STAND BY BULL

Banner
THE POWER COMPANY

Operating instructions

stationary vented lead-acid

1. Commissioning of filled and charged batteries

Prior to commissioning, all cells/blocks must be checked with regard to mechanical damage, correct connection of the terminals and the solid fit of the connector. The following torque values apply to the screw connections:

M 6 with 5 Nm +/- 1 Nm
M 8 with 10 Nm +/- 1 Nm
M 10 with 20 Nm +/- 1Nm.

If necessary, the terminal caps are to be mounted. The electrolyte level in all cells must be examined and if required topped up to the maximum level with purified water in accordance with DIN 43 530 Part 4. The charger should be turned off and consumers separated from the battery prior to correct pole connection to the d.c. current supply (positive pole to positive terminal).
The charger should then be switched on and charged as described in Section 2.2.

2. Operation

VDE 0510 Part 1 (draft) EN 50272-2 Part 2 apply for the installation and operation of fix-mounted batteries.

2.1. Discharging

The end point voltage of the discharge current of the battery may not fall below the figure resulting from the permitted end point voltage per cell multiplied by the number of cells. Unless otherwise stipulated by the manufacturer, the discharge may not exceed the rated capacity. Charging must take place after both full and partial discharging.

2.2. Charging

LAll charging processes with limits according to

DIN 41 773 IU-characteristic
DIN 41 774 W-characteristic
DIN 41 776 I-characteristic.

Depending on the design of the charger and the charging curve, during charging alternating currents flow through the battery, which are superimposed on the d.c. charge. These superimposed, alternating currents and the effects of consumers lead to additional warming of the battery and loads on the electrodes, which can cause subsequent damage (see Section 2.8). Depending on the equipment involved, charging can take place during the following types of operation:

a.) Stand by parallel operation and floating operation

In this case, the consumers, the d.c. current source and the battery are subject to constant, simultaneous switching. The charge voltage represents both the operational and the equipment voltage.

With Stand by parallel operation, the a.c. current source is constantly able to supply both the maximum consumer and the battery charge currents. The battery only supplies current should the d.c. current source fail. The charge voltage setting amounts to 2.23 V ± 1% x cell number measured at the end poles of the battery.
In order to reduce the amount of recharging time, a charging level can be employed with a charging voltage of 2.33-2.4 V x cell number (continuous battery power supply operation with recharging level). Automatic switching to a charging voltage of 2.33-2.4 V x cell number follows.
In the case of buffer operation, the d.c. current source is not always able to supply the maximum consumer current. The consumer current temporarily exceeds the rated current of the d.c. current source. During this period, the battery supplies power and is therefore not fully charged at all times. Accordingly, depending on the consumers, the charging voltage should be set at 2.25 -2.30 V x cell number.

b.) Switch mode

During charging, the battery is separated from the consumers. At the end of charging, the charging voltage of the battery can reach 2.6 -2.75 V/cell. Charging is to be monitored (see Sections 2.4, 2.5 and 2.6). Once a fully charged condition has been attained, charging should cease, or a switch to retentive charging in line with Section 2.3 should be made.

c.) Battery operation - charging/discharging

The consumer will only be fed from the battery. At the end of battery charging, the charge can amount to 2.6-2.75 V/ cell. Charging is to be monitored (see Sectionsv 2.4, 2.5 and 2.6). Once a fully charged condition has been attained, charging should be switched off. If needed, the battery can be switched to the consu mers.

2.3. Maintaining a fully charged condition Retentive charging

Devices defined according to DIN 41 774 can be used. They should be set in such a way that the cell voltage amounts to a mean 2.23V ± 1% and the electrolyte density does not decrease over a long period of time.

2.4. Equalisation charging

Appropriate measures are to be taken due to possible exceeding of the permitted consumer voltage, e.g. switching off of the consumers. Equalisation charges are required following deep discharges and insufficient charging. They can be carried out as follows:

- With a constant voltage of max. 2.4V/cell for up to 72 hours.
- With I- or W-characteristic and constant current of up to max. 2.65V/cell.

Should the maximum temperature of 55°C be exceeded, charging is to be interrupted, continued with reduced current, or reduced temporarily to retentive charging, in order that the temperature falls.
The end of retentive charging is attained when the electrolyte density and the cell voltage do not increase within a period of two hours.

2.5. Temperature

The recommended operating temperature range for lead batteries is 10°-30°C. The technical data is valid for the rated temperature of 20°C. The ideal operating temperature range is 20°C ± 5 K.
High temperatures cut battery service life, while low temperatures reduce the capacity available. Exceeding the temperature limit of 55°C is not permitted.

2.6. Temperature-dependent charging voltage

Within an operating temperature range of 10°-30°C, a temperature-dependent adjustment of the charging voltage is not required (rated temperature 20°C).
If the temperature range is smaller than 10°C, or larger than 30°C, temperature-dependent adjustment of the charging voltage should occur. The temperature correction factor amounts to (-0.004 V/cell per K).
Should the temperature constantly exceed 40°C, the factor ± 0,003 V/cell per K) must be applied.

2.7. Electrolyte

The electrolyte consists of diluted sulphuric acid. The rated density of the electrolyte
amounts to 20°C and the rated electrolyte level in a fully charged condition has a maximum deviation of ± 0.01 kg/l.
Higher temperatures reduce electrolyte density, while lower temperatures increase it. The related corrective factor amounts to 0.0007 kg/l per K.
Example. An electrolyte density of 1.23 kg/l at 35°C corresponds with a density of
1.24 kg/l at 20°C, or electrolyte density of 1.25 kg/l at 5°C corresponds with a density of 1.24 kg/l at 20°C.

2.8. Superimposed alternating currents Ieff

Maximal 2 A per 100 Ah C 10 in closed batteries, like ZVEI information leaflet no. 19.

3. Battery care and checks

The electrolyte level must be checked regularly. If it has fallen below the lower electrolyte level mark, purified water must be added in accordance with DIN 43 530 Part 4.Following production, the purified water must demonstrate a conductivity of < 10 µS/cm and at the time of filling into the cell have conductivity of < 30 µS/cm.
The battery must be kept clean and dry, in order to prevent creepage current. Battery cleaning should take place in accordance with the ZVEI directive, "Cleaning of batteries".
The plastic parts of the battery and particularly the cell containers may only be cleaned with water without any additives.
The following should be measured and noted at least every six months:

- Battery voltage
- The voltage of various cells/block batteries
- The electrolyte density of various cells/block batteries
- The electrolyte temperature of various cells/ block batteries

If the average retentive charging voltage deviates by +0.1V or –0.05V from the average value (see 2.3) in one cell, customer service support should be sought.

The following should be measured and noted annually:

- Voltage of all cells
- The electrolyte density of various cells/block batteries
- The electrolyte temperature of various cells/ block batteries

Annual visual checks:

- The screw connections. The solid fit of unsecured screw connections is to be checked
- The battery installation and surroundings
- Ventilation and air extraction

4. Testing

Testing should be completed according to EN 60896-1 Part 1 and 4. Special testing instructions, e.g. pursuant to DIN VDE 0107 and DIN VDE 0108, should also be observed.

a.) Operational safety of the battery system

In general, the functionality of the battery must be regularly checked using a capacity test in order to guarantee the operational safety of the system. Care must be taken that the capacity test is carried out with the maximum current for which the battery is designed in its highest loading condition. Regular checks of the battery can markedly reduce the risk of unexpected failures. It is thus recommended to carry out professional capacity tests at regular intervals, at least once a year.

5. Defects

If defects in the battery or the charger are identified, customer service support should be requested immediately. Measurement data in line with Section 3 simplifies the search for the defect and its repair.
A service contract with Banner also facilitates the timely identification of defects.

6. Storage and mothballing

If cells/batteries are to be stored for a long time or mothballed, they should be kept fully charged in a dry, frost-free room. In order to prevent damage, a choice can be made from the following charging measures:

1. Quarterly equalisation charging in accordance with Section 2.4. In the case of mean temperatures of over 30°C, monthly equalisation charging may be required.

2. Retentive charging in line with Section 2.3.

7. Installation date - commissioning

Banner batteries are marked at the plant with a commissioning label with a punched year and month. An undamaged, clearly legible label is a prerequisite for any possible guarantee claims.

8. Technical data

The rated voltage, the number of blocks, the rated capacity (C10 = CN) and the battery type are all to be read on the rating plate of the equipment.

Installation/Dealer stamp

on/by

Warnings and safety instructions for lead-acid batteries


- Adhere to the information printed on the batteries, in the instructions for use and the vehicle operating manual.


- Wear eye protection.


- Keep children away from acid and batteries.


Danger of explosions:
- A highly explosive oxyhydrogen gas mixture is created during battery charging.


Open flames, sparks, open lights and smoking are prohibited:
- Avoid sparks when handling cables and electrical devices! Avoid short circuits!


Danger of chemical burns:
- Battery acid can cause severe burns therefore.
- Wear gloves and eye protection!
- Do not tip the battery, as acid can escape from the degassing valves.


First aid:
- In the case of acid splashes in the eyes, immediately rinse out with clean water for several minutes! Then consult a doctor without delay!
- Treat acid splashes on the skin or clothing with an acid neutralizer or soap and rinse with large amounts of water.
- Should acid be swallowed, consult a doctor immediately!


Warning:
- Do not subject batteries to direct daylight.
- Discharged batteries can freeze; therefore use frost-free storage.


Disposal:
- Used batteries should be handed in at a collection point. The information provided under Item 1 should be taken into account during transport. Never dispose of batteries with household waste!

Any warranty claims are null and void should the instructions for use be ignored, non-original spare parts be used for repairs, unauthorised tampering with the battery occur, or additives be introduced into the electrolyte (alleged improvement agents).

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