

Lebanese University Campus - Hadath

1.4 - Work Parcel 1-Scope Of Work

1.4.1-Operation And Maintenance tasks

Technical Scope Of Work: Operation

- 1- Contractor shall comply with the requirements of the Contract documents
- 2- Contractor shall be responsible for the coordination with the Lebanese University buildings managements in order to operate the systems described in work parcel 1 as per the academic time schedules planned for each buildings.
- 3- Contractor shall be responsible for keeping systems installed satisfactory to perform their designed functions such as:
 - a-Perfect attainment of temperatures, air quality and humidity with acceptable noise, vibration levels, consumption of power and water, within manufacturer data sheets.
 - b-Control of priority contactors in case of emergency to provide maximum services to buildings using the available Power resources (Emergency Generators).
 - c- Control of potable water quality, in order to fit within the given technical requirements.
 - d- Control of Mechanical equipment (refer to attached appendix 1.3), via the Building Management System by keeping the key parameters of these equipment effective.
- 4- Contractor shall be responsible to provide regular report (quarterly) showing the consumption of main consumables (such as chemicals, water, gas etc....) as described in O&M manuals.
- 5- Contractor shall be responsible to operate the systems taking into account the energy saving measures as for and non-restricted to the following:
 - a-Planning and updating the schedules for operation of systems according to the results of the reports mentioned in paragraph 3 above.
 - b- Other energy saving measures as for gas, and water consumptions, should be taken into consideration for efficient operation.

Technical Scope Of Work: Maintenance

- 1- Contractor is responsible to perform all the preventive (routine) and corrective maintenance (emergency), (as defined in the O&M manuals), cleaning and restoration (painting, welding, minor repairs, corrosion protection) of Mechanical equipment which are defined in the contracts documents.
- 2- All maintenance works should be performed in accordance with the manufacturer's recommendations and /or as stipulated in the appendices.
- 3- Reporting:
The contractor shall be responsible to provide regular (quarterly) report showing the maintenance works executed, along with suggestions for future maintenance tasks, status of equipment, frequency & analysis of trouble shootings.

The contractor shall be responsible to provide emergency report for problems that may occur. There report shall contain description of the problem, corrective studies all necessary corrective actions, and budgeting.

- 4- Refer to the attached document overleaf for specific maintenance aspects within this trade



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1.4 – Work Parcel 1 – Maintenance Scope of Work

List of sample tasks scheduling for maintenance

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1.4 – Work Parcel 1 – Maintenance Scope of Work

1.4.0.Domestic Cold & Potable Water System- Copper, Galvanized Steel & PVC

Monthly

- Check all exposed pipe work, flanges, connections, etc. for leakage or damage. Report defect and repair as necessary.
- Check alignment of expansion bellows and lugs where applicable. Report any defects. Check guide points for wear and freedom of pipe movement, grease guide rollers if applicable.

Quarterly

- Carry out tasks as detailed for Monthly.
- Check all pipe support brackets for security, and tighten as necessary. Report conditions of supports.
- Check condition of all anti-vibration mounts. Report any defects.
- Check condition of all insulation and covering (if applicable), paying particular attention to the integrity of the vapour seal, report any defects.
- Check operation of valves, stop cocks, drain cocks, etc. Valves should be fully closed then fully opened, (Note the number of turns to fully close, so that valve can be reset to its original position). If operation of valve is stiff, lubricate as necessary, repeat opening and closing until clear, and then return valve to its original position. Report any irregularities.
- Examine all valve gland packing for leakage and adjust or repack as required.

Annually

- Carry out tasks as detailed for Quarterly.
- Check pipe work identification tags remain secure, report any defects.



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1.4 – Work Parcel 1 – Maintenance Scope of Work

- Check for integrity of fire stopping where pipes pass through walls etc. report any defects.



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1.4.1. Domestic Hot Water System - Copper, Galvanized Steel

Monthly

- Check all exposed pipe work, flanges, connections, etc. for leakage or damage. Report defect and repair as necessary.
- Check alignment of expansion bellows and lugs where applicable. Report any defects. Check guide points for wear and freedom of pipe movement, grease guide rollers if applicable.

Quarterly

- Carry out tasks as detailed for Monthly.
- Check all pipe support brackets for security, and tighten as necessary. Report conditions of supports.
- Check condition of all anti-vibration mounts. Report any defects.
- Check condition of all insulation and covering (if applicable), paying particular attention to the integrity of the vapour seal, report any defects.
- Check operation of valves, stop cocks, drain cocks, etc. Valves should be fully closed then fully opened, (Note the number of turns to fully close, so that valve can be reset to its original position). If operation of valve is stiff, lubricate as necessary, repeat opening and closing until clear, and then return valve to its original position. Report any irregularities.
- Examine all valve gland packing for leakage and adjust or repack as required.

Annually

- Carry out tasks as detailed for Quarterly.
 - Check pipe work identification tags remain secure, report any defects.
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1.4 – Work Parcel 1 – Maintenance Scope of Work

- Check for integrity of fire stopping where pipes pass through walls etc. report any defects.

1.4.2 Storm Water and Soil Networks-(HDPE, Polypropylene, Cast iron)

Bi-annually

Above Ground

- Check security of wall fixings and pipe joints.
- Check connections to roof drains, refix if necessary.
- Check down pipes for cracks or leakage and report all defects.
- Check drain connections and access plates for leaks and report all defects.
- Remove all silt and debris from roof drains and check joints for signs of leakage. Report all defects.
- Report any indication of water drainage to fascias, roofs, walls or structure.
- Flush out installation and inspect for leaking joints.
- Report all items requiring remedial works.

Below Ground

- Check all branches and drain connections.
- Remove grating or access plate where fitted.
- Clean any silt build up from pipe and trap.
- Replace grating or cover, inspect and report on all defects.

Annually



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1.4 – Work Parcel 1 – Maintenance Scope of Work

Above Ground

- Carry out tasks as detailed for Bi-annually.

Below Ground

- Carry out tasks as detailed for Bi-annually.
- Remove manholes covers and provide warning signs and barriers to prevent public injury.
- Remove all grease or silt build-up within manhole and flush out.
- Rod through and hose drain runs as required and check flow throughput, advise on condition of installation.
- Examine step irons, where fitted, and report on security and condition.
- Remove rodding eye cover plates to branch drain connections, where fitted. Check for and remove any obstructions. Replace rodding eye cover plates and replace any damaged gaskets.
- Clean covers and frames; clean out lifting keyholes and wire brush to remove rust and scale.
- Regrease manhole cover and frame. Replace or refit gaskets, where fitted, and refit cover. Ensure that all covers have correct sealing.
- Inspect and report all defects.
- Report any evidence of vermin infestation.



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1.4 – Work Parcel 1 – Maintenance Scope of Work

1.4.3 Soil and Waste Drainage System (HDPE, Polypropylene, Cast iron)

Bi-annually

Above Ground

- Check security of wall fixings and pipe joints.
- Check connections to outlets for fixings and leakage. Refix if necessary.
- Check exposed pipes for cracks or leaks, and report any defects.
- Remove roof vent cowls where fitted, clean and replace.
- Flush out installation and inspect for leaks. Report any damage to walls and structure.
- Inspect all cleanouts and access covers for leakage around joints. Report on all defects
- Inspect ceiling hangers, if applicable, tighten loose bolts insuring slope. Report condition of hangers.

Below Ground

- Check all branch waste and drain connections for blockage. Repair and report as necessary.
- Remove grating or access plates where fitted.
- Clean any silt build up from pipe and traps.
- Replace grating or cover. Inspect and report on all defects.

Annually

- Carry out tasks as detailed for Bi-annually.

Below Ground

- Inspect manholes and catch pits.
- Remove manhole or catch pit cover and provide warning signs and barriers to prevent public injury.



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1.4 – Work Parcel 1 – Maintenance Scope of Work

- Remove all grease or silt build-up within manhole or catch pit and flush out.
- Rod through and hose drain runs as required and check flow throughput, advise on condition of installation.
- Examine step irons, where fitted, and report on security and condition.
- Remove rodding eye cover plates to branch drain connections, where fitted. Check for and remove any obstructions. Replace rodding eye cover plates and replace any damaged gaskets.
- Clean covers and frames; clean out lifting keyholes and wire brush to remove rust and scale.
- Regrease manhole or catch pit cover and frame. Replace or refit gaskets, where fitted, and refit cover. Ensure that all covers have correct sealing.
- Inspect and report all defects.
- Report any evidence of vermin infestation.



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1.4 – Work Parcel 1 – Maintenance Scope of Work

1.4.4. Circulations Submersible Pumps

Monthly

- Examine pump unit and adjacent pipe work, together with associated connection for leaks and corrosion. Report findings.
- Externally clean pumps and motors.

Quarterly

- Carry out tasks as detailed for Monthly.
- Test unit for excessive noise or vibration. Repair as necessary
- Inspect bearings and glands for wear. Lubricate bearings to manufacturer's recommendations. Repack glands as required.
- Examine all pipe work and valves insulation. Repair any damaged section or item.
- Examine and record delivery and suction pressure gauge, together with thermometers. Report any defect.
- Inspect and clean strainers.
- Test all manually operated valves, ensure full and free travel and correct settings. Check for leakage, adjust or replace valve glands as required. Remove all deposits and lubricate valve.
- Examine pump drain points. Ensure they are clean and free from any foreign materials.

Electrical

- Inspect motor electrical terminals. Tighten if required
- Check and record full load running current.
- Examine control switches. Check for proper operation and calibration.

Annually



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1.4 – Work Parcel 1 – Maintenance Scope of Work

- Carry out tasks as detailed for Quarterly.
- Examine and ensure motor ventilation airways are clear, remove all dirt and dust by vacuum cleaner.
- Check pump and motor level and alignment. Repair as necessary.
- Check and tighten as required, report on condition of holding down bolts.
- Check and clean anti-vibration mounts. Repair or replace as necessary.

Electrical

- Check motor winding insulation. Report condition.
- Examine and report on condition of all associated wiring facility.



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1.4 – Work Parcel 1 – Maintenance Scope of Work

1.4.5. Sanitary Fixtures, Emergency Showers

Weekly

- Visually inspect fixtures for fracture, leakage, or missing elements. Report any defect or leakage.
- Check flexible connections for leakage, close relevant isolating valve, and report for replacement.
- Clean Sanitary fixtures using soap and water. Do not use abrasive or chemical cleaners. Disinfect using special chemicals.
- Clean Faucets and flush valves using soap and water. Wipe dry with clean cloth or towel. Do not use abrasive or chemical cleaners.
- Operate flush valves and check for proper operation. Report any defect.

Monthly

- Carry out tasks as detailed for weekly.

W.C.'s

- Flush all W.C.'s to provide a change of water.
- Check for any defects in flush mechanisms and drainage. Report any defects.
- Examine hose bib gland packings; adjust or repack as required. Check free travel of valve. Lubricate valve stem. Check hose for cracks & leakage. Repair or replace defective items.

Sinks & Wash Basins

- Run hot and cold taps for a minimum of 1 minute to ensure full change of water in supply systems.
- Check for any defects in drainage system. Report any defects.

Urinals



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1.4 – Work Parcel 1 – Maintenance Scope of Work

- Flush all urinals.
- Check for any defects in flush mechanisms and drainage system. Report any defects.

Note: All necessary precautions must be taken to ensure non use by the public or premises personnel until the unit(s) are returned to the correct operational setting.

Quarterly

- Carry out tasks as detailed for Monthly.

Showers

- Strip, thoroughly clean and sterilise all shower head(s) and pipe work in a solution of 50 ppm free chlorine, upon re-assembly replace any faulty or damaged parts and ensure correct operation.
- Run each hot shower for 15 minutes to ensure removal of any contamination.

Note: All necessary precautions must be taken to ensure non use by the public or premises personnel until the unit(s) are returned to the correct operational setting.

Bi-annually

- Carry out tasks as detailed for Quarterly.

W.C.'s

- Remove access panel to flush tank (if fitted).
- Check tightness of seat and flap securing bolts for European water closets and adjust as required.
- Flush and check all round bowl rim action, report any defects.
- Check action and ensure correct operation of flush tank.

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- Test and ensure satisfactory operation of tank fill times, correct water level, and correct flush time per unit.
- Check security of all fixings and brackets.
- Examine joint seal between pan and flush pipe and between pan and drain, report on condition.
- Test and report on condition of siphon assembly, advise on the necessity for any remedial works.
- Check floor connection, ensure stability of all fixings, carry out adjustments or repair as necessary.
- Report any damage to sanitary ware and all associated equipment.
- Adjust Flush Valve setting to insure proper flushing where applicable.

Sinks and Wash Basins

- Examine and ensure correct operation of taps, mixer taps assemblies, wastes and overflows.
- Ensure correct operation of tap closure and free spindle movement. Replace any defective tap washers or seals as necessary.
- Replace or take up any valve gland seals as required.
- Examine and check for correct fitting of plug, chain or other outflow control device, adjusting or advise on the necessity to replace any faulty items.
- Check rate of outflow and operation of overflow, if sluggish clean the traps and associated pipe work. Replace by new seals as necessary.
- Examine and ensure security of fixings, carry out adjustments or repairs as necessary.
- Report any damage to sanitary ware and all associated equipment.

Mop Sinks



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- Remove trap, clean and replace with new seals as necessary.
- Check plug fit and security of chain.
- Check drain down rate and drain off rate of overflow.
- Operate taps, confirm shut off and freedom of spindle movement. Replace washers or seals as necessary.
- Inspect and report on all defects.

Urinals

- Adjust Flush Valve setting to insure proper flushing where applicable.

Annually

- Carry out tasks as detailed for Bi-annually.

Showers, Emergency Showers

- Examine and ensure integrity of the shower unit fixings, repairing any defects as necessary.
- Examine the valve assembly(s), replacing any defective seals. Testing and ensuring correct operation of mixer if applicable.
- Examine the flexible and associated pipe work, replacing if defective the hose and/or washers.
- Test the rate of drain outflow, if slow strip and clean shower drain trap.
- Inspect and report on all defects.



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1.4.6. Electric Water Heaters, Drinking Fountains

Specific Precautions

- For safety, be aware, this water heater is capable of producing hot water at a temperature sufficient enough to cause scalding injury.
- Hydrogen gas can be produced in a hot water system served by this heater that has not been used for a long period of time (generally two weeks or more). Hydrogen gas is extremely flammable. To reduce the risk of injury under these conditions, it is recommended that the hot water faucet be opened for several minutes, before using any electrical appliance connected to the hot water system. If hydrogen is present, there will probably be an unusual sound such as air escaping through the pipe as the water begins to flow. There should be no smoking or open flame near the faucet at the time it is open.

Monthly

- Visually inspect external case and pipe work connections.
- Drain out two gallons of water from the water heater to control the build up of sediment at the base of the storage tank.
- Check pressure relief valve for correct operation. Ensure it is not blocked. Adjust settings. Replace valves suspected to malfunction during operation.
- Check for any internal defects for drinking fountains. Report for any defect.

Electrical

- Check water temperature controls, and compare with thermostat. Adjust thermostat as necessary.
- Check temperature setting of the high temperature cut-out.
- Check electrical connections for drinking water fountains.

Annually

- Carry out tasks as detailed under Monthly.
- Check valves operation. Ensure full and free travel. Lubricate as necessary. Ensure shut off valve to be open during operation.
- Drain the heater until water runs clear to avoid noisy operation and lime and sediment build-up.

Electrical

- Check electrical supply rating to be correct.



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1.4.7. Chilled, Heating, Steam, Condensate Systems and Ancillaries

Monthly

- Check all exposed pipe work, joints, connections, etc. for leakage or corrosion. Report defect and repair as necessary.
- Check alignment of expansion bellows and lugs where applicable. Report any defects.
- Check guide points for wear and freedom of pipe movement, grease guide rollers as required.

Quarterly

- Carry out tasks as detailed for Monthly.
- Check all pipe support brackets, hangers, and anchors for security, and tighten as necessary. Report condition.
- Check condition of all insulation and covering, paying particular attention to the integrity of the vapour seal, repair and report any defects.
- Check operation of valves, stop cocks, drain cocks, etc. If operation of valve is stiff, lubricate as necessary, repeat opening and closing until clear, and return valve to its original position.
- Examine all valve gland packing for leakage and adjust or re-pack as required.
- Clean strainer(s).

Annually

- Carry out tasks as detailed for Quarterly.
- Check pipe work identification tags remain secure, report any defects.



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1.4 – Work Parcel 1 – Maintenance Scope of Work

- Check for integrity of fire stopping where pipes pass through walls etc. report any defects.
- Re-calibrate pressure and temperature gauges

1.4.8. Chilled and Heating Water Pumps

Monthly

- Examine pump unit and adjacent pipe work together with associated connections for leaks and corrosion, report findings.
- Externally clean pumps and motors.

Quarterly

- Carry out tasks as detailed for Monthly.
- Test unit excessive noise or vibration. Repair as necessary.
- Examine and record delivery and suction gauges together with thermometers. Report any defects.
- Examine all pipe work and delivery and suction. Repair any damaged sections or items.
- Test all manually operated valves, ensure full and free travel and correct setting, check for leakage, adjust or repack valve glands as required, remove all deposits and lubricate valve.
- Ensure security of all brackets, supports and fixings.
- Lubricate pump and motor to manufacturer's recommendations.
- Examine pump drain points; ensure they are clear and free from any foreign matter.

Electrical

- Inspect motor electrical terminals. Tighten if required.
- Check and record full load running current.
- Check and ensure correct operation of controls, controllers and switches.

Annually



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1.4 – Work Parcel 1 – Maintenance Scope of Work

- Carry out tasks as detailed for Quarterly.
- Examine and ensure motor ventilation airways are clear, remove all dirt and dust by vacuum cleaner.
- Check and tighten as required, report on condition of holding down bolts.
- Check and clean anti-vibration mounts. Repair or replace as necessary:

Electrical

- Check motors winding insulation. Report condition.
- Examine and report on condition of all associated wiring facility and wiring, ensuring security of terminations



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1.4 – Work Parcel 1 – Maintenance Scope of Work

1.4.9. Incinerator

(scope is optional pending fitting out of incinerator)

Monthly & Quarterly

- Readjustment of timer set points.
- Readjustment of photocell and ignition electrodes.
- Verification of burner mouth status.
- Verification and maintenance of ignition transformer.
- Verification of smoke emission and adjustment of primary air damper.
- Checking of feeder cylinder seals.
- Adjustment of limit switches as necessary.
- Repair of cracks in refractory of primary chamber.
- Cleaning of bottom plates.
- Inspection and repair of oxygen probe and draught sensor.
- Verify function of speed control.
- Maintenance of de-ashing tilting cylinder, hinge door.
- Control and change of hydraulic oil.

Quarterly

- Clean up incinerator after shutdown.



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1.4 – Work Parcel 1 – Maintenance Scope of Work

1.4.10. Heat Exchangers Hot Water Storage Tanks

Monthly

- Visually inspect heat exchanger, and associated pipe work for leaks and corrosion. Repair leaks and report on condition.
- Inspect cover for damaged edges. Report if any remedial work is necessary.

Quarterly

- Carry out tasks as detailed for Monthly.
- Examine and check pressure gauges, safety valves, pressure regulator, and relief valves for correct operation.
- Check pressure drop across the heat exchanger tube side. Compare with commissioning figures. Report significant increase in pressure drop requiring internal cleaning of tubes.
- Examine all insulation. Report any damage.
- Examine isolation valve gland packing and adjust or repack as required. Check free travel of valve spindle and where applicable ensure hand wheel is secure.

Annually

- Carry out tasks as detailed for Quarterly.
- Test and calibrate pressure gauges.
- Observe interior and exterior conditions of all tubes. Remove scale or sludge with cleaning compounds. Removal of hard scale may be accomplished through mechanical means.
- Inspect tube joints with tube plates for leaks.
- Check for cracks in tubes. Plug-up cracked tubes. Report the number of plugged up tubes. If the number exceeds 5% of the total number of tubes, replace tube bundle.
- Replace all gaskets with a new set.
- Re-fix heads and tighten head bolts by means of torque wrenches. Refer to manufacturers catalogue for exact torque setting.
- After re-assembly, test the unit hydraulically to the pressures shown on the nameplate.