



TYPE APPROVAL CERTIFICATE
No. MAC135411XG

This is to certify that the product identified below is in compliance with the regulations herewith specified.

<i>Description</i>	Reciprocating Internal Combustion Engine
<i>Type</i>	D9 D9MH (R1) D9MH (R2) D9MG-HE (R1)
<i>Applicant</i>	AB VOLVO PENTA GROPEGARDSGATAN S-405 08 GOTEBOG SWEDEN
<i>Manufacturer</i>	AB VOLVO PENTA
<i>Place of manufacture</i>	GROPEGARDSGATAN S-405 08 GOTEBOG SWEDEN
<i>Reference standards</i>	Part C, Chapter 1, Section 2 of RINA Rules for the Classification of Ships

Issued in **Hamburg** on **November 28, 2011**. *This Certificate is valid until* **November 27, 2016**

RINA
Daniele Chirulli

This certificate consists of this page and 1 enclosure

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Reference Documents	
File and Test Report no.	Report of tests No. 66617-1.4, dated 01/07/2004, 68569-4, dated 08/12/2004 and CL0688, dated 26/04/2006 and relevant enclosures. File 2011XG011354; Report No. HMMC/2011/00360/MBT, dated 23.11.2011.

Technical Characteristics			
Type Approved MCR(s) [kW] - rpm	<p>D9MH (R1): 221 [kW] at 1800 [rpm] (MEP 1.57 N/mm²) 261 [kW] at 1800 [rpm] (MEP 1.86 N/mm²) 261 [kW] at 2200 [rpm] (MEP 1.52 N/mm²)</p> <p>D9MH (R2): 313 [kW] at 2200 [rpm] (MEP 1.82 N/mm²)</p> <p>D9MG-HE (R1): 239 [kW] at 1500 [rpm] (MEP 2.04 N/mm²) 265 [kW] at 1800 [rpm] (MEP 1.88 N/mm²)</p>		
Declared Time Between Overhaul	16000 (R1) 12000 (R2)	Hours	
Cycle	Diesel	2 or 4 stroke	4
Cooling	Water	Swept Volume [l/cyl]	1.567
Cylinder Bore [mm]	120	Stroke [mm]	138
Numbers Of cylinders (In Line)	6	Numbers Of cylinders (Vee Type)	---
Supercharged (yes or no)	Yes	Air Cooling (Yes or No)	Yes
Reversible (yes or no)	No	Compression Ratio	17.4 : 1
Max Firing Pressure [N/mm ²]	<p>MH (R1): 17.1 - 17.8 - 18.1</p> <p>MH (R2): 18.5</p> <p>MG (R1): 17.8 -18.0</p>	Mean Effective Pressure [N/mm ²]	see above
Specific Fuel Consumption [g/kWh]	---		

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Manufacturer Of Injection Pumps	Type Of Injection Pumps	Flow / Holes
Delphi	HBX6967173 (Propulsion) HBX6967938 (Auxiliary)	2.5 / 6 1.68 / 5

Manufacturer Of The Turbocharger	Number And Type Of Turbocharger:
KKK	1xK31 3971 QYAKB (Propulsion) 1xK29 3569 QOAKB (Auxiliary)

Fields Of Application	
The Engine May Be Intended For The Following Services:	Propulsion and Auxiliary Service See Remark (1) for Emergency Service

Tests Carried Out
According To Requirements Of Part C, Chapter 1, Section 2 of RINA Rules for the Classification of Ships On Engine: Type D9-500 having No. 6 cylinders and Serial No. 13625. Type D9-Aux having No. 6 cylinders and Serial No. 13655.

Remarks
Crankshaft Conforming To Drawings Approved With No.: MAC-7865 and MAC-7866, dated 18/08/2004.
Maximum Allowable Alternating Torsional Stress (Referred To The Crankpin) [N/mm ²]: 34.0 N/mm ²
(1) Emergency applications are subject to special consideration. <ul style="list-style-type: none"> ● This Type Approval Certificate does not include the control-, alarm- and safety electronic systems, which are to be separately type approved. ● It is intended that the minimum required monitoring equipment as per Pt C, Ch 1, Sec 2, Tabs 2-3-4 as applicable, are to be fitted to all engines intended to classified ships, unless otherwise agreed for restricted navigation. ● The approval is intended for propulsion of <u>classed ships</u> having multiple engine installations only, single Engine installation is subject to special consideration. ● On the engines which will be installed on <u>non-classed ships</u> below 200 GT having: single propulsion plant, sea worthiness or safety certificate and restricted navigation, a spare electronic governor ready for a fast connection to the engine is to be fitted. ● Emergency Genset first Loadstep: 1500 [rpm] / 50 [Hz]: 135 [kWe] 1800 [rpm] / 60 [Hz]: 220 [kWe] A spare electronic governor ready for a fast connection to the engine is to be fitted. ● Foundation arrangement to be submitted for each installation. ● Torsional Vibration calculations has to be submitted for each installation.

Hamburg November 28, 2011

