SOLAR RANGE

P 5.2E
December 2023

Ni-Cd Batteries

Installation and operating instructions

Safety precautions

- **WARNING: Risk of fire, explosion, or burns. Do not disassemble, heat above +70°C (+158°F), or incinerate.**
- **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 measures 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 Alcad.

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

2. Storage

Cells shall never be stored for a period exceeding 24 months from the date of manufacture. Storage time cannot be reset by doing a recharge mid storage time.

The battery must be stored in a dry, clean and well-ventilated indoor location, away from UV-sources (sunlight) at an ambient temperature between 0°C and +30°C (+32°F and +86°F).

Storage of battery at temperatures above +30°C (+86°F) or above 24 months can result in permanent loss of product performance.

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 heat, direct sunlight and other UV-source.

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 overturn the 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 6 = 11 ± 1.1 N.m (97.4 ± 9.8 lbf.in)
- M 8 = 20 ± 2.0 N.m (177.0 ± 17.7 lbf.in)
- M 10 = 30 ± 3.0 N.m (265.0 ± 26.6 lbf.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.

3.3. Ventilation

During operation the battery emits a gas mixture of oxygen and hydrogen.

Ventilation inside the battery room must be adequately managed, comply with IEC 62485-2 and local regulations.

To calculate the required ventilation, contact your local Alcad representant or use our sizing tool, BaSiCs.

3.4. Electrolyte

Do not top up with deionized or distilled water prior to initial charge to avoid overfilling a cell.

When checking electrolyte levels, a fluctuation in level between cells is normal. The level is normally at least 15 mm (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 (1.2") below the minimum level mark (lower), then refilling with E29 electrolyte is required.

4. Commissioning

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

A good commissioning is important and mandatory. After commissioning, the battery must be charged permanently according to section 5.

Prior and during commissioning charge, record all data requested in the commissioning report available on Alcad Academy.

It is mandatory to send commissioning report to *commissioning@alcad.com* to activate the warranty.

4.1. Cells delivered filled and charged stored up to 6 months

A commissioning charge is normally not required and the cells are ready for immediate use. However, the product's full performance will be achievable after 1 to 3 months of float charge in service.

If the published performance is required immediately, please refer to Section 4.2.

4.2 Cells delivered filled and charged stored for more than 6 months and up to 2 years or filled and deep discharged stored up to 2 years

Always conduct a commissioning charge before use in service.

Commissioning at ambient temperature between + 10°C to + 30°C (+ 50°F to + 86°F).

4.2.1. Constant current charge Charge for 10 h at 0.2 C_5 A (see Table A).

Charge for 10 h at 0.2 C5 A (see Table A).

If the current limit is lower than indicated in the table A, extend the charge time proportionally.

Note: At the end of charge, the cell voltage will reach about 1.80 V/cell, thus the charger shall be able to supply such a voltage.

Reliability inside

ALCAD

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.

4.2.2. Constant potential charge

- **Filled and charged/deep discharged**

Charge at 1.55 V/cell for a minimum of 24 h with current limit of 0.2 C_5 A (see Table A).

If this voltage level is not available, then charge at 1.50 V/cell for a minimum of 36 h with current limited to 0.2 C_5 A (see Table A).

- **Filled and deep discharged (option)**

Commissioning at ambient temperature between + 10°C to + 30°C (+ 50°F to + 86°F). Constant voltage charge at a low voltage level:

Charge at 1.45 V/cell for a minimum of 72 h with current limit of 0.2 C_5 A (see Table A).

If capacity is not needed directly it is also possible to charge 1.42 V/cell for a minimum of 1 month with current limited to 0.2 C_5 A (see Table A).

4.2.3. Commissioning at ambient temperature above + 30°C (+ 86°F)

Only constant current charge.

10 h at 0.2 C_5 A (recommended)

20 h at 0.1 C_5 A (possible)

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. It must be stopped to reduce the temperature.

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).

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

5. Charging in service

The photovoltaic array converts solar irradiance into DC electrical power at a predetermined range of voltages whenever sufficient solar radiation is available. Unlike a mains connected system, the output from a photovoltaic array is variable and, to obtain the best efficiency from the system, it is mandatory to have some form of charge control.

These are those which have a constant voltage limitation based on the PWM technics those ith several voltage steps charging where the battery, by switching means, is charging up to a high pre-set voltage (boost or float threshold), then drops to a lower voltage level (battery reconnect threshold) and then back to the high pre-set voltage and so on.

Float level

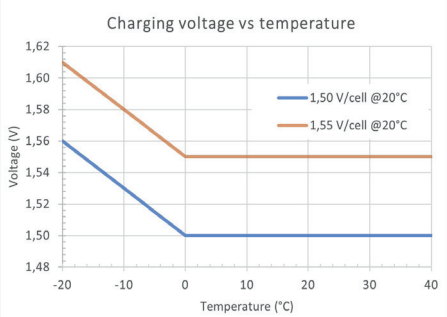
1.50 ± 0.01 V/cell

High rate (boost) level (not mandatory)

1.65 ± 0.01 V/cell

TCV is mandatory, from -20°C to 0°C (-4°F to +32°F) increase the charge voltage by 3 mV/°C/cell (+1.7 mV/°F/cell) starting from + 0°C (+ 32°F).

6. Preventive maintenance



Solar range is ultra-low maintenance battery which requires little preventive 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. Keep the battery clean using only water. Do not use a wire brush or solvents of any kind. Vent plugs can be rinsed in clean water if necessary.

- 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 VANTEX battery shall be carried out when battery is fully charged.
- Ensure all terminals and connectors are coated with a thin layer of anti-corrosion oil, anti-corrosion grease (NO-OX) or approved equal.

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'.

Additionally, follow your standard preventative maintenance procedures.

7. Environment

To protect the environment all used batteries must be recycled.

Contact your local Alcad representative for further information.

Table A

Cell type	Capacity		Charging Current		Pole size
	C_{120} Ah	C_5 Ah	0,1 C_5 A	0,2 C_5 A	
PV 50	50	45	5,0	10,0	M8
PV 100	100	95	10,0	20,0	M10
PV 136	136	126	13,6	27,2	M10
PV 150	150	140	15,0	30,0	M10
PV 175	175	163	17,5	35,0	M10
PV 200	200	185	20,0	40,0	M10
PV 235	235	218	23,5	47,0	M10
PV 250	250	235	25,0	50,0	M10
PV 275	275	253	27,5	55,0	M10
PV 305	305	280	30,5	61,0	M10
PV 320	320	294	32,0	64,0	2xM10
PV 355	355	325	35,5	71,0	2xM10
PV 370	370	338	37,0	74,0	2xM10
PV 405	405	375	40,5	81,0	2xM10
PV 415	415	380	41,5	83,0	2xM10
PV 455	455	420	45,5	91,0	2xM10
PV 485	485	450	48,5	97,0	2xM10
PV 505	505	470	50,5	101,0	2xM10
PV 555	555	515	55,5	111,0	2xM10
PV 610	610	560	61,0	122,0	2xM10
PV 645	645	595	64,5	129,0	3xM10
PV 660	660	610	66,0	132,0	3xM10
PV 710	710	650	71,0	142,0	3xM10
PV 760	760	700	76,0	152,0	3xM10
PV 790	790	729	79,0	158,0	3xM10
PV 810	810	750	81,0	162,0	3xM10
PV 835	835	774	83,5	167,0	3xM10
PV 860	860	800	86,0	172,0	3xM10
PV 910	910	840	91,0	182,0	3xM10
PV 930	930	862	93,0	186,0	4xM10
PV 960	960	890	96,0	192,0	4xM10
PV 1015	1015	940	101,5	203,0	4xM10
PV 1065	1065	980	106,5	213,0	4xM10
PV 1115	1115	1030	111,5	223,0	4xM10
PV 1170	1170	1080	117,0	234,0	5xM10
PV 1215	1215	1120	121,5	243,0	4xM10
PV 1245	1245	1150	124,5	249,0	5xM10
PV 1270	1270	1170	127,0	254,0	5xM10
PV 1320	1320	1220	132,0	264,0	5xM10
PV 1370	1370	1260	137,0	274,0	5xM10
PV 1385	1385	1279	138,5	277,0	5xM10
PV 1420	1420	1300	142,0	284,0	5xM10
PV 1470	1470	1350	147,0	294,0	5xM10
PV 1520	1520	1400	152,0	304,0	5xM10
PV 1570	1570	1450	157,0	314,0	6xM10
PV 1620	1620	1500	162,0	324,0	6xM10
PV 1670	1670	1550	167,0	334,0	6xM10
PV 1720	1720	1600	172,0	344,0	6xM10
PV 1775	1775	1650	177,5	355,0	6xM10
PV 1830	1830	1700	183,0	366,0	6xM10

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Alcad Limited
Sweden
Phone : +46 491 68 100
Fax: +46 491 68 110

Alcad Sales Offices
United Kingdom
Phone : +44 1279 772 555

Middle East
Phone : +357 25 871 816
Fax: +357 25 343 542

Asia
Phone : +65 6 7484 486
Fax: +65 6 7484 4639

USA
Phone : +1 23 985 2500
Fax: +1 23 985 2539

www.alcad.com | alcad.sweden@alcad.com