

MANAGEMENT OF PLANNED MAINTENANCE

**BATTERY INSTALLATIONS
TASKS 092 - 093**

1. HEALTH & SAFETY

- 1.1 Comply with any specific warning notices or site restrictions as identified within the site safety plan held by the responsible person, and with any other specific/temporary hazards identified during site induction/at time of visit.
- 1.2 All persons working under this Task Instruction must be an appointed 'Skilled Person' under the current MOD Safe System of Work (SRP 01), and may be required to have in their possession a Sanction to work on or near live equipment; as deemed necessary by the Mowlem Aqumen Authorised Person. Any battery installation, which is rated at more than 120v or made up of 60 cells or more, is classed as HIGH VOLTAGE. In this case the Skilled Person is to seek advice from the Mowlem Aqumen Authorised Person, before commencing work.
- 1.2 Be aware of the hazards associated with batteries, e.g. electric shocks, explosion from charging gases, short circuit from metallic objects, and hazards from electrolyte spillage.
- 1.3 The relevant PPE indicated within the risk assessment for this task must be used.
- 1.4 A specific 'risk assessment', to satisfy *The Management of Health & Safety at Work Regulations 1999*, must be carried out. Due consideration to this and any other statutory regulations e.g. COSHH 1999, Manual Handling Reg's 1992. Etc. must be made prior to carrying out any task detailed below. Risk assessments are to be carried out by the operative's employer. Relevant PPE shall be used as indicated by risk assessments.

2. GENERAL REQUIREMENTS

- 2.1 Liase with the building manager before starting and finishing work.
- 2.2 Wherever possible, any operating and maintenance instructions provided by the equipment manufacturer shall be followed. Where there is a difference between these instructions and those of the manufacturer, the manufacturers' guidance shall take precedence.
- 2.3 Record all inspection findings. All items requiring repair shall be listed on the PPM work docket, any repairs carried out under the Contract Lump Sum shall be indicated as such, any other items in this category requiring shut downs or spares shall be carried out following agreed procedures. Any deviation from accepted operation or any defects considered to present a safety or operational hazard shall be reported to the responsible person, who shall arrange any remedial actions, and who will advise the client as required.
- 2.1 All measuring equipment shall have a current certificate of calibration: Certificate No shall be written on PPM work sheet.
- 2.2 The attached **Battery installation Logbook Sheets** apply. Where possible operating parameters have been included, however it is the WSM's responsibility to insert in the Log Sheets those parameters applicable to their specific systems. Also any parameter that does not apply to a specific system is to be deleted from the Log Sheet before issue.
- 2.3 A copy of the Task Instructions is to be kept with the Logbook for information.
- 2.4 Log Book Defect Sheet – This is to be included at the front of the Log Book and completed on each occasion a defect is located and repaired whether within the Contract Lump Sum or not.
- 2.5 **Checklist 1** relates to the task 092.1
- 2.6 **Checklist 2** relates to the task 092.2
- 2.7 **Checklist 3** relates to the task 093.1
- 2.8 **Checklist 4** relates to the task 093.2
- 2.9 The attached Checklists as appropriate to the installation i.e. Lead Acid or Alkaline; are to be included on the Work Docket issued to the craftsman.
- 2.10 The sub-contractor shall supply all water treatment chemicals and lubricating oil associated with these tasks
- 2.11 The attached task instructions highlight the basic elements that should be carried out as a minimum requirement. The sub-contractor may adopt these instructions or submit there their own method statements for approval. The task instructions provided are generic in form and will require modifying to suit specific equipment/systems being maintained. It should be noted that the full requirements of the relevant reference documents must be complied with; the list provided here is not exhaustive. Lead reference' documents:

MANAGEMENT OF PLANNED MAINTENANCE

- MOD Safety Rules and Procedures SRP 01 Electricity.
- BS 6133:1995 “Code of practice for Safe Operation Of Lead-Acid Stationary Cells and Batteries”
- BS 3031:1996 Specification for sulphuric acid used in Lead acid batteries
- BS 4974:1975 Specification for water used in Lead acid batteries
- BS 6604:1985 Code of Practice for safe operation of starter batteries.
- BS 7481:1992 Code of Practice for testing venting systems and shields for Lead acid starter batteries.
- BS EN 50272-2:2001 Safety requirements for secondary batteries and battery installations. Stationary batteries.
- BS EN 50342:2001 Lead acid starter batteries. General requirements methods of test and numbering.
- BS EN 60095-1: 1993 Lead acid starter batteries. General requirements methods of test.
- BS EN 60896-1:1992 Stationary Lead acid batteries. General requirements methods of test. Vented types.
- BS EN 60896-2:1996 Stationary Lead acid batteries. General requirements methods of test. Valve regulated types
- BS 6132:1983 Code of practice for Safe Operation Of Alkaline Secondary Cells and Batteries
- BS EN 61434:1997 Secondary cells and batteries containing alkaline or non-acidic electrolytes. Guide to the designation of current in alkaline secondary cells and battery standards.
- 94/216281 DC Guide to the equipment manufactures and users of alkaline secondary cells and batteries on possible health and safety hazards. Part 1 Nickel –Cadmium (21A/163/CD)
- INDG139 Electric storage batteries. Safe charging and use 1993.
- PSA MEEG Vol. 6 Sections 21.105 & 21.106

Task Numbers AD-PPM 092-093 to be shown on all PPM dockets as appropriate

***Mandatory Frequencies to individually assessed per site, approved through Authorising Engineers * Table below guideline only.**

Item Description	Task No	Task	Lead Ref.	Status	Frequency	Remarks
LEAD ACID BATTERY INSTALLATIONS	92.1	Inspect battery installations for damage, leakage,	BS6133	Mandatory	3M	SEE ALSO TASK 236
	92.2	Test and check for overcharging, etc	BS6133	Mandatory	ANNUALLY (1Y)	SEE ALSO TASK 236
Ni-Cd ALKALINE BATTERY INSTALLATIONS	93.1	Inspect battery installations for damage, leakage,	BS6132	Mandatory	3M	SEE ALSO TASK 235
	93.2	Test and check for overcharging, etc	BS6132	Mandatory	ANNUALLY (1Y)	SEE ALSO TASK 235

LEAD ACID BATTERY INSTALLATIONS**TASK 092.1 – (3W) INSPECT BATTERY INSTALLATION FOR DAMAGE & LEAKAGE****PROCEDURES**

- 1 Check that the battery charger functions correctly. Make any necessary repairs or adjustments.
- 2 Measure and record the battery voltage and charging current.
- 3 Top up cells to correct level with distilled water. If water consumption is excessive investigate the cause.
- 4 Clean off any dirt, corrosion or moisture from external parts of the battery. Maintain a film of petroleum jelly on all exposed metal surfaces.
- 5 Check the condition of the installation, paying particular attention to instruments, switches, fuses, indicating lamps, battery connections, signs of corrosion, state of wiring and battery charger cubicle. Correct any defects found. Check that vent holes in cell plugs are not obstructed.
- 6 Check that ventilation requirements of battery rooms and individual battery cubicles within the battery room are being maintained

**LEAD ACID BATTERY INSTALLATIONS
TASK 092.2 – (1Y) CHECK AND TEST FOR OVERCHARGING ETC.****PROCEDURES**

- 1 Check that the battery charger functions correctly. Make any necessary repairs or adjustments.
- 2 Measure and record the battery voltage and charging current.
- 3 Test the specific gravity of the electrolyte of all cells. The readings should be uniform and indicate a fully charged state. If the specific gravity is low or not uniform then charge the battery. Investigate the cause of the unsatisfactory condition and rectify.

The specific gravity indicates the state of charge of a battery. Reference must be made to the manufacturers data and room temperature associated with a particular battery type before an assessment of battery condition is made.

- 4 Batteries with electrolyte specific gravity values below the specified fully charged state are to be treated as follows:
Installations having mains operated battery chargers:
 - (a) Fully automatic type - checks the charging rate and adjusts as necessary.
 - (b) Manual control type - switch to high charging rate, maintain charge until battery voltage and electrolyte have remained constant for 2 hours (i.e.: for 3 successive hourly readings) and then switch to normal charge.

Installations such as Mobile Generating Sets etc., having battery chargers, which operate only when the set is running:

- (a) Remove battery and bench charge at 10-hour rate until the voltage and specific gravity have remained constant for 2 hours.

Batteries without battery chargers are to be charged as described above. The frequency of charging is to be adequate to maintain the battery in a satisfactory condition.

**NICKEL CADMIUM ALKALINE BATTERY INSTALLATIONS
TASK 093.1 – (3M) INSPECT BATTERY INSTALLATION FOR DAMAGE & LEAKAGE****PROCEDURES**

- 1 Check that the battery charger functions correctly. Make any necessary repairs or adjustments. Where a battery test circuit is incorporated in a battery charger apply test for 30 seconds. A steady current reading not below the red line on the load test ammeter indicates a satisfactory state of charge.
- 2 Measure and record the battery voltage and charging current. A voltage between 1.45 and 1.5 volts per cell indicates correct charging conditions on low charge rate (trickle charge).
- 3 Top up cells to correct level with distilled water. If water consumption is excessive investigate the cause.
- 4 Clean off any dirt, corrosion or moisture from external parts of the battery. Maintain a film of petroleum jelly on all exposed metal surfaces.
- 5 Check the condition of the installation, paying particular attention to instruments, switches, fuses, indicating lamps, battery connections, signs of corrosion, state of wiring and battery charger cubicle. Correct any defects found. Check that vent holes in cell plugs are not obstructed.
- 6 Check that ventilation requirements of battery rooms and individual battery cubicles within the battery room are being maintained
- 7 Batteries installed without chargers are to be recharged at a frequency not exceeding 6 months. Where the nature of the battery duty demands more frequent recharging this is to be done. It is not detrimental to overcharge an alkaline battery.

**NICKEL CADMIUM ALKALINE BATTERY INSTALLATIONS
TASK 093.2 – (1Y) CHECK AND TEST FOR OVERCHARGING ETC.****PROCEDURES**

1. Check that the battery charger functions correctly. Make any necessary repairs or adjustments.
2. Measure and record the battery voltage and charging current.
3. Test the specific gravity of the electrolyte of all cells. The readings should be uniform and indicate a fully charged state. If the specific gravity is low or not uniform then charge the battery. Investigate the cause of the unsatisfactory condition and rectify.

The specific gravity indicates the state of charge of a battery. Reference must be made to the manufacturers data associated with a particular battery type before an assessment of battery condition can be made.

Batteries installed without chargers are to be recharged at a frequency not exceeding 6 months. Where the nature of the battery duty demands more frequent recharging this is to be done. It is not detrimental to overcharge an alkaline battery.

1. Charge the battery at the highest rate within the limit of the normal charging rate. Charging is to continue until the charging current has remained constant for 4 hours, and then revert to normal charge.
2. Batteries, which are completely discharged, are to be recharged as soon as possible. At the normal rate for the cell type for 8 hours **OR** at half normal rate for 16 hours. Allow a battery to stand for two hours after termination of charge to disperse bubbles before testing the specific gravity of each cell.
3. Measure the specific gravity of the electrolyte with a hydrometer and record the reading. Add 0.002 to the hydrometer reading for every 4.5°C above 20°C or subtract 0.002 for every 4.5°C below 20°C. If the specific gravity is below 1.160 or above 1.200. The hydrometer reading will only be correct when:
 - (a) The electrolyte level is correct.
 - (b) The electrolyte is thoroughly mixed.
 - (c) All gas bubbles are dispersed.

Batteries without battery chargers are to be charged as described above. The frequency of charging is to be adequate to maintain the battery in a satisfactory condition.

Establishment _____

Location _____

Installation supplies

Frequency- (3M) Record S/NS. NS record action taken

Record any defects here: -

Task Group 19
Battery Installations
Checklist No1
Tasks-092.1

Date-Week Comm.	Week No.	
(3M) Inspect battery installations for damage, leakage. Lead Acid Log Book Sheets Completed Battery Installation		
	Battery Installation	Initials
Carry out Work Instructions as Task No. 92.1 and complete Log Book Sheet		

Establishment _____

Location _____

Installation supplies

Frequency- (1Y) Record S/NS. NS record action taken

Record any defects here: -

Task Group 19
Battery Installations
Checklist No2
Tasks-092.2

Date-Week Comm.	Week No.	
(1Y) Check and test for overcharging etc. Lead Acid Log Book Sheets Completed Battery Installation		
	Battery Installation	Initials
Check battery charger operates correctly		
Measure and record battery voltage and charging current		
Test the SG of electrolyte in all cells and record. If readings not uniform investigate cause and rectify.		
Batteries with low SG		
(a) Automatic type-check charging rate and adjust as necessary		
(b) Manual type- switch to high charging rate, maintain charge until battery voltage and electrolyte have remained constant for 2 hours (i.e.: for 3 successive hourly readings) and then switch to normal charge.		
(c) Batteries not having chargers- Remove battery and bench charge at 10-hour rate until the voltage and specific gravity have remained constant for 2 hours.		
Batteries on such as Mobile Generating Sets etc., having battery chargers, which operate only when the set is running. Charge as (c).		

Establishment _____

Location _____

Installation supplies
Frequency- (3M) Record S/NS. NS record action taken
Record any defects here: -

Task Group 19
Battery Installations
Checklist No3
Tasks-093.1

Date-Week Comm.	Week No.	
(3W) Inspect battery installations for damage, leakage. Cadmium Alkaline Log Book Sheets Completed Battery Installation		
	Battery Installation	Initials
Carry out Work Instructions as Task No. 93.1 and complete Log Book Sheet		

Establishment _____

Location _____

Installation supplies

Frequency- (1Y) Record S/NS. NS record action taken

Record any defects here: -

Task Group 19
Battery Installations
Checklist No4
Tasks-093.2

Date-Week Comm.	Week No.	
(1Y) Check and test for overcharging etc. Cadmium Alkaline Log Book Sheets Completed Battery Installation		
	Battery Installation	Initials
Check battery charger operates correctly		
Measure and record battery voltage and charging current		
Test the SG of electrolyte in all cells and record. If readings not uniform investigate cause and rectify.		
Batteries with low SG		
(a) Charge battery at highest rate permissible. Continue till charging current has remained constant for 4hrs.		
(b) Discharged batteries, re-charge at normal rate for 8hrs		
(c) Batteries not having chargers. Re-charge as (b)		
Batteries on such as Mobile Generating Sets etc., having battery chargers, which operate only when the set is running. Charge as (b).		

