Annual Inspection

8.4.1 Products of Combustion Detector Cleaning - the minimal requirement for detector maintenance consists of an annual cleaning of dust from the collector plate screen only.

8.4.1.1 Cleaning programs should be geared to the individual environment in area where an oily film or other coating may develop, the collectors plate screen must be periodically cleaned with chemically pure alcohol. Material used in cleaning should be discriminately destroyed after used.

CAUTION: DO NOT CLEAN THE RADIOACTIVE SOURCE OR THE DETECTION CHAMBER UNLESS • IF-IS ABSOLUTELY NECESSARY. IP THESE AREAS MUST BE CLEANED, THE DETECTOR MUST BE HELD SO THAT YOUR HAND CONTACTS METAL SURFACE OF THE DETECTOR WHILE CLEANING IS PERFORMED. FAILURE TO GROUND YOUR BODY TO THE DETECTOR DURING CLEANING PROCESS CAN COME PERMANENT DAMAGE TO THE DETECTOR.

8.4.2 Remove the detector and initiator connections at the Control Panel. Check insulation resistance to ground using a 500V DC megohmmeter whose current output is limited to 50m. A maximum Insulation resistances must exceed 2 megohms. Replace detector connection only.

8.4.2.1 Tape or otherwise insulate the initiator field leads. Connect a 24V DC test lamp the initiator terminals in the Control Panel.

a) Check each individual detector and manual release station and abort switch for proper response as indicated by lighting of the test lamp, trouble light and alarm light. The detector must clear and the system must be reset at the control unit after each individual detector is tested. Thermal detectors may be tested with a test lamp. Ultraviolet detector may also be tested with any ultraviolet source - normal lamps will not sufficient for this test, quartz-iodide lamps or equivalent are recommended. Products of combustion detectors may be tested with a smoke generating freon device. These detectors may be connected for pre-alarm.

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8 HALON SYSTEM

8.4 Annual Inspection (Cont'd)

- b) With the system operating, remove one lead from each of the detector circuits - one circuit at a time at the control panel or at a detector (if more convenient) and ascertain that the trouble alarm is activated.
- c) Disconnect the initiators at each agent storage container and install jumper wires at the connector in place of the initiators. Connect a 24V DC test lamp in series with the initiator loop and connect to the initiator at the control panel. Install a temporary jumper across actuating terminals of a detector circuit and turn the system on. Test light, and fire light should function. Remove jumpers from each initiator, cable in turn, and the test light should go out indicating integrity of this circuit. If the system is equipped with a secondary or reserve supply, turn the system off, switch to the secondary supply and repeat this test procedure.
- d) Inspect all piping, fittings and nozzles for looseness, dirt or other damage. Disconnect piping at the agent storage container and blow out with low pressure air, if needed.
- e) Disconnect all temporary test wiring, remove test devices, reconnect all system components as they were originally and turn the system on.

8.5 Initiator Replacement

The initiators in each storage container must be replaced periodically. The life will vary with the ambient temperature. The following is recommended.

MAXIMUM EXPOSURE TEMPERATURE	REPLACE AFTER
80°F	5 years
100°F	3 years
120°F	2 years
140°F	1 year

If a container has relieved as a result of overheating both the initiator and the well should be replaced regardless of age.

RECONDITIONING

Following actuation, the agent storage container must be reconditioned. Each container would require the amount of Halon 1301 specified.

Initiator should not be connected into the circuits until it has been ascertained that all detectors are clear and that there are no wiring faults. Initiator cables and any activated manual release station and abort switch must be reset before reactivating the system.

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8 HALON SYSTEM

8.6 Refilling Of Halon 1301

Refilling of Halon 1301 shall be done within 24 hours after the discharge of the gas.

9 DECAM SYSTEM

(To manufacturer's requirement)

10 Monthly/half yearly/yearly test results must be submitted after every test.

11 Check and ensure all self contained breathing apparatus are proper maintain and ready for uses.

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11 FIRE AND JOCKEY PUMPS

- 11.1 Check and test the running of all fire pumps accordingly to their required operation.
- 11.2 Check, record and verify all fire and jockey pumps pressure gauges reading for cut-in and cut-out of duty standby pump and jockey.
- 11.3 Check that all stop valves are secured in the open or closed positions as appropriate, including valves located for remote from the main control valve.
- 11.4 Operate all pressure reducing valve (where appropriate) to the full and correct operation under all flow conditions and check the pressure side of the valves for deterioration from the original test reading.
- 11.5 Check adequacy of lubricating fluid for all bearings and supplement where necessary.
- 11.6 Correct any excessive leakage from gland and shaft packings. Renew packings where necessary.
- 11.7 Clean all component parts of each equipment.
- 11.8 Check and verify all pump suctions and delivery valves are fully open.
- 11.9 Check and verify pump starting by actuating test valve in a manner to simulate fire condition.
- 11.10 Check for presence of any excessive/abnormal noise and vibration. Investigate and report on cause and initiate remedial measures.
- 11.11 Check the oil alarm motor and gong mechanism.
- 11.12 Check speed of all operating pumps. Abnormal conditions are to be reported and remedial measures initiated.

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12 MAINTENANCE SCHEDULE FOR FIRE EXTINGUISHERS

- a) The following checklist (where applicable) to be carried out for all fire extinguishers, including wheeled types during each half-yearly servicing:-
- b) When extinguishers which removed for repair or refilling, the temporary replacement extinguisher shall be provided.

12.1 Checklist and Corrective Action

Part	Items To Check	Corrective Action
Label	<ol style="list-style-type: none"> 1. 1. Illegible wording 2. Corrosion or loose label 	<ol style="list-style-type: none"> 1. 1. Clean or replace 2. Inspect body under label for corrosion and refix label
Body	<ol style="list-style-type: none"> 1. Hydrostatic test date of date of manufacture. 2. Corrosion 3. Mechanical damage (denting or abrasion) 4. Plant condition 5. Evidence of previous repairs (welding, soldering, brazing, etc) 6. Damaged threads (corroded, cross-threaded or worm) 7. Damaged sealing surface (nicks or corrosion) 8. Broken hangar attachment, carrying handle lug 	<ol style="list-style-type: none"> 1. Retest if expired. 2. Hydrostatic test and repaint, or discard. 3. Hydrostatic test and repaint or discard. 4. Clean and repaint 5. Discard or consult manufacturer. 6. Discard or consult manufacturer 7. Clean, repair, and leak test; or discard 8. Discard or consult manufacturer