Certificate no.:
TAE0000523

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Li-Ion Battery System

with type designation(s)
MBmax14.3H-SP, MBmax16.3H-SP

issued to
Huizhou RoyPow Technology Co., Ltd.
Huizhou City, Guangdong, China

is found to comply with
DNV rules for classification – Ships, offshore units, and high speed and light craft

Application:

Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Issued at **Høvik** on **2025-04-22**
This Certificate is valid until **2030-04-21**.
DNV local unit: **China South NB**

for **DNV**

Approval Engineer: **Per Henning Hammerstad Møllevold**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

Natural cooled lithium-ion modular battery based electrical energy storage system (EES) for use in battery-powered or hybrid vessels and offshore units.

One battery string includes a DCB (domain control box), a PDU (power distribution unit), battery modules, and several connecting cables. The battery system can be connected in series with 1 to 17 battery modules to meet the required voltage range and numerous systems can be set up in parallel to gain more capacity and redundancy.

Each battery module is composed of two submodules connected in series, a total 16S1P LiFePo4-cells, BMU (battery monitoring unit) and I-TMU (independent-temperature monitoring unit), which monitors cell voltages and cell temperatures through a CCS board (cells contact system) and independent temperature probes, a 500A fuse, power connectors, off-gas valve and a safety board with condensed aerosol equipped on the top cover.

The battery management system (BMS) includes BMU, BCU (battery cluster unit) and BAU (battery array unit). The BMS monitors the temperature, voltage, current, insulation and other states of the battery, which can provide communication, security, cell balance and management control for the battery, and provide communication interfaces with application equipment.

The battery system meets the DNV Pt.6 Ch.2 Sec.1 Non-Propagation Design Option #1, no cell-to-cell propagation.

Type: MBmax14.3H-SP, MBmax16.3H-SP

Cell capacity	280 Ah	320 Ah
Type of cells	Prismatic	
Chemistry	Lithium ion LiFePO4	
Cells manufacturer	REPT	
Cell model	CB71173204EB	CB71
Module cell configuration	16S1P	
Module nominal voltage	51.2 V	
Module min-max voltage	40-58.4 V	
Module size	L: 800 * W: 465 * H: 247 mm	
Cooling	Natural cooling	
Temperature range	Charge: 0… 55°C, Discharge: -20… 55°C	
Ingress protection	IP67	

Battery string

Module type	MBmax14.3H-SP	MBmax16.3H-SP
Modules configuration	1-17x (16S1P)	
Voltage	51.2V-870.4 V	
Energy	14.3-243.7 kWh	16.4-278.5 kWh

Battery Management system (BMS)
BMU SW: NA, software for daisy chain communication.
BMU HW ESS-BMS-C-BMU
BAU SW: B3FY51BAUXXXXD0_V1.0
BAU HW: HESS01_DZ_V1.0
BCU SW: B3FY51BCUXXXXD0_V1.0
BCU HW: HESS01_DZ_V1.0
TCU SW: B3FY51TCUXXXXD0_V1.0
TCU HW: HESS01_DZ_V1.0
TMU SW: B3FY51TMUXXXXD0_V1.0
TMU HW: DZ19-TMU-1-11-A

Application/Limitation

1. When installed on a ship or offshore unit, the DNV class rules for battery installation must be followed (DNV Pt.6 Ch.2 Sec.1).
2. The Type Approval covers hardware and software listed under Product description.
3. The Type Approval is valid for systems made by production facilities stated under Manufactured by.

Product certification:
Battery systems rated equal or larger than 50kWh shall have a product certificate according to DNV Pt.6 Ch.2 Sec.1 Table 4 for each delivery to DNV classed vessels.
For product certification, at least the following documents should be submitted for approval:
- Reference to this type approval certificate;

- Copy of the approved safety description;
- (E120) Technical specification of the battery system that is subject for product certification;
- (E170) Electrical schematic diagram showing the battery packs, strings, modules with switchgears and control gears, dimensions of bus bars as relevant;
- (I030) Project-specific battery system block diagram;
- (I020) Project-specific functional description;
- Information on software versions applicable for the particular delivery;
- (Z252) Test procedure at manufacturer.

Location classes (DNV-CG-0339)

Temperature	Class A*
Humidity	Class B
Vibration	Class A
EMC	Class A
Enclosure	Battery module IP67, PDU IP67, DCB IP65

* Tested for Temperature Class B

Software update notification
When the type approved software is revised (affecting all future deliveries) DNV is to be informed by forwarding updated software version documentation. If the changes are judged to affect functionality for which rule requirements apply a new functional type test may be required and the certificate may have to be renewed to identify the new software version.

Type Approval documentation

Tests carried out
Tests according to DNV-CP-0418, DNV Rules for Ships Pt.6 Ch.2 Sec.1 (ed. July 2023), DNV-CG-0339

Marking of product
Manufacturer name, and battery system type designation

Periodical assessment
Periodical assessment
The scope of the periodical assessment is to verify that the conditions stipulated for the Type approval are complied with and that no alterations are made to the product design or choice of materials.
The main elements of the assessment are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Routine Tests (RT) checked (if not available tests according to RT to be carried out)
- Review of type approval documentation
- Review of possible change in design, materials and performance
- Ensuring traceability between manufacturer's product type marking and Type Approval Certificate.

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

Manufactured by:
ROYPOW Industrial Park, No. 16, Dongsheng South Road, Chenjiang Street, Zhongkai High-Tech District, Huizhou City 516006 Guangdong China