



PLEASE READ BEFORE PLACING BATTERIES IN SERVICE
THESE INSTRUCTIONS TO BE SHIPPED WITH BATTERY AND TO BE DELIVERED TO USER

POW'R PAK VRLA ELECTRIC VEHICLE BATTERIES

INSTALLATION AND OPERATING INSTRUCTIONS

1. RECEIVING BATTERIES

Immediately upon receipt of shipment, examine the outside of the packing for signs of rough handling before accepting battery from carrier. If there is evident damage, the receipt should be signed and both copies (carrier's and receiving copies) marked "Shipment Received Damaged". The carrier should be called immediately and asked to make a "Carrier's Inspection for Damage Report". If "concealed" damage is later detected, the carrier should be called immediately and requested to make a "Carrier's Inspection for Concealed Damage Report". After inspection by the carrier, arrangements should be made with the local representative to have the battery repaired before placing it in service.

BEFORE PLACING BATTERIES IN SERVICE, REVIEW AND ADHERE TO THE SAFETY GUIDELINES (ITEM 6).

2. PLACING IN SERVICE

All ELEMENT batteries must be given a freshening charge prior to their use. To accomplish this, connect the battery to the on-board SCR charger and commence charging until the charger indicates that it is in the float stage.

3. CHARGING

The charger is matched to the battery with respect to voltage and ampere-hour capacity. The charger is a GNB-approved high frequency charger with a CC-CV-CC profile which includes automatic charge control features. The constant voltage portion of the curve is set at 2.37 volts per cell.

The charger will automatically switch to float voltage of 2.28 volts per cell once the CC-CV-CC standard charge has completed.

TO BEGIN CHARGING: ALWAYS CONNECT THE BATTERY TO THE CHARGER PRIOR TO CONNECTING THE CHARGER TO AC POWER.

TO STOP CHARGING: ALWAYS DISCONNECT THE CHARGER FROM AC POWER PRIOR TO DISCONNECTING THE BATTERY FROM THE CHARGER.

FAILURE TO FOLLOW THIS SEQUENCE MAY CAUSE CHARGER DAMAGE.

4. COOL DOWN

When the battery reaches an 80% depth of discharge, disconnect battery from the lift truck and connect to the on-board SCR charger. The battery will normally reach full charge in 12 to 16 hours. Once the charge is complete, the battery must be allowed to cool down.

BATTERY REQUIRES COOL DOWN PERIOD FOLLOWING A CHARGE. FAILURE TO ALLOW FOR COOL DOWN WILL SHORTEN BATTERY LIFE.

5. OPPORTUNITY CHARGING

The ELEMENT battery is capable of being charged during any breaks or downtime to provide additional capacity within a given shift. Guidelines for opportunity charging are as follows:

- Battery in the range of 30% - 60% depth of discharge
- Allow for full charge at least once per week
- Avoid duty cycle changes that would allow this battery to sit discharged for periods greater than 24 hours

6. SAFETY

- Warning: Risk of fire, explosion, or burns. Do not disassemble, heat above 38 degrees Celsius, or incinerate.
- Wear appropriate safety equipment when working around electrically live batteries.
- Under no circumstances should you attempt to remove the safety relief-valve vent cap. Such removal shall void the battery's warranty and seriously impair battery performance.
- The ELEMENT battery can emit hydrogen gases under some abnormal charging conditions. Whenever possible, charge in a well-ventilated area and keep open flames away from batteries. However, normal warehouse ventilation is adequate for normal usage.
- Lift batteries with hoist, crane, lift truck, or similar equipment; move batteries on trucks, conveyors, or rollers. Make sure equipment is of ample strength and properly installed.
- Disconnect battery from the truck when performing maintenance and repair on motor or electrical system.
- Open or "break" battery circuit before attempting repairs to charging plug or receptacles.

POST THESE INSTRUCTIONS IN BATTERY MAINTENANCE AREA.

- Familiarize yourself with batteries and rules for charging and handling. Contact your local GNB representative for information.
- Assign battery and charger care to properly trained personnel. Review your company safety regulations, and familiarize yourself with industry and government guidelines (OSHA, ANSI, etc.) to help reduce personnel accidents and equipment damage.

7. OPERATION

Batteries are rated in ampere-hour and are selected to perform a specific workload within an established period of time. Increasing the work load or time period could result in over discharging, thus shortening battery life. In general, all lead-acid batteries should not be discharged to more than 80% of its six-hour rated capacity. In a typical application, one battery is required per truck per eight-hour shift. If a lift interrupt is used or installed on the lift truck, a minimum interrupt voltage of 1.86 VPC multiplied by the number of cells, should be set to avoid over discharge of the battery.

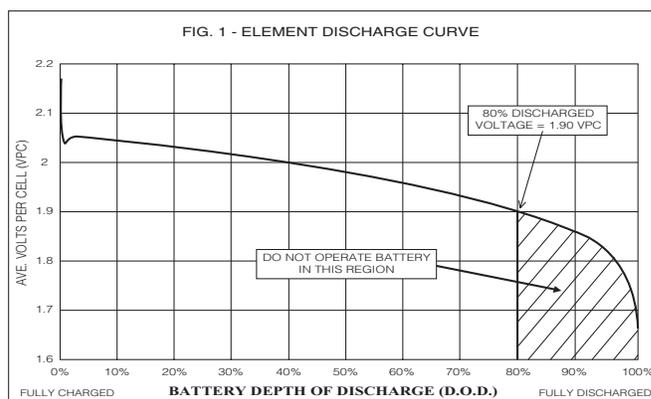
ADJUST LIFT INTERRUPT SETTING ON LIFT TRUCK TO A MINIMUM INTERRUPT VOLTAGE OF 1.86 VPC MULTIPLIED BY THE NUMBER OF CELLS FOR ELEMENT BATTERIES

Since an ELEMENT battery has unremovable vent caps, its state of charge cannot be approximated by specific gravity measurement. However, average cell voltage (Volts per Cell) with the battery under load can be used to approximate the battery depth of discharge as shown in FIG. 1. Alternatively, the battery at 80% depth of discharge will have an open circuit voltage equal to 2.02 VPC multiplied by the number of cells in the battery.

THE ELEMENT BATTERY SHOULD NOT BE DISCHARGED BELOW 1.86 VOLTS PER CELL (80% DEPTH OF DISCHARGE)

8. TEMPERATURE

Normal operating conditions shall be between 60°F and 100°F. Operating temperature above 100°F will reduce the battery's service life. Operating temperature below 60°F results in less capacity and special charging is required.



9. MAINTENANCE

Because this is a maintenance-free battery, there is little to do regarding maintenance operations. The top of the battery should be kept clean and dry and maybe dusted to remove any accumulated foreign matter. In the unlikely event of accidental contamination with electrolyte, wash with a neutralizing solution (or one-gallon water mixed with one pound of baking soda or commercial soda ash). Follow with a rinse using clear water. Ensure waste water is disposed of in accordance with Federal, State and Local regulations. Blow excess water off the top of the battery using compressed air. In the event of an accident involving a battery, notify your local GNB representative who is equipped to handle any environmental concern. Never attempt to add water to the battery - it has been designed to function without any such additions over its entire life. As previously noted, any attempt to remove the vent caps shall void the warranty.

10. CHANGES IN OPERATIONS

If any time after initial purchase you have changes to your operating conditions, such as extended shifts, increased loads or other changes that alter your initial purchase conditions, please contact your local GNB representative immediately to ensure you are properly equipped and are not affecting the life of the battery.

11. SERVICE

Additional information and assistance can be obtained by contacting your local sales representative or in the USA call toll free 1-888-563-6300.

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