TYPE APPROVAL CERTIFICATE

Certificate No:
TAM00000EH

This is to certify:

That the Diesel Engine

with type designation(s)
3500E/ C/ B -HD

Issued to
Caterpillar, Inc.
IN Lafayette, United States

is found to comply with
DNV GL Rules for classification, Ships - Pt.4, Ch.3, Sec. 1, Reciprocating Internal Combustion Engines

Application :

propulsion / auxiliary / emergency

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

This Certificate is valid until **2nd February, 2022**.

Issued at **Hamburg** on **3rd February, 2017**
DNV GL local station: **New York** for **DNV GL**

Approval Engineer: **Ralph Michael**

Frank Lutz
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: **262.1-002133-11**
Certificate No: **TAM00000EH**

Product description

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

Cylinder bore :	170
Piston stroke :	215
No. of cylinders :	12, 16

Additional place of production

Caterpillar Tianjin Ltd., Tianjin, China
Caterpillar India Pvt. Ltd. Power Systems Division, Hosur, India

Application/Limitation

Rated power [kW/cyl.]	158.43	137.5	105.67
Rated speed [rpm]	1800	1600	1200
Mean effective pressure [bar]	21.6	21.1	21.65
Max. firing pressure [bar]	-	-	-
Definition	C	C	C

Type Approval documentation

Tests carried out

Documentation:

Test report titel	Type Test Report 3500E HD Marine Engine
Place of test	Caterpillar Inc. Tech Center - Mossville,Test Cell 403, IL
Date of test	2015-12-08 until 2015-12-09

Test engine:

Model	3516
Serial no.	00516103
No. of cylinders	16
Power [kW/cyl.]	158.44
Speed [rpm]	1800

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

Engine safety, control and monitoring systems, including sensors, cables 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 DNV GL Rule Pt.4 Ch.9 Sec.1
.
Capability of redundancy, e.g. connection for service of independant stand-by pump on engine with mechnically driven pump for a single propulsion application is not covered by this type approval certificate.Documentation for an individual ship project shall be submitted for approval according to DNV GL Rule Pt.4 Ch.6 Sec.5 / Item 1-1.1, Pt.4 Ch.1 Sect.3/ Item 2-2.3

.
Capability of final athwartships inclination up to a maximum of 30 degrees for emergency power installation of liquefied gas or chemical tankers is not covered by this type approval certificate. Documentation for an individual ship project shall be submitted for approval according to DNV GL Rule Pt.4 Ch.1 Sec.3/ Item 2-2.2.1
.
The flame resistant hoses with couplings shall DNV GL approved according to DNV GL Rule Pt.4 Ch.6 Sec.9/ Item 4-4.1.3
.
All connections of pipes carrying lubrication oil or fuel oil have to be provide with re-assembly screening connections in piping P > 1.8 bar according to DNV GL Rule Pt.4 Ch.3 Sec.1/ Item 2-2.6

END OF CERTIFICATE