DNV·GL

Certificate No:
TAA00001HF

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Engine Control and Alarm System

with type designation(s)
MCS Alarm and Protection System for Caterpillar C4.4 and C7.1 Engines.

Issued to
Caterpillar Inc.
Lafayette, IN, USA

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

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

Location clasess can be found on page 2.

Issued at **Hamburg** on **2018-05-22**
This Certificate is valid until **2020-05-21**.
DNV GL local station: **Certification & Inspection Services**

Approval Engineer: **Didier Girardin**

for **DNV GL**

Joannis Papanuskas
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: **262.1-016310-2**
Certificate No: **TAA00001HF**

Product Description

The Caterpillar MCS Alarm and Protection System is Engine Safety, Control and Monitoring System to be used for Caterpillar DNV GL Type Approved Caterpillar engines series **C4.4 ACERT and C7.1 ACERT**. System provides complete monitoring and supervision of Caterpillar engines in manned and unmanned machinery spaces, including alarms, shutdown events, monitoring and data communications.

System main elements and their location classes					
Hardware unit name	**Location classes**				
	Temperature	**Humidity**	**Vibration**	**EMC**	**Enclosure**
Primary Engine ECM (ADEM V A5E2v1) – Control and Monitoring System element	D	B	B	B	C
Caterpillar MCS Controller (DEIF MCS-3) - Control and Monitoring System element	B*	B*	A*	B*	**
*) Location classes based on DNV GL Type Approval Certificate A-13814 as amended **) Required protection according to the Rules to be provided upon installation on board					

System units software versions		
Hardware name	**Software Version**	
	C4.4 ACERT	**C7.1 ACERT**
Engine Control Module (ADEM V A5E2v1)	AD809_XX	A8718_XX
Caterpillar MCS Controller	3.04.1	
XX – engine model specific parameters (rating number)		

Place of "ADEM V (A5E2v1)" manufacture
Delphi Hungary KFT
Zanati Utca 29 A
H-9700 Szombathely
Republic of Hungary

Place of "DEIF MCS" unit manufacture
DEIF A/S
Skive
Kingdom of Denmark

Place of complete system manufacture (final assembly)
Caterpillar Marine Power UK
Wimborne, Dorset
United Kingdom of Great Britain and Northern Ireland

Application/Limitation

1. This certificate is valid only for systems made and delivered by Caterpillar Inc. from production centers listed under "Place of complete system manufacture (final assembly)" for Caterpillar engine series listed under product description and provided they hold a valid DNV GL Type Approval Certificate.
2. The system intended only for multi-engine propulsion plants, auxiliary and emergency generator purposes.
3. Since engine output power is below 220 kW, approval is required only for propulsion and emergency engines.
4. Sufficient mechanical protection and correct installation of sensors to be verified for each installation during onboard survey.
5. For engine sensors, it is to be ensured by system manufacturer that each of the five location classes stated in "class guideline DNVGL-CG-0339, November 2016" meets the minimum location

class required for the actual location on engine. It is to be verified for each installation during onboard survey.

6. System block diagram and supply arrangement shall be like stated in document "STATEMENT OF MANUFACTURE AND TEST (GENSET PACKAGE)" (document number 5753-1-15).
7. For **propulsion** engines list of control & monitored points (including alarms, shutdowns, set points, etc.) shall at least comply with required by vessel main class and notations requirements from DNV GL Rules for Ships, HS, LC and NSC Pt.4 Ch.3 Sec.1 Table E3.
8. For **emergency** engines, list of control & monitored points (including alarms, shutdowns, set points, etc.) shall comply with requirements from DNV GL Rules for Ships, HS, LC and NSC Pt.4 Ch.3 Sec.1 Table E1
   In case of differences between listed below documentation required for approval and documents submitted for approval will be found, the system documentation needs to be case-by-case approved and system certification may be required. Approval fee will be applied. Documentation required for approval in this case can be extended to required by DNV GL Rules for Ships, HS, LC and NSC Pt. 4 Ch.9 Sec. 1 – 3.1.3.
9. If differences between actual delivery setup (difference in alarms and safety actions, firmware versions, sensors setup, monitoring functions, etc.) and setup required by this DNV Type Approval certificate for specific vessel notations and main class will be found during approval or onboard survey, system needs to be case-by-case approved. Approval fee will be applied. Documentation required for approval in this case can be extended to required by DNV GL Rules for Ships, HS, LC and NSC Pt. 4 Ch.9 Sec. 1 – 3.1.3.

Approval Conditions (propulsion and emergency engines only)

The following documentation of the actual application is to be submitted for approval in each case:
- Reference to this Type Approval Certificate
- Information about engine type and intended use (propulsion, emergency)
- DEIF software number for specific delivery
- ECM software version for specific delivery
- System block diagram as shown in document listed in in Application/Limitation point 6
- Confirmation that power supply arrangement is like stated in Application/Limitation point 6
- Confirmation that List of control & monitored points is like stated in Application/Limitation point 7

Product certificate.
As long as the units are covered by this Type Approval, a product certificate according to Pt.4 Ch.9 Sec.1 **will not be** required. Correct configuration and set up for each delivery to be tested during commissioning after installation.

Clause for application function control.
All changes in software are to be recorded as long as the system is in use on board. The records of all changes are to be forwarded to DNV GL for evaluation and approval. Major changes in the software are to be approved before being installed in the computer. Certification of Application Functions may be required.

Software update notification
When the type approved software is revised (affecting all future deliveries) DNV GL is to be informed by forwarding updated software version documentation. If the changes are judged to affect functionality for which rule requirements apply a new functional type test may be required and the certificate may have to be renewed to identify the new software version.

The Type Approval covers hardware and software listed under Product description.

Type Approval documentation
See ANNEX

Marking of product
The products to be marked with:
- manufacturer name
- model name
- serial number
- power supply ratings

Periodical assessment
The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:
- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Periodical assessment is to be performed at least every second year and at renewal of this certificate.

END OF CERTIFICATE

ANNEX

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