SPL+ Ni-Cd batteries

Installation and operating instructions

Important recommendations

WARNING: Risk of fire, explosion, or burns. Do not disassemble, heat above +70°C, or incinerate. Never allow an exposed flame or spark near the batteries, particularly while charging.

• Never smoke while performing any operation on the battery.

• For protection, wear rubber gloves, long sleeves and appropriate splash goggles or face shield.

• The electrolyte is harmful to skin and eyes. In the event of contact with skin or eyes, wash immediately with plenty of water. If eyes are affected, flush with water, and obtain immediate medical attention.

• Remove all rings, watches and other items with metal parts before working on the battery.

• Use insulated tools.

• Avoid static electricity and take measurements for protection against electric shocks.

• Discharge any possible static electricity from clothing and/or tools by touching an earth-connected part "ground" before working on the battery.

• Ventilation, in accordance with the IEC 62485-2 standard, is mandatory during commissioning and operation.

1. Receiving the shipment

Do not overturn the package.

Upon receipt of the goods, any transportation damage, electrolyte spillage or irregularities must be reported to the carrier and to Saft.

The battery is shipped filled and charged, and is ready for immediate use. Storage of cells must not exceed the maximum storage time indicated on the packing case.

2. Storage

• The battery must be stored in a dry and clean indoor location, on open, well ventilated shelves away from direct sunlight between 0°C and +30°C (+32°F and 86°F).
If stored in the shipping crates, the lid and top packing must be removed to allow ventilation.
Do not store in direct sunlight or expose to excessive heat.

SPL+ batteries are supplied filled with electrolyte and charged. They can be stored in this condition for maximum 24 months from date of shipment in accordance with the recommendations set forth in this I&O.

Storage of a filled battery at temperatures above +30°C (+86°F) can result in permanent change and loss of product performance, depending on the duration of the storage above the maximum recommended temperature. Never drain the electrolyte from the cells. To ensure maximum protection of the cells always store the product in its original packaging.

3. Installation

3.1. Location

Install the battery in a dry and clean room. Avoid direct sunlight and heat.
The battery will give the best performance when the ambient temperature is between +10°C to +30°C (+50°F to +86°F).

3.2. Mounting

For cells with handles, both must be used when lifting and moving. To prevent electrolyte spillage, do not tip cells.Verify that cells are correctly interconnected with the appropriate polarity and that the connectors are correctly torqued.

Connections between the battery and the load shall be made with nickel plated cable lugs. Tightening torque for the terminals must be:

• M 10 = 30 ± 3.0 N.m (265.0 ± 26.6l bf.in)

The connectors and terminals should be corrosion-protected by coating with a thin layer of anti-corrosion oil, anti-corrosion grease (NO-OX) or approved equal.

If a central water filling system is used as an option, refer to the corresponding installation and operating instructions sheet.

3.3. Ventilation

During charging, the battery is emitting gases (oxygen and hydrogen mixture).
Ventilation inside the battery room must be adequately managed, comply with IEC 62485-2 and local regulations.

3.4. Electrolyte

When checking the electrolyte levels, a fluctuation in level between cells is normal. This is due to the varying amounts of gas held in the separators of each cell. The level is normally at least 15 mm above the minimum (5/8") above the minimum level mark (lower) and there should be no need to adjust it.

If electrolyte is ever spilled from a cell and the level is 30 mm below the minimum mark (lower), then refilling with E23 electrolyte is required. Contact your local Saft representative for more details.

Do not top up with deionized or distilled water prior to initial charge to avoid overfilling a cell. After commissioning, when the level is stabilized, the electrolyte level should be approximately 5 mm below maximum mark (Upper).

4. Commissioning

Verify that ventilation, in accordance with the IEC 62485-2 standard, is provided during this operation.

A good commissioning is important. Charge at constant current is preferable. **If the current limit is lower than indicated in the table A, extend the charge time proportionally.**

After commissioning, the battery shall be charged permanently according to section 5.

Prior and during commissioning charge, record all data requested in the commissioning report available on www.saftbatteries.com.

Cells stored up to 6 months:
A commissioning charge is normally not required and the cells are ready for immediate use If the published performance is required immediately, please refer to Section 4 and the procedure dedicated to cells stored more than 6 months and up to 2 years.

SPL+ Ni-Cd range

Cells stored more than 6 months and up to 2 years:
Always conduct a commissioning charge before use.

Commissioning at ambient temperature between + 10°C to + 30°C (+ 50°F to + 86°F)
- Constant current charge:
Charge for 20 h at 0.1 C_5 A (see Table A)
Notice: At the end of charge, the cell voltage will reach about 1.80 V, thus the charger shall be able to supply such a voltage.
When the charger maximum voltage setting is too low to supply constant current charging, divide the battery into two parts to be charged individually at constant current.

- Constant voltage charge:
Charge at 1.55 V/cell for a minimum of 24 h with current limited to 0.1 C_5 A (see the current in Table A). If this voltage level is not available, then charge at 1.50 V/cell for a mini-mum of 36 h with current limited to 0.1 C_5 A (see the current in Table A).

• Commissioning at ambient temperature above + 30°C (+ 86°F)
- Only constant current charge:
Charge for 20 h at 0.1 C_5 A (see Table A).

The battery container temperature is to be monitored during charge. If the temperature exceeds +45°C (+113°F) during charging, then it must be stopped to reduce the temperature. The charging can be resumed when battery container temperature drops below +40°C (+104°F).

Following the commissioning charge and after placing the battery in service, check the electrolyte levels as topping-up may be necessary.

• Cell electrolyte after prolonged float charge:
Check the electrolyte level and adjust it to the upper level mark by adding distilled or deionized water.

Note: When full battery performance is required for capacity test purposes, the battery has to be charged in accordance with IEC 62259 section 7 (7.1 & 7.2).

5. Charging in service

The recommended charging voltages for continuous parallel operation, with occasional battery discharges, are:

• Single level voltage:
1.42 ± 0.01 V/cell

• Dual level voltage:
float level: 1.42 ± 0.01 V/cell
high rate (boost) level: 1.45 ± 0.01 V/cell

To minimizes the need for topping-up maintenance at high temperatures and increases the charge acceptance at low temperatures. Temperature Compensated Voltage (TCV) is generally mandatory. The conditions to apply TCV depend on ambient operating temperature.

For optimum charging, TCV charging is mandatory from from -20°C to +40°C (-4°F to +104°F). The TCV control value is−3 mV/°C/cell (−1.7 mV/°F/cell), starting from + 20°C (+ 68°F).

6. Preventive maintenance

SPL+ is an ultra-low maintenance battery which requires little to no maintenance.
However, it is good practice with any system to carry out an inspection of the system once per year or at the recommended topping-up interval period to ensure that the charging system, the battery and the ancillary electronics are all functioning correctly. Additionally, follow your standard preventative maintenance procedures.

• Keep the battery clean.
The battery can be wiped using only water. Do not use solvents of any kind. Soft non-metallic brushes and cloths can be used. Vent plugs can be soaked and rinsed in clean water if necessary.

• Check the charging voltage.
This should be checked and recorded at least once yearly.

• High water consumption is usually caused by an improper voltage setting or voltage drift that is above the recommended in-service charging voltages.

Cell type	Capacity C_5 Ah (Ah)	Charging current 0,1 C_5 A (A)	Cell connection per pole
SPL+ 80	80	8	M 10
SPL+ 100	100	10	M 10
SPL+ 130	130	13	M 10
SPL+ 165	165	16,5	M 10
SPL+ 200	200	20	M 10
SPL+ 250	250	25	M 10
SPL+ 290	290	29	2 x M 10
SPL+ 340	340	34	2 x M 10
SPL+ 380	380	38	2 x M 10
SPL+ 420	420	42	2 x M 10
SPL+ 470	470	47	2 x M 10
SPL+ 510	510	51	2 x M 10

To maximize the topping-up interval check the charging voltage and adjust as required.

• Visually check the electrolyte level. Never let the level fall below the minimum level mark. Use only distilled or deionized water to top-up. **Topping up of the SPL+ battery shall be carried out when battery is fully charged.** Experience will tell the time interval between topping-up.

Note: There is no need to check the electrolyte density.
•Electrolyte density measurements do not indicate state of charge or state of health.

CAUTION: Topping-up should be done only when the SPL+ is in float charge operation mode.

• Ensure all terminals and connectors are coated with a thin layer of anti-corrosion oil, anti-corrosion grease (NO-OX) or approved equal.

Note that all these maintenance recommendations followed the IEEE 1106 standard 'Recommended Practice for Installation, Maintenance, Testing and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications'.

7. Environment

To protect the environment all used batteries must be recycled. Contact your local Saft representative for further information.

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