**ANNEX K**

**MINIMUM MAINTENANCE REQUIREMENTS**

All Preventative Maintenance shall be scheduled, at least, to the requirements of the following table (the contractor must ensure that sufficient allowance for all the items are made with the pricing in the Activity Schedule):
Maintenance of fire water pump stations, fire sprinkler systems, fire hydrants, fire hose reels and fire extinguishers shall conform to the following standards:

a. SANS 1128-1 (Firefighting equipment Part 1: Components of underground and above-ground hydrant systems)
b. SANS 1128-2 (Firefighting equipment Part 2: Hose couplings, connectors and branch pipe and nozzle connections)
c. SANS 543 (Fire hose reels)
d. SANS 10105-2 (The use and control of fire-fighting equipment Part 2: Fire hose reels and above-ground hydrants)
e. SANS 10400-T (The application of the National Building Regulations Part T: Fire protection)
f. SANS 10400-W (The application of the National Building Regulations Part W: Fire installation
g. SANS 10142-1 (The wiring of premises Part 1: Low-voltage installations).
h. Furthermore, in the maintenance of control panels feeding the diesel engine and the main Control for the control of the diesel and electric pumps, the contractor to ensure that the subcontracted electrical company; to have registration with the department of labour as an electrical contractor. The work must be done under supervision of the competent person with a wireman license.

## FIRE WATER PUMPS

| Infrastructure | Maintenance Activities | Frequency |
|---|---|---|
| Diesel Engines | Check oil level and top up if necessary | Weekly |
| Diesel Engines | Check battery condition and change if necessary | Weekly |
| Diesel Engines | Check and record battery readings | Weekly |
| Diesel Engines | Check battery voltage drop on initial test run of diesel engine | Weekly |
| Diesel Engines | Perform battery charger tests | Weekly |
| Diesel Engines | Check operation of starter motor | Weekly |
| Diesel Engines | Check operation of all temperature gauges and replace if necessary | Weekly |
| Diesel Engines | Check operation of all pressure gauges and replace if necessary | Weekly |
| Diesel Engines | Check, measure and record the operating temperature of the diesel engines against the OEM | Weekly |
| Diesel Engines | Inspect and clean all filters | Weekly |
| Diesel Engines | Test diesel engines on load for at least 30 minutes | Weekly |
| Diesel Engines | Check diesel tank levels and top up if necessary. Ensure at all times that the level is 3 quarters full. | Weekly |
| Diesel Engines | Clean diesel engines | Weekly |
| Diesel Engines | Check proper operation of all stop solenoids | Weekly |
| Diesel Engines | Check condition of water hoses and repair if necessary | Weekly |

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| Diesel Engines | Check engine mountings | Weekly |
| Diesel Engines | Check high temperature alarms for proper functioning | Weekly |
| Diesel Engines | Check tightness of fan belt and adjust if necessary | Monthly |
| Diesel Engines | Check injector cam box oil | Monthly |
| Diesel Engines | Check governor | Monthly |
| Diesel Engines | Check turbo charger | Monthly |
| Diesel Engines | Check exhaust silencer and piping | Monthly |
| Diesel Engines | Check low oil pressure alarm | Monthly |
| Diesel Engines | Check over speed alarm | Monthly |
| Diesel Engines | Check low fuel alarm | Monthly |
| Diesel Engines | Check start failure alarm | Monthly |
| Diesel Engines | Perform electric-to-diesel pump automatic switch over test | Monthly |
| Diesel Engines | Perform 6h Diesel Full load Engine test run (10.1 SANS 10287) | Quarterly |
| Diesel Engines | Change oil, fuel, and air filters | Annually |
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| Control Panels | Check all electrical connections inside the control panel | Monthly |
| Control Panels | Check all electrical connections at sump pump junction boxes | Monthly |
| Control Panels | Check and test all level probes | Monthly |
| Control Panels | Check and confirm that all limits on reservoir covers are in operation | Monthly |
| Control and power panels | Check and ensure that panel wiring is neat and that all DBs are locked. Ensure that the wiring diagram is in place. | Weekly |
| Pumps | Check drive couplings on pumps and ensure that coupling guarding is in place. | Monthly |
| Pumps | Replace bearings on pumps when necessary | Monthly |
| Pumps | Check pump seals for leaks and replace or adjust | Monthly |
| Pumps | Check all drain pipes for leaks and repair | Monthly |
| Pumps | Alternate the duty pump (ie Change operational pump to ensure all run equally.) | Weekly |
| Pumps | Check the base grouting, Check the pump and motor alignment with a dial or laser alignment machine and record results | Monthly |
| Pumps | Replace pumps if necessary | Monthly |
| Electric Motors | Check for bearing noise | Monthly |
| Electric Motors | Inspect shaft seals | Monthly |
| Electric Motors | Check all electric motors for loose connection | Monthly |
| Electric Motors | Check cable for tidiness and good condition | Monthly |
| Valves | Check valve operation and repair or replace where necessary | Monthly |
| Flow Measurements | Check, measure and record the water flowrate for the main discharge line using clamp on meters (e.g. Ultrasonic Device) | Weekly |
| Flow Measurements | Check, measure and record discharge and suction pressure for both diesel and electric pumps | Weekly |
| Fire extinguisher | Check that all fire extinguishers in the fire water pump station are serviced and report back to service manager. | Monthly |
| Sump Pumps | Check High- and Low-level probes and repair or replace if necessary | Weekly |
| Sump Pumps | Remove pumps and check condition of pumps. Repair or replace if necessary. | 3-Monthly |
| General Activity | Check and clean pump stations | Weekly |
| General Activity | Check condition of floor paint | Weekly |
| General Activity | Check all metal parts, pipes for corrosion and repaint if necessary | Weekly |

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| General Activity | Check that the crawl beam is certified and has an SWL displayed then report | Weekly |
| General Activity | Check all alarms on SCADA | 6-Monthly |
| General Activity | Start diesel engines remotely from SCADA | Weekly |

## FIRE SPRINKLER SYSTEMS

| Infrastructure/Area | Maintenance Activities | Frequency |
|---|---|---|
| | Record water level percentage of the water reservoir on the IMCS system. If level recorded is below 20% report to Fire Maintenance Engineer. | Monthly |
| Alarms | Test all water flow meter alarms/gongs for at least 30s and record | |
| Valves | Ensure that all valves are locked with chain and lock | |
| Valves | Check all the water supply valves are in open position<br>The drainage valve must be in closed position | |
| Valve stations | Clean all valve stations | |
| Stop valves | Inspect and test all valves | |
| Flow switches | Test all flow switches for correct functioning | |
| Flow switches | Check that alarm is reported at the IMCC and record the results | |
| Potter pressure switches | Test all potter switches for correct functioning and record results | Monthly |
| Stores Management | Report on inventory in line with ACSA's Inventory management procedure | |
| Sprinkler heads | Perform visual inspection of sprinkler heads, record condition and replace where necessary | |
| Drawings | Check that block plans for each zone supplied by a sprinkler valve station are correct and develop or amend drawing where deviations are noted. All drawings to comply with ACSA Standard for CAD drawings and applicable parts of SANS 10111. | |
| | Check that all valve station P&ID are in place and correctly drawn and labelled. If not in existence, develop the drawings. | |
| Sprinkler classification system | Check that each sprinkler zone is classified according to SANS 10287 (ie Ordinary or High Hazard class) and report deviations to the Fire Maintenance Engineer | |
| Pipe earthing | Check pipe earthing and correct where necessary | |
| Foam tanks | Check concentrate level and refill where necessary. | Quarterly |
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| Alarm valves | All OEM required services | Six monthly |
| Piping | Perform a pipe thickness test at agreed 100 test points with Fire maintenance engineer and record results. These test points must be marked and used consistently throught the contract term. | Three-yearly |
| Piping | Visually Check all piping for corrosion and or flaking paint and correct where necessary | |
| Foam concentrate | Take a sample of the concentrate from each tank and test if its properties still meet the manufacturers specification. | |
| Foam solution testing and foam concentrate proportioner | Take a sample of the foam solution from each tank and test if it meets the recommended concentrate manufacturer's properties. Check or test or replace the concentrate proportioner subsequent to the foam solution test results. | |
| Valves | All OEM and ASIB required services on the valves | Three Yearly |

## FIRE HOSE REELS

| **Maintenance of Fire Hose Reels** |
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| # | Description of maintenance activity | Frequency |
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| 1 | Place hands on opposite sides of the drum and grip the inside disc. Jerk firmly away from the wall. If there is movement, adjust or replace the mounting bolts. If hose reel frame is corroded or damaged, repair and refinish or replace. | Yearly |
| 2 | Using one hand only, rotate hose reel drum in each direction. If drum does not rotate with ease, unroll the hose and replace the gland packing where applicable, or lubricate the shaft and O-rings.<br>If corrosion is reason for tightness and the severity cannot be overcome, condemn the hose reel and replace. | Yearly |
| 3 | Unroll the hose and examine the drum and discs.<br>If loose, corroded or damaged, repair and refinish or replace. | Yearly |
| 4 | Examine the component parts and if corroded, bent, broken, cracked or worn, repair and refinish or replace. | Yearly |
| 5 | Measure hose while unrolling or unroll and measure along floor. If greater than 30 m, cut off excess hose. If less than 28 m, condemn the hose and replace. If joints are present, condemn the hose and replace. | Yearly |
| 6 | Hose ends should be clean cut and show no signs of deterioration. If hose shows signs of deterioration, cut off the damaged section of hose, 15 mm from the commencement of deterioration.<br>Check that the hose is securely clamped to the hose reel and to the shut-off nozzle. Clamps should be free of rust and adjustable. Replace defective clamps. | Yearly |
| 7 | Close the shut-off nozzle, and slowly open the inlet stop valve. If no water, halt servicing, indelibly mark the outside of the front disc of the hose reel with the words “NO WATER” and remove the service labels.<br>If there is a flow of water, examine hose for signs of leakage. If hose leaks on ends, adjust clamps. If hose leaks elsewhere and cutting hose at point of leak will cause the hose to be less than 28 m, condemn the hose and replace. | Yearly |
| 8 | Examine all water seals for signs of leaks. If leaking from the stuffing box, adjust fasteners equally until leak halts (hose reel must continue to rotate freely) or replace gland packing considering the lubrication required. If leaking from the water<br>jacket, inspect jacket for damage and replace O-rings where deformity has occurred. If leak persists, condemn the hose reel and replace. | Yearly |
| 9 | Open nozzle and discharge water into a bucket or suitable receptacle. If nozzle does not discharge with a constant flow, close inlet stop valve and remove | Yearly |

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| | and inspect shut-off nozzle for damage or blockage. If nozzle is damaged, condemn and replace. Clear nozzle if blocked, or if blockage cannot be cleared, condemn nozzle and replace.<br>If water flow does not cease when nozzle is closed, condemn nozzle and replace. If nozzle rotates in the hose, adjust the clamp. | |
| 10 | If the hose reel passes inspection, complete and fit a service label on the inside of the front disc in a position that is visible once the hose reel is fully unwound. | Yearly |
| 11 | Close the inlet stop valve, open the shut-off nozzle and discharge water into a bucket or suitable receptacle. With shut-off nozzle open, rewind the hose onto the drum ensuring that the hose is evenly wound and free from kinks. Milk the hose by rotating the drum back and forth until water no longer discharges from the shut-off nozzle. Close the shut-off nozzle and secure in position. | Yearly |
| 12 | After closing inlet stop valve and rewinding hose, examine the inlet stop valve for signs of leakage.<br>If leaking from the valve stem gland, tighten the gland nut while ensuring that valve stem is still able to turn. If leak persists, refer to responsible person for replacement. If leaking (bypassing) a washer, refer to responsible person for repair or replacement. | Yearly |
| 13 | Ensure that hose guide is present where required and that hose is passed through the guide. Check whether the guide roller is functioning. If guide is damaged, repair and lubricate or replace. | Yearly |
| 14 | Examine the operating instructions for correctness and legibility. Renew if necessary. | Yearly |
| 15 | Using an acceptable seal, seal the inlet stop valve in a manner that prevents use without breaking the seal. The seal should break on half a rotation of the inlet stop valve handle or handwheel and, should only require the force exerted by a single hand. | Yearly |
| 16 | If the hose reel passes inspection, complete and fit a service label on the outside of the front disc in a position such that it does not obscure the operating instructions. | Yearly |

**FIRE HYDRANTS**

| **Maintenance of fire hydrants** | | |
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| **#** | **Description of maintenance activity** | **Frequency** |
| 1 | Examine the standpipe for signs of corrosion, damage or leaks. If corroded or damaged, repair and refinish or refer to responsible person for repair or | Yearly |

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| | replacement. If leaking, refer to responsible person for repair or replacement. | |
| 2 | Examine the component parts and if corroded, bent, broken, cracked or worn, repair and refinish or replace. | Yearly |
| 3 | Examine the handwheel and if damaged, repair and refinish or replace. If loose, tighten the retaining nut. If missing, replace. | Yearly |
| 4 | Examine the pawl assembly for correct operation. If bent, jammed or binding, repair and lubricate or replace. | Yearly |
| 5 | Remove and examine the lip seal washer. If damaged, cut, cracked, worn, aged or weathered, replace. If missing, replace. | Yearly |
| 6 | Using a 65 mm blank cap assembly, check and record the static water pressure. If blank cap assembly does not fit into the outlet of the hydrant, check the outlet for damage or deformity. If damaged or deformed, condemn hydrant and refer to responsible person for replacement. If no water, halt servicing, indelibly mark the supply pipe or wall as close as possible to hydrant with the words “NO WATER” and remove the service label. | Yearly |
| 7 | Examine the spindle assembly for signs of damage or leaks. If spindle is bent, condemn hydrant and refer to responsible person for replacement. If spindle is jammed or binding, repair and lubricate or replace. If leaking from the spindle gland, tighten the gland nut while ensuring that the spindle is still able to turn. If leak persists, refer to owner for replacement. If clack washer is leaking (bypassing) after closing valve, refer to responsible person for replacement. | Yearly |
| 8 | Using an acceptable seal, seal the hydrant valve in a manner that prevents use without breaking the seal. The seal should break on half a rotation of the hydrant valve handwheel. | Yearly |
| 9 | If the hydrant passes inspection, complete and fit a service label on the supply pipe, wall or structure to which the hydrant is mounted and as near as possible to the hydrant valve. | Yearly |
| 10 | Check seal in-side hydrant head | Monthly |
| 11 | Check operation of hydrant | Monthly |
| 12 | Measure water flow and pressure | Monthly |
| 13 | Attach service label where missing | Monthly |
| 14 | Seal hydrant | Monthly |

Tenderers to ensure that the proposed maintenance programme agrees with the OEM maintenance recommendations.