DNV·GL

Certificate No:
TAM000001W

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Diesel Engine

with type designation(s)
3600 Series / C280 Series

Issued to
Caterpillar Inc.
Lafayette IN, United States

is found to comply with
Det Norske Veritas' Rules for Classification of Ships/High Speed and Light Craft
DNV's Offshore Standard DNV-OS-D201 "Electrical Installations", October 2008
DNV's Offshore Service Specification DNV-OSS-201 "Verification for Compliance with Norwegian Shelf Legislation".

Application :

The approval is valid for propulsion, auxiliary and emergency duty. Engine model 3616 (C280-16) and 3612 (C280-12), both with dry sump are approved for emergency duty for Mobile Offshore Unit according to DNV Offshore Standard and NMA 856/87 §11.

Rating **see page 2 for ratings**

This Certificate is valid until **2017-06-30**.

Issued at **Høvik** on **2015-08-21**

for **DNV GL**

DNV GL local station: **New York**

Approval Engineer: **Amir Dzaferi**

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.

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Job Id: **262.1-005620-9**
Certificate No: **TAM000001W**

Product description
Four Stroke Diesel Engine

Cylinder bore: 280 mm
Piston stroke: 300 mm
No. of cyl.: 6 and 8 in-line
12 and 16 in-Vee

Application/Limitation
1. Approval according to Det Norske Veritas' Rules for Classification of Ship:
The approval is valid for propulsion and auxiliary duty based on the following main data:

Engine type:	3600/C280 In-Line	3600/C280 In-Line	3600/C280 Vee-type	3600/C280 Vee-type	C280-16 Vee-type
Application	Aux./prop.	Aux./prop.	Aux./prop.	Aux./prop.	Prop.
Mean effective pressure (bar)	23,4	22,0	25,9	22,0	22,9
Max. cylinder pressure (bar)	173	173	173	173	175
Rated cont. output (kW.cyl)	325	339	358	339	353
Corresponding to (RPM)	900	1000	900	1000	1000

2. Approval according to DNV's Offshore Standard DNV-OS-D101 "Marine and Machinery Systems and Equipment":
The approval is valid for emergency duty onboard mobile offshore units with main data as specified in above table, but is limited to the in-V configuration.

3. Approval according to DNV's Offshore Service Specification DNV-OSS-201 "Verification for Compliance with Norwegian Shelf Regulations":
The approval covers compliance with DNV-OSS-201 (NMA 856/87 §11) but is limited to the in-V configuration, in combination with generator type ABB AMG 0900 SM08 LAE, and is valid for emergency duty onboard mobile offshore units with main data as specified in above table.

   The approval is only valid for the given combination of engine and generator type.

Type Approval documentation
Tests carried out
According to the Rules. Caterpillar Prototype Evaluation Test, Inspection Report from DnV-Houston dated 25.6.85.
C280 Type test, dated October 20-21, 2005
Thermoscanning report from test of 3612 dated 2008-04-24

In-vee engine series.
Prototype test according to NMA 856/87 §11 with generator set (engine type C280-16 and generator type ABB AMG0900SM08), carried out 2013-12-16

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 surveyor shall perform a survey every second year and before the expiry date of this certificate to verify that the conditions of the type approval are complied with.

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. The main scope of the Periodical Assessment will normally include:

- Verification of the Type Approval applicant's production and quality system w.r.t. ensuring continued consistent production of the Type Approved products at the Type Approval applicant's own premises and at other companies that are given the responsibility for manufacturing of the products.
- Review of the Type Approval documentation and that this is still used as basis for the production
- Review of possible changes to the design, the material and the performance of the product
- Verification of the product marking.

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

Foundation arrangement to be submitted for each installation according to the Rules, Pt.4 Ch.3 Sec.1 A500 - Documentation of arrangement.

Torsional vibration calculations to be submitted for each installation according to the Rules Pt.4, Ch.3, Sec.1, G - Vibration.

Flexible hoses for flammable fluids to be type approved by DNV.

Signboards according to the Rules Pt.4, Ch.3, Sec.1, C 406

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 Pt.4 Ch.9 Sec.1 Table C2 and/or as listed in relevant type approval certificates.

Electric cables and cabling is not covered by this approval and must be verified to comply with the requirement of DNV Rules for Ships/ High, Speed Light Craft and Naval Surface Craft Pt.4 Ch.8 - Electrical Installation.

The approval does not include driven member. Excepted from this, is compliance with NMA 856/87 §11 for the engine and generator combination referred to under Application/Limitation, item 3.

END OF CERTIFICATE