C1037-002-EE-003

# STAND-BY GENERATOR SCOPE OF WORK AND SPECIFICATION

# PROJECT SCOPE OF WORKS FOR THE SUPPLY, DELIVERY, INSTALL AND MAINTAIN THE NEW GENERATOR SET

# Contents

# TRANSNET PROPERTY

# GENERATOR PLANT

## SCOPE OF WORKS

### 1. GENERAL

(a) The Standard for Uniformity in Construction Procurement published in terms of the Construction Industry Development Board (CIDB) Act, 2000 (Act no. 38 of 2000) / latest document, the Standardized Construction Procurement Documents for Engineering and Construction Works as issued by the CIDB and any other relevant documentation pertaining thereto must be studied and all principles in this regard must be applied to all procurement documentation, practices and procedures.

(b) The *Contractor*, under this contract, shall supply, install and commission a new emergency generating plant to provide emergency power to the Transnet Building.

(c) **It is a specific requirement of this enquiry that the successful contractor must have permanent premises situated in a suitable geographic location in order to provide a standby response of two hours maximum to the 96 Rissik street Transnet Building, Johannesburg.**

(d) **Tenderers are to note that typical basic standard offers by their suppliers will not be acceptable. All offers must be fully in accordance with the specifications in these tender documents inclusive of all extra items specified.**

The scope of work is to procure, manufacture, supply, store, assemble, deliver, install, test and commission, guarantee and maintain for first 12 months a new **1500 kVA** 3 phase, 400VAC, 50 Hz emergency generator plant at the Transnet Building, which will enable the plant to provide a reliable system of emergency power should the normal mains power supply fail at the Transnet Building 96 Rissik street Johannesburg main supply. The generator shall have a guarantee of 12 months or 1200 hours, whichever comes first, from the hand over date. During that first 12 months contractor shall provide free spare parts caused by contractor's quality of product. Contractor shall carry out service 4 times during the year as per the scheduled attached on annexure of the document.

The complete diesel generator installation shall comply with the requirements of the Transnet Property (TP) / Transnet General Technical Specification for emergency generator plant and the additional requirements in this section of the document.

The generator contractor will be responsible for the complete diesel generator installation and associated equipment and power and communication cabling between the generator set and the AMF panel, the set is to include the metal clad insulation of the complete exhaust pipe and silencer system within the enclosure and the supply, oil resistant hose pipes and a funnel. The fuel line from the fuel tank must be fitted with a fuse link operated shut-off valve. Fuse link to be mounted above the plant in the event of a fire. The drain from the radiator and oil sump must be extended to outside the base frame. The exhaust pipe must discharge horizontally and be fitted with a mesh at the end to prevent entry of small birds.
It is the generator contractor's responsibility to ensure that the container manufacturer / supplier provides adequate ventilation within the enclosure for the efficient operation of the plant at full load condition.
Adequate electrical protective devices must be provided to shut the engine down before any permanent damage can result to the generator equipment. Refer to 'Alarm and Protection Equipment' clause in the General Technical Specification. The following equipment must also be provided:
A low level cut out probe in the diesel day tank to prevent the engine running dry, in addition to the low level alarm probe.

A low level cut-out probe near the top of the radiator to provide engine cut-out in the event of low coolant or a water leak.
In general, the essential outgoing circuits will be the:
The supply to the kiosk / electrical board on the essential side of the electrical board.

The electrical contractor shall provide the cabling and connections from the TP electrical panel to the generator change over, to the generator and back to the essential electrical panel.

Part of this contract is to provide:
A 12 month guarantee of all new diesel generator plant from the date of hand over to the employer.
A day time emergency call out service with a response time of 2 hours during the first year.
A three monthly maintenance inspection including a 30 minute on-load run test and checking the battery charging system and replacing the fuel filters.
A full annual service of the generator plant and replacement of the battery at the end of the 12 month guarantee period.

**1.1 Guarantee**

A guarantee period of 12 months shall apply to all new plant and equipment supplied and installed under this contract. The guarantee period shall commence from the practical completion date.
For details refer to the clause Guarantee in the General Technical Specification.

**1.2 Maintenance**

Maintenance of the specified systems, services and / or parts of equipment and infrastructure shall all be referred to as "Maintenance of an Installation". Maintenance of all completed installations shall ensure reliable functioning and optimum service life thereof. Maintenance responsibilities for each installation including all units and components as specified shall commence after practical completion of the installation and shall leave the Contractor with a functional installation to maintain and guarantee for 12 months.

Maintenance of an installation shall be performed in accordance with the Technical Specifications, the Operating and Maintenance Manuals (where applicable) and the Maintenance Control Plan.

**1.3 Drawings**

Final position of the generator set is indicated on the drawing. Further details shall be discussed on site by the generator specialist and the engineer.

**2. Engine Instruments**

Refer to clause Panel Equipment in the General Technical Specification for equipment to be provided.

**3. Battery Charging System**
This shall include the engine alternator and regulator (12V or 24V system). Battery specification to suit manufacturer.

**4. Electrical Reticulation**

Electrical reticulation work under this contract will involve the installation of the new AMF panel and interconnecting of the power and control cabling and earthing between the generator set, alternator and the AMF panel. Also included under this scope of work is the separate earthing to ground of the generator set and the AMF panel. An emergency stop button shall be fitted on the outside of the enclosure. Wiring between this stop button and the AMF panel shall be undertaken by the generator contractor.

The electrical contractor will install and terminate the out-going cables from the AMF panel to the TP electrical board and / or as per drawings.

Cabling between the alternator and the AMF panel shall be suitably rated for the full load rating of the alternator and shall be suitably supported on stainless steel Gr316L cable tray.
All new electrical installation work shall comply with the SANS 10142-1 as amended.

After completion of the work, a compliance certificate for the new electrical installation work for the generator and AMF panel shall be issued to the Engineer.

## 5. AMF Panel

The diesel engine must be started automatically when the mains power fails.
The AMF panel must be mounted on the base frame of the engine or alternatively mounted at the end of the set and be visible through a window in the enclosure door.
A 2500 amp TP 25 kA MCCB shall be provided as the main switch for the incoming supply from the TP supply source. A separate main generator circuit breaker rated for the FLC of the alternator, to protect the alternator against short circuit and overload is to be mounted in the AMF panel. The electrical / mechanical change over switch / contactors shall be mounted in the AMF panel. A by-pass switch for maintenance is also to be provided.
In addition, there shall be a cable to the main distribution board to an essential supply side to feed essential busbar which shall have circuit breakers feeding other distribution boards. Refer to the single line diagram for detailed drawing.

The AMF panel shall be fully equipped (including battery charger) and wired as detailed in the standard specification. An approved generator controller unit shall be used – Levato RGAM 20 or similar.

In addition to the power cabling a 2,5 mm² 7 core armoured (control) cable and a 4 mm² 4 core armoured cable (for battery charger) will be required. The AMF panel shall also incorporate a red alarm indicator with audible electronic siren and reset button which must be clearly visible through the window in the door. A remote panel to be provided under this scope of works shall consist of a red indicator lamp for a general generator alarm (labelled GENERATOR ALARM)
The remote panel is to be handed over to the Electrical contractor and or client.

## 6. Fuel / Water Separator

The diesel generator set shall be provided with a Duvalco or similar and approved fuel separator/filter unit.

The fuel filter unit and replacement filters are available from DUVALCO AFRICA or similar in South Africa.

**T**enderers shall allow for the separator / filter to be installed in the fuel line from the tank to the diesel engine. The unit shall be positioned above the engine drip tray. The separator shall be manufactured to the following specifications and shall preferably be supplied by DUVALCO AFRICA.
The filter cartridge must be changed every 3 months even if the diesel engine does not run. Tenderers must allow for the cost of replacing the cartridges in their service rates.

### Technical Specification

The diesel / water separators:

- Shall be manufactured from die-cast aluminium.
- Shall be Robust Double Epoxy powder coated.
- Shall have a 10 micron filter cartridge with mechanical shut off, for overwhelming by water.
- Shall have a flow rate of ± 4 litres per minute minimum.
- Shall have an Inlet / Outlet port.
- All parts shall be corrosion resistant and float shall be solid.
- Approximate measurement of unit shall be, Height - ± 325mm, Width - ± 99mm, Depth ± 125mm.
- Shall be 4 Bar pressure tested.

- Shall have a ± 300 millilitre per minute water dump – differential head pressure dumping.
- Shall have a 2mm dump valve aperture.

**Operation**

- No visual inspections i.e. automatic water dumping.
- No electrical circuits required.
- Complete water separation.

## 7. Fuel

Fuel supplied and used in the diesel engine shall be commercially obtainable automotive diesel fuel to SANS 342.
The new generator set shall be provided with a full tank of diesel fuel. The fuel shall be pumped into the day tank for use during testing and commissioning.

A spare 1000 litre tank and bund wall shall be provided under this contract by the generator specialist. The diesel tank shall be have a bund wall to catch any fuel spillage. The automatic pump shall be provided under this contract by generator specialist.

## 8. Generator Room

There is a generator room provided. No need for a generator enclose / generator canopy. However, the generator to have lowest noise level. Lift points shall be provided in the base frame of the generator set for lifting the plant.

## 9. Annual Service

At the end of the guarantee period a full annual service shall be undertaken in accordance with the following table. Should this service schedule not include all the requirements deemed necessary by the manufacturers of the relevant generator sets, then the contractor is to ensure that the omitted schedule maintenance items are included and that the annual service is in accordance with the manufacturer specifications.

Should the engine use for less than 400 hours in the twelve month period, the schedule below must be used:
The preventive maintenance operations must be applied at the interval (hours or months) which occurs first.

To ensure consistency in tendering, tenderers shall allow in the priced bill of quantities for 3 inspections and the replacement of filters and a full annual services at the end of the guarantee period.

A = 3 Monthly inspection / service and initial training of operators
B = Every 400 hours or 12 months

| A | B | Operation |
|---|---|---|
| ☐ | ☐ | Check the amount of coolant |
| ☐ | ☐ | Check the level of the lubricating oil |
| ☐ | ☐ | Check the restriction indicators for the air filters and, when necessary, renew the filter elements. |
| ☐ | ☐ | Start and run the engine with 30% load (minimum), until normal temperature of operation is reached. Engine must run for a minimum of 1 hour. |
| ☐ | ☐ | Drain the water / sediment from the primary fuel filter. |

| | | |
|---|---|---|
| | ☐ | Check the condition and the tension of all drive belts. |
| | ☐ | Check the specific gravity and the pH value of the coolant. |
| | ☐ | Renew the lubricating Oil |
| | ☐ | Renew the canisters of the lubricating oil filter |
| | ☐ | Renew the canister of the main fuel filter |
| | ☐ | Clean the primary fuel filter |
| | ☐ | Ensure that the mounting nuts for the turbochargers are tightened securely. |
| | ☐ | Check the timing of the fuel injection pump |
| | ☐ | Check that the drive coupling bolts of the fuel injection pump are tightened to 120Nm (88lbf ft) |
| | ☐ | Ensure that the fuel injectors are checked and corrected or renewed, if necessary * |
| | ☐ | Ensure that the tappet clearances are checked and adjusted, if necessary * |

In addition to the operations listed above, the following must be included in the 12 month annual service.

- Drain and flush the coolant system and renew the coolant mixture.
- The operation of the turbochargers be checked and repaired if necessary by a competent person.
- Check that the air charge cooler and the radiator are clean and free from debris
- The operation of the alternator be checked and repaired if necessary by a competent person.
- Check the battery charging system, and adjust the charging rate if necessary.
- Install a new heavy duty battery each 12 month interval.

**10. Quarterly Maintenance Inspections**

A quarterly maintenance inspection is required every 3 months throughout the guarantee period for the plant providing emergency power. A quarterly maintenance schedule is attached which must be photocopied and completed by the service Contractor. The engine must be started by simulating a mains failure and run for at least 30 minutes.
The price for the quarterly inspections shall include all necessary costs such as travelling, labour, tools, cleaning materials, ***replacing fuel filter cartridges*** etc. Contractors are advised to assess the rising costs and price these services accordingly, as these costs are fixed and no additional escalation on rates will be permitted.

**11. Monthly Maintenance Services**

A monthly maintenance service will not be required for the generator set unless otherwise recommended by the diesel generator set manufacturer. This generator in not a **base load set** that would run continuously day and night to provide electricity.

**12. Emergency Call Outs**

Should a breakdown occur during the 12 month free maintenance period, the contractor is expected to visit site within two hours of receiving written notification from Transnet Agent. Any faulty electrical or mechanical equipment shall be replaced at the contractor's cost under the guarantee.
Reimbursement (including travelling) will not be made for call outs to faults on new equipment installed under guarantee unless it can be proven wilful damage or negligence by the Employer's operating staff.

**13. Servicing**

All parts and components shall be approved and in accordance with the manufacturer's spare parts' list. Generic or similar parts not approved by the manufacturer of the plant may not be used.

**14. Documentation**

General Technical Specification: **INSTRUCTION MANUALS.** The same clause also specifies the requirement for wall mounted drawings in plant rooms which are to be provided for in the enclosure of the new generator set.
Four copies of an A4 size hard covered spiral binder with 12 coloured plastic fly sheets suitable to contain the following information shall be provided for the new generator and handed to the Engineer:

1) Cover page with title of contract and file numbers
2) Contractors details – name, address, contact names and phone/cell numbers
3) Consultants details as above
4) Hand over certificates – compliance forms, practical completion forms
5) AMF panel routine test certificates from supplier – refer SANS 1973 and a schedule of all controller programmed settings
6) Site instructions
7) Technical data sheets with suppliers names and model numbers – radiator level probes, battery charger unit, generator controller, plug-in relay types and replaceable filter cartridges.
8) As built drawings of AMF panel and genset
9) Operating and maintenance manuals
10) List of all consumables with make and type number – oil, filters etc.

## 15. Log Book

An A4 size hard covered service log book on a chain shall be provided in a metal envelope in the door. The log book shall be chained to the inside of the enclosure. The log book is to be filled in each time anyone opens the doors to the enclosure after the set is commissioned. A full detail of servicing and repairs is to be recorded in the book with the run hour reading.

## 16. Cleaning / Clearing

Cleaning during maintenance service refers to the high pressure hosing of the engine. Removal and disposal of any oil or diesel in the drip tray.
All mechanical and electrical equipment must be cleaned of dust and oil. The electrical switchboard must be blown out of dust with an air blower.

Clearing refers to the removal of all unauthorised items stored within the canopy to ensure fire safety and compliance with the OHS Act. The enclosure may not be used as a store room.

## 17. Signage

Mandatory signs to SABS shall be installed inside the enclosure – first aid, resuscitation, fire, etc. All other signage shall be approved by the Transnet Agent (Consultant) before purchasing.
A sign as indicated in clause 11 of the General Technical Specification must be installed inside the enclosure at the electrical indication/control panel.
In addition to the mandatory OHS signs, a plastic laminated schedule shall be mounted inside the enclosure with the contractor's name and contact details together with the name of the Transnet service/maintenance manager and his/her contact details.
A plastic laminated schematic wiring diagram of the electrical control system must also be mounted inside the electrical enclosure.
Two signs shall be installed outside on the door. One at high level with the words "GENERATOR PLANT" and the other with the words "UNAUTHORISED ACCESS NOT PERMITTED"
The generator set plant and the control panel shall also be provided with a unique alpha numeric label identifying the plant for the TP e.g. TP – 005.
All signs must be fixed with non corrodible screws.

## 18. Commissioning

The diesel generator set and AMF panel is to be tested in the supplier's workshop prior to dispatching to site. Tests in the workshop shall include a load test with a dummy load, equivalent to the full output of the particular alternator and in the presence of the Transnet Agent (Consultant). Temperature rise tests shall also be taken within the enclosure during the load tests.

**19. Training**

The contractor shall ensure that the relevant Transnet personnel (at least two persons) are fully versed with the operation, starting procedure and monthly maintenance requirements of the generator sets. The names ***and signatures*** of the trained officials indicated on the handover certificate shall be forwarded to Transnet Agent (*Project Manager / Engineer*).

**20. Electrical Competent Person & Identification**

The *Contractor* must have in his permanent employ a person deemed to be electrically competent. Such a person must be in possession of a valid and current certificate certifying he/she is an Installation Electrician. This person will accept a permit to work on behalf of the Contractor associated with system outages. It is a requirement that the above person be resident on the site whenever installation work is being carried out. Work on site shall at all times be supervised by a designated responsible person appointed in writing in terms of the OHS Act No. 85 of 1993.
Whilst on site all staff and labourers employed by the generator contractor shall wear distinctively marked clothing bearing the name of the mechanical contractors or his identification logo.

**21 Visits to Site**

Tenderers are advised to visit the site and acquaint themselves with the existing installation, working, site and access conditions. A compulsory site visit will be held as per the details noted in the Tender Notice.
No claims whatsoever shall be entertained due to lack of knowledge of the site conditions.

**22 Attendance on Principal Contractor**

It is a requirement that the generator contractor liaise closely with the Principal contractor on all aspects of the generator plant installation. The generator contractor will be required to attend regular (2 weekly) site meetings with the Principal Contractor.

**23. Indemnity**

In carrying out his obligation as the Mandatory to the Employer for this Contract in terms of Section 37(2) of the Occupational Health & Safety Act No. 85 of 1993, the Contractor ensures that he complies with the Act when providing the Works or using plant, materials or equipment. The Contractor indemnifies the Employer and the Engineer and their representatives against loss and damage to property, death of, or injury to, a person and claims, proceedings, compensation and costs arising from the Contractor's transgression of the Act, except to the extent that the Employer caused the transgression.

24. **QUALITY CONTROL**

The Contractor shall specify to what standards the equipment will be Manufactured i.e. ISO, EN, IEC, CENELEC.

The Contractor shall supply all necessary compliance certificates, handover documents, drawings,

25. **SAFETY ARRANGEMENTS AND PROCEDURAL COMPLIANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT (ACT 85 OF 1993) AND APPLICABLE REGULATIONS.**

- The Contractor shall accept his obligation to complying fully with the Act and applicable Regulations and with Transnet safety requirements.
- The Contractor shall provide a written Health and Safety plan, the file shall be approved before starting with the work
- The Contractor shall keep a safety file at all times.
- The Contractor shall keep a site diary and instruction book.
- The Contractor shall attend Transnet safety induction training before starting with the work.

26. **ENVIRONMENTAL RESPONSIBILITY.**

- The Contractor shall separate hazardous or non-hazardous waste and where practical, waste for recycling prior to disposing thereof.
- The Contractor also undertakes to minimize the amount of waste generated or released, whether it is hazardous or non-hazardous waste, as far as possible to reduce the impact on the Environment.

The Contractor undertakes to dispose of all waste generated, albeit hazardous or non-hazardous waste in a responsible manner and submit proof of all disposal documents to the Project Manager / Engineer.

**ADDENDUM "A"**

**GENERATOR : 3 MONTHLY MAINTENANCE**
**(STANDBY PLANTS)**

**ITEMS CHECKED TO BE TICKED OFF**

| [1} | CHECK AND TOP UP WHERE NECESSARY (SPECIFY TOTAL QUANTITY). EXCESS OF 10 LITRES WILL BE REIMBURSED | YES | NO | [5] | VISUAL INSPECTION OF ELECTRICAL APPARATUS | YES | NO |
|---|---|---|---|---|---|---|---|
| A | CRANKCASE OIL (QTY ) | | | A | LV CABLES IN ORDER | | |
| B | INJECTOR BOX OIL (QTY ) | | | B | LV CABLE TERMINATIONS IN ORDER | | |
| C | RADIATOR | | | C | ALL LV SWITCHGEAR COVERS & PANELS INTACT | | |
| | | | | D | ALL SWITCHGEAR INTACT | | |
| [2] | CHECK FUNCTION ADJUST, TIGHTEN AND LUBRICATE (WHERE NECESSARY) | | | E | SWITCHES / CIRCUIT BREAKERS IN "ON" POSITION | | |
| A | FUEL PUMP TIMING | | | F | ARE CIRCUIT LEGENDS AVAILABLE? | | |
| B | PUMP DRIVE | | | G | ARE CIRCUIT LEGENDS COMPLETE? | | |
| C | OIL FEED PUMP | | | H | ARE CIRCUIT BREAKERS PROPERLY LABELLED? | | |
| D | EXCESS FUEL DEVICE | | | I | TIME SWITCHES / SET ACCORDINGLY? | | |
| E | GOVERNOR | | | J | ARE INDICATING PANEL LIGHTS WORKING? IF NOT INDICATE QUANTITY REPLACED | | |
| F | TURBO CHARGER | | | K | CHECK SELECTOR SWITCH IN ALL POSITIONS | | |
| G | HEAT EXCHANGER | | | L | CHECK ALARM ENGINE SHUTDOWN FUNCTION ON : | | |
| H | FAN BEARINGS | | | | LOW FUEL WARNING | | |
| I | DYNAMO BEARINGS | | | | START FAILURE | | |
| J | STOP SOLENOID | | | M | CHECK ALARM ENGINE SHUTDOWN FUNCTION ON : | | |
| K | HAND / ELECTRIC DAY TANK PUMP | | | | HIGH TEMPERATURE | | |
| L | LUBRICATING OIL FILTER ELEMENT | | | | LOW OIL PRESSURE | | |
| | | | | | OVER-SPEED | | |
| [3] | CHECK CONDITION, TIGHTEN (WHERE NECESSARY) | | | N | TEST PLANT FOR 30 MIN ON FULL LOAD | | |
| A | RADIATOR CORE | | | O | CHECK AND RECORD THE METER READINGS | | |
| B | RADIATOR HOSES | | | | 3PH..... PH1.....V PH2.....V PH3.....V | | |
| C | RADIATOR PRESSURE CAP / VALVE | | | | ..... A ..... A ..... A | | |
| D | WATER HEATER ELEMENT & THERMOSTAT | | | P | RESET ALL MAXIMUM DEMAND AMMETERS | | |
| E | VEE BELTS | | | | | | |
| F | ENGINE MOUNTING | | | [6] | CLEANING | | |
| G | ENGINE / ALTERNATOR COUPLING | | | A | CLEAN AIR CLEANER DRY ELEMENT & BATH | | |
| H | EXHAUST SILENCER & PIPES | | | B | CLEAN FINS AND OIL COOLER | | |
| I | DAY TANK CONDENSATE | | | C | CLEAN ENGINE | | |
| | | | | D | CLEAN DRIP TRAYS (WHERE FITTED) | | |
| [4] | CHECK FOR LEAKS & TIGHTEN (WHERE NECESSARY) | | | E | CLEAN DAY TANK AND GAUGE GLASS | | |
| A | DRAIN PLUG | | | | | | |
| B | OIL LINES AND SEALS | | | [7] | DUST AND CLEAN | | |
| C | FUEL LINES AND SEALS | | | A | DOORS AND FRAMES | | |
| D | INJECTOR SEALS | | | B | WINDOW PANES AND FRAMES | | |
| E | ALL PACKING SEALS | | | C | WINDOW GUARDS | | |
| | | | | D | WINDOW CILLS | | |
| | | | | E | WALLS AND CEILINGS | | |
| | | | | F | CABLE DUCTS | | |
| | | | | G | LV SWITCHGEAR | | |
| | | | | H | LV DISTRIBUTION BOARD / CONTROL PANEL | | |

| [1} | CHECK AND TOP UP WHERE NECESSARY (SPECIFY TOTAL QUANTITY). EXCESS OF 10 LITRES WILL BE REIMBURSED | YES | NO | [5] | VISUAL INSPECTION OF ELECTRICAL APPARATUS | YES | NO |
|---|---|---|---|---|---|---|---|
| [8] | INSPECTION & ATTENDANCE TO SUNDRY ITEMS | YES | NO | [10] | CLEAN AND OIL | YES | NO |
| A | CABLE DUCT COVERS TO BE IN POSITION | | | A | DOOR HINGES | | |
| B | WARNING SIGNS IN POSITION ON OUTSIDE DOOR | | | B | DOOR LOCKS | | |
| C | WARNING / FIRST AID SIGNS IN POSITION ON INSIDE OF PLANT ROOM | | | | | | |
| D | FIRE EXTINGUISHER PRESENT AND SERVICABLE | | | | | | |
| | | | | | | | |
| [9] | REPORT UNDER REMARKS THE CONDITION | | | [11] | CLEAN AND POLISH | | |
| A | DOORS (HINGES, LOCKS, ETC.) | | | A | PLANT ROOM FLOORS | | |
| B | WINDOWS INCLUDING GLASS, CILLS, ETC. | | | | | | |
| C | YARD FENCING AND GATES (WHERE APPLICABLE) | | | [12] | REPLACE FUEL FILTER CARTRIDGE | | |
| D | WALLS (ANY CRACKS?) | | | A | CHANGE FILTER CARTRIDGE - EVERY 3 MONTHS | | |
| E | ROOFS (ANY LEAKS?) | | | | | | |

Contractors are to note that all maintenance to Nickel Cadmium Alkaline batteries, charging equipment and accessories are to be in accordance with the manufacturer's requirements. Any loss or damage to the equipment through negligence on the Contractor's part will be for his account.

| [13] | BATTERIES AND CHARGERS | YES | NO | CELL NO | Volts | Specific Gravity (SG) | YES | NO |
|---|---|---|---|---|---|---|---|---|
| A | CLEAN BATTERY / CONTAINER / STAND AND TERMINALS WITH LUKE WARM WATER AND DRY OUT | | | 1 | | | | |
| B | NEUTRALISE CORROSION WITH BICARBONATE OF SODA SOLUTION | | | 2 | | | | |
| C | TOP UP ALL CELLS WITH DISTILLED WATER | | | 3 | | | | |
| D | CHECK SPECIFIC GRAVITY OF ELECTROLYTE IN EACH CELL WITH HYDROMETER | | | 4 | | | | |
| E | CLEAN ALL BATTERY TERMINALS AND SPRAY WITH RED AND GREEN TERMINAL PROTECTOR SPRAY | | | 5 | | | | |
| F | CHECK FOR LOOSE CONNECTIONS AND TERMINALS, TIGHTEN WHERE NECESSARY | | | 6 | | | | |
| G | **Ensure that battery charger is set on trickle charge** | | | 7 | | | | |
| H | 15 AMP / VOLTMETER ON CHARGER OPERATIONAL | | | 8 | | | | |
| I | IS TEST BUTTON ON CHARGER OPERATIONAL? | | | 9 | | | | |
| J | CHECK INDICATION LIGHTS ON CHARGER AND REPLACE IF NECESSARY. INDICATE QUANTITY REPLACED (QTY ) | | | 10 | | | | |
| | | | | 11 | | | | |
| | | | | 12 | | | | |

**REMARKS** : If answer is "NO" on any of the previous items, state action taken by yourself or to be taken by the Department

| |
|---|
| |
| |
| |
| |

SERVICED BY _____ MODEL & SERIAL NO OF SET _____

PRINT NAME

SIGNATURE _____ LOCATION OF SET _____

COMPANY NAME _____ RUN TIME DURING TEST _____

DATE _____ RUN HR METER READING _____ Min.