

JUICE.

BATTERY CARE

BATTERY CARE &
MAINTENANCE GUIDE

Tel: **0800 6335 532**

Email: sales@juiceenergy.co.uk

SAFETY PRECAUTIONS

Operating Notes

Motive Power batteries are completely safe in the hands of trained personnel who follow the manufacturer's recommendations carefully.

However, they can be hazardous when being handled, maintained or repaired, if the proper procedures are not followed.



Handling

Motive Power batteries are heavy, so adequate mechanical handling systems are to be used. Care is to be taken to ensure the sulphuric acid electrolyte is not spilled and the cells are not physically damaged.

Precautions:

- Keep batteries upright when lifting. Use the lifting points located in the sides of the battery tray (container).
- Take care to ensure the lifting equipment does not short-circuit the cell terminals and connectors.
- Ensure the battery is located in its correct position on the vehicle and secure any restraining devices.



Acid Electrolyte

The electrolyte in lead-acid batteries is corrosive and poisonous. It will cause burns or irritation if it comes into contact with the skin or eyes.

Precautions:

- When working on batteries, always wear the appropriate protective clothing and goggles.
- Handle batteries carefully and always keep them upright.
- Top-up battery cells only to the correct level, as recommended by the manufacturer. Do not over fill.



Emergencies

If acid is spilled on the floor, neutralise as quickly as possible, using an alkali, such as soda ash, sodium carbonate or sodium bicarbonate. If acid is spilled on clothing, wash as soon as possible. If acid comes into contact with the skin, wash off with plenty of clean water. If acid splashes into the eye, immediately flood the eye with copious quantities of mains tap water. Then immediately seek medical advice.



Explosions

When a lead-acid battery is on charge and the voltage rises above 2.30 Volts per cell, hydrogen and oxygen gases are evolved. If the concentration of hydrogen exceeds 4%, the gases form an explosive mixture.

Precaution:

- To avoid the risk of igniting these explosive mixtures, never smoke or use a naked flame near a battery. For ventilation requirements in battery charging rooms, read Eternity Technologies Note ET/ON001-0911.



Electrical Energy

A battery can be short-circuited by simultaneously touching two or more of the cell terminals or intercell connectors with a metal tool or other object capable of conducting electricity. If this happens, the conductive object will:-

(a) Become hot and cause burns, and/or, (b) Eject molten metal and sparks which could ignite any hydrogen present, resulting in an explosion.

Precautions:

- Before working with a battery, remove any metallic items from the hands (such as rings), wrists (such as bracelets or watches) and necks (such as necklaces). Remove, also, anything which may fall from the pockets of clothing.
- Always use insulated tools. Spanners used must be of the single-ended type only.
- Do not place tools or any other objects capable of conducting electricity on battery tops.
- Always wear eye protection.
- Always ensure that the charger is switched off before connecting or disconnecting the battery.



Maintenance

- Keep the top of the battery, trays and container dry and clean to prevent electrical leakage between cells. Should there be any corrosion of the metalwork, remove the products of corrosion and neutralise any remaining acid with a solution of an alkali, as suggested in Section 2. Protect from further corrosion by covering with acid-proof paint or petroleum jelly.
- Lifting facilities on battery trays should be examined periodically for corrosion and/or other deterioration. Do not lift damaged trays as there is a danger of collapse.
- If excessive corrosion or other deterioration becomes evident in any part of the battery, it should be reported to the manufacturer.
- Check bolted connections on the battery for tightness and ensure they are clean and efficient.
- Inspect battery cable insulation and battery/charging connectors and cables for wear or damage to insulation and burning of contacts. Refurbish or replace as necessary.
- Add nothing to the cells but distilled or deionised water. Never add acid.
- Keep filling plugs and connections tight. Remove filling plugs only when topping-up and taking specific gravity readings. Vent plugs on heat sealed polypropylene cells need not be removed.

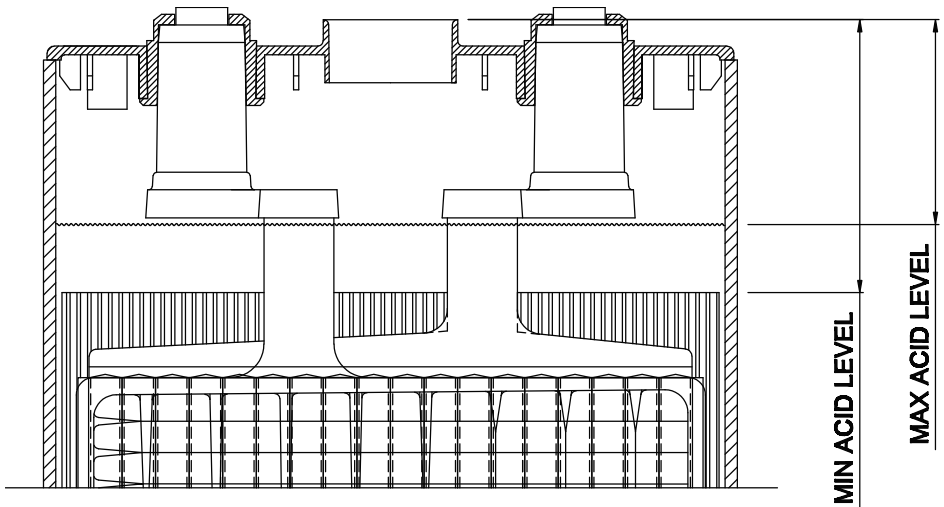
GUIDELINES FOR BATTERY TOPPING

USER MANUAL

Guidelines For Battery Topping Using Manual Filling

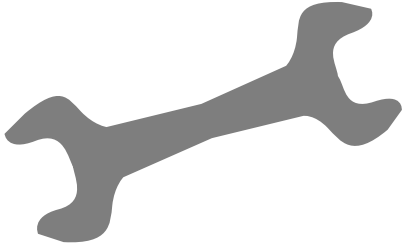
Topping up procedures:

- The battery water level should be checked weekly.
- The battery should always be topped up after charge.
- Do not overfill. Keep the visible components just covered (electrolyte visible). See diagram below.
- Always use demineralised / deionised / distilled water.
- Metal vessels should not be used to store or dispense water.
- Leave the vent plugs in position and closed except when topping up.
- Any spillage on top of the battery should be cleaned off immediately to prevent corrosion.



BATTERY CARE INSTALLATION & MAINTENANCE INSTRUCTIONS

MOTIVE POWER BATTERIES



When working on a battery:

- Use only insulated tools.
- Remove all rings, watches, bracelets or any other metal personal effects.
- Always wear protective clothing.
- Always wear eye protection.



Safety Precautions:

- Do not smoke or expose a naked flame near a battery.
- Areas where batteries are kept or charged must be adequately ventilated.
- If acid is spilt on skin or clothing, wash with plenty of clean water.
- If acid comes into contact with the eyes, wash with plenty of clean water and seek immediate medical attention.
- Always switch charger off BEFORE disconnecting or connecting battery.

Explosions



When a lead-acid battery is on charge gases are evolved which can form an explosive mixture.

Precautions:

- Keep sparks, flames, cigarettes and pipes away from batteries to avoid the risk of igniting these gases.
- Switch off the charger before connecting or disconnecting the battery to avoid a spark causing an explosion.
- Using only insulated tools ensure connections are secure before switching on.
- Areas where batteries are kept of charged must be adequately ventilated (please refer to Eternity Technologies Operating Note ET/ON001-0311).

Electrical Energy



A battery can be short circuited by simultaneously touching two or more of the cell terminals or inter-cell connectors with a metal tool or other object capable of conducting electricity. If this happens, the conductive object will:

- Become hot and cause burns and / or
- Eject molten metal and sparks which could ignite any hydrogen present, resulting in an explosion

Precautions:

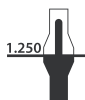
- Before working with a battery, remove any metallic items from the hands (such as rings), wrists (such as bracelets or watches) and necks (such as necklaces).
- Remove, also, anything which may fall from the pockets of clothing.
- Always use insulated tools. Spanners used must be of the single-ended type only.
- Do not place tools or any other objects capable of conducting electricity on battery tops.
- Always wear eye protection.
- Always ensure that the charger is switched off before connecting or disconnecting the battery.
- Do not use metal vessels or jugs to store or dispense water or acid

Preparing the battery for service

Motive Power batteries are heavy, so adequate mechanical handling systems are to be used. Care is to be taken to ensure the sulphuric acid electrolyte is not spilled and the cells are not physically damaged.

- **On receipt**
Examine carefully to see if there has been any damage in transit. It is important to report any damage to the carrier and the company notified that this has been done.
- **Preparing the cells**
Providing the specific gravities* are above 1.250 batteries can be put into service immediately. If the specific gravities are below 1.250, the battery should be given a charge. If the battery is not required for service immediately, it should be stored on open circuit and given charges at monthly intervals. The cells should be topped up when necessary after the charge (refer to maintenance section).
**All specific gravities quoted relate to a temperature of 30°C.*
- **Fitting on vehicle**
Wipe the top of the battery clean and dry. All bolted connections to battery terminals should be smeared with an appropriate anti-corrosive grease and then tightened up. Connecting cables should be well anchored and sufficiently long to prevent pulling on battery terminals. The cells must be accessible to facilitate testing and topping-up.

Operation



- **General**
It is recommended that the battery is not discharged beyond 80% of nominal capacity. Deeper discharging nullifies the warranty. When the battery has been discharged it should be recharged as soon as possible on the appropriate charger. Open the battery compartment to get additional ventilation during a charge. Leave the vent plugs firmly in position. The maximum recommended temperature is 43°C (110°F).
- **Fully charged specific gravity**
Eternity Technologies cells 1.290 / 1.295*.

- **How to Ascertain the State of Discharge of Cells**

The change of specific gravity of the acid is directly proportional to the ampere hours taken out of the cell on discharge. Where extreme accuracy is required, readings should be taken after a stabilisation period of several hours with the battery on open circuit. A discharged battery operated in accordance with our recommendations will have a specific gravity* of 1.130 minimum†.

- **Using the Hydrometer**

A quantity of acid is drawn out from the cell into the barrel until the hydrometer float moves freely. The specific gravity is then read at the point where the scale emerges from the acid.

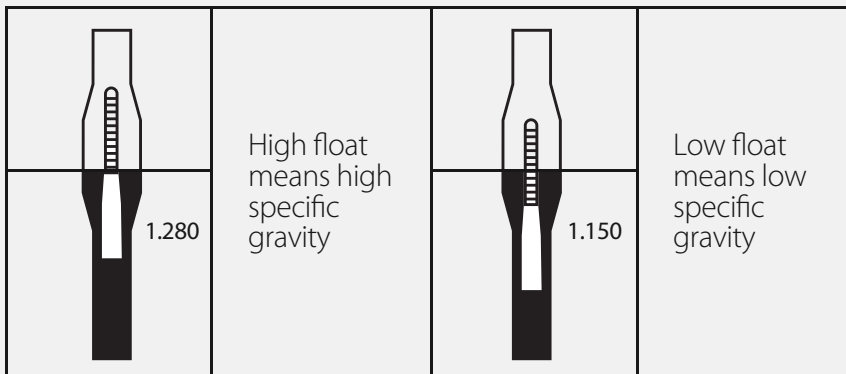
Acid density or specific gravity varies with temperature, being lower at high temperature and higher at low temperature; thus the hydrometer readings must be temperature-compensated:-

For every 10°C of the cell acid temperature above 30°C add 0.007 to the hydrometer reading. For every 10°C below 30°C subtract 0.007 from the hydrometer reading.

Example: Temperature 40°C, hydrometer reading 1.240; the true corrected specific gravity is $1.240 + 0.007 = 1.247$.

**All specific gravities quoted relate to a temperature of 30°C.
†Is a stabilised specific gravity. Actual observed gravities at the end of discharge will read 0.015 to 0.020 higher.*

Figure One



Charging



Recharge the battery daily, except where only lightly discharged – specific gravity above 1.220. Do not leave the battery in a discharged state. Regularly check the condition of the charging plug and socket and keep contact surfaces clean.

- **Methods of Charging:**
Taper Charging or Constant Current followed by Taper Charger: it is important that the output of the charger is matched to the capacity of the battery.
- **Equalising Charges:**
An equalising charge consists of a regular charge extended until the voltage and specific gravities of all the cells have remained constant over three successive hourly readings.
- **Supplementary Charges:**
When the battery has been performing an unusually heavy duty and some supplementary charging is required in the middle of the day this can be given by connecting it to the normal charging source for the time available. This supplementary charging, more commonly known as ‘Opportunity Charging’, is at its most beneficial if used in conjunction with a modern self compensating charger. The ampere-hours put back into the battery during such a charge are determined by the relative state of discharge of the battery. There is little benefit in trying to charge the battery when it is 75% charged or above, whereas a battery which is 50% charged will have in the region of 13% of ampere-hour capacity restored in an hour of charge using an 8 hour charger. A 12 hour charger will in the same circumstances restore 9%. Too many opportunity charge periods may cause unnecessarily high temperatures. (A copy of the Eternity Technologies Operating Note “Opportunity Charging” ET/ON006-0311 is available on request).

Maintenance



Care of Battery in Service:

- Add nothing to the cells but distilled, deionised or approved water and do this often enough to keep the visible components just covered (electrolyte visible).
- Never add acid except to compensate for spilling.
- To prevent electrical leakage between cells keep the top of the battery trays and containers dry and clean. Should there be any corrosion of the metal work, remove the products of corrosion and neutralize any remaining acid with a solution of water and sodium bicarbonate or with dilute ammonia. Cover with acid-proof paint or petroleum jelly to protect from further corrosion.

-
- Lifting facilities on battery trays should be examined periodically for corrosion or other deterioration. Do not lift damaged trays as there is a danger of collapse. If the battery is in two units, these should be kept together when charging.
 - If excessive corrosion or other deterioration becomes evident in any part of the battery, it should be reported to Eternity Technologies.
 - Check bolted connections on the battery for tightness and ensure that they are clean.
 - Inspect battery cable insulation and battery charging connectors for wear and damage to insulation and burning of contacts. Refurbish or replace as necessary.
 - Keep all terminal connections smeared with an appropriate anti-corrosive grease.
 - Keep vent plugs closed and connections tight.
 - Remove or open vent plugs only when topping-up and taking specific gravity readings.

Care of Battery out of Service:

- If a battery is to be taken out of service for a time, or if a new, charged battery cannot be put into service immediately, it should be given a charge and stored in a cool dry place.
- Disconnect detachable connectors.
- Every month check acid levels and give a charge.
- If a vehicle is used at irregular intervals the battery should be given a charge every month and the battery disconnected from the vehicle during its idle periods. Before putting back into service, check the levels and give a charge.

Disposal of Old Batteries



Careless disposal of a battery can harm the environment and can be dangerous to persons. Always dispose of batteries to an authorized dealer. Do not attempt to open or dismantle a battery or cell.

The British Standards Institute have published a 'Code of Practice for Safe Operation of Traction Batteries' – BS 6287:1982 which is available from their Standards Office.

JUICE.

BATTERY CARE

Unit 8, Sherwood Network Centre
Sherwood Energy Village
Ollerton NG22 9FD

FREE PHONE: 0800 6335 532

Tel: 01623 863 880

Fax: 01623 863 881

Email: sales@juiceenergy.co.uk

Web: www.juiceenergy.co.uk