



Pan American
Health
Organization



World Health
Organization
REGIONAL OFFICE FOR THE
Americas



PREVENTIVE MAINTENANCE MANUAL



SAFE + GREEN = SMART

FOR SMALL HEALTH CARE FACILITIES
(Non-medical equipment)

**MECHANICAL
ELECTRICAL
PLUMBING
BUILDING**

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INTRODUCTION

Many health facilities in the Caribbean are located in areas of high risk and need strengthening in the face of repeated damage or increasing climate threats. Health care facilities can also be large consumers of energy, with a significant environmental footprint. With energy prices in the Caribbean among the highest in the world, savings could be better used on improving services. A smart health facility is both safe and green.

The 'Smart Health Care Facilities in the Caribbean' project funded by the UK Department for International Development (DFID) was implemented by PAHO/WHO in partnership with the Ministries of Health in 7 target countries: Belize, Dominica, Grenada, Guyana, Jamaica, Saint Lucia and Saint Vincent and the Grenadines.

Up till now (preventive) maintenance has never been a top priority in the Caribbean. It is however another way to save money in the long term which can again be used to improve the health services. In order to make the Smart Hospitals Project sustainable, following the instructions of this preventative maintenance manual is strongly recommended. It comes in a easy to use pocket format, so it will be effortless to refer to while conducting the highly recommended preventive maintenance. Let's start using it to provide safer, greener health facilities to deliver care in disasters!

Note: Reference is made to UK Department of Health and Social Security Preventive Maintenance Manuals.

SECTION A

SECTION A
GENERAL
INSTRUCTIONS

1. GENERAL INSTRUCTIONS

SECTION B
SAFETY

- 1.1 This manual provides a list of fittings, fixtures and equipment that is typically found in small health facilities, health centres and polyclinics. It also includes the building structure, roof and grounds. It DOES NOT cover medical equipment.

SECTION C
TOOLS,
EQUIPMENT AND
TEST INSTRUMENTS

- 1.2 For each item listed there is a set of instructions that will assist the maintenance or contract personnel to carry out the Preventive Maintenance (PM) tasks.

SECTION D
MECHANICAL

- 1.3 The frequencies of the maintenance tasks stated in this Manual are intended only for general guidance and should be adjusted to suit the local environment (eq. seaside locations, dusty locations, etc.), degree of usage, and condition of the equipment. In this Manual, the frequency of the maintenance task is denoted by the following letter code:

SECTION E
ELECTRICAL

SECTION F
PLUMBING

SECTION G
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W = Weekly

M = Monthly

Q = Quarterly

S = Semi-Annually

Y = Yearly

- 1.4 The manual does not include detailed instructions for each component part of each item of equipment but personnel are expected to carry

out the usual maintenance work to the whole item in accordance with the normal trade practice.

SECTION A
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INSTRUCTIONS

- 1.5 All local codes and statutory requirements are to be observed. There must be coordination with the particular health facility when carrying out the PM tasks. New PM tasks must be added to the list if they are not presently included and new equipment is added.

SECTION B
SAFETY

SECTION C
TOOLS,
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TEST INSTRUMENTS

- 1.6 Personnel carrying out PM tasks will carry out minor repairs or replacements. Where it is considered that repairs will be time consuming or of an extensive nature, personnel should report the situation to their supervisor and fill out a Maintenance Requisition form. Contract personnel should report to their employer so that the more extensive work could be scheduled under a separate Work Order.

SECTION D
MECHANICAL

SECTION E
ELECTRICAL

SECTION F
PLUMBING

- 1.7 Where equipment manufacturer maintenance procedures are available their recommendations should be used.

SECTION G
BUILDING

- 1.8 Preventive Maintenance requires the following main tasks:

1.8.1 Clean: This is self-explanatory and involves tasks such as brushing, washing, wiping with dry rags, wiping with rags with clean water, rags with detergent, and rags with a solvent.

1.8.2 Lubricate: This requires the use of oils and greases that may be applied with dispensing devices or by brush.

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- 1.8.3 Check: This requires the observation and careful inspection of the item or system for functionality.
- 1.8.4 Examine: This requires a critical check or examination for functionality, damage, wear or deterioration. This will also ascertain that the plant or equipment is correctly adjusted to conform to the required standard. The inspection is carried out without dismantling by using senses such as sight, smell, noises and vibration.
- 1.8.5 Test: This requires operating the item using the appropriate testing instruments to ensure the item is functioning correctly.
- 1.9 In this manual, routine part replacement is not considered.
- 1.10 A weekly PM Report must be submitted to the supervisor by the maintenance personnel.
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SECTION B

SECTION A
GENERAL
INSTRUCTIONS

2. SAFETY

SECTION B
SAFETY

- 2.1 All local laws and regulations related to occupational health, safety and the environment (HSE) must be observed. Safety in all its aspects refers to the health and safety of the person, the safe operation of the equipment, and concern to the preservation of the environment.
- 2.2 All plant and equipment that is being worked on must be rendered safe. Lock out tags must be used when appropriate.
- 2.3 Safety guards must be securely fixed and safety devices must be left operational.
- 2.4 Where pathological or biological hazards may exist, the responsible officer must be contacted.
- 2.5 Appropriate Personal Protective Equipment (PPE) must be worn by service men carrying out the work. This includes safety harnesses for working on ladders and at heights.
- 2.6 The service team should comprise at least two technicians. The team should be equipped with all the necessary tools, equipment and instruments to safely and effectively perform their job. This may include the exclusive use of a small, customize, pick-up truck.
- 2.7 The correct tool must be used for the job. Avoid using substitute tools that may cause

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damage to the individual or to equipment. Specialized tools must be available for the maintenance of equipment.

- 2.8 All defects in tools, steps, ladders and other items which may impair safety must not be used and immediately reported to the supervisor. Defective equipment must not be used until defects are rectified.

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SECTION A
GENERAL
INSTRUCTIONS

3. TOOLS, EQUIPMENT AND TEST INSTRUMENT

SECTION B
SAFETY

- 3.1 Each service team must be equipped with all the necessary tools, equipment and instruments to safely and effectively perform their job. This may include the exclusive use of a small, customize, pick-up truck. A typical list of tools include, but are not limited to, the following:

SECTION C
TOOLS,
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SECTION D
MECHANICAL

3.1.1 Hand tools:

SECTION E
ELECTRICAL

- Set of four flat blade screwdrivers, $\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ".
- Set of three Phillip screwdrivers, No. 1, No. 2, No. 3.
- Set of three Robinson head screwdrivers, red, green, black.
- Set of miniature screwdrivers.
- Set of nut drivers.
- Set of pliers:
 - ◆ Long nose.
 - ◆ Linesman.
 - ◆ Vice grip.
 - ◆ Pump pliers (grove joint).
 - ◆ Diagonal cutting pliers.
 - ◆ Wire stripping/crimping pliers.
- Socket set, imperial, $\frac{3}{16}$ "- $\frac{1}{2}$ ".

SECTION F
PLUMBING

SECTION G
BUILDING

- Socket Set, metric, 4 – 13.
- Combination wrench set, imperial, 1/4" – 3/4".
- Combination wrench set, metric, 6 – 19.
- Set of adjustable wrenches. 6", 10".
- Set of pipe wrenches. 6", 12", 18".
- Basin wrench.
- Hex key set, imperial and metric.
- Utility knife.
- Claw hammer.
- Wire brush.
- Hacksaw.
- Miniature hacksaw.
- Miniature file set.
- Punch and chisel set.
- Tool kit.

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3.1.2 Equipment:

- Step ladder, 6'.
- Extension ladder, 24'.
- Hand trolley.
- Torchlight.
- Extension cord with examination light.
- Empty containers for used oil, etc.
- Miscellaneous brushes, rags, gloves, safety glasses, safety harnesses, etc.

3.1.3 Instruments:

- Square, 2' X 1'.
- Level, 2'.
- Tape measure, 10' (3m).
- Digital temperature thermometer.
- Air conditioning unit gauge set.
- Digital multi-meter.
- Spring balance.

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SECTION A
GENERAL
INSTRUCTIONS

4. MECHANICAL

SECTION B
SAFETY

4.1 Air Conditioning and Ventilation Systems. (Q)

4.2 Fire Fighting Equipment. (Y, S, M, W)

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TEST INSTRUMENTS

4.3 Potable Water Pumps and Systems, including Rain Water Harvesting and Hot Water Systems. (Y, M, W)

4.4 Compressed Air and Vacuum Systems. (Y, Q, W)

SECTION D
MECHANICAL

4.5 Sewage Plant. (Y, Q, W)

4.6 Septic Tank. (Y, M)

SECTION E
ELECTRICAL

4.7 Grease Trap. (Y, M)

4.8 Laundry Equipment. (Y, Q)

4.9 Lifts, Elevators, Dumb Waiters. (Y, M)

SECTION F
PLUMBING

4.10 Incinerators. (Y, S, Q, M)

4.11 Gas Services and Appliances. (M)

SECTION G
BUILDING

4.1 Air Conditioning and Ventilation Systems (Q)

4.1.1 GENERAL

4.1.1.1 Test Controls.

4.1.1.2 Examine for leaks.

4.1.1.3 Examine for physical condition and mechanical connection to walls, ground, roof top, etc.

4.1.2 EVAPORATOR UNIT

4.1.2.1 Examine and Clean filters.

4.1.2.2 Loosen evaporator coils. Clean

	behind coils. Check for any mould.	SECTION A GENERAL INSTRUCTIONS
4.1.2.3	Clean.	
4.1.3	CONDENSING UNIT	SECTION B SAFETY
4.1.3.1	Examine.	
4.1.3.2	Clean.	
4.1.3.3	Test for correct refrigerant pressures.	SECTION C TOOLS, EQUIPMENT AND TEST INSTRUMENTS
4.1.4	WINDOW TYPE UNIT	
4.1.4.1	Remove unit from case and take to safe location.	SECTION D MECHANICAL
4.1.4.2	Examine for leaks.	
4.1.4.3	Clean filter.	SECTION E ELECTRICAL
4.1.4.4	Clean evaporator and condenser.	
4.1.4.5	Test for correct refrigerant pressures.	SECTION F PLUMBING
4.1.4.6	Clean unit case and front.	SECTION G BUILDING
REPORT ON CONDITION		

4.2 Fire Fighting Equipment (Y, S, M, W)

4.2.1 SPRINKLER SYSTEMS (Y)

- 4.2.1.1 Examine fixings and anchorages.
- 4.2.1.2 Examine pipe for leaks.
- 4.2.1.3 Clean and Examine hydrant boxes.
- 4.2.1.4 Test hydrant valves.
- 4.2.1.5 Run out hoses, examine and test.

- 4.2.1.6 Examine sprinkler heads for signs of dirt, corrosion. Replace as necessary.
- 4.2.2 SPRINKLER SYSTEMS (S)
- 4.2.2.1 Run out hoses, examine and test.
- 4.2.2.2 Test alarms.
- 4.2.3 PORTABLE FIRE EXTINGUISHERS (S)
- 4.2.3.1 Ensure that extinguishers are in their correct position.
- 4.2.3.2 Examine for signs of external damage or corrosion.
- 4.2.3.3 Examine hoses.
- 4.2.4 SPRINKLER SYSTEMS (M)
- 4.2.4.1 Check for alarm conditions.
- 4.2.4.2 Check water level in tanks. Record water level as full, three-quarters, half, quarter, or empty.
- 4.2.4.3 Check water pressure gauges.
- 4.2.4.4 Clean pumps and control panels.
- 4.2.5 PORTABLE FIRE EXTINGUISHERS (M)
- 4.2.5.1 Examine bracket fixing.
- 4.2.5.2 Examine unit for safety seal.
- 4.2.5.3 Check pressure on gauges. Remove for servicing if reading is in the “red” range.

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4.2.5.4	Test weight using spring balance. Remove for servicing if values are less than 90% of the full weight.	SECTION A GENERAL INSTRUCTIONS
4.2.5.5	Check for corrosion.	SECTION B SAFETY
4.2.6	SPRINKLER SYSTEMS (W)	
4.2.6.1	Check general condition of hose reel cabinets.	SECTION C TOOLS, EQUIPMENT AND TEST INSTRUMENTS
4.2.6.2	Examine and Test operation of pumps.	
4.2.7	PORTABLE FIRE EXTINGUISHERS (W)	SECTION D MECHANICAL
4.2.7.1	Examine unit for safety seal.	SECTION E ELECTRICAL
4.2.7.2	Check pressure on gauges.	
	REPORT ON CONDITION	SECTION F PLUMBING
4.3	Potable Water Pumps and Systems, including Rain Water Harvesting and Hot Water Systems. (Y, M, W)	SECTION G BUILDING
4.3.1	YEARLY	
4.3.1.1	Clean water tanks.	
4.3.2	MONTHLY	
4.3.2.1	Clean area around tanks and pumps.	
4.3.2.2	Check pumps, pipe fixings and anchorages.	
4.3.2.3	Examine pipework for leaks and damage.	
4.3.2.4	Test valves, including main service valve.	

- 4.3.2.5 Examine rain water collection system. **SECTION A
GENERAL
INSTRUCTIONS**
- 4.3.2.6 Clean roof gutters, channels, pipe, strainers, etc. as necessary. **SECTION B
SAFETY**
- 4.3.2.7 Examine Chlorinator and UV disinfection system. Report chlorine bottle pressures. **SECTION C
TOOLS,
EQUIPMENT AND
TEST INSTRUMENTS**
- 4.3.2.8 Examine filters, clean or replace as necessary.
- 4.3.2.9 Clean and examine solar water heaters. Check for damage and leaks. **SECTION D
MECHANICAL**
- 4.3.3 WEEKLY **SECTION E
ELECTRICAL**
- 4.3.3.1 Check water level in tanks. Record water level as full, three-quarters, half, quarter, or empty. **SECTION F
PLUMBING**
- 4.3.3.2 Check function of water tank float valve. **SECTION G
BUILDING**
- 4.3.3.3 Examine pump for leaks, unusual noise and vibration.
- 4.3.3.4 Clean pump and control panel.
- 4.3.3.5 Check function of water pump. Record cut-in and cut-out pressures.
- 4.3.3.6 Check time between cut-in and cut-out of water pump. If unusually short, report damaged pressure tank.

REPORT ON CONDITION

4.4 Compressed Air and Vacuum Systems (Y, Q, W)

4.4.1 YEARLY

4.4.1.1 Examine all pipework for leaks and damage.

4.4.1.2 Examine hangers and supports; adjust as necessary.

4.4.1.3 Drain and clean air receiver and vacuum vessels.

4.4.1.4 Check safety valves.

4.4.1.5 Prepare pressure vessels for Statutory Inspection.

4.4.2 QUARTERLY

4.4.2.1 Examine pulleys and keys.

4.4.2.2 Check for alignment of motor; adjust as necessary.

4.4.2.3 Examine anti-vibration mountings.

4.4.2.4 Test safety valves.

4.4.2.5 Check and clean valves, drain cocks and automatic drains.

4.4.2.6 Examine pressure gauges.

4.4.2.7 Examine air filters, service as necessary.

4.4.2.8 Lubricate as necessary.

4.4.2.9 Clean cooler fins and fan blades.

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4.4.2.10 Examine pressure regulators and other control elements.

SECTION A
GENERAL
INSTRUCTIONS

4.4.3 WEEKLY

4.4.3.1 Examine oil levels.

SECTION B
SAFETY

4.4.3.2 Drain air receiver.

4.4.3.3 Examine belts for correct tension.

SECTION C
TOOLS,
EQUIPMENT AND
TEST INSTRUMENTS

4.4.3.4 Ensure safety guards are in position and securely fixed.

SECTION D
MECHANICAL

REPORT ON CONDITION

4.5 Sewage Plant (Y, Q, W)

4.5.1 YEARLY

SECTION E
ELECTRICAL

4.5.1.1 Examine containment vessel or structure for leaks and damage.

SECTION F
PLUMBING

4.5.1.2 Examine filter beds; renew media as necessary.

SECTION G
BUILDING

4.5.1.3 Examine all valves.

4.5.1.4 Check pumps.

4.5.1.5 Examine water level.

4.5.1.6 Check instruments and controls.

4.5.1.7 Clean deposits in sediment tanks.

4.5.1.8 Clean filter media; renew as necessary.

4.5.2 QUATERLY

4.5.2.1 Examine Chlorinator or UV disinfection system. Report chlorine

- bottle pressures.
- 4.5.2.2 Check system for leaks. **SECTION A
GENERAL
INSTRUCTIONS**
- 4.5.2.3 Examine pumps.
- 4.5.2.4 Lubricate pumps. **SECTION B
SAFETY**
- 4.5.2.5 Clean area around treatment plant.
- 4.5.2.6 Test valves for free travel. **SECTION C
TOOLS,
EQUIPMENT AND
TEST INSTRUMENTS**
- 4.5.2.7 Examine for excess build-up of grease and detergent. **SECTION D
MECHANICAL**
- 4.5.3 WEEKLY
- 4.5.3.1 Examine pipelines; ensure they are clear. **SECTION E
ELECTRICAL**
- 4.5.3.2 Rotary distributors.
- 4.5.3.2.1 Brush through arms. **SECTION F
PLUMBING**
- 4.5.3.2.2 Clean and examine sparge holes. **SECTION G
BUILDING**
- 4.5.3.2.3 Lubricate ratchets and pawls.
- 4.5.3.2.4 Lubricate top and bottom bearings on central column.
- 4.5.3.3 Clear screens and clean buckets.

REPORT ON CONDITION

4.6 Septic Tank (Y, M)

4.6.1 YEARLY

- 4.6.1.1 Open cover and examine.

- 4.6.1.2 Make arrangements to pump sludge as necessary.

SECTION A
GENERAL
INSTRUCTIONS

4.6.2 MONTHLY

- 4.6.2.1 Apply measured amount of septic tank treatment bacteria to any toilet and flush twice.

SECTION B
SAFETY

SECTION C
TOOLS,
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REPORT ON CONDITION

4.7 Grease Trap (Y, M)

SECTION D
MECHANICAL

4.7.1 YEARLY

- 4.7.1.1 Open cover and examine.

SECTION E
ELECTRICAL

- 4.7.1.2 Make arrangements to pump sludge as necessary.

SECTION F
PLUMBING

4.7.2 MONTHLY

- 4.7.2.1 Apply measured amount of grease trap treatment bacteria to any kitchen sink that flows through the grease trap. Let cold water run for one minute (do not use hot water).

SECTION G
BUILDING

REPORT ON CONDITION

4.8 Laundry Equipment (Y, Q)

(It is assumed that small medical facilities may have residential type laundry equipment or small commercial units)

4.8.1 YEARLY

4.8.1.1	Dryer	
4.8.1.1.1	Open dryer and remove drum.	SECTION A GENERAL INSTRUCTIONS
4.8.1.1.2	Clean inside and internal components.	SECTION B SAFETY
4.8.1.1.3	Examine condition of blower wheel, hub and shaft for wear.	SECTION C TOOLS, EQUIPMENT AND TEST INSTRUMENTS
4.8.1.1.4	Examine drum belt, replace as necessary.	SECTION D MECHANICAL
4.8.1.2	Washer	SECTION E ELECTRICAL
4.8.1.2.1	Open washer and remove agitator and tub.	SECTION F PLUMBING
4.8.1.2.2	Clean inside and internal components.	SECTION G BUILDING
4.8.1.2.3	Examine shaft for wear.	

4.8.2 QUARTERLY

- 4.8.2.1 Test operation of all cycles of washing machine and dryer.
- 4.8.2.2 Check for water leaks.
- 4.8.2.3 Check machines for unusual vibration.
- 4.8.2.4 Clean around and inside machines.

REPORT ON CONDITION

4.9 Lifts, Elevators, and Dumb Waiters (Y, M)

SECTION A
GENERAL
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4.9.1 YEARLY

SECTION B
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4.9.1.1 Prepare equipment for Statutory Inspection.

4.9.1.2 Contract out service to specialist contractor.

SECTION C
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4.9.2 MONTHLY

4.9.2.1 Contract out service to specialist contractor.

SECTION D
MECHANICAL

4.9.2.2 Check operation of equipment.

4.9.2.3 Check condition of car.

SECTION E
ELECTRICAL

4.9.2.4 Check position lift stops at floor.

4.9.2.5 Examine all indicator lights and car light.

SECTION F
PLUMBING

4.9.2.6 Check emergency communication equipment.

SECTION G
BUILDING

4.9.2.7 Clean motor room and control panel.

REPORT ON CONDITION

4.10 Incinerators (Y, S, and Q should be contracted out to specialist Company)

4.10.1 YEARLY

4.10.1.1 Examine air tubes; ensure they are clear.

4.10.1.2 Examine condition of refractory lining.

- 4.10.1.3 Check and renew valve seat disc on safety shut off burner valve. SECTION A
GENERAL INSTRUCTIONS
- 4.10.1.4 Check for fuel oil or gas fuel leaks. SECTION B
SAFETY
- 4.10.1.5 Sweep main flues.
- 4.10.1.6 Examine and test hooks, anchorages and ladders. SECTION C
TOOLS, EQUIPMENT AND TEST INSTRUMENTS
- 4.10.1.7 If fitted with an oil heater, check heater unit, valves, seats, glands. SECTION D
MECHANICAL
- 4.10.1.8 Check pumps.
- 4.10.1.9 Drain water from oil storage tank. SECTION E
ELECTRICAL
- 4.10.1.10 Examine chimney lining, insulation, exterior, guy ropes and fixings; repair as necessary. SECTION F
PLUMBING
- 4.10.2 SEMI-ANNUALLY SECTION G
BUILDING
- 4.10.2.1 Lubricate as necessary.
- 4.10.2.2 Examine door seals and hinge pins; repair as necessary.
- 4.10.2.3 Examine side wall burner damper plate.
- 4.10.2.4 Test temperature recorder for accuracy with thermometer and compare with standards.
- 4.10.2.5 Test alarms.
- 4.10.2.6 Test pre-set cycle for correct sequence.

4.10.2.7 Examine refractory liner and support beams.

SECTION A
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4.10.2.8 Examine anchorage to floors.

4.10.2.9 For gas fired equipment:

SECTION B
SAFETY

4.10.2.9.1 Clean and adjust burners.

SECTION C
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4.10.2.9.2 Clean U tubes.

4.10.2.9.3 Test valves for free travel; lubricate and adjust as necessary

SECTION D
MECHANICAL

4.10.2.9.4 Test automatic controls.

SECTION E
ELECTRICAL

4.10.2.9.5 Clean out condensate traps.

SECTION F
PLUMBING

4.10.2.10 For oil fired equipment:

4.10.2.10.1 Clean oil pump reservoir.

SECTION G
BUILDING

4.10.2.10.2 Clean motor bearings, drive gear and linkages; lubricate as necessary.

4.10.2.10.3 Examine content gauges.

4.10.2.10.4 Test fans; lubricate as necessary.

4.10.3 QUARTELY

4.10.3.1 Examine door securing devices.

- 4.10.3.2 Examine furnace temperature gauge probe. SECTION A
GENERAL
INSTRUCTIONS
- 4.10.3.3 Examine water level in trough. SECTION B
SAFETY
- 4.10.3.4 For gas fired equipment:
 - 4.10.3.4.1 Examine vent pipes; ensure they are clear. SECTION C
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 - 4.10.3.4.2 Test gas alarm on gas line. SECTION D
MECHANICAL
 - 4.10.3.4.3 Test safety valve. SECTION D
MECHANICAL
- 4.10.3.5 For oil fired equipment:
 - 4.10.3.5.1 Drain off water and sludge in fuel tank. SECTION E
ELECTRICAL
 - 4.10.3.5.2 Clean and examine filters. SECTION F
PLUMBING
- 4.10.3.6 Remove and clean burner vortex plate/ cup. SECTION G
BUILDING
- 4.10.3.7 Clean gas/fuel oil filters.
- 4.10.3.8 Clean and examine air intake grilles.
- 4.10.3.9 Test gas/fuel oil isolating valves for leaks and free travel.
- 4.10.3.10 Lubricate pump and fan bearings as necessary.
- 4.10.3.11 Examine fan drive alignment; adjust as necessary.
- 4.10.3.12 Examine pumps; repack glands as necessary.

- 4.10.3.13 Examine isolating valves.
- 4.10.3.14 Examine pump drive alignment; adjust as necessary.
- 4.10.3.15 Clean all external surfaces of incinerator and ancillary equipment.
- 4.10.3.16 Clean area around incinerator.
- 4.10.3.17 Examine chimney and flues for water damage.
- 4.10.3.18 Examine and test dampers and draught stabilizers.
- 4.10.3.19 Examine and test access door seats.
- 4.10.4 MONTHLY (In-house staff)
- 4.10.4.1 Clean and examine venture blocks and chamber air tubes.
- 4.10.4.2 Examine after burner chamber; clean as necessary.
- 4.10.4.3 Clean inspection windows.
- 4.10.4.4 Check burner head.
- 4.10.4.5 Clean air dampers. Lubricate links.
- 4.10.4.6 Test fire valve.
- 4.10.4.7 Examine gauges; replace as necessary.
- 4.10.4.8 Examine and test flame failure devices.

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- 4.10.4.9 Lubricate fan and pump bearings as necessary.

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4.11 Gas Services and Appliances. (M)

SECTION B
SAFETY

4.11.1 Incinerators (Small)

- 4.11.1.1 Clean and examine; adjust as necessary.

SECTION C
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- 4.11.1.2 Examine burners and pilot jets.

- 4.11.1.3 Examine connecting flue; ensure it is clear.

SECTION D
MECHANICAL

4.11.2 Bottled Fuel and Medical Gas

- 4.11.2.1 Clean and test for leaks.

SECTION E
ELECTRICAL

- 4.11.2.2 Examine sealing washers; renew as necessary.

- 4.11.2.3 Test safety devices.

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- 4.11.2.4 Examine chains and straps anchoring cylinders to walls. Ensure they are tightly secured at the top and bottom.

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SECTION B
SAFETY

5.1 Main Electrical Power Installation and Distribution system (Y).

5.2 Lighting fixtures, including outdoor and street lamps, and outlet circuits (Q).

SECTION C
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5.3 Door bells, buzzers, staff call installations (M).

SECTION D
MECHANICAL

5.4 Office equipment and computer systems (Q).

5.5 Communication systems including telephone, wi-fi and Internet, and wireless (Q).

SECTION E
ELECTRICAL

5.6 Lightning protection equipment (Y).

SECTION F
PLUMBING

5.7 Photo voltaic power supply (Q).

5.8 Ceiling fans, standing fans, and wall mount fans (Q).

SECTION G
BUILDING

5.9 Sluices, bedpan washers, disinfectors, and destructors (Y, S, Q).

5.10 Generators (Q).

5.1 Main Electrical Power Installation and Distribution system (Y)

5.1.1 Prepare for and arrange for Statutory Inspection of entire electrical installation, normally every five years in most jurisdictions.

5.1.2 Arrange for high voltage inspection and

servicing of transformers and high voltage cables.

- 5.1.3 Examine Main Electrical Service supply point, including electrical post, meter, and weather heads.
 - 5.1.4 Examine Main Circuit Break Panel. Check for any corrosion.
 - 5.1.5 Check for loose connections.
 - 5.1.6 Test Main Circuit Breaker Panel for “hot spots” using digital thermometer.
 - 5.1.7 Test Main Circuit Breaker Panel for voltage across phases, neutral and ground. Record readings.
 - 5.1.8 Clean interior of panel.
 - 5.1.9 Check that circuits are identified and supply voltage is displayed.
 - 5.1.10 Examine earth connections and condition of earth rod.
- 5.2 **Lighting fixtures, including outdoor and street lamps, and outlet circuits (Q)**
- 5.2.1 Examine lighting fixtures.
 - 5.2.2 Test operation of light switches. Replace damaged switches.
 - 5.2.3 Clean all lamp shades, bulbs, tubes and LED arrays.
 - 5.2.4 Replace all broken lamp shades, bulbs, tubes, ballasts, starters, photo cells, etc.
 - 5.2.5 Ensure lamps operate.

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- 5.2.6 Check insulation of cable ends for deterioration. Re-terminate as necessary. SECTION A
GENERAL INSTRUCTIONS
- 5.2.7 Check all wall outlets for damage. SECTION B
SAFETY
- 5.2.8 Check that equipment is supplied with the correct power supply (voltage, phase, circuit capacity) and properly sized plugs. SECTION C
TOOLS, EQUIPMENT AND TEST INSTRUMENTS
- 5.3 Door bells, buzzers, staff call installations (M) SECTION D
MECHANICAL
- 5.3.1 Examine and test.
- 5.3.2 Test low voltage transformers. SECTION E
ELECTRICAL
- 5.3.3 Clean bells, buzzers and push buttons.
- 5.3.4 Test batteries. SECTION F
PLUMBING
- 5.3.5 Test audible signal for clarity and volume.
- 5.4 Office equipment and computer systems (Q) SECTION G
BUILDING
- 5.4.1 Examine plugs for damage. Test for hot spots.
- 5.4.2 Examine cables for damage.
- 5.4.3 Examine UPS unit. Clean battery compartment. Ensure battery connections are clean and tight.
- 5.5 Communication systems including telephone, wi-fi and Internet, and wireless (Q)
- 5.5.1 Examine plugs for damage. Test for hot spots.

- 5.5.2 Examine cables for damage.
- 5.5.3 Test system. Request information on performance from users.
- 5.5.4 Clean devices.
- 5.6 **Lightening protection equipment (Y)**
- 5.6.1 Examine for damage.
- 5.6.2 Check connections and tighten as required.
- 5.6.3 Examine earth connections and repair as required.
- 5.7 **Photo voltaic power supply (Q)**
- 5.7.1 Examine solar collectors for damage.
- 5.7.2 Clean collectors.
- 5.7.3 Check conduit for damage.
- 5.7.4 Examine connections and tighten as required.
- 5.7.5 Test electronic panel for hot spots.
- 5.7.6 Examine batteries and battery compartment.
- 5.7.6.1 Test for hot spots.
- 5.7.6.2 Examine connections. Tighten as required.
- 5.7.6.3 Clean compartment. Ensure battery connections are clean and tight.
- 5.7.7 Test system.

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5.8 Ceiling fans, standing fans, and wall mount fans (Q)

5.8.1 Examine mounting to ceiling or wall.

5.8.2 Check fan for operation.

5.8.3 Examine plugs and cable for damage.

5.8.4 Clean fan blades, guard and motor.

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5.9 Sluices, bedpan washers, disinfectors, and destructors (Y, S, Q)

5.9.1 YEARLY

5.9.1.1 Examine electrical connections.

5.9.1.2 Clean and test pilot lights on control equipment.

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SECTION E
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SECTION F
PLUMBING

5.9.2 SEMI-ANNUALLY

5.9.2.1 Test timer switches.

5.9.2.2 Test solenoid operated valves and indicator lamps.

5.9.2.3 Clean and test all relays and contactors.

5.9.2.4 Examine heating elements.

5.9.2.5 Examine all terminals and connections.

5.9.2.6 Examine safety devices.

5.9.2.7 Test under normal running conditions.

SECTION G
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5.9.3 QUARTERLY

5.9.3.1 Test heating elements.

5.9.3.2 Test thermostats.

5.9.3.3 Blow out motor windings.

5.9.3.4 Examine bearings; lubricate as necessary.

5.9.3.5 Test under normal running conditions.

5.9.3.6 Examine drive belts; align and tighten as necessary.

5.9.3.7 Examine securing bolts and fixings; tighten as necessary.

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5.10 Generators (Q, M)

5.10.1 QUARTERLY

5.10.1.1 It is recommended that this service be contracted to a specialist company.

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5.10.2 MONTHLY (In-house staff)

5.10.2.1 Clean unit and area around unit.

5.10.2.2 Clean ATS (automatic transfer switch).

5.10.2.3 Check oil and coolant levels; top up as necessary.

5.10.2.4 Check battery water level and terminal connections; top up and adjust as necessary.

- 5.10.2.5 Test unit by simulating power failure.
- 5.10.2.6 Examine securing bolts; tighten as necessary.
- 5.10.2.7 Check fuel tank securing bolts; tighten as necessary.
- 5.10.2.8 Check fuel hoses for wear or damage.
- 5.10.2.9 Check fuel level; top up as necessary.

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6. PLUMBING

SECTION B
SAFETY

- 6.1 Water closets and urinals (M).
- 6.2 Wash hand basins (M).
- 6.3 Laundry tubs (M).
- 6.4 Pantry sink (M).
- 6.5 Sluices, bedpan washers, disinfectors, and destructors (Y, S, Q).

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6.1 Water Closets and Urinals (M)

- 6.1.1 Test function.
- 6.1.2 Check for leaks and internal overflow.
- 6.1.3 Examine sanitary ware for damage.
- 6.1.4 Check water level control valve for correct setting. Adjust as necessary.
- 6.1.5 Check seat and cover for damage.
- 6.1.6 Test angle valve. Adjust gland as necessary.

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6.2 Wash Hand Basins (M).

- 6.2.1 Test function.
- 6.2.2 Check for leaks.
- 6.2.3 Examine sanitary ware for damage.
- 6.2.4 Check hot and cold faucets.

- 6.2.5 Test angle valves. Adjust gland as necessary.
- 6.3 Laundry Tubs (M)
- 6.3.1 Test function.
- 6.3.2 Check for leaks.
- 6.3.3 Examine sanitary ware for damage.
- 6.3.4 Check hot and cold faucets.
- 6.3.5 Test angle valves. Adjust gland as necessary.
- 6.4 Pantry Sink (M)
- 6.4.1 Test function.
- 6.4.2 Check for leaks.
- 6.4.3 Examine sanitary ware for damage.
- 6.4.4 Check hot and cold faucets.
- 6.4.5 Test angle valves. Adjust gland as necessary.
- 6.5 Sluices, Bedpan Washers, Disinfectors, and Destructors (Y, S, Q). In all cases reference should be made to manufacturer's manual for a particular machine.
- 6.5.1 YEARLY
- 6.5.1.1 Examine moving jet assembly; renew washer.
- 6.5.1.2 Check ball valve; renew washers.
- 6.5.1.3 Check door opening/closing mechanism; renew door seal.
- 6.5.1.4 Check door safety lock and valve actuating assembly.

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- 6.5.1.5 Check water pump.
Renew as necessary.
- 6.5.1.6 Check macerating mechanism; renew as necessary.
- 6.5.2 SEMI-ANNUALLY
- 6.5.2.1 Check and operate sluice flushing mechanism, bedpan washers, disinfectors and destructors.
- 6.5.2.2 Clean out tanks and pump filters.
- 6.5.2.3 Examine ball valves.
- 6.5.2.4 Examine dashpot assembly; renew hydraulic fluid.
- 6.5.3 QUARTERLY
- 6.5.3.1 Examine water level in tanks.
- 6.5.3.2 Examine for leakage.
- 6.5.3.3 Examine drive belt; renew as necessary.
- 6.5.3.4 Examine belt tension; adjust as necessary.
- 6.5.3.5 Examine foot pedal; adjust as necessary.
- 6.5.3.6 Examine hoses and connection; tighten as necessary.
- 6.5.3.7 Examine cam shaft, door hinge bolts and pumps; lubricate as necessary.
- 6.5.3.8 Test door safety lock.

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6.5.3.9 Test door and closing device for effective seal; renew as necessary.

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6.5.3.10 Clean and test water and steam jets.

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SAFETY

6.5.3.11 Examine vent pipe and ensure it is clear.

6.5.3.12 Test discharge; ensure drainage is adequate.

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6.5.3.13 Examine securing bolts and other fixings; tighten as necessary.

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6.5.3.14 Clean and test valves for free travel; re-pack and adjust as necessary.

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7. BUILDING (INCLUDING ROADWAYS, GROUNDS AND DRAINS)

- 7.1 Roofs and Gutters (Y).
 - 7.2 External Walls (Y).
 - 7.3 Internal Walls, Ceilings, and Floors (Q).
 - 7.4 Windows, Louvres, Storm Shutters (Q).
 - 7.5 Doors, Frames and Partitions (Q).
 - 7.6 Roadways, Car Park areas, Curb Walls, Paved areas (Y).
 - 7.7 Drains (M).
 - 7.8 Walls and Fences, Internal and External Handrails (Y).
 - 7.9 Grassed areas, Flower Beds, Trees (M).
 - 7.10 Signage, Sculptures, Permanent Notice Boards and Caution Graphics (Y).
- 7.1 **Roofs and Gutters (Y, Q)**
 - 7.1.1 **YEARLY** (Repairs to be contracted out to specialist contractor)
 - 7.1.1.1 Inspect and clean.
 - 7.1.1.2 Repair as necessary.
 - 7.1.2 **QUARTERLY**
 - 7.1.2.1 Inspect.
 - 7.2 **External Walls (Y)**
 - 7.2.1 Inspect and clean.

- 7.2.2 Paint every four years (Increase frequency depending on environment).
- 7.3 Internal Walls, Ceilings and Floors (Q). Routine cleaning by hospital staff, not maintenance workers.
- 7.3.1 Inspect.
- 7.4 Windows, Louvres, Storm Shutters (Q)
- 7.4.1 Clean.
- 7.4.2 Inspect; remove broken glass and replace with specified glass.
- 7.4.3 Lubricate handles, hinges and locks.
- 7.4.4 Examine and Test manual and powered Storm Shutters.
- 7.5 Door, Frames, and Partitions (Q)
- 7.5.1 Inspect; replace broken or damaged components.
- 7.5.2 Lubricate handles, hinges and locks.
- 7.6 Roadways, Car Park areas, Curb Walls, Paved areas (Y)
- 7.6.1 Inspect; repair as necessary.
- 7.7 Drains (M)
- 7.7.1 Inspect; repair as necessary.
- 7.7.2 Clean.
- 7.8 Walls and Fences, Internal and External Hand-rails (Y)
- 7.8.1 Clean and Inspect; repair as necessary.

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- 7.8.2 Paint every four years. (Increase frequency depending on environment).
- 7.9 Grassed Areas and Flower Beds, Trees (M). It is recommended that this item be contracted to a specialised contractor. (Increase frequency depending on environment).
- 7.9.1 Cut grass.
- 7.9.2 Clean flower beds.
- 7.9.3 Prune plants and trim hedges.
- 7.9.4 Rake leaves.
- 7.9.5 Inspect trees for weak, rotted or damaged branches. Cut and remove as required.
- 7.10 Signage, Sculptures, Permanent Notice Boards and Caution Graphics (Y).
- 7.10.1 Check items above for adequate anchorage either to the ground or wall.
- 7.10.2 Heavy or tall sculptures should be anchored to prevent overturning.
- 7.10.3 Check Signage, Notice Boards and Caution Graphics for visibility, relevance, clarity, and appropriate information. Repair and update as required.

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Pan American
Health
Organization



World Health
Organization

REGIONAL OFFICE FOR THE Americas