Certificate no.:
TAP00002TY

TYPE APPROVAL DESIGN CERTIFICATE

This is to certify:

that the Wind assisted propulsion system

with type designation(s)
Hyundai Heavy Industries Co., Ltd. 5m x 30m "Hi-Rotor" rotor sail

issued to
HD Hyundai Heavy Industries Co., Ltd.
1000, **Bangeojinsunhwan-doro, Dong-gu, Ulsan, Republic of Korea**

is found to comply with
DNV standard DNV-ST-0511 – Wind assisted propulsion systems

Application:

Design Assessment of:
Wind assisted Propulsion System for installation on ships not purely relying on the additional thrust generated by those, being able to safely navigate with them in operation and also without them contributing, in all possible operational and environmental situations, as outlined and limited on page 2 of this certificate and in the design documentation.

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

Issued at **Høvik** on **2023-12-20**
This Certificate is valid until **2028-12-19**.
DNV local unit: **AC Europe PMA**

for **DNV**

Approval Engineer: **Hasso Hoffmeister**

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.

Product description

Rotor sail 5m x 30m Wind assisted propulsion system with fixed foundation.

Application

General:
"Hi-Rotor" rotor sail 5m x 30m with fixed foundation underwent a **design assessment** according to DNV-CG-0550, Sec.3 [3.2.1].
The Type Approval Design Certificate is valid for the type and version described and the conditions defined in the design documentation.

Structural parameters:
The design of the "Hi-Rotor" rotor sail 5m x 30m has been approved with regards to an installation on ships, including the design loads and environmental conditions as specified in DNV-ST-0511 Wind assisted Propulsion systems, with limitations as set out in the design documentation.

Limitation

This Type Approval covers design(s) only, i.e., the Type Approval Design Certificate is not covering:

- The ship-specific foundation of the rotor sail
- Requirements arising from Classification aspects of the ship on which the rotor sail will be installed on, i.e., type approval of rotor sail associated equipment, materials and others, as laid out in DNV Rules for Classification RU-Ship Pt.6 Ch.2 Sec.12
- Supervision of construction
- Supervision of testing

As such, this Type Approval is not covering the final product but may be used as basis for issuing a product declaration (PD).

Type Approval documentation