



Certificate no.:
TAE0000571

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Li-Ion Battery System

with type designation(s)
RS-J317AF-001, RS-J317LF-001 Battery System

issued to
Shenzhen Racern Technology Co., Ltd.
Shenzhen, China

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

Application:

Product approved by this certificate is accepted for installation on all vessels classed by DNV following DNV Rules of July 2025

Issued at **Høvik** on **2026-02-13**

This Certificate is valid until **2031-02-12**.

for **DNV**

DNV local unit: **China South NB**

Approval Engineer: **Uwe Supke**

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 RS-J317AF-001/RS-J317LF-001 Battery Systems are the air cooling/liquid cooling lithium-ion battery energy storage systems (ESS) for battery-powered or hybrid ships and offshore installations. The system consists of Battery Module Box (BMBOX), Battery String Box (BSBOX), Battery Array Box (BABOX). Multiple BMBOXs connected in series to form a battery string, with a maximum of 14 BMBOXs, with a maximum rated voltage of 1081.92V and a maximum capacity of 343kWh.

Each battery string consists of BMBOXs, a BSBOX and connecting cables, with charging and discharging control of the battery pack and its own protection function. Each BMBOX contains a module acquisition system which monitors and communicates voltage, temperature, and diagnostic information to the BSBOX. The BSBOX contains a string controls system which can disconnect the battery string from the DC bus and communicates with the BABOX. 1 to 6 battery strings are connected to form a battery array, with a maximum capacity of 2058kWh. The battery array is controlled by a BABOX. BABOX communicates with the BSBOXs, and external systems. BABOX includes an HMI that allows engineers to view relevant data of the battery system, set parameters, and perform some local control.

The BMBOX, BSBOX, BABOX and all other components are housed within a dedicated racking systems which provides: all module and string electrical interconnection, string communication, module cooling, fire suppression unit, and an integrated thermal runaway exhaust duct.

Battery Cell

Cell Type	Lithium iron phosphate (LFP)
Cell Manufacturer	CATL
Cell Model	CBC10
Rated Capacity	317Ah
Nominal Voltage	3.22V
Operating Voltage Range	2.5V~3.65V
Rated storage energy	1020.74Wh
Maximum Continuous Charge/Discharge Rate	1C

Battery Cell Block

Cell Block Manufacture	CATL
Cell Block Model	LFP317Ah_1P8S
Nominal Capacity	317Ah
Combination Method	1P8S
Nominal Voltage	25.76V
Operating Voltage Range	20V~29.2V
Nominal Energy	8.165kWh

BMBOX

Module Model	RS-317AF-24-001	RS-317LF-24-001
Cell Arrangement	1P24S	1P24S
Rated Capacity	317Ah	317Ah
Nominal Voltage	77.28V	77.28V
Voltage Range	60 to 87.6V	60 to 87.6V
Energy	24.50kWh	24.50kWh
Maximum Continuous Charge/Discharge Current	200A(0.63C)	300A(0.95C)
Cooling	Rack air cooling	Liquid cooling
IP rating	IP67	IP67

BSBOX

Model	RS-BS-D-001
Control Power	24VDC
Max Battery String Voltage	1226.4V
Max Current	400A@1500V
Short Circuit Breaking Capability	180kA
IP rating	IP67

BABOX

Model	RS-BA-D-001
Control Power	Dual Power Supply: One 220VAC converted to 24VDC, another 24VDC
HMI	10.1" touch panel LCD
Mass Storage	512 MB
Remote Emergency Stop Function	Yes
Local Emergency Stop Button	Yes, on Enclosure
Fire Solenoid Valve Control	Yes
Fire Cylinder Solenoid Valve Control	Yes
Max No. of strings	6
IP rating	IP44

Single Battery String Battery System

Max No. of modules: 14
Max Voltage: 1226.4V
Voltage Rating: 1081.92V
Max Energy: 342.99kWh

Single Battery Array Battery System

Max No. of strings: 6
Max Voltage: 1226.4V
Voltage Rating: 1081.92V
Max Energy: 2057.94kWh

Battery Management system

The functions of the BMS are distributed between BMBOX, BSBOX and BABOX, with independent over-temperature monitoring as a safety shutdown circuit.

BCU (Battery Collection Unit) and ITMU (Independent Temperature Monitoring Unit) are installed in the BMBOX.

BCU picks up the voltage & temperature of battery cells and the smoke alarm signal.

ITMU (Independent Temperature Monitoring Unit) picks up over-temperature signal and controls fire valves.

BSMU (Battery String Management Unit) and ITPU are installed in the BSBOX. BSMU communicates with the BCU to read the voltage and temperature data collected by the BCU. The ITPU receives the ITMU over-temperature protection signal within the BMBOX on a separate line.

BAMU (Battery Array Management Unit), EMU (Emergency Stop Management Unit) and HMI are installed in the BABOX. BABOX communicates with BSBOX, HMI and EMS. EMU for system emergency stop management. HMI allows engineers to view relevant data of the battery system, set parameters, and perform some local control.

BMBOX (Battery Module Box)

Part Number: RS-317AF-24-001; RS-317LF-24-001
BCU Hardware Version: ARS-BCU-LT123
BCU Software Version: 10XXX
ITMU Hardware Version: ARS-ITMU-EX161
ITMU Software Version: 11XXX
SDU Hardware Version: ARS-SDU-DG1
SDU Software Version: 12XXX

BSBOX (Battery String Box)

Part Number: RS-BS-D-001
BSMU Hardware Version: ARS-BSMU-DG1
BSMU Software Version: 20XXX
ITPU Hardware Version: ARS-ITPU-DG1
ITPU Software Version: 21XXX

BABOX (Battery Array Box)

Part Number: RS-BA-D-001
BAMU Hardware Version: ARS-BAMU-DG1
BAMU Software Version: 30XXX
EMU Hardware Version: ARS-EMU-DG1
EMU Software Version: 31XXX
HMI Model: X2-PRO-10-B2
HMI Software Version: RS-20XXXXXX-VX.X

*Software change management is described in Software change handling procedure No. R250320013.V1.0

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-CG-0339)

Temperature	Class B
Humidity	Class B
Vibration	Class A
EMC	Class A
Enclosure	Class B (BMBOX: IP67, BSBOX: IP67, BABOX: IP44)

Name and place of manufacturer

Shenzhen Racern Technology Co., Ltd.

Production Base: Hunan Racern Technology Co., Ltd., Yueyang city, Hunan 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

Type Test Report at CVC: R250320020 2026-01-15

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

The products to be marked with:

- manufacturer name
- model name
- serial number
- power supply ratings

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 changes 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