

ATTACHMENT #7



## PREVENTIVE MAINTENANCE GUIDELINES

Solicitation OPM-RFP-00-00934HLW

1. General. The following guides will serve as instructional guidelines for performing preventive maintenance. As necessary, machinery and equipment shall be cleaned and touch up painted as part of the normal preventive maintenance requirements. Recommended OSHA safety standards in 29 CFR 1910 shall be utilized when performing preventive maintenance.

2. Standard tools. The following lists serve as guides for supplying maintenance personnel with tools. Basic and trade tools required will vary depending on equipment served and on individual preferences. Special tools and materials are listed in the individual guides.

### STANDARD TOOLS – BASIC All Trades

1. Standard and Phillips head screw drivers-various sizes.
2. Pliers-vise grip (2), slipjoint, needlenose, diagonal, cutting pliers, side cutters
3. Ball peen hammer
4. Hack saw and spare blades
5. 3/8" drive socket set and ratchet
6. Small set of Allen wrenches
7. Assorted center punches, drift punches, steel chisel
8. 12' measuring tape
9. Crescent wrenches 4" to 8"
10. Open and box end wrenches 1/4" to 3/4"
11. File
12. Pipe wrenches to 14"
13. Small level and square
14. Pocket knife
15. Flashlights
16. Grease guns and oilers
17. Wire brush
18. Extension cord and inspection lights
19. Various cleaning tools – brushes, scrapers, etc.
20. Emery cloth

### TOOL GROUP A

1. Standard tools – basic
2. Refrigeration – gauges
3. Leak detector – electronic or halogen
4. Pocket thermometer
5. Voltmeter – Ohmmeter – Milliammeter
6. Flaring tool
7. Tubing cutters
8. Clamp-on ammeter
9. Packing kit and packing
10. Crescent wrenches to 14"

### TOOL GROUP B

1. Standard tools – basic
2. Insulated pliers and screwdrivers
3. Wire strippers
4. Wire crimpers
5. Voltmeter-Ohmmeter-Milliammeter
6. Clamp-on ammeter
7. Soldering kit
8. 1/8" 25' fish tape
9. Burnishing tool

### TOOL GROUP C

1. Standard tools – basic
2. Pipe wrenches to 24"
3. Tubing cutters
4. Flaring tool
5. Small acetylene outfit
6. Package kit and packing
7. 3/4" socket set
8. Crescent wrenches to 14"

## A-4 Air Compressor

### Special Instructions

1. Review manufacturer's instructions.
2. Coordinate motor PM on an annual basis. See Guide M-3.
3. Tank should be inspected and tested by qualified inspector.

### Check Points

1. Perform normal tour checks and operations.
2. Change compressor crankcase oil.
3. Clean air intake filter.
4. Check air dryer for proper operation. Clean condenser coils and cover grills.
5. Inspect belt alignment and condition. Adjust or replace belts as required.
6. Check for corrosion on water-cooled units.
7. Clean heat exchanger surfaces.
8. Check accuracy of gauges with calibrated test gauge.
9. On two-stage compressor, check intermediate pressure.

### Tools & Materials

1. Standard Tools – Basic
2. Belts
3. Lubricants
4. Fin comb
5. Vacuum
6. Test gauge

A-6 Air-Conditioning Machine  
Package Unit (Comfort Cooling)

Frequency: Annual

Special Instructions

1. Review manufacturer's instructions
2. Prior to cooling season; open and tag electrical circuits

Check Points

1. Thoroughly inspect and clean interior and exterior of machine with vacuum (remove panels).
2. Clean drain pan and note excessive corrosion.
3. Check for refrigerant leaks using a halogen detector or similar testing device.
4. Check refrigerant levels and recharge if needed. Report leaks to supervisor.
5. Check condition of cooling and reheat coils. Use fin comb if needed to straighten fins.
6. Clean coils; use detergent solution and warm water.
7. Check belts for wear, adjust tension or alignment, and replace belts when necessary.
8. Drain and clean humidifier drip pan, if applicable. Remove corrosion as needed.
9. Lubricate motor and fan bearings, if not sealed. Check alignment of motor and fan.
10. Replace prefilters if needed.
11. Replace final filters if needed.
12. Check compressor oil level.
13. Run machine, check action of controls, relays, switches, etc., to see that:
  - a. compressor (s) run at proper settings
  - b. reheat coils activate properly
  - c. suction and discharge pressures are proper
  - d. discharge air temperature is set properly
14. Check and adjust vibration eliminators.

Tools & Materials

1. Tool Group A
2. Cleaning tools and materials, vacuum, fin comb, grease gun and oil, filters and prefilters, spare belts.
3. Ladder – ceiling hung units

A-7 Air-Conditioning Machine  
Package Unit (Computer Room)

Frequency: Monthly

Special Instructions

1. Review manufacturer's instructions.

Check Points

1. Thoroughly inspect and clean interior and exterior of machine with vacuum (remove panels).
2. Clean drain pan and note excessive corrosion.
3. Check for refrigerant leaks using a halogen detector or similar testing device.
4. Check refrigerant levels and recharge if needed. Report leaks to supervisor.
5. Check condition of cooling and reheat coils. Use fin comb if needed to straighten fins.
6. Clean coils; use detergent solution and warm water, if coil is heavily soiled.
7. Drain and clean humidifier drip pan, if applicable. Remove corrosion as needed.
8. Lubricate motor and fan bearings, if not sealed. Check alignment of motor and fan.
9. Check belt tension and condition. Adjust or replace as required.
10. Replace prefilters if needed.
11. Replace final filters if needed.
12. Check compressor oil level.
13. Run machine, check action of controls, relays, switches, etc. to see that:
  - a. compressor (s) run at proper settings
  - b. reheat coils activate properly
  - c. suction and discharge pressures are proper
  - d. discharge air temperature is set properly
14. Check and adjust vibration eliminators.

Tools & Materials

1. Tool Group A
2. Cleaning tools and materials, vacuum, fin comb, grease gun and oil, filters and prefilters, spare belts
3. Ladder – ceiling hung units

## A-8 Air-Conditioning, Window Unit

Frequency: Annual

### Special Instructions

1. Disconnect electric cord to unit.
2. Review manufacturer's instructions.

### Check Points

1. Clean condenser, cooling coil fins, and fans.
2. Remove dirt or dust from all interior parts.
3. Replace filter.
4. Inspect and adjust damper.
5. Lubricate motor and fan bearings.
6. Inspect gasketing. Look for leaks between unit and window, caulk as necessary.
7. Check for refrigerant leaks.
8. Start unit and observe operation.
9. Check temperature differential and controls.
10. Check frame of unit with ohmmeter for proper electric ground.
11. Replace covers (if any).
12. Clean area.

### Tools & Materials

1. Tool Group A
2. Cleaning tools and materials
3. Lubricants
4. Vacuum
5. Fin comb
6. Filters

## A-9 Air-Cooled Condenser

Frequency: Annual

### Special Instructions

1. Review manufacturer's instructions.

### Check Points

1. Remove debris from air screen and clean underneath unit.
2. Pressure wash coil with coil cleaning solution.
3. Straighten fin tubes with fin comb.
4. Check electrical connections for tightness.
5. Check mounting for tightness.
6. Check for corrosion.

### Tools & Materials

1. Standard Tools – Basic
2. Pressure washer
3. Fin comb
4. Paint brushes
5. Cleaning materials
6. Respirator
7. Safety goggles



## A-10 Heat Pumps

Frequency: Annual

### Special Instructions

1. Inspect piping for evidence of leaks and vibration.
2. Inspect all wiring for deterioration, and tighten electrical contacts. Check for corrosion.
3. Check mounting bolts and tighten if needed.
4. Check crankcase heater.
5. Check fan for vibration or excessive noise. Lubricates fan and motor if required.
6. Check refrigerant levels, recharge if necessary. Check for leaks if loss of refrigerant is detected.
7. Check temperature drop across condensing coil.
8. Clean air intake and screens.
9. Brush or pressure wash coil surfaces. Straighten fins with fin comb.
10. Check that reversing valve is energized in the "heat" mode and de-energized in the "cool" mode. Replace defective valves.
11. Check oil.

### Tools & Materials

1. Tool Group A
2. Lubricants
3. Cleaning materials
4. Fin comb
5. Vacuum or pressure washer

## A-11 Air Handler Unit

Frequency: Annual

### Special Instructions

1. Review manufacturer's instructions.
2. Schedule shutdowns with operating personnel, as needed.
3. Open lock and tag electrical circuits.
4. Schedule PM on motor per guide M-3, in conjunction with this guide.

### Check Points

1. Check fan blades for set buildup and clean if necessary.
2. Check fan blades and moving parts for excessive wear.
3. Check fan RPM to design specifications.
4. Check bearing collar set screws on fan shaft to make sure they are tight.
5. Check dampers for dirt accumulations. Check felt, repair or replace as required.
6. Check damper motors and linkage for proper operation. Adjust linkage on vanes if out of alignment.
7. Lubricate mechanical connections of dampers-sparingly.
8. Clean coils by brushing, blowing, vacuuming, or pressure washing.
9. Check coils for leaking, tightness of fittings.
10. Use fin comb to straighten coil fins.
11. Flush and clean condensate pans and drains.
12. Check belts for wear, adjust tension or alignment, and replace belts when necessary. Multi-belt drives should be replaced with matched sets.
13. Check rigid couplings for alignment on direct drives, and for tightness of assembly. Check flexible couplings for alignment and wear.
14. Before heating season: drain cooling coils; blow down to remove moisture; refill with anti-freeze and water solution; drain. (Use solution in other coils).
15. Check freeze-stat for proper operation.
16. Vacuum interior of unit.
17. Lubricate fan shaft bearings while unit is running. Add grease slowly until slight bleeding is noted from the seals. Do not over lubricate. Remove old or excess lubricant.

### Tools & Materials

1. Tool Group A
2. Tachometer
3. Grease gun and oiler
4. Pressure washer
5. Vacuum
6. Fin comb
7. Cleaning tools and materials
8. Safety goggles

C-3 Coils, Preheat, Reheat, Etc.  
(Remote Locations)

Frequency: Annual

Application

This guide applies to coils that are not part of an air washer or air-handling unit.

Check Points

1. Vacuum or blow out the fins, coils, etc.
2. Remove obstructions to airflow.
3. Check coils. Correct or report any leaks.
4. Test and inspect controls that protect against freezing.

Tools & Materials

1. Standard Tools – Basic
2. Vacuum
3. Radiator brush
4. Coil cleaner
5. Respirator
6. Safety goggles

Special Instructions

1. Schedule maintenance with operating personnel.
2. Obtain and review manufacturer's information for servicing, testing and operating.
3. Obtain "AS BUILT" diagrams of installation.

Check Points

1. Clean, calibrate and adjust all central (Main-frame), remote (peripheral) and Interface systems.
2. Test and analyze results for systems operational integrity.
3. Test all power supplies and battery charging networks.
4. Test all software and firm ware programs for applied results.
5. Prepare a written service report as to test results and service performed and file with the buildings manager.

Tools & Materials

1. Tool Group B
2. Manufacturer's testing instruments
3. Cleaning tools and materials
4. Lubricants

C-6 Controls, Central System  
Heating and Air-Conditioning

Frequency: Annual

Special Instructions

1. Read and understand manufacturer's instructions before making adjustments or calibrations.
2. Obtain "AS BUILT" control diagrams prepared by control contractor.

Check Points

1. Check set point of controls (temperature, humidity, or pressure).
2. Compare control point with an external measuring device, note deviations, and adjust.
3. Check the unit over its range of control. If possible, impose simulated conditions to activate controls and check operation.
4. Check for control pint cycling.
5. Check closeness of differential gap on two position controllers (on-off-open-closed).
6. Check condition and action of primary elements in the controllers (biometallic strips, sealed bellows with capillary tubes) for remote sensing, etc.
7. Note the action of the controlling device (thermostats, humidistats, and pressurestats) which changes the controlled device (motors, valves, dampers, etc.).
8. On electronic controls check the source of the signal and its amplification.
9. Check resulting action of pressure sensing primary control elements such as diaphragms, bellows, inverted bells, and similar devices when activated by air, water, or similar pressure. Check operation of all relays, pilot valves, and pressure regulators.
10. Use test kits and manufacturer's instructions whenever possible. Replace rather than rebuild a control installed in the system. Take control to shop for repair.

Tools & Materials

1. Tool Group B
2. Pressure gauge, psychrometer
3. VOM
4. Air filter replacements

## D-1 Door, Power Operated

Frequency: Semi-Annual

### Application

This guide applies to warehouse or large overhead doors.

### Special Instructions

1. Review manufacturer's instructions

### Check Points

1. Inspect general arrangement of door and mechanism, mountings, guides, wind locks, anchor bolts, counterbalances, weather stripping, etc. Clean, tighten, and adjust as required.
2. Operate with power from stop to stop and at intermediate positions. Observe performance of various components, such as brake, limit switches, motor, gearbox, etc. Clean as needed.
3. Check operation of electric eye, treadle, or other operating devices. Clean and make required adjustments.
4. Check manual operation. Note brake release, motor disengagement, functioning or hand pulls, chains, sprockets, clutch, etc.
5. Examine motor, starter, push button, etc. Blow out or vacuum if needed.
6. Inspect gearbox, change or add oil as required.
7. Perform required lubrication. Remove old or excess lubricant.
8. Clean unit and mechanism thoroughly. Touch up paint where needed.

### Tools & Materials

1. Standard Tools – Basic
2. Lubricants
3. Cleaning materials

D-3 Drains, Roof, Gutter (per 100')

Frequency: Quarterly

Special Instructions

1. Use care when working on high places.
2. Use safety line with belt if necessary.

Check Points

1. Remove all trash, debris, or loose material from roof and dispose of properly.
2. Clean out all drains and gutters.
3. Where applicable, examine strainers in drains and/or screens over gutters.
4. If downspouts have heaters, test operation and correct deficiencies.
5. Test drains and/or downspouts by flushing with water.
6. Inspect gutters for adequate anchors, tighten if necessary.

Tools & Materials

1. Tool Group B
2. Ladder

D-4 Door, Automatic Hydraulic  
Electric or Pneumatic Operated  
Main Entrance

Frequency: Quarterly

Check Points

1. Check alignment of door and mechanism. Inspect mountings, hinges, mats and trim, weather stripping, etc. Replace, tighten, and adjust as required.
2. Operate with power, observing operation of actuating and safety mats, door speed, and checking functions.
3. Check manual operation.
4. Inspect power unit, lubricate and tighten lines as required.
5. Check operation of control board relays, clean, replace, adjust contacts as required.
6. Inspect door-operating unit, tighten lines, and adjust as required.
7. Clean and lubricate door pivot points.

Tools & Materials

1. Tool Group B
2. Lubricants



## D-5 Doors, Main Entrance

Frequency: Semi-Annual

### Application

This applies to entrance doors used in main entries to building where a poorly operating door may be dangerous and cause congestion.

### Check Points (For hinged doors)

1. Inspect the frame and supporting structures.
2. Inspect hardware; hinges, latch keeper, lock, etc. Apply graphite where needed, wipe off excess.
3. Inspect glass, putty, or retaining pieces. Correct any deficiencies.
4. Operate door to observe functioning of check. Adjust and service as needed.
5. Touch up paint as needed.

### Check Points (For revolving doors)

1. Remove obstructions and clean out track.
2. Fold door. Note action and freedom of motion.
3. Inspect locking device, adjust as needed.
4. Clean pivot pints and apply graphite.
5. Inspect felt or rubber seals.
6. Set the emergency fold pressure on the door to the manufacturer's specifications. Check automatic speed control, should limit speed of door to 12 RPM.
7. Touch up paint as required.

### Tools & Materials

1. Standard Tools – Basic
2. Graphite

D-6 Drains, Areaway, Driveway, Storm

Frequency: Annual/As Needed

Special Instructions

1. Perform work in autumn after leaves have fallen.

Check Points

1. Clean drain and area leading to drain.
2. Remove debris and trash, and dispose of properly.
3. Test drain for free water flow by flushing with hose.

Tools & Materials

1. Standard Tools – Basic
2. Hose
3. Work gloves

Special Instructions

Check manufacturer's instructions. The frequencies shown are in addition to the regular PBS inspection tour. Items regularly inspected on a weekly basis include the motor generator unit, hoist machine, controls, and governor. Doors, hangers, closers, interlocks, door operators should be checked frequently for proper operation by PBS elevator mechanics as they ride the elevators. Items requiring attention should be reported to the elevator shop supervisor. This guide includes check points that should be accomplished on a monthly, quarterly, or semi-annual basis as noted.

Check Points (Monthly)

1. Machine Room: Dust machines, motor generator sets, control cabinets, etc. Sweep floor, relamp, and remove trash. Inspect controllers, signal, scheduling and dispatch panels, selectors and selector tapes. Make repairs and adjustments for proper operation.
2. Pits: Dust ironwork, sweep floor, empty drip pans, relamp, remove trash, and check for leaks. Check runby, buffer switch, compensating switch, and emergency stop switch.
3. Motors: Hoist motor, motor generator, and regulators: inspect oil level, oil pick up, and belts. Check for excessive heat, noise and leaks. Lubricate in accordance with manufacturer's specifications. Renew brushes as necessary. Keep end bells, commutators, and brush riggings clean.
4. Geared Machines: Inspect worm and gear for bottoming and back lash, thrust endplay, bearing wear, oil pick up, and pan. Renew brushes as necessary.  
Keep end bells, commutators, and brush riggings clean.
5. Brakes: Observe operation of brake. Inspect drum and shoe clearance and adjust as necessary. Lubricate pivot points and clean as necessary.
6. Car Gate: Clean, lubricate, and inspect hangers, and all related gate operating mechanisms. Check rollers, upthrust, interlock, gearbox, motor brushes, door control box, cables, safety edge, light rays, gibs, sills, proper operating speed, and force close speed.
7. Speed Governor: Including tension sheave. Observe operation. Check electrical switches and seals. Lubricate pivot points and clean as necessary.

## E-1 Elevators, Electric or Hydraulic

Frequency: Monthly

8. Lighting: Lamp hatchway, hall landings, position indicators, car stations, and dome. Check emergency procedure sign, inspection certificate, top and side exits. Test alarm bell, emergency stop switch, communications system, fire recall service (key capture and smoke detector), hospital service, and any other emergency recall features. Clean light diffusers and car stations as necessary.
9. Hydraulic Machines: Observe operation of motor and pump, oil lines, tank, controls, plunger, and packing. If creeping is excessive; correct. Test manual and emergency control. Clean and lubricate as necessary

### Check Points (Quarterly)

1. Guides: Roller guides, guide shoes, and rail oilers: Inspect, clean, lubricate and adjust as necessary.
2. Hatches: Complete 25% in each of the following months: September, December, March, and June. Clean rails, beams, and all related iron work in hatchway. Dust wall if necessary. Clean top, bottom, and sides of car. Clean counterweight and pit area.
3. Controllers: Complete 25% in each of the following months: September, December, March, and June. Clean controllers with blower or vacuum. Check switches, relays, timers, capacitors, resistors, contacts, overloads, wiring, connections, fuses, oil level of overloads and overload settings. Replace worn parts and adjust for proper operation. Check for MG shutdown, high call reversal, zone control, load by-pass, door failure time, etc. Check programming up peak, down peak, off-hours, off peak, etc.

### Check Points (Semi-Annual)

1. Cables: Inspect, lubricate, and adjust hoist cables and compensating cables as necessary. Inspect and repair traveling cables as necessary. Check all cable fastenings. Inspect guide rails and counterweights. Check slow down and limit switches. Adjust as necessary

### Tools & Materials

1. Standard Tools – Basic
2. Barricades
3. Out of service signs
4. Cleaning tools and materials
5. Lubricants

E-19 Emergency Lights  
(Closed Systems)

Frequency: Quarterly

Special Instructions

1. Use rubber gloves, apron and plastic face shield.
2. Do not spark battery terminals or smoke while performing maintenance.
3. Review manufacturer's instructions.

Check Points

1. Inspect for structural defects and deposits.
2. Clean off corrosion deposits and apply silicone grease to terminals.
3. Push test button and observe light operation (See manufacturer's instructions).
4. Check vent holes.
5. Clean exterior with dry cloth.
6. Unplug unit to check operation.

Tools & Materials

1. Tool Group B
2. Distilled water
3. Cleaning equipment and materials
4. Hydrometer
5. Silicone grease

## E-21 Over and/or Under Voltage Relay

Frequency: Annual

### Special Instructions

1. Schedule outage with operating personnel.
2. Obtain and review manufacturer's instructions, and circuit diagrams for relays and test set.
3. De-energize, tag, and lock out circuit.

All tests shall conform to the appropriate ASTM test procedure and the values used as standards shall conform to the manufacturer's and ANSI standards specifications.

### Check Points

1. Visual and mechanical inspection.
  - a. Disconnect any potential transformers (by Low Voltage Links, etc.) to prevent dangerous High Voltage backfeed.
  - b. Remove relay from case and visually inspect. Also, clean, mechanically and visually inspect panel wiring.
  - c. Examine condition of bearings.
  - d. Check all connections for tightness.
  - e. Examine contacts and contact backstops. Burnish contacts.
  - f. Clean and remove foreign matter from permanent magnet and disc.
  - g. Examine case connections.
  - h. Inspect disc restraint spring for proper tension and for damage.
2. Electrical test
  - a. Perform pickup test to determine the minimum/maximum voltage required to operate the trip circuit. Adjust as per manufacturer's instructions.
  - b. Perform time current or voltage characteristic test according to system requirements and settings and manufacturer's instructions.
  - c. Test target and/or seal-in operation.
  - d. Calibrate panel voltmeter within 3 percent of test meter reading.
  - e. Test associated wiring as required, avoiding any unintentional transformer high voltage backfeed or energization.
  - f. Mechanically operate the relay to ascertain that the relay will electrically operate the associate devices as originally designed/desired.
  - g. Record results of inspection and test and report deficiencies on GSA Form 2543B (adapt as necessary).
  - h. Remove tags and lock, return circuit to service.

### Tools & Materials

1. Tool Group B
2. Relay test set
3. Cleaning materials
4. Test blocks and jumpers

E-27 Low Voltage Power Circuit  
Breakers (Over 50 Amps)

Frequency: Three Years

Special Instructions

1. Open breaker, rack it out, and remove from cubicle. Breaker should be handled with some type of lifting device.
2. Inspect primary fingers on back of the breaker for missing or broken springs, finger wear, and dirt.
3. Remove arc chutes and inspect for cracks, broken or burned parts.
4. Inspect and clean main and arcing contact.
5. With the arc chutes removed, close the breakers mechanically to check contact action and alignment. CAUTION: Keep all parts of the body in the clear. The contacts are spring operated and could cause serious injury.
6. Operate breaker several times, check for smooth operation.
7. Lubricate the racking-in mechanism in accordance with manufacturer's instructions. Take care not to use excess lubricant.
8. Tighten all bolts and screws.
9. Remove dust and dirt from breaker, cubicle and arc chutes with high suction industrial vacuum cleaner.
10. Check trip bar movement to operate breaker.
11. Check the trip arm on each trip device for proper contact with trip bar.
12. Check contact resistance in micro-ohms from the breaker primary fingers.
13. Determine the applicable curve and the proper setting for the breaker. The proper setting can usually be determined from the nameplate data and "as found indicator" on the breaker. If the system characteristic curves originally prepared for the project short circuit study are available, they shall be used. Any deviation or questionable setting must be referred to the regional office for electrical engineering design approval.
14. Check breaker connections in the cubicle by applying a thin film of black contact grease to the line and load stabs, then rack the breaker in and out of the cubicle and measure the primary finger. Wipe marks on the stab.
15. Disable time delay mechanism and adjust delay trip device to operate at the minimum trip value setting.
16. Restore time delay mechanism and perform time-current characteristic test to ascertain that the device operates on proper curve. Test current multiple selected from the "knee of the curve." Make needed adjustments and record as found and as left readings.
17. Determine that instantaneous device will operate at its rate of setting value.

E-27 Low Voltage Power Circuit  
Breakers (Over 50 Amps)

Frequency: 3 Years

18. Perform a dielectric strength test between each phase (ACB closed) and each pole to grounded case (ACB open).
19. Needed repair or replacement should be reported.
20. Record results of test and inspection and report deficiencies on GSA Form 2543B, Circuit Breaker Test Record.
21. Remove tags and lock, return circuit to service.

Tools & Materials

1. Tool Group B
2. Lubricants
3. Cleaning tools and materials
4. Vacuum cleaner
5. Micro-Ohmmeter
6. "Multi-Amp" test equipment



E-34 Disconnects  
(Isolating Switch; Per Switch)

Frequency: Annual

Special Instructions

1. Schedule outage with operating personnel.
2. De-energize and tag circuit. Note these switches do not have an interrupting rating and can only be operated after the circuit has been opened by some other means. They should never be operated under load.
3. Obtain and review manufacturer's literature on the equipment.

All tests shall conform to the appropriate ASTM test procedure and the values used as standards shall conform to the manufacturer's and ANSI Standards specifications.

Check Points

1. Inspect for signs of overheating and loose or broken hardware.
2. Inspect torque connections to bus and cables.
3. Clean main contacts, adjust and put a thin film of conductive lubricant on them if recommended by manufacturer.
4. If the contacts were burned or the switch had overheated, a contact resistance test should be conducted. Adjust the contacts with the highest readings to correspond with the lowest reading contact. A maximum value can be obtained from the manufacturer's instructions.
5. Check the fuse tubes and renewable elements for corrosion, dirt, and tracking. Clean or replace as required.
6. Clean entire cubicle with vacuum.
7. Remove tags and return circuit to service.

Tools & Materials

1. Tool Group B
2. Torque wrenches
3. Cleaning equipment and materials
4. Vacuum
5. Micro-Ohmmeter
6. Appropriate lubricants

E-40 Emergency Generator, Electric  
Gasoline or Natural Gas Engines

Frequency: Annual

Special Instructions

1. Have approved type fire extinguishers readily available.
2. Allow no open flame or smoking in area.
3. Use safety type fuel cans only.
4. Review manufacturer's instructions.

Check Points

1. Adjust carburetor and governor for proper operating speed.
2. Check fuel supply. If fuel is over 9 months old, discard and replace with fresh fuel. Gasoline deteriorates with age, so a large supply of fuel should not be maintained. Prior arrangements should be made to purchase fuel locally for emergencies.
3. Change engine oil and filter, and perform other lubrication of engine and generator.
4. Remove old oil and gas from area around generator when maintenance is complete.

Tools & Materials

1. Standard Tools – Basic
2. Engine tune-up kit
3. Belts

## F-1 Alarm Check Valves and Accessories

Frequency: Semi-Annual

### Application

This applies to all sprinkler valves.

### Special Instructions

The work required may cause the activation of an alarm and/or a supervisory signal. (See guide No. F-14). The field office manager and the control center or fire department that will receive the alarm and/or signal must be notified prior to start of work. If drains are not piped to outside of building, take necessary steps to prevent water damage during full flow drain test. Rate of discharge from 2-inch drain may exceed capacity of floor drain. Preventive maintenance should be scheduled for the control valve (main supply) of the wet pipe sprinkler system at this time. (See Guide Nos. F-3 and F-4). Review manufacturer's instructions.

### Check Points

1. Record static pressure (pressure on supply side gauge).
2. Check for proper water flow through 2-inch drain. If water flow is weak, (considerable drop in water pressure when 2-inch is wide open), supply valves may not be fully open or there may be other piping obstructions.
3. Record the flow full drain residual pressure (lowest pressure on supply side gauge).
4. Close 2-inch drain.
5. Close main supply valve for the sprinkler system, and then open 2-inch drain valve.
6. Immediately close drain valve when water pressure on incoming side of alarm check valve has dropped to 10 to 20 psi. If pressure rises within one minute, main supply valve is not seating properly. In such case, open drain valve and alternately open and close supply valve several times in an attempt to flush the valve seat. If not successful, supply valve needs to be repaired.
7. With supply open, check operation of alarm check valve, water motor gong and its drain, and all other alarm or supervisory signals, such as water flow paddle alarms, pressure switches, etc. by flowing water through inspector's test both at valve and at remote connection.
8. When applicable, check that excess pressure, booster, jockey, and fire pumps equipped with automatic start are operating.

## F-1 Alarm Check Valves

Frequency: Semi-Annual

9. Perform any other steps required in manufacturer's instructions.
10. Check that water flow through water motor gong is topped to ensure that clapper of alarm check valve is properly seated.
11. Record static pressure (pressure on supply side gauge).
12. Perform internal inspections of alarm valves when normal testing procedures indicate the need. Examine valve body for tuberculation and check freedom of clapper operation. Replace clapper facings or resurface seat rings, if necessary.

## Tools & Materials

1. Tool Group C

## F-2 Dry Pipe, Deluge and Preaction Valves

Frequency: Annual

### Special Instructions

In general, it is recommended that the servicing of these valves be entrusted only to experienced personnel in this work or to representatives of a sprinkler company. The work required by this procedure might cause activation of an alarm and/or a supervisory signal. The field office manager and the control center or fire department that will receive the alarm and/or signal must be notified prior to start of work. If drains are not piped to outside of building, take necessary steps to prevent water damage during full flow drain test. Rate of discharge may exceed capacity of floor drain. On preaction and deluge valves, the associated fire detection system must also be serviced. (See Guide Nos. F-14 and F-15). Whenever possible, the operation of the preaction or deluge valves should be tested by the initiation of the fire detection system using the appropriate simulated fire condition, i.e., heat or smoke. Preventive maintenance should be performed on the control valve (main supply) at this time since its functional purpose can be tested, (stop water flow). (See Guide Nos. F-3 and F-4). Review manufacturer's instructions.

### Check Points

1. Determine that legible manufacturer's maintenance instructions are posted in a convenient location near valve.
2. Trip valve once a year in warm weather along with any accelerators and exhausters, and perform all steps in accordance with the manufacturer's instructions, including a full flow drain test. Observe operation of any quick opening devices while making trip tests. The manufacturer's instructions for testing and resetting the quick opening device should be carefully followed.
3. Check air pressures, priming water level, latching arrangements, automatic drip connections and general condition of valve room.
4. Observe operation of water motor gong, and other alarms or supervisory signals such as water flow paddle alarms, pressure switches, etc.
5. After annual trip test, dry-pipe valve should be internally cleaned and reset in a normal manner with special attention to renewal of rubber parts or adjustment of gauges or alarm devices.
6. All low point drains should be drained and kept free of water.

### Tools & Materials

1. Standard Tools – Basic

## F-3 Fire Post Indicator Valve

Frequency: Annual

### Special Instructions

The work required by this procedure might cause the activation of an alarm and/or a supervisory signal. The field office manager and control center of fire department that will receive the alarm and/or signal must be notified prior to start of work. This work should be done when other scheduled maintenance is being performed that involves water flow through valve. (See Guide Nos. F-1, F-2, and F-4). Review manufacturer's instructions.

### Check Points

1. Remove any obstructions to easy accessibility.
2. Where applicable, remove debris and water from pit.
3. Inspect for valve being set plumb so that post indicator is vertical.
4. Replace damaged or missing cap, window glass; target plate, operating wrench, post, bonnet, and valve tamper switch.
5. Remove cap; check for corrosion or damage to extension rod, coupling, threads, and signs of leaking valve.
6. Lubricate threads.
7. Remove and clean window glass.
8. Clean both target plates. Illegible target plates should be replace or painted.
9. Completely close valve and check for easy operation and leaks from stuffing box.
10. Adjust target plat (shut) so it is centered in window frame.
11. Open valve until torque of rod is noticed (tendency for wrench to spring back) then back off valve about 1/4 turn.
12. Check position of target (open). Adjust if necessary.
13. Replace cap, tamper seal, and wrench.

### Tools & Materials

1. Tool Group C
2. Lubricants
3. Cleaning materials

F-4 Fire Control Valves (4" or over)  
for Interior Water Distribution Systems

Frequency: Annual

Special Instructions

The work required by this procedure might cause the activation of an alarm and/or a supervisory signal. Tamper switches may be provided. (See Guide No. F-13). The field office manager and the control center or fire department that will receive the alarm and/or signal must be notified prior to start of work. When a valve is left unattended in a position, which will interrupt fire protection water supply, HB, PBS P 5920.9 must be complied with. Most fire system control valves are normally in the open position. If a valve is found closed at the time of the inspection, confirmation must be obtained through the building manager's office on the proper normal valve position. This work should be done when other scheduled maintenance is being performed that involves water flow through valve(s). (See Guide Nos. F-1, F-2, and F-3). Review manufacturer's instructions.

Check Points

1. Remove any obstructions for easy accessibility of valve.
2. Determine that safe ladders or access ways are in place where needed.
3. Inspect for damage to valve or accessories, including tampering devices.
4. Determine that valve is properly identified.
5. Check that nonrising stem and underground valves are marked with direction in which to open. If not, permanently mark valve with proper direction to open.
6. Lubricate outside stems, and other friction points used for operating valves.
7. Remove any tamper locking devices and completely close (or open) valves. Check that water flow has ceases when valve is closed.
8. Inspect for leaks.
9. Reopen (or close) valve and check for leaks at stem and joints.
10. Replace tamper seals or locks.

Tools & Materials

1. Tool Group C

F-10 Fire Department Pumper Connections  
(Standpipe or Sprinkler)

Frequency: Annual

Special Instructions

Never stand directly in front of connection when removing cap.

Check Points

1. Remove any obstructions to easy accessibility.
2. Inspect for collision damage and missing parts.
3. Remove caps, check for internal obstruction and signs of leaking check valve.
4. Inspect swing check for free movement (Siamese type).
5. Inspect threads.
6. Replace missing parts and screw caps on hand-tight when applicable, install new frangible caps.
7. Inspect check valve for corrosion and leakage at joints.
8. Check ball drip for free movement.
9. Inspect drain for corrosion, blockage and cross connection.

Tools & Materials

1. Standard Tools – Basic



F-11 Fire Doors – Stairwells and  
Exitways (Swinging)

Frequency: Quarterly

Special Instructions

The work required by this procedure might cause the activation of an alarm and/or a supervisory signal. The field office manager and the control center or fire department that will receive the alarm and/or signal must be notified prior to start of work. (See Guide No. F-14).

Check Points

1. Remove all hold-open devices such as fusible links except approved electro-magnetic hold open devices.
2. Check hang and swing for close fit. Doors must latch on normal closing cycle and have a neat fit.
3. Remove any obstructions that retard full swing or movement of door.
4. Test operation of panic hardware.
5. Inspect door coordinates on pairs.
6. Check operation of any special devices such as smoke detectors or magnetic door releases.
7. Inspect door for damage.

Tools & Materials

1. Standard Tools – Basic

F-13 Fire Supervisory  
Signals – Testing

Frequency: Quarterly

Special Instructions

The work required by this procedure might cause the activation of an alarm and/or a supervisory signal. The field office manager and the control center or fire department that will receive the alarm and/or signal must be notified prior to start of work. When feasible the position of valves, air pressure, temperature, or water level being monitored should be altered to actuate the signals. Check all supervisory devices for damage, corrosion, and pitted electrical contactors. Inspect conduit for loose joints, hangers, and clamps.

Check Points

1. Valve supervision – turn valve stem about three (3) revolutions and check for Signal. Adjust tamper device if necessary.
2. Air pressure supervision.
  - a. Inspect pressure gauges for any damage.
  - b. Tap gauge to see if needle is jammed or immovable.
  - c. Check for proper air pressure.
  - d. Gradually release air pressure and note pressure at which pressure switch activates signal. When necessary, adjust pressure switch. Re-pressurize system.
3. Temperature supervision – mechanically activate temperature switches and check for signal. Adjust if necessary.
4. Water level supervision – check float mechanism for corrosion and freedom of movement. Move float until signal is received. Adjust if necessary.

Tools & Materials

1. Standard tools – Basic

## F-14 Automatic Fire Detection or Alarm Devices

Frequency: Quarterly

### Special Instructions

The work required by this procedure might cause the activation of an alarm and/or a supervisory signal. The field office manager and the control center or fire department that will receive the alarm and/or signal must be notified prior to start of work. When it is both feasible and safe, the environmental conditions being monitored should be altered to actuate the device. Check all detection devices for drainage and proper anchorage.

### Check Points

1. Inspect conduit for loose hangers or clamps.
2. Ion chamber detectors (including duct type) – activate alarm with freon aerosol spray or by blowing smoke near detector. Test for proper signals. Check air-sampling tubes for duct type. Clean according to manufacturer's instructions.
3. Self-restoring temperature detectors – increase temperature or mechanically complete circuit and test for proper signals. Make adjustments if necessary (snap action or bi-metallic strips).
4. Non-restorable temperature detectors – check tension on thermostatic cable. Check continuity of circuits by use of test buttons or by mechanically completing circuit. Test for proper signals.
5. Pneumatic tube detectors – in locations susceptible to damage, check tubing for crimps or damage. Heat tubing by means of resistance heater, hot water, etc., and test for proper signals. Adjust release device and replace diaphragm if necessary.
6. Photoelectric detectors (including duct type) – inspect for proper alignment. Diffuse or obstruct the light rays and test for proper signals. Check air-sampling tubes for duct type. Clean according to manufacturer's instructions.
7. Water flow alarms (zoned) – open valve to test pipe or drain pipe (usually located at sprinkler risers) or open inspector's test valve (located at end of most remote branch line) and check for proper transmission of signals from water flow paddle alarms or pressure switches. This should be done in conjunction with alarm check valve maintenance. (See Guide No. F-1).
8. General – check other features for activation by the devices through the fire alarm control panel. These features include alarm bells, elevator capture, releasing of fire doors held open, notification of fire department, smoke control, etc.

### Tools & Materials

1. Standard Tools – Basic
2. Cleaning Materials

F-16 Fire Alarm System – Recorder

Frequency: Weekly

Check Points

1. Clean recording devices
2. Check rewound mechanisms. Rewind if necessary.
3. Examine alignment and tension of paper tape and supply of tape on reels. Install new tape when needed.
4. Manually move ribbon to prevent ink from drying (papermaking type).
5. Inspect for legible punctures or markings on tape.
6. Check for correct time on time stamp. Reset if necessary.

Tools & Materials

1. Standard Tools – Basic
2. Ink

F-17 Fire Alarm Boxes (Manual -  
Coded and Uncoded)

Frequency: Quarterly

Special Instructions

The work required by this procedure might cause the activation of an alarm and/or a supervisory signal. The field office manager and the control center or fire department that will receive the alarm and/or signal must be notified prior to start of work. When alarm systems are connected to municipal systems, test signals to be transmitted to them will be limited to those acceptable to that authority. Results should be recorded.

Check Points

1. Examine box for damage and legible box number.
2. Check external tamper devices.
3. When practical, remove "Break Glass" or lass rods and follow instructions for actuating alarm.
4. Confirm that proper signal (coded or uncoded) is transmitted to receiving station (Central Control Fire Department, Police Department, ADT, etc.).
5. Determine that audible alarms or signals, local or general, and actuated by the alarm box are operating.
6. General – check other features for activation by stations or boxes through the fire alarm control panel. These features include alarm bells, elevator capture, releasing of fire doors held open, notification of fire department, smoke control, etc.
7. Inspect recording register (if applicable) for legibility, time, code number, and number of rounds.
8. On systems with shunt non-interfering or positive non-interfering circuits, operate one box and then operate another box on each box loop prior to the completion of the first cycle. Check for interference at receiving station or recording register.
9. Restore alarm box and accessories to normal position promptly after each test. This may include rewinding, resetting, replacement of tamper devices, etc.

Tools & Materials

1. Standard Tools – Basic
2. Cleaning materials

## F-18 Fire and Smoke Dampers

Frequency: Two years

### Special Instructions

Fusible link must never be replaced with a piece of wire. On first inspection, make sure that damper is not installed backwards. In all cases, the air movement should tend to close damper.

### Check Points

1. Determine that access door is reasonably airtight and latches properly.
2. If damper is closed, check for ruptured fusible links, broken attachment or hinges, damage, corrosion, etc.
3. Remove fusible link and check for proper rating.
4. Determine that damper is self-closing and properly latches. Adjust if necessary.
5. Check operation of motorized damper control. Lubricate friction pints and exercise damper to insure complete freedom of movement. Remove old or excess lubricant.
6. Each year, in areas of vibration, install new fusible links of proper rating and tensile strength.
7. Reinstall fusible link (locations where vibration is not a problem).
8. Close access door and check for wind noise.

### Tools & Materials

1. Standard Tools – Basic
2. Lubricants

F-19 Fire Hydrants (Dry Barrel  
or Wet Barrel)

Frequency: Annual

Special Instructions

1. Dry barrel hydrants should be checked in the fall before the first frost.

Check Points

1. Remove any obstructions, which hinder accessibility.
2. Outlets must be at least 18 inches above ground or floor and the hydrant in plumb position.
3. Make sure that dry barrel type hydrants are used in unheated areas (indoor or outdoor) where freezing is encountered.
4. Check for leakage at hose outlet, etc.
5. Examine condition of gaskets, packing gland and threads.
6. Examine barrel for cracks.
7. Remove outlet caps, check for ease of removal, replace all but one 2 ½" cap.
8. Dry barrel type – shut hydrant, check for drainage by back suction or by dropping weight on string into barrel to check for water.
9. Dry barrel type – if water is present, unplug drain valve. If water table is higher than drain hose, plug the hole.
10. Flush hydrant and check water flow. Flush until water is clear.
11. Cap hydrant, open hydrant 2 turns.
12. Check for leaks.
13. Dry barrel type – repeat items 8 and 9 above.
14. If drain is manually plugged, pump water out of barrel.
15. Lubricate all threads.
16. Check to see that nozzle caps are hand-tight.

Tools & Materials

1. Tool Group C
2. Lubricants

F-20 Sprinkler Heads -  
Spinklered Areas

Frequency: Semi-Annual

Special Instructions

This work should be scheduled immediately prior to the scheduled maintenance on dry pipe valves or alarm check valves (wet pipe). Needed replacement of sprinkler heads should be performed at that time.

Check Points

1. Inspect and identify damaged, bent, corroded, painted, whitewashed, or weeping sprinkler heads, all of which will need replacement.
2. Remove any insect nests attached to sprinkler heads.
3. Place light coat of oil on sprinkler heads located in areas conducive to insect nests.
4. For sprinkler heads, which are subject to above normal temperature (adjacent to steam pipes, furnaces, ovens, hot gas, vents, exhaust, etc.), check color-coding of sprinkler heads for the proper temperature range. Identify the sprinkler heads with improper temperature ranges, all of which will need replacement.
5. Check that minimum distance of 18 to 36 inches is maintained between sprinkler heads and racks, palletized stock, or other stacked materials.
6. Remove any ladders, stock or material, which is being supported by the sprinkler piping.
7. Replace broken pipe hangers and refasten any that have come loose.
8. Check that all water is drained from low points on dry piping systems.

Tools & Materials

1. Tool Group C
2. Spare heads of proper temperatures
3. Ladder



F-22 Fire Extinguisher -  
Stored Pressure with Gauge

Frequency: Annual

Special Instructions

Do not pressurize any extinguisher that shows signs of mechanical damage, corrosion, or which has reduced pressure without being discharged. In such cases, release pressure and perform hydrostatic test. (See Guide No. F-25).

Check Points

1. Remove any obstructions to visibility and easy accessibility.
2. Inspect shell for dents, broken hanger attachments or hangers, corrosion at seams, damaged threads, and legible operating instructions.
3. Check for broken seals, bent, damaged, or missing pins or any other signs that extinguisher has been used or tampered with. Regardless of gauge readings, if seal or taper device is broken, release pressure (without discharging extinguishing agent) and check for proper level of extinguishing agent. Repressurize extinguisher and check for leaks.
4. Tap gauge to see if it is jammed or immovable. Read gauge. If not in operating range, check for leaks and repressurize. Inspect gauge casing and crystal for damage.
5. Replace cracked, cut, or brittle hose, and damaged couplings. Remove any obstructions in nozzle or hose.
6. Replace broken seal or tamper indicators, tag extinguishers and replace on hanger.

Tools & Materials

1. Standard Tools – Basic
2. Spare hoses and couplings
3. Seals
4. Tags
5. Cleaning materials

## F-24 Fire Extinguisher – Inspection

Frequency: Monthly

### Application

This guide is for a monthly inspection of all fire extinguishers listed in Guide Nos. F-21, F-22, and F-23, and is in addition to the annual maintenance. The quantity for this guide is the sum of the quantities for Guide Nos. F-21, F-22, and F-23.

### Check Points

1. Check that the extinguisher is in its designated place.
2. Check that the extinguisher has not been actuated or tampered with.
3. Check the extinguisher for physical damage or condition that would prevent operation.

### Tools & Materials

Non-applicable

F-25 Fire Extinguishers, Hydrostatic Testing of Carbon Dioxide, Store Pressure, and Cartridge Type

Frequency: As Required

Special Instructions

Soda acid, carbon dioxide, and foam extinguishers should be tested on a 5-year basis. Dry chemical extinguishers, with the exception of ones with stainless steel shells (5 year) should be tested on a 12-year basis. Testing should be in accordance with NFPA Standard No. 10. Hydrostatic testing of extinguishers requires experienced personnel and suitable testing equipment.

Check Points

1. Any cylinders that have been repaired by soldering or welding, damaged, corroded, burned, or had calcium chloride type of extinguishing agent used in stainless steel extinguisher shall not be hydrostatically tested but destroyed.
2. Operated stored pressure and cartridge type extinguisher and check performance.
3. Dismantle and remove all traces of extinguishing agent (dry chemical or dry powder), from inside of shell and hose assembly.
4. Insert plug into shell opening. (External cartridge type extinguishers only).
5. Fill with water and connect the test pump.
6. Secure shell in protective cage and apply proper test pressure. Pressure to be applied at rate so test pressure is reached within one minute.

Type of Extinguisher

Hydrostatic Test Pressure

Carbon dioxide	5/3 the service pressure
Soda acid, foam	350 psi
Dry chemical or powder	Original factory test pressure

7. Observe shell and gauge for any distortion or leakage. After one minute release pressure. Destroy shells that fail this test.
8. All dry chemical and dry powder extinguishers must have all traces of water removed from extinguishing agent, shell, hose and nozzle. A heated air stream is recommended with its temperature not exceeding 150° F.
9. Weigh replacement cartridge to insure that it is full of gas.
10. Recharge extinguisher according to manufacturer's instructions.
11. Affix permanent record on extinguisher with year of hydrostatic test.

F-25 Fire Extinguishers, Hydrostatic  
Testing or Carbon Dioxide, Stored  
Pressure, and Cartridge Type

Frequency: As Required

Tools & Material

1. Standard Tools – Basic
2. Seals
3. Tags
4. Scale
5. Appropriate testing equipment

F-26 Fire Extinguisher Systems -  
Carbon Dioxide (High Pressure),  
Halon, Dry Chemical

Frequency: Semi-Annual

Special Instructions

In general, it is recommended that the servicing of these systems be entrusted to representatives of fire extinguishing installation companies. The work required by this procedure might cause the activation of an alarm and/or a supervisory signal. The field office manager and control center of fire department that will receive the alarm or signal must be notified prior to start of work. When replacement cylinders are received from supplier, check that hydrostatic test date is current.

Check Points

1. Check each cylinder for the date of the last hydrostatic test (all dates are stamped on Cylinder).
2. Replace those cylinders for which the elapsed time exceeds:
  - a. Carbon dioxide – 12 years
  - b. Halon – 20 years
  - c. Dry chemical – 12 years
3. Weigh or check pressure on remaining cylinders. Replace if:
  - a. Carbon dioxide – weight loss is 10% or greater.
  - b. Halon – weight loss is 5% or greater or if pressure loss (adjusted for temperature) is 10% or greater.
  - c. Dry chemical – weight loss in gas expellant cylinder exceeds acceptable limit on system (or the cylinder) or if pressure gauge indicates “inoperable” range.
4. Check the entire piping system (including cylinders) for leaks, obstructions, physical damage, and proper support. Examine all nozzles to ensure they are properly positioned, clean, and not clogged. Replace or repair as necessary. Replace seals on all systems. For dry chemicals systems, check dry chemical in storage container (s) to be sure it is free flowing and without lumps (this does not apply to stored pressure systems). Replace old dry chemical agent every 12 years or earlier if necessary by annual inspection. Replace all fusible alloy type fixed temperature elements (fusible links).
5. For all systems, test (and clean if necessary) all mechanical, manual, and automatic detection equipment and actuating devices according to manufacturer’s instructions. Replace or repair those yielding unsatisfactory performance.
6. For all systems, test (“dry run” trip test) the system in accordance to manufacturer’s instructions.
7. Check for proper operation of all alarms and signals at the fire alarm control panel.
8. Restore system to “ready” status and record data on system tag.

F-26 Fire Extinguisher Systems -  
Carbon Dioxide (High Pressure),  
Halon, Dry Chemical

Frequency: Semi-Annual

Tools & Materials

1. Standard Tools – Basic
2. Seals
3. Tags
4. Scale

F-26A Reserved

## F-27 Fan, Centrifugal

Frequency: Annual

### Special Instructions

1. Review manufacturer's instructions.
2. Schedule shut-downs with operating personnel, as needed
3. Open, lock and tag electrical circuits.

### Check Points

1. Check fan blades for dust buildup and clean if necessary.
2. Check fan blades and moving parts for excessive wear. Clean as needed.
3. Check fan RPM to design specifications.
4. Check bearing collar set screws on fan shaft to make sure they are tight.
5. Vacuum interior of unit if accessible. Clean exterior.
6. Lubricate fan shaft bearings while unit is running. Add grease slowly until slight bleeding is noted from the seals. Do not over lubricate. Remove old or excess lubricant.
7. Check belts for wear, adjust tension or alignment, and replace belts when necessary. Multiple belt drives should be replaced with matched sets.
8. Check structural members, vibration eliminators and flexible connections.
9. Schedule PM on motor per Guide No. M-3 at same time.

### Tools & Materials

1. Standard Tools – Basic
2. Tachometer
3. Cleaning equipment and materials
4. Vacuum
5. Grease guns, lubricants
6. Respirator



F-30 Filters, Viscous Type  
(Wire Mesh)

Frequency: As Required

Application

This guide is for reusable filters and includes time for removing, cleaning and replacing the filters. The throw-away filters are usually more economical than the viscous type. Therefore, this filter shall only be used where economically justified.

Check Points

1. Remove filters and replace with filters that have been cleaned and recoated. Examine frame and clean it with a high suction vacuum.
2. Move dirty filters to cleaning station.
3. Clean, recoat, and store filters removed until next scheduled change.

Tools & Materials

1. Standard Tools – Basic
2. Respirator
3. Goggles
4. Vacuum
5. Filter replacement

F-32 Filter, Throw Away

Frequency: As Required

Special Instructions

1. Open and tag switches controlling fans.
2. Filters should be replaced when static pressure reading indicates.

Check Points

1. Remove old filters.
2. Vacuum filter section of air handler.
3. Inspect frame, clamps, etc.
4. Install new filters. Make sure direction of airflow corresponds to the airflow shown on the filter and filters are properly sized to cover the opening.
5. Remove tags, and restore to service.

Tools & Materials

1. Standard Tools – Basic
2. Filter replacement
3. Vacuum
4. Respirator

F-34 Fluorescent Light  
Washing and Relamping

Frequency: 2 ½ Years

Application

For the group replacement of standard fluorescent lamps in office areas of a single building. Work performed by a two-person crew. Fixture height is such that the work can be accomplished with the use of an eight-foot stepladder. Time is allowed for disassembly, washing, reassembly, and replacement of lamps in each fixture. For types of fixtures that cannot be disassembled, time is allowed to clean in place.

Special Instructions

This guide requires that the fluorescent light fixtures be washed every 2.5 years. However, since the expected life of the fluorescent light tubes are in excess of five years, the tubes should be replaced only every other washing. The existing tubes should be reused on the interim washing. Turn off branch circuit at panel or individual light switch in room as appropriate.

Check Points

1. Disassemble fixture. Wash all removable parts with warm water and a mild detergent. Rinse and allow to drip dry.
2. Damp wipe remaining body of fixture in place.
3. Remove old fluorescent lamps and install new lamps.
4. Test light fixture. Replace starters, where necessary. Note and report any needed electrical repairs.
5. Reassemble all removable parts to fixtures.

Tools & Materials

1. Standard Tools – Basic
2. Ladder
3. Cleaning materials

F-35 Fluorescent Light Fixture  
Relamping Only

Frequency: 5 Years

Application

For the group replacement of standard fluorescent lamps in office areas of a single building. Work is performed by a two-person crew. Fixture height is such that the work can be accomplished with the use of an eight-foot stepladder. Group relamping on a more frequent basis than once every five years must be justified and request for same submitted to Central Office through the regional office for approval.

Special Instructions

1. Turn off branch circuit at panel, or individual light switch in room as appropriate.

Check Points

1. Remove louver or diffuser as necessary.
2. Remove all fluorescent lamps and install new lamps.
3. Test light fixture. Replace starters where necessary. Note and report any needed electrical repairs.
4. Reassemble louver or diffuser, as required.

Tools & Materials

1. Standard Tools – Basic
2. Ladder

F-36 Fans, Propeller, 24" Diam. Or Larger

Frequency: Annual

Special Instructions

1. Disconnect and tag circuit

Check Points

1. Clean unit, especially fan blades.
2. Inspect pulleys, belts, couplings, etc.; adjust tension and tighten mountings as necessary. Change badly worn belts. Multi-belt drives should be replaced with matched sets.
3. Perform required lubrication and remove old or excess lubricant.
4. Clean motor with vacuum or low-pressure air (less than 40 psig). Check for obstructions in motor cooling and airflow.
5. Remove tags, start unit and check for vibration and noise.

Tools & Materials

1. Standard Tools – Basic
2. Vacuum
3. Cleaning materials
4. Lubricants

F-38 Lighting Protection  
(Per Down Conductor)

Frequency: Annual

Special Instructions

On first inspection, check that (1) all air terminals (lighting rods) are interconnected, (2) at least two down conductors are installed with their own ground connection.

Check Points

1. Inspect air terminals for corrosion and rigid attachment to structure.
2. Examine conductors for corrosion, strong mechanical joints, which provide good electrical conductivity, and loose or broken fasteners.
3. Check for loops, sharp bends (less than 8" radius) and frayed horizontal and vertical conductors.
4. Check for damaged guards and down conductors.
5. Inspect grounding attachment for permanency and corrosion (if practical).
6. Test resistance to ground for each down conductor.

Tools & Materials

1. Tool Group B

## G-2 Grease Traps

Frequency: Monthly

### Special Instructions

1. Use appropriate protective clothing, especially safety glasses.

### Check Points

1. Clean out trap and sterilize.
2. Inspect for clogging, scale, and improper positioned or missing baffles.
3. Tighten loose parts as necessary.

### Tools & Materials

1. Standard Tools – Basic
2. Gloves
3. Goggles

## H-2 Hot Water Heater – Gas

Frequency: Annual

### Special Instructions

1. Review manufacturer's instructions

### Check Points

1. Drain several gallons from tank to remove sediment.
2. Manually check operation of safety valve. Check for corrosion.
3. Check all connections – electric, gas and water. Tighten as necessary.
4. Check operation and setting of aquastat. Check hot water temperature with dial thermometer, and set aquastat at minimum value.
5. Check pilot and burner assembly. Clean and adjust nozzles for proper flame distribution and quality.
6. Check operation of electric ignition device, if applicable. Check spark gap and adjust if needed.
7. Check flue for proper draft, leaks, and corrosion. Check thermocouple for corrosion or soot. Clean if required.

### Tools & Materials

1. Tool Group C
2. Cleaning equipment and materials
3. Thermometer
4. Clamp-on ammeter
5. Gap gauge (auto ignition)



## L-1 Lawn Mower and Edger

Frequency: Semi-Annual

### Application

This applies to gasoline powered, hand operated, rotary mowers and edgers. Maintenance should be scheduled after every 50 hours of operation or twice a season. Routine lubrication should be accomplished by operator.

### Check Points

1. Change engine oil (Note: oil should be changed at end of season prior to laying unit up for winter).
2. Service air and fuel filters.
3. Sharpen or replace cutting blade.
4. Clean and gap or replace spark plug.
5. Inspect unit, clean debris from cooling air passages and make other needed adjustments.

### Tools & Materials

1. Standard Tools – Basic

L-4 Lighting, Outside  
Incandescent, Fluorescent,  
Mercury Vapor or High  
Pressure Sodium

Frequency: See Application

Application

This guide applies to parking lot, street, loading dock, and perimeter lighting, and provides for group relamping and maintenance of such fixtures outside the building. The frequency should correspond with the group relamping frequency, which should be approximately one year for incandescent lamps, five years for fluorescent, mercury vapor, and high-pressure sodium lamps.

Check Points

1. Open and tag switch.
2. Remove old lamp and clean fixture including reflector, refractor, and globes.
3. Inspect condition of wiring, contacts, terminals and sockets. Look for evidence of overheating.
4. Install new lamp and assemble checking gaskets for proper seat.
5. Test operation of automatic switches.
6. Inspect lamp standard and mounting devices.

Tools & Materials

1. Standard Tools – Basic
2. Cleaning materials

L-5 Lawn Sprinklers (Per Nozzle)

Frequency: Annual

Special Instructions

1. Work to be performed prior to flushing out system.

Check Points

1. Check nozzle and remove corrosion/encrustation.
2. Replace washers and/or "O" rings if required.
3. Clean unit thoroughly and inspect for freedom of operation.
4. On rotating types: check throw regulator and spring assembly for tightness. Lightly lubricate pivot arm and guide bushings. Check adjustment screw and retaining spring.

Tools & Materials

1. Standard Tools – Basic
2. Washers
3. Lubricants

M-2 Manholes, Sewer

Frequency: Quarterly

Special Instructions

1. Wear suitable protective clothing.
2. No open flames or smoking
3. Use barricade around manhole.
4. Provide ventilation within manhole.

Check Points

1. Test for gas.
2. Remove cover
3. Observe flow
4. Examine structural features of sewer line, interior of manhole, manhole frame and cover, etc.

Tools & Materials

1. Standard Tools – Basic
2. Respirator
3. Barricade

## M-3 Motors

Frequency: Annual

### Application

This guide is for squirrel-cage, wound-rotor and synchronous motors in excess of 1 horsepower. The maintenance specified by this guide is not intended to require disassembly of the motor. GSA Form 1738, Preventive Maintenance Control Card, should be prepared for each motor on which maintenance is performed. This guide does not normally apply to motors rated less than 1 horsepower. Maintenance for these motors is normally limited to cleaning and lubrication, which is accomplished with the maintenance of the driven machine.

### Special Instructions

1. If necessary, schedule shutdown with operating personnel.
2. Review manufacturer's instructions.
3. Open, tag, and lock circuit serving motor, when applicable.

### Check Points

1. Check ventilation ports for soil accumulation, clean if necessary.
2. Clean exterior of motor surfaces of soil accumulation.
3. Lubricate bearings according to horsepower ratings.

#### HP RANGE

1-7.5 hp  
Over 7.5 to 50 hp  
Over 50 hp

#### FREQUENCY

every 4 years  
yearly  
two times/year

- a. Remove filler and drain plugs (use zerk fittings if installed).
- b. Free drain hole of any hard grease (use piece of wire if necessary).
- c. Add grease – use good grade lithium base grease unless otherwise noted.
4. Check motor windings for accumulation of soil. Blow out with air if required.
5. Check hold down bolts and grounding straps for tightness.
6. Remove tags and return to service.

### Tools & Materials

1. Tool Group B
2. Tachometer
3. Cleaning equipment and materials
4. Lubricants

## R-2 Roof Inspection (All Types)

Frequency: Semi-Annual

### Special Instructions

1. Check manufacturer's or installer's instructions.
2. Perform inspection prior to heating and cooling seasons.
3. This is a general inspection, and deficiencies should be handled on a service call or repair basis.
4. Use care when working in high places.
5. Use safety line with belt if necessary.

### Check Points

1. General Appearance – check for cans, bottles, leaves, rags, and equipment that may have been left from a job on or near the roof. Dispose of appropriately.
2. Water Tightness – check for presence of leaks, and historical information for leaks during long-continued rain, leaks occurring every rain, etc.
3. Check exposed nails that have worked loose from seams, shingles and flashings.
4. Check for wrinkles, bubbles, buckles and sponginess on built up roofing.
5. Check exposure of bituminous coating due to loose or missing gravel or slag.
6. Check shingles for cracking, loss of coating, brittleness, and edge curl.
7. Check seams on built up roofing.
8. On wood shingles, check for cracks, looseness and rotting.
9. Check for water ponding.
10. Check all flashing for wind damage, loss of bituminous coating, loose seams and edges, damaged caulking and curling, and exposed edges. Check flashing fasteners for looseness and deterioration.
11. Check all metal gravel stops for damage and deterioration.
12. Inspect all pitch pockets for cracking, proper filling, flashing, and metal damage.
13. Check lead sleeves on roof vents for deterioration.
14. Check inverted roof systems for fungus growth in between and under insulating panels.

### Tools & Materials

1. Standard Tools – Basic
2. Ladder
3. Safety line (if necessary)

## S-7 Sump Pump

Frequency: Annual

### Special Instructions

1. Strainer cleaning requires removal of pump unit and should be handles as a repair.
2. Excessive sediment and debris, not removed by flushing the pit should be handled on a project basis, and not considered under this guide.
3. Review manufacturer's instructions.

### Check Points

1. Flush pit, and pump out.
2. Check bail, floats, rods, and switches. (Make sure float operates as designed).
3. Inspect and lube motor, and pump (repack if needed).
4. Inspect check valves.

### Tools & Materials

1. Tool Group C
2. Cleaning equipment and materials
3. Lubricants

## S-11 Snow Blower

Frequency: Annual

### Application

This applies to gasoline powered, hand operated, and reel type snow blowers.

### Special Instructions

1. Review manufacturer's instructions.
2. Maintenance should be scheduled every 50 hours of operation or twice a season.
3. Routine cleaning, lubrication, and the application of rust preventive compound to bare metal parts of the equipment prior to storing shall be accomplished by the operator. See instructions contained in the HB, Custodial Management (PBS P 5810.2B, Appendix S).

### Check Points

1. Change engine oil (Note: oil should be changed at end of season prior to storing for summer).
2. Service air and fuel filters.
3. Clean and gap or replace spark plug.
4. Inspect blades.
5. Inspect unit, remove any debris from cooling air passages and make other needed adjustments.

### Tools & Materials

1. Standard Tools – Basic
2. Gap gauge
3. Lubricants
4. Filters – fuel and air
5. Spark plug (if required)



## T-1 Tanks, Water, (All Types)

Frequency: Every three years

### Special Instructions

Maintenance shall be coordinated with inspections specified in PBS P 5800.18A, Chap. 12, Part 7. This applies to hot water, cold water, expansion tanks, etc. but not to hot water convertor (steam) tanks.

### Check Points

1. Examine exterior of tank including fittings, manholes, and hand holes for leaks, signs of corrosion, and correct as indicated.
2. Drain and flush tank.
3. Open tank and remove rust, scale and buildup by scraping, wire brushing or shot cleaning.
4. Inspect thoroughly the interior of tank; record the size and depth of pits, presence of cracks and condition of openings, fittings, welds, rivets, and joints.
5. Coat with epoxy or other approved protective coatings.
6. Inspect structural supports and repair or replace damaged insulation or covering.
7. Clean, test, and inspect sight glasses, valves, fittings, drains and controls.
8. Perform hydrostatic test if required. (See PBS P 5800.18A, Chap. 12-87).
9. Fill and return to service.

### Tools & Materials

1. Tool Group C
2. Safety signs
3. Respirator
4. Goggles
5. Cleaning equipment and materials

U-2 Unit Heater (Gas and Oil Fired)

Frequency: Annual

Special Instructions

1. Open and tag electric circuit.
2. Review manufacturer's instructions

Check Points

1. Clean and adjust heater deflector fins and element.
2. Clean fan and lubricate motor.
3. Clean burner, chamber, thermocouple and control. (Use a high suction vacuum and/or brush).
4. Adjust pilot or electric ignition device.
5. Inspect vent and damper operation.
6. Operate unit and adjust burner.
7. Check operation of safety pilot, gas shut-off valve, and other burner safety devices.

Tools & Materials

1. Tool Group C
2. Fin comb
3. Vacuum
4. CO2 analyzer
5. Lubricants

V-1 Vacuum Cleaner,  
Heavy Duty, Tank Type

Frequency: Semi-Annual

Application

This applies to heavy duty, tank type cleaners used for vacuum cleaning carpet in office areas. The operator in accordance with instructions contained in the HB, Custodial Management (PBS P 5810.2B, Appendix A) should accomplish daily equipment care.

Special Instructions

1. Review manufacturer's instructions.

Check Points

1. Vacuum or blow out dust from cooling air passages.
2. Service filter.
3. Lubricate according to manufacturer's instructions.
4. Start machine and observe operation.

Tools & Materials

1. Standard Tools – Basic
2. Lubricants
3. Vacuum

## V-3 Valves, Regulating

Frequency: Annual

### Application

This applies to single or double seated; diaphragm or spring loaded, pilot operated valves.

### Check Points

1. Inspect for dirt collected at bleedport and restriction elbow. Clean if necessary.
2. Inspect joints for leakage. Tighten all bolts.
3. Check for dust or other material, which may have sifted onto the upper face of the pilot pressure plate. Clean if needed.
4. Remove and clean line strainer (back-flush where possible).
5. Inspect valve head and seats for nicks or abrasions.
6. Inspect pressure reading against set point.
7. Check for free operation of valve stem.
8. Inspect condition of diaphragm.
9. Inspect pilot line for leaks.

### Tools & Materials

1. Tool Group C
2. Cleaning equipment and materials

## V-5 Valve, Manually Operated

### Frequency:

Main Line or Critical: Annual

Other Over Two Inches: 5 Years

### Application

This applies to valves other than those used on Fire Protection systems. Maintenance for valves used on fire protection systems is described under the appropriate guide for the specific item of fire protection equipment.

### Check Points

1. Operate valve in full open/closed position. Loss of ability to close tightly will require inspection of valve seals and discs for wear and contaminant build-ups.
2. Check for sticking valve stems and lubricate stems and fittings sparingly.
3. Replace packing; dress, re-bush, or replace packing gland assembly, if required.
4. Check for freedom of motion on valves equipped with wheel and chain for remote operation.

### Tools & Materials

1. Tool Group C
2. Lubricants

W-1 Drinking Water Filter Systems

Frequency: As Required

Check Points

1. Drain, clean and flush drinking water system.
2. Disassemble filters, flush and drain.
3. Install new gravel, sand, and charcoal.

Tools & Materials

1. Tool Group C
2. Respirator
3. Gravel, sand, and charcoal