



Certificate no.:
TAE000053H

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Li-Ion Battery System

with type designation(s)
EVE-280K-161 A Battery System

issued to

EVE POWER Co., Ltd.
Jingmen City,, Hubei, China

is found to comply with

DNV rules for classification – Ships, offshore units, and high speed and light craft

Application:

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Location Classes:

Temperatur: D

Humidity: B

Vibration: A

EMC: B

Enclosure: B (Module: IP67; SSC, MSM: IP44)

Issued at **Høvik** on **2025-07-01**

This Certificate is valid until **2030-06-30**.

for **DNV**

DNV local unit: **Wuhan NB & CMC**

Approval Engineer: **Uwe Supke**

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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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to USD 300 000.

Product description

The Battery System is an air or liquid cooled lithium-ion battery energy storage systems for ships and offshore installations. The battery system consists of several battery modules, several SSC and one MSM.

Battery Cell

Battery Type	LFP
Battery Model	LF280K
Nominal Capacity	280 Ah
Nominal Voltage	3.2 V
Charge Cut-off Voltage	3.65 V
Discharge Cutoff Voltage	2.5 V
Standard Charge/Discharge Rate	0.5C (140A)

Battery Module

Product model	EVE-B2-1P18S-11
Cell Arrangement	1P18S
Nominal Capacity	280 Ah
Nominal Voltage	57.6 V
Voltage Range	45 to 65.7 V
Nominal Energy	16.128 kWh
Continuous current	0.5C (140A)
Peak Charge/Discharge Rate	1C (280A)
Cooling	liquid
Weight	125 ± 5 kg
IP Rating	IP67

Power distribution unit: SSC (Single string controller)

Product model	EVE SSC-945V280A
IP Rating	IP44

MSM (Multi string manager)

Product model	EVE MSM-945V1400A
IP Rating	IP44

Battery String

Max No. of modules:	15
Max Voltage:	945 V
Nominal Voltage:	864 V
Max Energy:	241.9 kWh

Battery system

Max No. of strings:	8
Max Voltage:	945 V
Nominal Voltage:	864 V
Max Energy:	1935.4 kWh

Single string configuration:

Number of series battery modules	Nominal Voltage (V)	Ceiling Voltage (V)	Nominal Energy (kWh)
2	115.2	126	32.3
3	172.8	189	48.4
4	230.4	252	64.5
5	288	315	80.6
6	345.6	378	96.8
7	403.2	441	112.9
8	460.8	504	129.0
9	518.4	567	145.2
10	576	630	161.3
11	633.6	693	177.4
12	691.2	756	193.5
13	748.8	819	209.7
14	806.4	882	225.8
15	864	945	241.9

Multiple string configuration

	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S	12S	13S	14S	15S	
	126V	189V	252V	315V	378V	441V	504V	567V	630V	693V	756V	819V	882V	945V	
1P	32.3	48.4	64.5	80.6	96.8	112.9	129.0	145.2	161.3	177.4	193.5	209.7	225.8	241.9	kWh
2P	64.5	96.8	129.0	161.3	193.6	225.8	258.1	290.3	322.6	354.8	387.1	419.3	451.6	483.8	kWh
3P	96.8	145.2	193.6	241.9	290.3	338.7	387.1	435.5	483.8	532.2	580.6	629.0	677.4	725.8	kWh
4P	129.0	193.5	258.0	322.6	387.1	451.6	516.1	580.6	645.1	709.6	774.1	838.7	903.2	967.7	kWh
5P	161.3	241.9	322.6	403.2	483.8	564.5	645.1	725.8	806.4	887.0	967.7	1048.3	1129.0	1209.6	kWh
6P	193.5	290.3	387.0	483.8	580.6	677.4	774.1	870.9	967.7	1064.5	1161.2	1258.0	1354.8	1451.5	kWh
7P	225.8	338.7	451.6	564.5	677.4	790.3	903.2	1016.1	1129.0	1241.9	1354.8	1467.7	1580.5	1693.4	kWh
8P	258.0	387.1	516.1	645.1	774.1	903.2	1032.2	1161.2	1290.2	1419.3	1548.3	1677.3	1806.3	1935.4	kWh

Battery Management system

The functions of the BMS are distributed between the Main Battery Management Unit (MBMU) on Battery system level, Secondary Battery Management Unit (SBMU) on Battery String level and the Battery Management Unit (VCMU) on battery module with independent over-charge protection system as a safety shutdown circuit.

Hardware/ software versions

System Part		BMS Unit		
Item	Product model	Item	Hardware Version	Software Version
Battery module	EVE-B2-1P18S-11	Acquisition board (VCMU)	V3.0	xxxxxx15XV024Xzzz
		Redundant board (VCMU)	V3.0	xxxxxx15XV024Rzzz
SSC	EVE SSC-945V280A	SBMU	V3.3	xxxxxxFyyyS15Szzz
		Control panel (VCMU)	V3.0	xxxxxx15XV024Czzz
MSM	EVE MSM-945V1400A	MBMU	V3.3	xxxxxxFyyyS15Mzzz
		Display screen	DCP-1000M	xxxxxxFyyyS15H07Vzzz

xxxxxx: represents the corresponding project number.
yyy: the number of cells in series in a battery string.
zzz(zzzz): represents the version number.

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.

Location Classes (DNV-CGG-0339)

Temperature	Class D
Humidity	Class B
Vibration	Class A
EMC	Class B
Enclosure	Class B (Module: IP67; SSC, MSM: IP44)

Name and place of manufacturer

EVE POWER Co., Ltd.

Address: No. 68 Jingnan Avenue, Duodao High-tech District, Jingmen City, Hubei Province, China

Application/Limitation

1. The Type Approval covers hardware and software listed under Product description.
2. The Type Approval is valid for systems made by production facilities, listed under 'Name and place of manufacture'.
3. When installed on a DNV classed ship or offshore unit, the DNV class rules for battery installation must be followed (DNV Pt.6 Ch.2 Sec.1)
4. The piping system venting the exhaust gases from the rack to open air/safe location shall be verified onboard in each case. Requirements in DNV Rules Pt.6 Ch.2 Sec.1 shall be fulfilled.)

Product certification:

Each delivery of the application system to be certified according to DNV Pt.6 Ch.2 Sec.1. This includes factory acceptance test to be performed at the manufacturer before the system is delivered to the yard.

For each delivery to DNV class the following documentation of the battery system is to be submitted for approval:

- Reference to this type approval certificate
- Copy of the Safety description
- (E120) Technical specification of the battery system that is subject for product certification
- (E170) Electric schematic diagram of the battery system showing internal arrangement of battery modules, battery strings, including switch gear and control gear
- (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

Type Approval documentation

Tests carried out

Type tests according to applicable DNV rules and standards as listed below have been carried out.

DNV-CP-0418, DNV RU SHIP Pt.6 Ch.2 Sec.1 (2024-07) and DNV-CG-0339, IEC 62619 and IEC 62620

Propagation testing acc. DNV-RU-SHIP Pt.6 Ch.2 Sec.1 [4.13.2] (opt.1: no propagation between cells)

Marking of product

Manufacturer name, battery system type designation with serial number.

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.

END OF CERTIFICATE