

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Diesel Enginewith type designations(s)
D2862LE4../ D2868LE4..

Issued to

MAN Truck & Bus AG
90441 Nürnberg, Germany

is found to comply with

DNV GL Rules for classification, Ships - DNVGL-RU-SHIP-Pt.4 Ch.3 Sec.1, Reciprocating Internal Combustion Engines**Application:**

propulsion, multi engine plant

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

This Certificate is valid until **12th May, 2021**Issued at **Hamburg** on **12th May, 2016**

DNV GL local station: Augsburg

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: **262.1-008596-7**
Certificate No: **TAM000008A**

Product description

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

Cylinder bore: 128 mm
Piston stroke: 157 mm

Additional place of production

not applicable

Application / Limitation

Rated power [kW/cyl.]	110.25	101.1
Rated speed [rpm]	2300	2300
Mean effective pressure [bar]	28.5	26.1
Max. firing pressure [bar]	220	202
Definition	non-cont.	cont.

Type Approval documentation

09-102375, 09-135550, 10-058115, 11-028675, 12-098891, 13-094389, 15-043416, 262.1-008596-6

Tests carried out

Documentation:

Test report title	Type test run Engine D2862LE453
Test report reference	11-028675, 2010-12-17
Place of test	Nürnberg, Test bed 16
Date of test	2010-06-14 until 2010-06-18

Test engine:

Model	D2862LE453
Serial no.	2586 801
No. of cylinders	12
Power [kW/cyl.]	101.1
Speed [rpm]	2300

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, DNV GL shall perform a Periodical Assessment every second year and before the expiry date of this 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 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/ Item 1
2. Exhaust gas turbochargers are not covered by this type approval certificate.
Documentation shall be submitted for approval according to DNV GL Rule Pt.4 Ch.3 Sec.1/ Item 11
3. Application/ Limitation
The approval is valid for propulsion multi engine plant to following duty types (as defined by MAN):
Light duty : LE443/ 446/ 453/ 456 / 433*/ 436* - * non overload
Medium duty : LE422/ 425/ 432/ 435/ 463/ 466
Heavy duty : LE421/ 424/ 431/ 434 / 441/ 444

Maximum allowable torsional stress in crankpin: 66.2 N/mm²
UTS of crankshaft material : min. 850 N/mm²
4. 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
5. 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
6. The additional spare parts of electronic controlled diesel engine have got to be provide according to manufacturer list and to DNV GL Rule Pt.4 Ch.1 Sec.5/ Item 1.2 - Table 1 in case of unrestricted service

END OF CERTIFICATE