Certificate no.:
TAA00003MM

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Loading and unloading arrangement

with type designation(s)
Bow Loading System

issued to
MacGregor Norway AS
Arendal, **Norway**

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.
The Type Approval covers security capabilities in accordance with DNV security profile 1 and IACS UR E27 Rev.1, subject to conditions stated in this certificate.

Issued at **Høvik** on **2025-07-10**
This Certificate is valid until **2027-07-09**.
DNV local unit: **West Norway CMC**

Approval Engineer: **Pål Børre Kristoffersen**

for **DNV**

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.

Product description

This Type Approval consists of the following systems:

Product name: 4th and 5th Generation Bow Loading System

Product function:
The purpose of the bow loading arrangement is to handle crude oil transfer hoses from:
1) A submerged Offshore Loading System (OLS or SAL) at a rate of 9000 m3/h.
2) An Articulated Loading Platform (ALP).
3) Other vessels like Storage Vessel and Production/Storage vessel.

The system is able to handle axial loads up to 100 tonnes in the incoming riser/hose angle. The crude oil coupler does not transfer bending moments in the riser or hose and an accurate tension measuring system is arranged. Mooring system is designed with SWL 500 tonnes.

To cover the different loading systems, the bow coupler can rotate 35° in each direction without limitation around the ship's longitudinal horizontal axis, 60° outwards and 40° inwards (stowed position) from the ship's transversal horizontal axis.

The difference between the 4th and 5th generation Bow Loading System is that 5th generation have more digital IO ports.

Application/Limitation

This type approval covers cyber security capabilities at security profile 1 for the systems listed in Product description.

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. Ref “Network topology and Component Layout Rev A”.

The Type Approved include systems for remote maintenance.

If the type approved product is used in applications subject to cyber security requirements by DNV rules for classification, correct configuration shall be verified by DNV.

Major changes affecting the type approved security capabilities shall be informed to DNV. Such modifications may require witnessing of type testing and update of this type approval certificate to reflect new products or versions listed in Product description.

Tests carried out

Tested in accordance with requirements for DNV rules Pt.6 Ch.5 Sec.21 security profile 1, edition July 2024. Relevant manuals and instructions of MacGregor’s management system have been verified for compliance with IACS UR E27 chapter 5.

Marking of product

The product shall be marked with:

- manufacturer name
- model name
- serial number
- power supply ratings

Periodical assessment

The scope of the periodical 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 versions, 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

Periodical assessment is to be performed at renewal of this certificate.

END OF CERTIFICATE