TYPE APPROVAL CERTIFICATE

Certificate No:
TAM00000JM

This is to certify:

That the Diesel Engine

with type designation(s)
V228(D,E,F)

Issued to
GE Transportation Parts, LLC
Erie, PA 16531, United States

is found to comply with
DNV GL Rules for classification "Ships" Pt.4 Ch.3 Sec.1 and "High speed and light craft" Pt.4 Ch.3 Sec.1

Application :

propulsion, multi engine plant / auxiliary

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

This Certificate is valid until **31st October, 2022**.

Issued at **Hamburg** on **01st November, 2017**
DNV GL local station: **New York** for **DNV GL**

Approval Engineer: **Jan Sell**

Burkhard Lilienthal
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.

Job Id: **262.1-001528-6**
Certificate No: **TAM00000JM**

Product description
four stroke, v-engine, non-reversible, trunk-piston, with supercharging, with charge air cooling, constant-pressure charging system, pulsating pressure charging system, direct injection, injection operation electronically controlled, valve operation by cams, liquid fuel

Cylinder bore :	228.6
Piston stroke :	266.7
No. of cylinders :	8, 12, 16

V228D: Designed to meet IMO Tier I emission standard, e.g. 8V228D
V228E: Designed to meet US EPA Tier 2 emission standard, e.g. 8V228E
V228F: Designed to meet IMO Tier II emission standard, e.g. 8V228F

Additional place of production
not applicable

Application/Limitation

Rated power [kW/cyl.]	190.75
Rated speed [rpm]	1050
Mean effective pressure [bar]	19.82
Max. firing pressure [bar]	162
Definition	-

Vibration damper Vibratech TVD (P/N 712955-000, GE drawing no. 41B520563) is approved as part of the engine and is covered by this certificate.

Type Approval documentation

Tests carried out
- Type test carried out 2004-11-03 until 2004-11-12, engine type 7FDM12, engine serial no 308413, 190.75 kW/cyl. @ 1050 rpm
- Type test report 7DFM12 (12V228V) rev.0 dated 2006-11-21 and Thermoscanning Report dated 2007-07-24.

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

Periodical assessment
Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.
The objective of the Periodical Assessment is to verify that the conditions for the Type Approval are not altered since the Type Approval certificate was issued.
In case 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
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 GL Rules Pt.4 Ch.9 Sec.1 Table 5 and/or as listed in relevant Type Approval certificates.
2. Electric cables and cabling are not covered by this certificate and shall be verified to comply with DNV GL Rules Pt.4 Ch.8.
3. This renewal of Type Approval for V228(D,E,F) is based on previous certificates M-12368 and 50733-08HH.

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END OF CERTIFICATE