

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Engine Control System

with type designation(s)
CM2350

Issued to

Cummins Inc.
North Charleston, SC, 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.

Temperature D

Humidity B

Vibration B

EMC A

Enclosure Required protection according to the Rules to be provided upon installation on board

Issued at **Hamburg** on **2018-12-12**

This Certificate is valid until **2020-12-11**.

for **DNV GL**

DNV GL local station: **Certification & Inspection Services**

Approval Engineer: **Jens Dietrich**

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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.



Product description

Engine control system consisting of 4 x **CM2350** modules (1x parent, 3x child) with redundant CAN intercommunication.

Implemented functions:

- Fuel Injection valve control
- Speed governing
- Engine Control- and Monitoring

CM2350 module (Part number 4384703):

CPU: Mamba, 160MHz, 4Mbyte flash, 256kByte internal RAM/1 Mbyte External RAM
Power supply: 24VDC

Fuel System I/O: Fuel Pressure 1, Fuel Pressure 2 (ISL Emergency), MUX'ed Fuel Press 2 & Temp (protect), Water In Fuel, Lift Pump, Engine Speed Sensor (Main), Engine Position Sensor (Back-up), Option 1: Inlet Metering Valve (IMV), Option 2: Inlet Metering Valve (IMV), Option 3: Denso PCV 1 & 2, Pressure Release Valve (PRV), Injector 1-6, IMV/PRV Voltage Monitor, Boost Supply.

Air Handling I/O: TBAP, MAF, VGT Control, VGT Power, VGT Speed, Intake Air Heater Relay/Either Start, Intake Air Throttle, TMAP, Exhaust Manifold Pressure, Exhaust Return Temperature (500deg C), Exhaust Gas Recirculation Valve (HD), Option 1: Exhaust Gas Recirculation Valve (MR- Borg Warner), Option 2: Exhaust Gas Recirculation Valve (MR-Melco), Exhaust Bypass Valve (If XLR'S Blackhawk MY10 is carried over), EGR Valve (Komatsu), EGR BPV (Komatsu), Intake Air Throttle (Komatsu).

Other Engine I/O: Oil Pressure Switch, Oil Pressure Sensor, Oil Quality (protect for feature), Oil Level, Crank Case Sensor, Crank Case Switch (protect for feature), Coolant Temp, Engine Coolant Level, Engine Brake 1 (HD), Engine Brake 2 (HD).

System-Software: 32.xx.xx.xx

Place of manufacture

Continental Automotive Systems, Seguin, TX, USA

Application/Limitation

1. This system is only to be used as engine control system for multi engine propulsion plants, auxiliary and emergency duties.
2. An independent safety system shall be installed in addition to this control system.

The Type Approval covers hardware and basic software listed under Product description. When the hardware is used in applications to be classed by DNV GL, the following documentation of the actual application system is to be submitted for approval in each case:

- Reference to this Type Approval Certificate
- System block diagram
- Power supply arrangement (may be part of the System block diagram)
- List of control and monitored points
- Software version for particular delivery
- Test procedure for integration test (see below)

Product certificate

As long as the units are covered by the Type Approval, a product certificate according to Pt.4 Ch.9 Sec.1,

1.4 will not be required. As required by DNV GL Pt.4, Ch.3, sec.1, 4.2.3 an integration test is to be conducted at the engine/system application maker integrating control, monitoring and safety system, before the system is shipped to the yard.

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.

Tests carried out

Applicable tests according to Class Guideline DNV GL CG-0339, Nov. 2016.
Functional Performance Test on QSK95 engine, May-2016.

Marking of product

Maker, type designation, serial number...

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 renewal of this certificate.

END OF CERTIFICATE