

Introduction

Valve regulated lead acid (VRLA), Thin Plate Pure Lead (TPPL) NexSys® CORE batteries are certified to ATEX standards (increased safety concept Ex e) for use in hazardous areas where there is a risk of explosion, due to gas or dust. These batteries are part of the following equipment groups and categories:

- Group I, category M2/Mb
- Group II, categories 2 and 3 (Zone 1 2G/Gb, Zone 2 3G/Gc)
- Group III, categories 2 and 3 (Zone 21 2D/Db and Zone 22 3D/Dc)

Relative to conventional ATEX batteries, the patented ventilation design of EnerSys battery trays may make it possible for a higher capacity battery to be selected for a given truck manufacturer's available battery compartment.

Unlike conventional batteries with liquid electrolyte, NexSys® CORE ATEX batteries are valve-regulated lead-acid batteries with immobilised electrolyte. Instead of a vent plug, a valve is used to regulate the internal gas pressure, preventing the ingress of oxygen from the air and allowing the escape of excess charging gases.

Operating VRLA batteries require similar safety precautions as vented batteries, specifically there are risks associated with electrical, corrosive and explosive hazards. Battery valves must never be removed. These batteries do not require topping up with distilled or demineralised water.

This manual should be used in conjunction with the manual for standard NexSys® CORE batteries which is available on www.enersys.com.

Upon receipt, batteries should be in perfect condition and free from any damage. If any damage is noted or accessories are missing, please contact your supplier immediately.

ATEX-certified NexSys batteries are designed for use in battery-powered applications (such as electric counterbalance, reach and pallet trucks) within hazardous areas. EnerSys cells and connectors have an IP (ingress protection) of 65; creates of 23 (when lids fitted).

The use of electrical equipment, such as DC-DC converters, low voltage alarms and EnerSys® Wi-iQ units, is prohibited unless certified for use in hazardous areas and fitted outside the battery.

Conformity

NexSys® CORE ATEX batteries conform with the relevant provision of ATEX Directive 2014/34/EU. Conformity has been demonstrated with reference to the following documentation:

ATEX	IECEx	Certificate Description
SIRA 01 ATEX3022X	SIRA IECEx 07.0065X	Batteries up to 68.8 kWh
SIRA 03 ATEX3090U	SIRA IECEx 07.0064U	DIN-size NexSys (and Gel) cells

Notes:

- ATEX certificates apply to the EU whilst IECEx certificates relate to the rest of the world (except North America).
- Quality assurance notification: SIRA 01 ATEX M103.

The applicable rating data for NexSys® CORE ATEX batteries is as follows:

- | | |
|--------------------------------------|--------------------|
| 1. Nominal capacity C ₅ : | See type plate |
| 2. Nominal voltage: | See type plate |
| 3. Discharge current: | C ₅ /5h |
| 4. Rated temperature: | 30°C |

These cells comply with the following clauses: EN/IEC 60079-0 clause 23.3 (Cell types), 23.6 (Interchangeability), 23.8 (Leakage) 23.9 (Connections), 23.10 (Orientation) and 23.11 (Replacement of cells or batteries), and EN/IEC 60079-7 clause 5.6 (classification), 5.6.3.1 (Types of permissible batteries), 5.6.3.3 (cells), 5.6.3.4 (connections) and 6.6.3 (shock test).

When they are assembled into a battery, the remaining clauses of EN/IEC 60079-7 need to be addressed with particular reference to clauses EN/IEC 60079-0 clause 23.2 (Batteries), 23.4 (Cells in a battery), 23.5 (Rating of a battery), 23.11 (Replacement of cells or batteries), and EN/IEC 60079-7 clause 5.6.3.2 (Battery containers), 5.6.4 (Charging of cells and batteries), 6.6.2 (insulation resistance) and 6.6.4 (ventilation).

The cells covered by this certificate shall be installed in series, in a suitable battery enclosure, together with cells of the same electrochemical system, cell design and rated capacitance that is manufactured by EnerSys. The battery enclosure shall provide protection from mechanical impact;

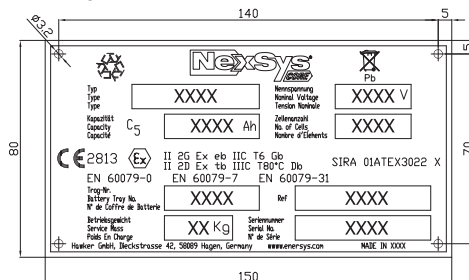
The cells shall be installed in a vertical orientation, with the electrical connectors at the top.

This equipment includes non-conducting parts that may generate an ignition-capable level of electrostatic charges under certain extreme conditions. The user shall ensure that the equipment is not installed in a location where it may be subjected to external conditions (such as high-pressure steam) which might cause a build-up of electrostatic charges on non-conducting surfaces. Additionally, cleaning of the equipment shall be done only with a damp cloth;

The cells shall have a certified service temperature range of -20°C to +60°C, which shall be taken into account when used in a battery. Battery operating conditions take precedence.

Condition of use

Do not charge in a hazardous area



An example of NexSys® CORE ATEX label

1. Safety



- Pay attention to the operating instructions and keep them close to the battery.
- Work on batteries must only be carried out by skilled personnel!



- Use protective glasses and wear safety clothing when working on batteries.
- Adhere to the current accident prevention rules in the country where the battery is used or EN 62485-3, EN 50110-1.



- No smoking!
- Do not expose batteries to naked flames, glowing embers or sparks, as it may cause the battery to explode.
- Avoid sparks from cables or electrical apparatus as well as electrostatic discharges.



- Acid splashes into the eyes or on the skin must be washed immediately with an abundance of clean water. After abundant flushing consult a doctor immediately!
- Clothing contaminated by acid should be washed in water.



- Risk of explosion and fire.
- Avoid short circuits: do not use non-insulated tools, do not place or drop metal objects on top of the battery.



- Remove rings, wristwatches and articles of clothing with metal parts that might come into contact with the battery terminals.



- Electrolyte is highly corrosive.
- In the normal operation of this battery a contact with acid isn't possible. If the cell containers are damaged, the immobilized electrolyte (absorbed in the separator) is corrosive like the liquid electrolyte.
- Batteries are heavy. Ensure secure installation! Use only suitable handling equipment.
- Lifting hooks must not damage the cells, connectors or cables.
- Do not place batteries in direct sunlight without protection. Discharged batteries can freeze. For that reason, always store in a frost-free zone.



- Dangerous electrical voltage!
- Avoid short circuits: NexSys batteries are capable of high short circuit currents.
- Caution – metal parts of the battery are always live: do not place tools or other objects on the battery!



- Pay attention to the hazards that can be caused by batteries.

Any work carried out on the battery must comply with EN 60079-19 and EnerSys' operating instructions. All defective parts must be replaced by EnerSys supplied parts. No attempt should be made to repair faulty parts. Failure to adhere to this will render the warranty and certification null and void.

Always remember that the battery is a source of power. Even when fully discharged, sufficient energy remains in the battery to cause serious damage.

The battery is designed to be used within the intended surrounding area conditions.

The materials used are not known to react with any of the explosive atmospheres with which they may come in contact with. If unsure, please contact EnerSys.

The apparatus does not cause injury or harm when used as specified in this manual and the standard NexSys' CORE battery manual.

The apparatus does not produce ignition-capable electrical sparks or arcs when used in compliance with this instruction manual. The apparatus has been designed not to produce potential ignition sources from electromagnetic, acoustic, optical or other external energy sources.

Individual cells contain sulphuric acid. These cells are constructed from materials that are resistant to acid attack.

Follow the safety practices below:

- Never charge NexSys' CORE ATEX battery in a zoned controlled area unless special conditions, defined by equipment manufacturers, are met.
- Never disconnect a battery under load in a zoned area.
- Never open the battery cover (if present) in a zoned area.
- Always use certified DC plugs for connection to the battery.
- Never use the battery if damaged or bare cables are visible.
- Never use the battery if the DC plugs are damaged.
- Never attempt to service the battery: call your recommended authorised service centre.
- Any servicing carried out must be in accordance with ATEX directives.
- Never mix cells of different types or capacities within one battery.

2. Service

Your local authorised service engineer provides help and support. This handbook gives guidelines of a general nature; the engineer will help you to interpret your needs in relation to your particular requirements. Your engineer can answer the questions that are beyond the scope of this manual. Please do not hesitate to call your local service centre if you have any questions relating to your battery.

3. Handling

As NexSys' CORE ATEX batteries are heavy, always use the appropriate equipment when attempting to handle batteries. When lifting and handling NexSys' CORE ATEX batteries, use the appropriate, approved lifting equipment and keep the battery in an upright position. Due to the wide range of types of electric vehicles, of designs of battery containers, of equipment used and in methods of battery changing, it is not possible to give detailed instructions on the procedures to be followed when changing the batteries on a specific electric vehicle. The manufacturer of the vehicle or the battery changing equipment must supply the correct method and procedure.

4. Taking delivery of your battery

Remove all packaging and carefully examine the complete battery to ensure that there is no physical damage. Should the battery not be put in service immediately, please refer to storage guidelines (section 9).

5. Commissioning

NexSys[®] CORE ATEX batteries are supplied in a charged condition. Check the following:

1. The cleanliness of the battery and the vehicle's battery compartment.
2. Ensure systems are in place to prevent your battery being connected to the improper charging equipment. Ensure all connections are correct and that positive and negative polarities, which are clearly indicated on plugs, are respected. Improper connection may result in damage to the battery, vehicle or charger.
3. Ensure that any charging equipment is suitable for use with NexSys[®] CORE ATEX batteries.
4. Charge the battery before first use.
5. Should there be any uncertainty regarding the nature of the hazardous area, please contact the equipment representative.

6. Operation

6.1 Operational safety

Batteries should be used in accordance with the EN 62485-3 standard ("Safety requirements for secondary batteries and battery installations - Part 3") and Directive 1999/92/EC ("Minimum requirements for improving the health and safety protection of workers potentially at risk from explosive atmospheres").

6.2 Operating conditions

The ATEX-approved operating temperature range is -20°C to 40°C.

The lifetime of the battery depends on a number of operating conditions, in particular the operating temperature and depth of discharge. Optimal battery life is obtained with the battery at a temperature between +15°C and +35°C to maximise performance and battery life. High temperatures shorten the life of the battery, low temperatures reduce the available capacity.

Operating at a depth of discharge of 60% or less will maximise the battery lifetime. The maximum permissible discharge is 80% of C_n nominal capacity. From new, the battery reaches its full capacity after approximately three charge/discharge cycles.

6.3 Discharging

The valves on the top of the battery must not be sealed or covered. Electrical connections (e.g. plugs) must only be connected or disconnected in the open circuit condition (without load). Discharges over 80% of the rated capacity are categorised as deep discharges and are not acceptable as they significantly reduce the life expectancy of the battery. Discharged batteries MUST be recharged immediately and MUST not be left in a discharged condition.

Note: The following statement only applies to partially discharged batteries.

Discharged batteries can freeze. Limit the discharge to a maximum of 80% depth of discharge (DOD). The cycle life of the battery will depend on the DOD; the higher the DOD, the shorter the cycle life. The presence of a discharge limiter on the vehicle is necessary.

When discharged with currents in the range of I_1 to I_2 , the following energy cut-off settings must be used:

- 60% DOD 1.96V
- 80% DOD 1.92V

At lower currents please seek advice from EnerSys.

6.4 Charging

Note: Never recharge a NexSys[®] CORE ATEX battery in a zoned area unless special conditions, defined by equipment manufacturers, are met.

NexSys[®] CORE ATEX batteries must be charged using appropriate EnerSys chargers. Using non-specified chargers will invalidate the warranty. NexSys[®] CORE ATEX batteries are suitable for both standard duty and heavy-duty applications. In standard duty applications the charger (0.2-0.25 charging rate) will recharge the battery from 80% depth of discharge in approximately six hours.

Short opportunity charges are allowed (one opportunity charge is permitted between main charges with a maximum energy throughput of 100% C_n)

Charging Rate	From 80% Depth of Discharge to Full Charge	From 60% Depth of Discharge to Full Charge	From 40% State of Charge to 80% State of Charge
0.25 C_n	5.5 hours	4.75 hours	1.6 hours
0.20 C_n	6.25 hours	5.25 hours	2 hours

Under normal circumstances NexSys[®] CORE ATEX batteries have extremely low gas emissions. For safety purposes, when calculating gas emission levels, use 1.5A / 100Ah C_n . Provision must be made for venting of the charging gases. When charging, doors, battery container covers (when present) and the covers of battery compartments must be opened or removed. Ventilation openings must not be sealed or covered. Electrical connections (e.g. plugs) must only be connected or disconnected under open circuit condition. To charge the battery, connect it to the charger ensuring the charger is switched off. Ensure positive and negative polarities are correct. NexSys[®] CORE ATEX batteries must receive their full charge at least once a week.

6.5 Equalising charge

NexSys[®], NexSys[®]+ and Lifespeed iQ™ chargers will automatically provide an equalising charge, following a normal full charge (conditions embedded into the charging profile).

7. Maintenance

As the electrolyte is immobilised its density cannot be measured. Never remove safety valves from cells. In case of accidental damage to valves, contact EnerSys[®] for replacement.

7.1 Daily

Recharge the battery after every discharge. Check the condition of the plugs, cables and that all insulation covers are in place and in good condition. If any damage is visible, take the battery out of service immediately and place it in a safe area outside the hazardous zone. Do not attempt to repair NexSys[®] CORE ATEX battery unless qualified to do so. Call EnerSys or your authorised service representative for assistance.

7.2 Weekly

Visually inspect the battery for signs of dirt and mechanical damage to all component parts. Pay attention to the battery charging plugs and cables.

7.3 Quarterly

It is recommended to carry out voltage readings at the end of charge as well as to measure and record:

- The voltage of the complete battery
- The voltage of each cell

If significant changes from earlier measurements or differences between cells are found, please contact EnerSys service.

If the runtime of the battery is not as expected, check the following:

- That the required application matches the battery capacity
- The settings of the charger
- If necessary, the settings of the discharge limiter on the vehicle.

7.4 Annually

Remove dust from the battery. Test all connections (sockets, cables and contacts). The insulation resistance of the truck and the battery must be checked by an electrical specialist in accordance with EN 1175-1 at least once per year. Tests on the insulation resistance of the battery must be conducted in accordance with EN 1987-1. The minimum insulation resistance must be 50Ω per Volt of nominal voltage and the minimum battery resistance must not be below 1kΩ regardless of voltage (ref. EN 62485-3 standard).

The integrity of crates should also be monitored to ensure that lifting equipment has not caused any damage. Any lifting hole present on the tray must be checked for potential damage. No sign of any deformation should be visible.

8. Care of the battery

The battery should always be kept clean and dry to prevent tracking currents. Cleaning must be done in accordance with the ZVEI code of practice "The Cleaning of Vehicle Traction batteries". Any liquid in the battery tray must be extracted and disposed of in the correct manner. Damage to the insulation of the tray should be repaired after cleaning, to ensure that the insulation value complies with EN 62485-3 and to prevent tray corrosion.

Should it be necessary to remove cells, please contact EnerSys service.

9. Storage

Batteries are dispatched from the manufacturer in a fully charged condition. The state of charge will decrease with the storage time. Due to parasitic chemical reactions all batteries lose their stored energy when allowed to stand on open circuit. The rate of self-discharge is non-linear and increases with decreasing state of charge. High temperatures greatly reduce storage life as they increase the rate of self-discharge. If the truck/vehicle is not going to be used for periods in excess of 48 hours, the ignition key must be removed and any auxiliary equipment (such as lights, beacons, on-board computer, etc) must be switched off.

The standard storage time for a battery not installed on a truck is one month without the need to recharge. The maximum storage time is 6 months at 20°C provided the battery is fully charged when put into storage and that other equipment that could cause the battery to discharge is disconnected. It is advisable to conduct an inspection and open circuit voltage check after three months and implement a refresh charge if necessary.

10. Faults

If faults are found on the battery or the charger, EnerSys service should be called in without delay. The measurements taken in point 7.3 will facilitate fault finding and their correction. A service contract with EnerSys will make it easier to detect and correct faults and ensure the battery performs at its best.

Back to the manufacturer!
Batteries with this sign must be recycled.
Batteries which are not returned for the recycling process must be disposed of as hazardous waste!

