Certificate no.:
TAE00004T6

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Li-Ion Battery System

with type designation(s)
NMP PowerStack

issued to
Nordic Marine Power AS
Trondheim, **Norway**

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.

Issued at **Høvik** on **2026-02-20**
This Certificate is valid until **2031-02-19**.
DNV local unit: **East & South Norway CMC**

Approval Engineer: **Trond Kleivi Sjåvåg**

for **DNV**

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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 NMP PowerStack is an air-cooled Lithium Iron Phosphate battery-based energy storage system (ESS) for use in battery power or hybrid vessels and offshore units. Battery modules are racked together with a Power Distribution Unit (PDU) to form a string. The strings communicate with a Battery Management System (BMS) located in an Automation cabinet.

Parameter	
Cell chemistry	Lithium Iron Phosphate (LFP)
Cooling	Forced air
Capacity per module	8.9 kWh
Short circuit current min / max	3946 A / 5333A
Max number of modules per string	20
Battery capacity per string	179 kWh (with 20 modules)
Voltage range per string	928 VDC – 1108VDC (with 20 modules)
Maximum charging voltage	1152 VDC (with 20 modules)
C-rate	1C = 175 A
Standard disch. / charge	1C
Max cont. disch. / charge	1.4C (temperature dependent)
Emergency peak disch. / charge	2C (15 min, 10 times / year)
Communication interface	Modbus TCP

Software versions:
String controller: 1.0.1
BMS Controller: 1.1.0

Up to 20 battery modules can be connected in series to form a battery string and achieve the required system voltage. For each string there is a PDU. The PDU contains switchgear and control gear for operation and safety of the string. Multiple strings can be connected in parallel to increase the capacity and power of the system.

Internally in the modules, data from each cell is collected wirelessly. String Controllers (SC) communicates with the modules through coaxial cables. There is one String Controller per string. There is one BMS per ESS. The SCs and the BMS communicate through an ethernet network connected in ring topology. Each SC operates independently of the BMS, except from receiving connect and disconnect commands. Connection to the Energy Management System is via Modbus through a network switch. Connect / disconnect commands come either remotely via the Modbus interface, or locally via buttons on the ESS automation cabinet doors.

The battery modules are designed as a stacking system which includes ducting for forced air cooling. It also includes dedicated ducting for off-gas in case of a thermal runaway event.

The battery module meets the DNV-RU-SHIP Pt.6 Ch.2 Sec.1 [4.4.1] design option #1, no cell-to-cell propagation.

Location Classes

Temperature Class B
Humidity Class A
Vibration Class A
EMC Class A
Ingress Protection IP65

Application/Limitation

Integrator manual gives important information related to e.g. connection of cooling air supply, off-gas duct, fuse etc and is to be observed.

Product certification:
A DNV Product Certificate according to DNV Pt.6 Ch.2 Sec.1 Table 2 is required for each delivery to a DNV classed vessel.
The following documents shall be submitted for approval:
- Reference to this Type Approval Certificate
- Copy of the approved Safety Description and Safety Philosophy

- (E120) Technical specification of the battery system that is subject for product certification
- (I030) Project-specific Battery System Block Diagram
- (I020) Project-specific functional description
- (I110) Project specific list of controlled and monitored points, as submitted to other top systems, or displayed on delivered HMI (as applicable)
- Information on software versions applicable for the specific delivery
- (Z252) Test procedure at manufacturer

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-CG-0339

Marking of product
Manufacturer name and battery system type designation

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:
Nordic Marine Power AS
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