

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Li-Ion Battery System**

with type designation(s)

SuperB Nomada 12V105Ah Battery System

Issued to

**Super B Lithium Power B.V.
Hengelo Ov, Netherlands**

is found to comply with

DNV GL 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 GL.**Issued at **Høvik** on **2021-02-22**This Certificate is valid until **2026-02-21**.DNV GL local station: **Netherlands CMC**for **DNV GL**Approval Engineer: **Hanwee Low**

**Marta Alonso Pontes
Head of Section**

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 GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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 300,000 USD.



Name and place of manufacture

Super B Lithium Power B.V.
Demmersweg 3, 7556 BN Hengelo
The Netherlands

Product description

Air cooled Lithium-ion battery-based electrical energy storage (EES) for use in battery-powered or hybrid vessels and off-shore units.

The battery system is designed according to design option 1, (no thermal runaway propagation between cells within a module).

The battery system is designed to ventilate possible off-gas directly to the EES space.

The EES system consists of one variant battery module, Nomada 12V105Ah, and one variant of master Battery management system (BMS), SB-BCI-C1. A battery pack/string consists of one master BMS which is connected to a maximum of 69 battery modules in series, where each battery module has an integrated module level BMS.

Module including cells and control circuits

Type:	Nomada 12V105Ah
Chemistry:	Lithium Iron Phosphate (LFP)
Number of cells:	4
Cell configuration:	4S1P
Max Voltage:	1000 V
Min Voltage:	12 V
Capacity:	105 Ah
Energy:	1.33 kWh
Cooling:	Natural ventilation

Battery Management System (BMS)

Type:	SB-BCI-C1
Max No. of modules:	69 in series for maximum charge voltage of 1000 VDC
Max load voltage:	883 Vdc
Max load current:	315 A

Application/Limitation

1. When installed on a DNVGL classed ship or offshore unit, the DNV GL class rules for battery installation must be followed (DNV GL 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 listed under Place of Manufacture
4. The Type Approval does not include the full functionality of the independent overcharge protection as required in battery rules Pt.6 Ch.2 Sec.1 [4.1.5.2]. Independent temperature sensors are included, and interface to these is provided. However, monitoring of those sensors, logical handling of the measurements and disconnection of the battery system is the responsibility of the system integrator. This will thus be part of a separate system which is to be documented and approved case-by-case.
5. The Type Approval covers the circuit design of main switch disconnect. The hardware installation is not covered by this type approval and shall be installed in accordance to the approved circuit design.
6. As the SOH calculations are based on cycles only, the potential inaccuracy of this must be compensated by the EMS (Energy Management System) by adding an extra safety margin. This applies whenever the batteries are used for main propulsion or DP under Battery (Power) notation.

Product certification:

Battery systems rated equal or larger than 50kWh shall have a product certificate according to DNV GL Pt.6 Ch.2 Sec.1 Table 4 for each delivery to DNV GL classed vessels.

For product certification, at least the following documents should be submitted for approval:

- Reference to this type approval certificate
- Documentation for compliance with item no.4, 5 and 6 in Application/Limitation above

Job Id: **262.1-032512-1**
Certificate No: **TAE0000476**

- Copy of the approved Safety description
- (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
- Information on software versions applicable for the particular delivery
- (Z252) Test procedure at manufacturer

Location classes (DNVGL-CG-0339)

Temperature	Class B
Humidity	Class B
Vibration	Class A
EMC	Class A
Enclosure	IP65

Type Approval documentation

Tests carried out

Tests according to DNVGL-CP-0418 (July 2020) and DNVGL-CG-0339 (December 2019).

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.

END OF CERTIFICATE