



DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. **M-12333**

This is to certify that the
Diesel Engine

with type designation(s)
D9

Manufactured by
AB Volvo Penta
GÖTEBORG, Sweden

is found to comply with
Det Norske Veritas' Rules for Classification of Ships/High Speed and Light Craft

Application
The approval is valid for propulsion, auxiliary and emergency duty.

Rating see page 2

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

Issued at **Høvik** on **2013-06-14**

DNV local station: **Gothenburg**

Approval Engineer: **Tin Nguyen**

for **Det Norske Veritas AS**

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Torbjørn Lie
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.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

Product description

Four stroke diesel engine

Cylinder bore: 120 mm
Piston stroke: 138 mm
No. of cylinders: 6 in-line

Application/Limitation

The approval is valid for propulsion, auxiliary and emergency duty and is based on the following main data:

Propulsion:

Volvo rating group:	1		2	3	4	
Mean ind.pressure (bar):	18.5	21.9	17.9	21.4	21.4	21.3
Max. cyl. pressure (bar):	171	178	181	185	185	194
Rated output (kW):	221	261	261	313	313	368
Corresponding to (RPM):	1800	1800	2200	2200	2200	2600

Auxiliary/emergency:

Mean ind.pressure (bar):	24.8	23.2
Max. cyl. pressure (bar):	178	180
Rated output (kW):	247	278
Corresponding to (RPM):	1500	1800

Maximum allowable torsional stress in crankpin: 55 N/mm².

Type Approval documentation

Crankshaft drawing 3161415 and other drawings mentioned in covering letter MTPNO/HKERIK/262-J-43094 dated 05-02-08.

Tests carried out

Type test report 66617-1.4 dated 04-07-01 and report 68569-4 dated 04-12-08

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.

When a Type Approved product is manufactured at other companies, the Type Approval applicant takes the sole responsibility for the conformity of the product to the applicable requirements.

Other conditions

UTS of crankshaft material: min. 600 N/mm².

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

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.

Cables and installation of these shall comply with DNV Rules for Ships Pt.4, Ch.8.

All field instrumentation, including test facilities shall comply with DNV Rules for Ships Pt.4, Ch.9.

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

END OF CERTIFICATE