

Rolls

**DEEP CYCLE
BATTERY RANGE**

World Class Battery Engineering



Rolls Maintenance Manual



MAIN PRODUCT FEATURES

- 10 year warranty
- 3300 cycles to 50% depth of discharge
- Dual container eliminates stray current & stray voltage.
- Easy cell assembling & disassembling
- Non breakable polyethylene box
- Up to 20 years of operational life.



HYDROCAP GAS RECOMBINATION TOPS

- Catalytically reintroduces Hydrogen and Oxygen battery gas into pure water and returning to each battery.
- Eliminating battery gas
- Battery maintenance - reduced to annual check
- Extends battery maintenance

INTRODUCTION

This instruction manual will provide you with the information to safely operate and maintain your deep cycle batteries or cells.

RECEIVING YOUR PRODUCT

Before signing for the shipment, inspect it for damage and make a note of it on the shipping documents. If damage is found after delivery please contact the freight company and your dealer. Freight companies, in general, will not admit liability unless damage is documented at receiving.

SAFETY

Safety tips are summarized as follows:

- NEVER short-circuit a battery.
- NEVER add seawater to a battery.
- NEVER smoke around a battery bank.
- ALWAYS wear safety glasses and gloves when working around a battery bank.
- Protective clothing such as an apron and steel toe-capped boots is suggested and may be required during installation or when handling acid.
- ALWAYS provide adequate ventilation especially during equalization.
- ALWAYS remember you are working around electricity and a battery bank has the potential to deliver a severe shock and/or burns.
- ALWAYS make sure battery covers are clean and dry after maintenance and before putting on charge.

PRODUCT DO's & DON'Ts

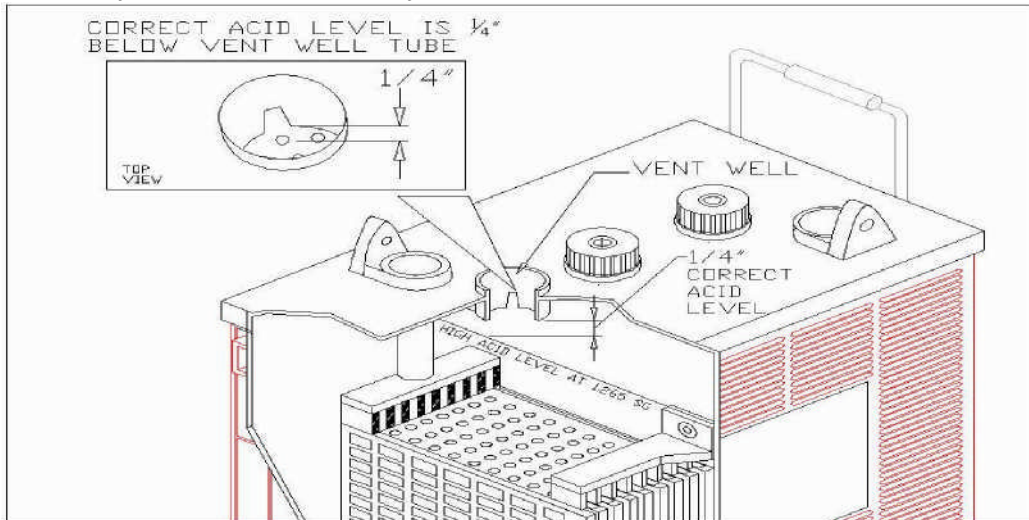
- Do properly follow the instructions given in this manual.
- Do contact your dealer or Rolls Battery if problems or questions arise.
- Do isolate starting batteries from the main battery bank.
- Don't add acid to batteries once they have been cycled.
- Don't allow the batteries to exceed 125°F/52°C.
- Don't charge batteries of different types or sizes together.

SERVICE INSTRUCTIONS

This section describes preventive maintenance and recommended charging procedures to maximize battery life. The leading cause of premature battery failure is improper charging and poor battery maintenance. Equalization is very important and must be performed correctly but only as required.

PREVENTATIVE MAINTENANCE

When a battery is first received the cell electrolyte levels should be checked and the battery should be put on charge. After removing from charge the specific gravity readings of each cell should be recorded and kept for the life of the battery. Preventive maintenance involves, at a minimum, checking the cell electrolyte level for correct acid volume once a month (once every 6 months if using gas recombination tops) and equalizing once every six months. The cells should be watered back to the original acid level which is 8 to 12mm below the bottom of the vent well (tube inside the battery cell with slots on each side). Distilled water is highly recommended. Water containing high minerals or iron will dramatically reduce the battery life.



A recommended preventive maintenance program can be summarized as follows:

- Water each cell to original level as required
- Equalize as required or once every six months
- Record the specific gravity readings of each cell every three months.

Occasionally cleaning the battery terminals and case/cover is a good practice and recommended. A weak solution of household baking soda and water can be used to neutralize any spilled acid (100 g per litre). Make sure the vent caps are securely tightened and that NO soda solution gets into the battery cells. Good record keeping is stressed as review of these records can help to determine the "health" of the battery and can prove invaluable if system problems develop.

MAKE SURE BATTERY TOPS ARE CLEAN AND DRY AFTER MAINTENANCE AND BEFORE PUTTING ON CHARGE AND BACK INTO SERVICE.

This will help to eliminate stray current and shorts

CYCLIC RATES

Please note the following number of cycles are needed to bring Rolls batteries to full capacity:

4000 Series = 10–25 Cycles

5000 Series = 25– 50 Cycles

STATE OF CHARGE

The truest measure of a battery's state of charge is the SPECIFIC GRAVITY of the battery acid. The following shows the approximate state of charge at various specific gravities at 25°C.

State of Charge	Specific Gravity
100%	1.255 to 1.275
75%	1.215 to 1.235
50%	1.200to1.180
25%	1.165to1.155
0%	1.130to1.110

A three step charging procedure is strongly recommended. Recommended voltage settings are as follows:

Charge Parameter	Volts per Cell
Equalization	2.58 to 2.67(max)
Bulk/Absorption	2.37 to 2.45(max)
Float	2.20 to 2.23(max)

CAUTION: The ideal float voltage is the lowest voltage setting that will maintain the battery at full charge. The higher the voltage the more water the cell will consume. The minimum equalization voltage is highly recommended unless it is suspected that a sulfation problem exists.

ABSORPTION

A 3 hour absorption stage is recommended for Rolls 5000 series (CS & KS plates) batteries and cells.

EQUALIZATION (routine maintenance)

Equalization is required to mix the battery acid and bring every battery plate to an equal charge. Equalization should only be performed when required or once every six months. Equalization is required when the cell specific gravities vary from highest to lowest by +/- 0.015 (1.245 – 1.260 at full charge). The exact particulars (such as charging time and currents) are dependent on the charging system. However, the point is to bring the batteries up to the equalization voltage and continue charging for 1-2 hours at a low current, without excessive heat. The final or finishing charging current should be 3-7% of the 20 hr capacity in amps. If battery temperature exceeds 52°C the battery should be taken off of charge and allowed to cool before equalization is continued. When two consistent specific gravity readings are taken a half hour apart the battery is equalized. It is recommended to water the battery cells before or half way through the equalization. This is to ensure the water is completely mixed into the electrolyte.

CAUTION:

If you have **HYDROCAPS** *remove* during corrective equalization charge.

Equalization (Corrective)

Corrective equalization needs to be performed if symptoms arise such as a constantly running generator (low capacity) or the battery bank will “not hold a charge”. These symptoms are typical of a heavily sulfated battery. If a battery is not being fully charged on a regular basis or limited equalization is performed using a generator sulfation will occur from “deficit” cycling. This undercharge condition can take months before it becomes a major and noticeable problem. This under-charge condition is caused when batteries are deficit cycled. The cells receive less of a charge each cycle and starts to sulfate. Eventually the sulfate will cause a resistance to charge and a “false high voltage” reading will occur. The “false high voltage” is measured by the charge controller, which further lowers the charging current to maintain the voltage set point. This further increases the undercharge condition. This is one reason why specific gravity measurements are so important as “false high voltage” readings can be misleading.

Amperage hour meters can compound the problem and cause people to believe they are returning the correct amount of energy back into the batteries to maintain a good state of charge. Amp-hr meters should be thought of as simply a fuel gauge that does not measure state of charge directly but indirectly. The state of charge is determined by using an equation (Peukert's equation). Sometimes there can be fundamental errors with factors used in these calculations. You should always confirm, at least initially, state of charge by taking a specific gravity measurement of one cell when it is thought the bank is fully charged.

Corrective Equalization - Method Corrective Equalization can take a very long time depending on the degree of sulfation.

1. If you have hydrocaps remove during equalization.
2. Set charging controls to the highest voltage allowable by the charge controller (inverter). If the bank is severely sulfated or available current is very limited, charge control can be removed or by-passed. Temperature should be monitored very, very closely and keep below 125°F/52 °C.
3. Charge at a low DC current (5 A per 100 AH of battery capacity).
4. Once an hour, measure and record the specific gravity and temperature of a test cell. If the temperature rises above 115°F (46°C) and approaches 125°F (52°C) remove the batteries from charge. (For temperature measurement choose a center cell, if applicable).
5. If severely sulfated, it may take many hours for the specific gravity to rise.
6. Once the specific gravity begins to rise the bank voltage will most likely drop or the charging current will increase. The charging current may need to be lowered if temperature approaches 125°F (46°C). If the charge controller was by passed, it should now be used or put back in line.
7. Continue measuring the specific gravity until 1.265 is reached.
8. Charge for another 3 hours. Add water to maintain the electrolyte above the plates.
9. Allow cells to cool and check and record the specific gravity of each cell. The gravities should be 1.265 ± 0.005 or lower. Check the cell electrolyte levels and add water IF necessary.

To avoid this situation it is recommended that a specific gravity reading of one pilot cell is measured and recorded on a regular basis when it is thought that the battery bank is fully charged. The measurement should be compared to previous readings. If the measurement is lower than the previous reading a longer absorption time and higher voltage setting should be used. Note as stated above, the longer the absorption time and the higher the bulk voltage, the more water will be consumed but less equalization will be required. Note: the specific gravity should rise as the cells use water. Look for trends in the specific gravity over a period of time and make very small adjustments as necessary.

CAUTION:

If you have **HYDROCAPS** *remove* during corrective equalization charge.

BATTERY STORAGE

Before storing batteries for an extended period of time they should be watered and equalized. If not, the battery(s) will sulfate and could freeze. Disconnect interconnection leads. Store battery in a cold and dry area in order to slow the process of self-discharge. You would expect a Rolls Battery to lose about 3-7% of its capacity per month. The maximum storage length is 6 months if the bulk of the storage is at cold temperatures (0°C). If the battery(s) are stored in warmer climates fully charging the bank is recommended every three months. It is NOT recommend leaving the batteries on a float or trickle charge when stored unless power is required for critical components. If this is the case they are really NOT considered stored but in fact, on float service.

WARRANTY

For full details please see the official warranty policy which can be summarized as follows:

4000 SERIES BATTERIES:

2 years free replacement and prorated to 84 months.

5000 SERIES BATTERIES:

3 years free replacement and prorated to 120 months.

PRODUCT RECYCLE:

All lead acid batteries are fully recyclable. Please contact your dealer or local waste management center for further details.

TECHNICAL ASSISTANCE:

You should always contact your local dealer first, but remember we are always here to help. Please call 01489 570770, visit www.rolls-europe.com or email info@rolls-europe.com if further assistance is required.