Certificate No: LR26118340TA
Issue Date: 24/03/2026
Expiry Date: 23/03/2031

Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested with satisfactory results in accordance with the relevant requirements of the Lloyd's Register Type Approval System.

Manufacturer	**Hanwha Aerospace Co., Ltd.**
Address	6 Pangyo-ro 319beon-gil, Bundang-gu Seongnam-si, Gyeonggi-do, 13488, South Korea
Place of Production	JIWOO ELECTRONICS CO., LTD 110-1 Gyesan-Ro, Gyeyang-Gu, Incheon, 21086, South Korea
Place of Production	VALEO KAPEC CO., LTD 113, Hosandong-ro, Dalseo-gu, Daegu, 42709, South Korea
Type	Lithium-Ion Battery System
Description	SEAL Energy Lithium Ion Battery System is consists of SPUs (System Protection Unit), BPUs (Battery Protection Unit) and Battery Modules. Main SPU (System Protection Unit) is a communication and interface unit for multi-parallel battery strings, managing 1 to 5 BPUs and interfacing with parent systems including EMS and PMS etc. Sub SPU is an interface unit for managing 6-11 BPUs. BPU(Battery Protection Unit) is control and safety unit of a battery string including BMS, control switchgears (e.g. power contactors) and fuses. It is used with one of two options based on the system operation current. Normal BPU : Max. 400A, Low C-rate BPU : Max. 200A. 1 string is consists of maximum 11 Battery modules. Battery Module is consists of 2P24S pouch cells. Cell to cell propagation prevention. The interior contains 4 temperature sensors, 24 voltage sensors on each of the two cell monitoring boards and a safety busbar

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and cooled by immersed liquid solution.

Trade Name	SEAL Energy Lithium Ion Battery System
Application	Marine applications for use in environmental categories ENV2 and ENV3 in the "General Power Distribution Zones" as defined in LR Type Approval System Test Specification No. 1-2024 where the Test Specification is satisfactory for the intended operation.
Specified Standard	LR Type Approval System Test Specification No. 1 (July 2024) LR Type Approval System Test Specification No. 5 (March 2019)
Ratings	Cell designation (IEC62620): INP9.7/355/101/M/-30+60/80 (Pouch Cell) Cell capacity: 60.3 Ah, 224 Wh, 3.66 V (Min 2.5 V, Max 4.2 V) Module designation (IEC62620): INP656/434/195/[2P24S]M/-20+55/80 Module capacity: 120.6 Ah, 10.75 kWh Maximum ambient operating temperature: 55 °C Automatic shutdown cell temperature limit: Max ≥ 59 °C, Min ≤ -29 °C Module operating voltage range: 87.8V (Min 60 V, Max 99.7 V) Cell shutdown voltage limits: Max ≥ 4.195 V, Min ≤ 2.3 V Module shutdown voltage limits: 2P24S Max ≥ 100.68 V, Min ≤ 55.2 V Continuous charge rate; 0.5C (60.3A) peak: 2.75C (331.65A) Continuous discharge rate: 1.0C (120.6A) peak: 2.75C (331.65A) Peak bolted short circuit current: Battery String BOL(beginning of life) 10.5 kA Equipment ingress protection rating: IP56 Gas volume generated (calculated per module): 84L per a battery cell Gas Temperature Classification and Division/Zone Group: T2 and IIC Battery System: Maximum 11 Strings (1.3 MWh) SPU input voltage: 24 VDC SPU interface: Communication 2 x Ethernet

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External I/O 2xCAN (SPU to BPU), 2 x RS-232/485 (SPU to external device, optional), Hardwired I/O 1 x emergency stop, 2 x Digital I/O (SPU to external device, optional)
BPU: Maximum 11 battery modules (115 KWh)
BPU input voltage: 24 VDC
BPU Interface: Communication 2 x CAN (BPU to SPU),External I/O 2 x isoSPI (BPU to Battery Module)

Other Conditions

1. For vessels classed with Lloyd's Register, lithium-ion battery system shall comply with all applicable Lloyd's Register Rules and Regulations relevant to the specific projects. Demonstration of compliance shall be provided as part of the project approval process.
2. Detailed arrangements related to thermal dielectric fluid leakage and integrated off-gas management including detection, containment, and ventilation measures shall be addressed and verified on a project basis to ensure compliance with applicable Lloyd's Register Rules and Regulations.
3. Type approval does not eliminate the need for normal inspection and survey procedures required by the Rules and Regulations.
4. If the specified standards are amended during the validity of this certificate, the product is to be re-approved prior to it being supplied to vessels to which the amended standards apply.
5. (In case of applications other than marine) The application of the type approval certificate will be limited to the relevant scope of the specified standard and acceptance thereof by the local authorities.

This certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register Asia of any modification or changes to the equipment in order to obtain a valid Certificate.

The Design Appraisal Document LR26118340TA and its supplementary Type Approval Terms and Conditions form part of this Certificate.

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