TYPE APPROVAL CERTIFICATE

Certificate No:
TAM0000185

This is to certify:

That the Dual Fuel Engine

with type designation(s)
X82DF-1.0

Issued to
Winterthur Gas & Diesel Ltd.
Winterthur, Switzerland

is found to comply with
DNV Rules for classification, Ships - DNV-RU-SHIP-Pt4 Ch3 Sec1
Reciprocating Internal Combustion Engines

Application :

mechanical propulsion (fixed pitch propeller)

Issued at **Hamburg** on **6th August, 2021**
This Certificate is valid until **5th August, 2026**.

DNV local station: **Augsburg**

for **DNV**

Approval Engineer: **Sven Neddenien**

Olaf Drews
Head of Section

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
two stroke, in-line engine, reversible, crosshead, with supercharging, with charge air cooling, constant-pressure charging system, direct injection, injection operation electronically controlled, valve operation electronically controlled, dual fuel

Cylinder bore [mm]	820
Piston stroke [mm]	3375
No. of cylinders	6, 7, 8, 9

Additional place of production
not applicable

Application/Limitation
Rated power [kW/cyl.]	3214
Rated speed [rpm]	62.5
Mean effective pressure [bar]	17.31
Max. firing pressure [bar]	200

The operation in gas mode is limited from 5% to 100% rated power.

Type Approval documentation

Tests carried out
Documentation:

Test report title	Type approval test report WinGD X82DF-1.0
Place of test	China Shipbuilding Industry Corporation Diesel Engine, Qingdao
Date of test	2021-04-12 until 2021-04-16

Test engine:

Model	7X82DF-1.0
Serial no.	CSS043
No. of cylinders	7
Power [kW/cyl.]	3214
Speed [rpm]	62.5

Marking of product
The product to be marked with manufacturer's name or trademark and type number identification.

Periodical assessment
Meetings on regularly basis and at least every second year with the Type Approval applicant (hereof: the Engine Designer) shall be arranged with the objective to verify that the conditions for the Type Approval are not altered since the Type Approval Certificate was issued, and to keep DNV updated with regard to:

- The latest development status and design as covered by the Type Approval certificate.
- Damages and failures of products certified by DNV leading to break down or other malfunctions in service. The causes and reasons for the failure and results from investigations are to be made available to DNV upon request. Failure to inform DNV may lead to suspension of this Type Approval certificate.

In cases where the Type Approved design is manufactured at other companies, DNV shall verify that the Type Approval applicant has a quality control system for consistent production at their licensees/subcontractors.

Other Conditions
1. Engine safety, control and monitoring systems, including sensors and actuators, are not covered by this certificate. Documentation for engine safety, control (including speed governing), and monitoring systems shall be submitted for approval according to DNV Rules Ships Pt.4 Ch.9 Sec.1 Table 5 and/or as listed in relevant Type Approval certificates.
2. The integrated gas pressure regulation (iGPR-5.2) is type approved with the certificate TAM0000187 and accepted for this engine type.

END OF CERTIFICATE