



Certificate no.:
TAA00003R3

TYPE APPROVAL CERTIFICATE

This is to certify:

that the **Control and Monitoring System**

with type designation(s)
Battery Management System

issued to

AYK ENERGY Ltd.
Andorra La Vella, Andorra, Andorra

is found to comply with

DNV rules for classification – Ships Pt.6 Ch.5 Sec.21 Cyber security

Application:

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV. This type approval covers security capabilities for DNV Cyber security profile level 1 (SP1) and IACS UR E27, subject to conditions stated in this certificate.

Issued at **Høvik** on **2025-09-03**

This Certificate is valid until **2027-09-02**.

for **DNV**

DNV local unit: **Area NB/CMC Iberia**

Approval Engineer: **Mirza Muqadam Baig**

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 AYK's approved Battery Management System (BMS) with the DNV-RU-SHIP Pt.6 Ch.5 Section 21 Cyber security - Security Profile 1 (SP1) is a combination of hardware, software and proprietary protocols. The main components of this system are the Single Board Computer (SBC), the Single String Controller (SSC), the battery modules and a remote interface for onshore support and diagnostics. This system is designed to ensure the safe operation, monitoring, and control of battery modules and strings. The BMS interfaces with an external third-party Energy Management System (EMS) or Power Control System (PCS) with a dedicated channel to enable coordinated energy distribution.

The functionality of the BMS system is covered by another type approval certificate **TAE000048S**.

The following table enlists main hardware comprising the system that has been type approved:

No.	Component Description	Manufacturer	Type Designation	OS/Software
1.	Network Firewall & Router	Mikrotik	hAP	Refer to the approved F071 Inventory list – Document 2417 AYK F071 Inventory List (Cyber Security) Rev 1
2.	Network Switch	TP-Link	TL-SF1008 Industrial Grade	
3.	HMI	TouchTink	TSD TCP133-M2 Resistive Touch	
4.	Single String Controller (SSC)	AYK	N/A	
5.	Single Board Computer (SBC)	Aaeon	Mini-ITX APL1	

Approval conditions

Each type approved system intended for DNV classed vessels shall be delivered with a vessel-specific Product certificate (PC). The Product certificate shall confirm compliance with applicable DNV rules for the project and shall be issued based on approval of design documents and certification survey with testing as specified in DNV-RU-SHIP Pt.4 Ch.9.

For newbuilding projects, design documents for identical deliveries to sister vessels with the same DNV project ID shall be submitted for approval in one common document transmittal. Certification survey and testing is required for each delivery. See [8.3.1.1] – specify the PC-process in Pt.4 Ch.9

When the type approved system is delivered to a vessel with class notation Cyber secure(Essential), the following additional verification applies as per DNV-RU-SHIP Pt.6 Ch.5 Sec.21:

1. It shall be demonstrated that the architecture of each delivery is documented in a project-specific system topology F030 and that this is consistent with type approved document.
2. It shall be demonstrated that each delivery is correctly represented by a vessel-specific asset inventory (F071) and that this inventory is consistent with type approved document.
3. It shall be demonstrated by a declaration or test report (Z261) that each delivery has been configured and hardened as per the type approved document. Certification testing of cyber security capabilities is not required if the delivery is fully covered by this TA certificate.

If a delivered system differs from the type approved system, this shall be described and submitted for assessment.

Application/Limitation

The following conditions shall be satisfied when the system is installed and used on a vessel where the class notation Cyber secure(Essential) applies:

- The type approved products shall be installed in restricted areas. Access to the components shall be restricted and controlled.
- The type approved products shall be installed with the included firewall controlling all external communication.
- The type approved products shall only be connected to networks or systems explicitly illustrated in the approved system topology and shall not interface with any untrusted networks or systems outside of this scope.

Tests carried out

Tested in accordance with requirements for DNV rules Pt.6 Ch.5 Sec.21 security profile 1, edition July 2024 as per the supplier's F252 document. Relevant manuals and instructions of AYK's management system have been verified for compliance with DNV-RU-SHIP Pt.6 Ch.5 Sec.21 [3.3].

Marking of product

- Hardware devices are marked with product name and type as listed in 'Product description' above
- Software version(s) can be seen via each product's management interface

Renewal assessment

A renewal assessment will be performed at renewal of the certificate.

The scope of the renewal assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software version, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate
- Review documented evidence of adherence to Secure Development Lifecycle processes.

Manufactured by

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