

TYPE APPROVAL CERTIFICATE

Certificate No:
TAM00000ZG**This is to certify:****That the Dual Fuel Engine**with type designation
DE(M)28DF(L)

Issued to

**Daihatsu Diesel Mfg. Co. Ltd Moriyama Division
Shiga Pref. Moriyama, Japan**

is found to comply with

**DNV GL Rules for classification, Ships - DNVGL-RU-SHIP-Pt4 Ch3 Sec1,
Reciprocating Internal Combustion Engines****Application :**

Multi engine plant: mechanical propulsion and auxiliary

Product approved by this certificate is accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **30th June, 2023**.Issued at **Høvik** on **20th November, 2018**DNV GL local station: **Kobe**for **DNV GL**Approval Engineer: **Tage Olav Alexander Strøm**

**Oddvar Deinboll
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.

Product description

Four stroke, in-line engine, non-reversible, trunk-piston, with supercharging, with charge air cooling, pulsating pressure charging system, direct injection, injection operation by cams, injection operation electronically controlled, valve operation by cams, dual fuel

Cylinder bore [mm]	280
Piston stroke [mm]	390
No. of cylinders	6, 8

Application/Limitation

Rated power [kW/cyl.]	288	288
Rated speed [rpm]	720	750
Mean effective pressure [bar]	20	19.2
Max. firing pressure [bar]	140 (tested)	140 (tested)
	177 (design)	177 (design)

Type Approval documentation

Tests carried out

Documentation:

Test report title	Test record of the dual fuel engine at shop trial
Place of test	Moriyama, Japan
Date of test	2014-10-20 until 2014-10-23

Test engine:

Model	6DE(M)28DF
Serial no.	DETN628F1601
No. of cylinders	6
Power [kW/cyl.]	288
Speed [rpm]	720

Marking of product

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

Periodical assessment

For retention of the type approval, a DNV GL surveyor shall perform an assessment after 2 years and after 3.5 years, to verify that the conditions of the type approval are complied with. A renewal assessment will be performed at renewal of the certificate.

In cases where the type approved product is manufactured at other companies, the periodical assessment shall verify that the type approval applicant has a quality control system for consistent production at their licensees/subcontractors. Furthermore, periodical assessment shall be carried out randomly at these companies.

Other Conditions

Electrical equipment installed in the gas valve unit space shall be certified for zone 1 in accordance with Pt.6 Ch.13 Sec.5 A102.

The explosion protection of the gas admission valves does not comply with the hazardous area zone definition of the IGF Code, paragraph 12.5.1 and -2. For installation of engines on ships subject to that Code, proof of suitability for the intended use, either by (a) explosion protection certification, or (b) any other suitable measures in addition to the existing explosion protection level of the valve, shall be documented in the safety concept and approved accordingly. Additional measures (b) are subject to final acceptance by the relevant flag state administration for ships subject to the IGF Code.

Flexible hoses with couplings to be type approved by DNV GL.

Job Id: **262.1-015909-2**
Certificate No: **TAM00000ZG**

Engine safety, control and monitoring systems, including sensors and actuators are not covered by this type approval certificate. Documentation for engine safety, control including speed governing and monitoring systems shall be submitted for approval according to the rules Pt.4 Ch.9 Sec.1 Table 5 - Documentation requirements.

Electric cables and cabling are not covered by this approval and must be verified to comply to the rules Pt.4 Ch.8 - Electrical Installation.

END OF CERTIFICATE