



Certificate no.:
TAE00004XZ

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Fuel Cell

with type designation(s)
Pelican Fuel Cell System

issued to

Corvus Energy Fuel Cell AS
Nesttun, Norway

is found to comply with

DNV rules for classification – Ships Pt.6 Ch.2 Sec.3 Fuel cell installations – FC

Application:

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Issued at **Hamburg** on **2024-08-23**

This Certificate is valid until **2029-08-22**.

for **DNV**

DNV local unit: **Mid-North Norway CMC**

Approval Engineer: **Lukas Ritt**

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 300,000 USD.



Form code: TA 251

Revision: 2023-09

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Product description

The Pelican Fuel Cell System (FCS) is a modularized maritime PEM-based system able to supply 340 kW of electrical power. It comprises four Toyota 85 kW FC modules which are installed into gas tight, explosion proof enclosures that are inerted with nitrogen. The Pelican FCS incorporates a management system designed to ensure safe and efficient operation. All functions directly related to safety is segregated from functions used for control and monitoring of the process.

The arrangement that follows the inherently gas safe principle with double barriers combined with effective detection and automatic actions, ensures that the installation room into which the Pelican FCS is installed can be considered a non-hazardous space with regards to explosive atmospheres.

Supplementary to internal hydrogen detectors, the Pelican Fuel Cell System is equipped with hydrogen detectors and an oxygen detector in the auxiliary space.

This type approval covers the whole cabinet, called Pelican Fuel Cell System, with the interfaces as described below.

System Data

Control System Hardware and Software Version

Software 1.Y.Z (where Y and Z represents Minor Version and Bugfix)
Firmware DNV approved LTS versions from 2023.0 and later (Phoenix Contact)

Safety System Hardware and Software Version

Software 3.Y.Z
Firmware DNV approved LTS versions from 2023.0 and later (Phoenix Contact)

Independent Safety triggered by

Hydrogen supply pressure dp/dt LL (pressure drop)
Hydrogen supply pressure HH
Pressure enclosure LL
Pressure enclosure HH
Hydrogen detection enclosure HH
Oxygen detection enclosure HH
Temperature enclosure HH
Liquid detection enclosure
Hydrogen detection cabinet HH
Process water level LL in water lock

Interfaces to vessel

Double walled hydrogen supply
Process air supply
Compressed air supply
Cooling water in/out
Exhaust outlet
Process water outlet
Inert gas vent
230 VAC power supply, normal and UPS
400 – 750 VDC output
Energy/power management system
Ship safety system

Application/Limitation

The Pelican Fuel Cell System with 340 kW is approved for application as per DNV-RU-SHIP Pt.6 Ch.2 Sec.3.

Each application shall be approved on a case-by-case basis to cover the safety aspects as specified in the outstanding documents:

- 99090-00158 Maintenance manual
- 99090-00157 Operation Manual
- 99090-00186 Taglist
- Documentation of the arrangement for H2 detection in internal expansion tanks

As a common practice, an EMC analysis and plan according to IEC 60533 Annex B and/or IEC 61800-3 Annex E shall be executed onboard:

- Radiated emissions 0.15 – 30 MHz (enclosure)

For the installation onboard it has to be ensured that the following conducted emissions will not have any detrimental impact:

- AC 10 kHz – 30 MHz (Auxiliary power)
- DC 10 kHz – 30 MHz (DC power)

Fuel cell installation room

The fuel cell space is not equipped with A60 insulation and is not equipped with a fire extinguishing system as indicated in MSC.1/Circ. 1647 para 3.1.2 and 3.3.1. Therefore, the requirements for the fuel cell installation room shall be defined in the detailed design phase for the vessel and accepted by the Administration. The fuel cell installation room is regarded as non-hazardous space with regards to explosive gas atmospheres. However, due to the production of nitrogen inside the pack, six (6) air changes per hours are required.

Approval Conditions

For each delivery to DNV class the following documentation of the fuel cell power installation is to be submitted for approval:

- Reference to this type approval certificate
- DNV RU-SHIP, Pt. 6 Ch. 2 Sec. 3, table 3: Documents listed under 'Fuel cell power installation'
- 99090-00031 Integrator manual
- 99090-00034 Ship designers guide
- G060 Fixed fire protection drawing
- G200 Structural fire protection drawing

The Type Approval covers hardware and software listed under product description.

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.

Product certificate

Each delivery of the application system is to be certified according to Pt.6, Ch.2, Sec. 3. The certification test is to be performed at the manufacturer of the application system before the system is shipped to the yard. After certification, the clause for application software control will be put into force.

Application software control

All changes in software are to be recorded as long as the system is in use on board. Documentation of major changes are to be forwarded to DNV for evaluation and approval before implemented on board.

Type Approval documentation

Tests carried out

Marking of product



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The product is to be marked with the manufacturer's name or trademark, the fuel cell system's model designation, the serial number, voltage level, and the output rating [kw].

Periodical assessment

For retention of the Type Approval, a periodical assessment as per DNV-CP-0338 Sec.4 shall be performed by a DNV Surveyor in order to verify that the conditions for the Type Approval are complied with.

To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>.

END OF CERTIFICATE