BATTERY PASSPORT AND OPERATING MANUAL

ASTERION SEALED LEAD ACID BATTERIES WITH REGULATING VALVES

Nominal technical characteristics:
The nominal voltage of the battery is U x m, where m is the number of series-connected elements that are a part of the battery. The rated voltage is indicated on the case of each battery.

Nominal capacity Cn, where n is the duration of the discharge. The duration and final discharge voltage are indicated directly on each product.

Rated discharge current Inom = In: $In = \frac{Cn}{n}$

Sealed stationary batteries do not require topping up the distillate throughout the entire service life. Opening the lid and sealing valve is strictly forbidden, and leads to damage to the battery. Sealing of batteries is carried out by using a valve that relieves excess gas pressure in the battery to prevent deformation of the battery.

Follow the instruction and keep it near the battery. Only qualified personnel are allowed to operate.

No smoking! To avoid explosive and fire hazard situations, the use of open flame, soldering or sparks near the battery is prohibited.

Use safety glasses when working with batteries! Observe safety precautions to prevent accidents.

If acid gets into eyes or skin, rinse with plenty of water and seek medical attention immediately. Acid-contaminated clothing should be washed immediately with plenty of water.

Avoid explosive and fire hazard situations as well as short circuits!

Attention! Batteries are always live. Do not place tools or objects on top of batteries. Do Not Short Circuit.

Electrolyte - an aqueous solution of sulfuric acid - an aggressive substance! In normal use, contact with electrolyte is excluded. When the housing is destroyed, the possibility of leakage of electrolyte. Using damaged batteries is strictly prohibited!

Batteries have significant weight. Ensure proper battery placement during installation and operation. Do not put on the edge. Avoid the falls and
shock battery. For transportation use only the means intended for this.

Warning -the battery is live!

Operation

Before commissioning, it is necessary to check all elements / blocks for mechanical damage, for the correct polarity of the connection and the strength of fastening of all threaded connections.
When commissioning a group of batteries, equalizing charge must be carried out in accordance with paragraph 2.3.
Tightening torque for bolted connection: M8 10 Nm ± 1 Nm, M5.5 / M6 8 Nm ± 1 Nm, OPzV 12 Nm ± 1 Nm.
Protective caps must be installed on the boron.
With the charger turned off and the consumer disconnected, connect the battery to the rectifier equipment according to the polarity. Turn on the charger and charge the battery in accordance with paragraph 2.2 and 2.4.

***Note!**
Remember that the combined use of old and new batteries, as well as batteries of different brands and series in the same circuit, can shorten the design life of the batteries.

1. Operation
When installing and operating stationary batteries, the standards of GOST R IEC 62485-2-2011 and the regional rules and regulations must be observed. Battery operation is permissible in any position except turned upside down.
Batteries should be installed so that the temperature difference between the individual cells / units is not> 4 ° C.

1.1 Discharge
The limiting value of the final discharge voltage depends on the discharge current. Do not discharge below a specified value for the final voltage. The battery should not be allowed to discharge more than the rated capacity.

***Note!**
By discharging the battery with low currents, you can get more energy than the nominal value. With such a discharge, the final discharge voltage should be higher. If you discharge the battery with low currents without adjusting the voltage, this can lead to a significant reduction in capacity and shortened battery life.

It is strictly forbidden to take energy more than the nominal value of the battery energy!

After a full or partial discharge, you must immediately begin to charge the battery. Storing a battery in a discharged state leads to its premature failure.

***Note!**
Remember that when discharged, the density of the electrolyte decreases. With a decrease in the density of the electrolyte, its freezing temperature rises. Do not store batteries at low temperatures.

1.2 Charge
Depending on the type of equipment, a charge can be made under the following battery operating conditions:
a) Support mode and buffer mode (standby use).
In these modes, consumers, DC power and battery are always connected in parallel. In this case, the charging voltage is simultaneously both the voltage of the battery and the voltage of the consumer equipment.

In maintenance mode, the DC source always provides maximum consumer current and battery power. The battery only supplies current when the DC source fails.
In the buffer mode of operation, the direct current source cannot provide the return of the maximum load current from the consumers. The load current temporarily exceeds the rated power of the DC source. The battery takes over these temporary load maxima. This means that the battery does not have a constant full charge.
Support / buffer mode charge voltage, measured at the battery terminals, is shown in Table 1.

Table1

Model	The voltage at the battery terminals, V / el, at **20°C**	The voltage at the battery terminals, V / el, at **25°C**
All models OPzV	2,25	2,23
All models FT-M, FTS-X	2,30	2,27
All models DTM I, DTM-L, HR, HR-W, HRL-X, HRL-W, GEL, GX, STC, GSC, CGD	2,30	2,27
All models DT, DTM	2,32	2,30

After an emergency operation and network recovery, the battery goes into charge mode. The charge values are shown in table 2.

Table2

Model	Charge voltage, V / el, at **20°C**	Charge voltage, V / el, at **25°C**
All models OPzV	2,35	2,33
All models FT-M, FTS-X	2,40	2,38
All models DTM, DTM I, DTM-L, HR, HR-W, HRL-X, HRL-W, GEL, GX, STC, GSC, CGD	2,37	2,35
All models DT	2,47	2,45

б) Cyclic mode (charge / discharge)

When working in a cyclic mode (cycle use), the consumer receives power only from the battery. This mode of operation depends on the characteristics of the operating modes of the system, charge / discharge modes and must be agreed with the manufacturer. In this mode, the charge voltage should not exceed the values given in table 3.

Table3

Model	Charge voltage in cyclic mode, V / el, at **20°C**	Charge voltage in cyclic mode, V / el, at **25°C**
All models OPzV	2,35	2,33
All models FT-M, FTS-X	2,40	2,38
All models DTM, DTM I, DTM-L, HR, HR-W, HRL-X, HRL-W, GEL, GX, STC, GSC, CGD	2,37	2,35
All models DT	2,47	2,45

Attention!Cyclic batteries cannot be discharged below 1.8 V / cell

When charging, batteries should not deviate from a vertical position in any direction by more than 90 °.

2.3 Equalizing charge

Due to possible deviations of the cell voltages from the median value of the operating voltage in the group, appropriate measures should be taken, for example, to carry out equalizing charge.
This charge mode is carried out after a deep discharge or after a chronic undercharging of the battery. The mode provides a charge with a constant voltage of no more than 2.4 V / cell for no longer than 48 hours.

For all models of the OPzV series, the surge voltage is 2.35 V / cell. The equalization charge is completed if the consumption current remains unchanged for 2 hours. The charging current at the initial moment of time should not exceed a predetermined percentage (see table 4 in clause 2.4) of Cn (the current decreases over time).

If the maximum battery temperature exceeds 50 ° C, the charge should be stopped or switched to the maintenance mode to reduce the temperature.

Attention! Recommendation for a buffer battery.

After a discharge in emergency mode, the batteries should be charged to the voltage of the buffer mode (see section 2.2). After reaching the voltage, apply an equalizing charge according to clause 2.3. After equalization, the batteries are returned to normal operation.

2.4 Charging currents

When charging the battery, the currents should not be higher than the values indicated in table 4:

Table 4

Model	Maximum charging current,%.
All models DT, DTM, DTM I, DTM-L, HR, HR-W, HRL, HRL-W, FT-M, FTS-X, STC	30%
All models GEL, GX, GSC, OPzV	20%
All models CGD	50-100%*

**Charging with currents from 50% to 100% is possible by monitoring of battery temperature up to 25°C*

Attention!

For all charge modes, the minimum charge current cannot be less than 10% of the nominal capacity.

2.5 Temperature

The recommended operating temperature range of lead-acid batteries is 20-25 ° C (see table. 1,2,3).
High temperatures (over 30 ° C) significantly reduce battery life. Lower temperatures reduce the ratings (rated capacitance, current and discharge time, etc.).
Raising the temperature to + 60 ° C is unacceptable - this greatly reduces the service life. It is advisable to avoid battery operation at temperatures above 45 ° C.
Keeping batteries below the freezing temperature of the electrolyte will damage the batteries. The freezing temperature of the electrolyte in fully charged batteries is about -60 ° C. As the battery discharges, the freezing temperature of the electrolyte increases: at a 70 percent level of battery charge, the freezing temperature will be about -25 ° C. Staying discharged at low temperatures will damage the battery.

***Note!**

When the battery is discharged, sulfuric acid is consumed, as a result, the density of the electrolyte decreases. A low degree of discharge reduces the density of the electrolyte. Any slight decrease in the density of the electrolyte at low temperatures will lead to the formation of centers of water crystallization (the formation of microcrystals of ice).

During installation, batteries must be installed with a temperature gap of 10-20 mm. In the absence of a temperature gap, local overheating of the batteries is possible, which can lead to their failure. When operating a group of series-connected batteries, the difference between their temperatures in the group should not exceed 4 ° C.

2.6 Charging voltage depending on temperature

To achieve maximum battery life, it is recommended

to use chargers with temperature compensation function for charge voltage.
When the temperature changes from + 15 °C to + 25 °C , the use of temperature compensation of the charging voltage is optional.
If the temperature noticeably deviates from the indicated values, an adjustment of the charge voltage by the formula is required:

$$U_{T_1} = U_{T_0} + (T_1 \quad T_0) * U_{\text{T-compensation}}$$

1. where UT0 is the recommended charge voltage for the considered mode (buffer or cyclic) at normal temperature T1, for which the nominal capacity parameters are given;

Y_{T1} - charge voltage at a temperature T0 other than normal;

$U_{T\text{-compens.}}$ - he temperature compensation voltage value for a specific battery operation mode (buffer or cyclic).

Temperature compensation of voltage is 5 mV / (element x ° C) for cyclic mode and 3.3 mV / (element x ° C) for other modes.

When batteries are operating as part of an automated system, temperature compensation is introduced when the temperature deviates from the values shown in table 2 for each degree.

2.7 Electrolyte
The electrolyte is an aqueous solution of sulfuric acid. Observe precautions!

5. Battery Care and Control
To prevent surface leakage, the battery must be dry and clean. Battery cleaning should be carried out in compliance with safety precautions in accordance with GOST R IEC 62485-2-2011, as well as regional and departmental standards.
The plastic parts of the batteries, especially the case, must be cleaned of dust and dirt without the addition of cleaning agents.
Do not allow water to enter the enclosure to prevent a short circuit.
At least 1 time in 3 months (when operating in maintenance mode), it is necessary to measure and record in the battery log:
-voltage on the battery,
-voltage of individual elements / blocks,
- surface temperature of individual elements / blocks,
-temperature in the battery room.
If the surface temperature of different elements / blocks differs by more than 4 ° C, the battery life is significantly reduced.
If possible, conductivity measurements should be carried out regularly. Annually should be measured and recorded in the battery log:
-voltage of all elements / blocks,
- surface temperature of all elements / blocks,
-temperature of the room.
Visual inspection should be carried out annually:
-strength of the connection nodes (check threaded connections for a fixed fit),
-installation and placement of the battery,
- ventilation systems.

5.1 CPC (control and training cycle)
The control and training cycle is carried out in order to determine the residual capacity.
CTC consists of three stages.

2. Charge mode constant voltage cyclic mode, not longer than 21 hours. Exposure after charging from 1 to 24 hours.
3. Discharge mode to rated voltage, rated current.
4. Make a full charge and return to normal operation. CPC should be carried out in accordance with internal regulations.

CTC is held at least once a year. It is recommended that CTC be performed once every six months.

3.2 Regulatory charge
Preventive charges of batteries in storage should be periodically carried out.
At a storage temperature of less than 20 ° C, recharging is carried out every 9 months. The charge is constant voltage, the voltage value is indicated in table 2. The duration of the charge should be no longer than 24 hours

At a storage temperature of 20 ° C to 30 ° C, recharging is carried out every 6 months. Charge constant Charge constant voltage. The duration of the charge should be no longer than 16 hours. At a storage temperature of 30 ° C to 40 ° C, recharging is carried out every 3 months. Charge constant voltage. The duration of the charge should be no longer than 10 hours

Note!
All charges are produced at a normal temperature of 20-25 ° C (see table. 1,2,3).

6. Tests
Tests should be carried out in accordance with GOST R IEC 60896-21-2013.

7. Problems
If you find a problem in the battery or in the charger, you should immediately contact the service department of the equipment manufacturer. Entries in the battery log, according to paragraph 3, will help to avoid many problems and facilitate troubleshooting.

8. Storage and decommissioning of batteries
If the elements / blocks are stored or decommissioned for a long time, they should be fully charged in a dry room at a temperature of 20 ° -25 ° C. When decommissioning batteries and storing them, the batteries must be fully charged. Unloaded storage is not permitted. This will lead to battery failure, which will not be a warranty case.
During storage and use, direct sunlight should be avoided. During storage, it is recommended to recharge in accordance with paragraph 3.2.

***Note!**
A maximum of two recharges is permissible during the storage period. Then it is recommended that you use the battery in maintenance mode.

It is strictly forbidden to store batteries in a discharged state.

9. Transportation
Sealed batteries that are not damaged during transport shall not be considered as dangerous goods if they are reliably protected from short circuits, rolling, tipping over or damage if they are properly stacked and secured on pallets and if there are no dangerous goods on the items prepared for shipment traces of acid from the outside.

Attention! It is important to observe the precautions when loading and transporting!

10. In addition

Strictly observe the regional codes and regulations for battery operation. Battery testing and verification is permissible only in accordance with GOST R IEC 60896-21-2013. It is permissible to check the capacity and internal resistance of the battery with the help of devices only to control the uniformity of the batteries.
The capacitance values obtained as a result of the use of “analyzers” or “express testers” cannot be accepted as a claim basis.

11. Service life

The design life of the battery is shown in table 5, except for special series.

Table5

Model	Model
DT (up to 40 Ah including)	5 years
All models DTM	6 years
All models HR-W, HR (up to 26 Ah including)	8 years
DT (up to 100 Ah including)	7-10 years
DT (from 150 Ah)	10 years
All models DTM I, DTM-L, FT-M, GEL, HR (from 40 Ah including)	10-12 years
All models HRL-X, HRL-W, FTS-X	12 years
All models GX, CGD	15 years
All models OPzV, GSC, STC	20 years

In cyclic battery mode, the service life is the number of cycles. For cyclic mode, the determining factor in the service life is the depth of discharge. Depending on the depth of discharge during cyclic mode, the number of cycles for batteries will be different.

***Note!**

The discharge depth is determined by the final discharge voltage, discharge time and discharge current.

When the battery is in the operating mode, the service life is the number of years. The service life will be affected by several factors. The main ones are the operating temperature and the presence of temperature compensation (see section 2.6), the absence of microcycles and timely maintenance (see section 2.3, 3).

Note to the instruction

Using traction batteries. (when used in wheelchairs, self-propelled carts, floor cleaning machines, toy vehicles, etc.)

Before using the battery in cyclic mode, it must be fully charged! If the batteries are used in a cyclic mode in a group of series-connected batteries, it is necessary to carry out either an equalizing charge or charge each battery separately.

When the ambient temperature drops below 20 ° C, the performance of the lead-acid battery decreases. With intensive use and high energy consumption from the battery even at 5 ° C, the distance covered by the battery powered technology can be reduced to 50%.

An uncharged battery in the cold season can freeze (freezing, the distillate in the battery expands, the battery case cracks). Freezing leads to constructive death of the battery even if the case remains intact, the plates get damaged under the influence of the formed ice. Do not store uncharged batteries at low temperatures. Do not allow the battery to discharge for many hours at low temperatures, this mode can be regarded as storage in an uncharged state at low temperatures.

During cyclic operation in a group of several series-connected batteries, unbalance may occur over time, i.e. The battery will have a different voltage. To prevent this, it is recommended that once every three months, the open circuit voltage of each battery is checked after a full charge by disconnecting the batteries from the charger.

If imbalance is detected, it is necessary to carry out equalizing charge or full charge of each battery separately.

When using the battery, it is necessary to charge it at least 1 time per day or after each use, even with a short idle time.

Do not charge in a confined space to prevent disturbance of normal heat exchange with the environment. Overheating of the battery may cause it to swell

The recommended value of the charging current is optimal. A deviation to the lower side is allowed, while the value of the charging current should not be less than 10% of the nominal capacity. Exceeding the maximum charging current leads to the death of the battery.

A strong loss of capacity during operation is not a guarantee case (loss of capacity due to the high degree of sulfation).

Sulfation of the active mass of the battery.

When discharged, the active mass passes into lead sulfate. When charging, the reverse process occurs with the destruction of lead sulfate and the restoration of the active mass. Crystalline indestructible lead sulfate is formed during storage and the use of the battery in an uncharged state, with a charge of less than 10% of the nominal capacity, with a charge of more than the value recommended in the instructions.

- When storing the battery in an uncharged state, lead sulfate becomes indestructible.
- Using the battery in an uncharged state will result in the growth of indestructible lead sulfate.
- Charge currents of less than 10% of the nominal capacity will lead to the formation of a strong crystalline structure of lead sulfate, which will prevent the restoration of the active mass.
- When charged with currents of more than the recommended value in the instruction, lead sulfate may not be completely destroyed. The remaining lead sulfate will quickly transfer to indestructible sulfate and the battery capacity will be significantly reduced.

Sulphation of the active mass leads to a decrease in service life and a significant decrease in battery capacity.

Uncharged storage has a significant impact on the life and capacity of the battery. If you want to use the rechargeable battery for as long as possible, it is necessary to charge the battery up to 100% after each use.

Do not store the battery in a discharged state!
It is not allowed to stay in the discharged state for a long time at negative temperatures to prevent freezing of the electrolyte
REMEMBER!

1. A deeply discharged battery cannot be considered defective.
2. Do not open batteries!
3. After purchase, the battery must be charged up to 100%.
4. Subject to the rules of operation and maintenance, your battery will last a long time.

WARRANTY

1. The seller guarantees the battery's performance during the warranty period, subject to the operating instructions;
2. The warranty applies only to manufacturing defects;
3. The battery must be presented in the warranty service clean, with legible factory markings and company stickers.

BATTERY WARRANTY DOES NOT COVER IN THE FOLLOWING CASES:

1. Failure to comply with the requirements specified in this document, service or safety measures;
2. Misuse of the battery;
3. Constructive death;
4. In the absence of a warranty card or the impossibility of otherwise confirming the date of purchase;
5. Battery failure due to deep discharge or overcharging;
   Disruption of operation due to deep discharge (voltage at the battery terminals less than 10.5 V) is not a reason for replacing the battery and serves as the basis for withdrawing the warranty;
6. Disruption of battery performance due to sulfation;
7. Violation of the battery's performance as a result of loss of H2O (drying out or boiling away) due to incorrect operation;
8. The decrease in battery capacity during operation.

DISPOSAL OF BATTERIES

A rechargeable battery, a battery that has reached its end of life, must be returned to the collection point for used batteries for future disposal.

BATTERY WARRANTY CARD
(BATTERY)

ASTERION BATTERY

PRODUCT WARRANTY IS_____ MONTH(S)

The guarantee is implemented in accordance with the federal legislation of the Russian Federation.

Model _____

SALE DATE « ___ »_____ 201 _ г.

PRODUCTION CODE

Battery checked by the seller in the presence of the buyer.

I have read the warranty conditions and operating rules

_____ _____

_____ _____

O.N.O. NOGMNCA

DATE « ___ »_____ 202 _ г.

SELLER

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