

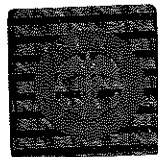


TYPE APPROVAL CERTIFICATE
No. MAC087811XG

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>	D13 D13-500 (R1) D13 MG 400
<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 **October 24, 2011**. *This Certificate is valid until* **October 23, 2016**



RINA
Daniele Chirulli

This certificate consists of this page and 1 enclosure

TYPE APPROVAL CERTIFICATE

No. **MAC087811XG**
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Reference Documents	
File and Test Report no.	Report of tests No. 173515-1 carried out 20 Juni - 01 July 2011 and relevant enclosures. File 2011XG01878; Report No. HMMC/2011/301/MBT, dated 04.10.2011.

Technical Characteristics			
Type Approved MCR(s) [kW/cyl] - rpm	<p align="center">Propulsion Service: D13-500 (R1): 368kW at 1800 rpm</p> <p align="center">Auxiliary Service: D13 MG 400 (Prime): 360kW at 1500 rpm D13 MG 400 (Prime): 400kW at 1800 rpm</p> <p align="center">Emergency Service: D13 MG 400 (St-By): 396kW at 1500 rpm (2-Step) D13 MG 400 (St-By): 440kW at 1800 rpm (2-Step)</p>		
Declared Time Between Overhaul	According to the Manufacturer's Maintenance Instructions	Hours	
Cycle	Diesel	2 or 4 stroke	4
Cooling	Water	Distance Between Conrod Bearings [mm]	267.5
Cylinder Bore [mm]	131	Stroke [mm]	158
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	18.5
Max Firing Pressure [N/mm ²]	16.5	Mean Effective Pressure [N/mm ²]	2.18
Specific Fuel Consumption [g/kWh]	211		

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

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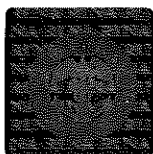
Manufacturer Of Injection Pumps	Type Of Injection Pumps	Plunger Bore [mm]
Haldex Concentric Pumps Limited	4565-02MA acc. to Volvo Penta dwg: 21639414	---

Manufacturer Of The Turbocharger	Number And Type Of Turbocharger:
Holset	1xHX55W acc. to Volvo Penta Dwg.:21343024

Tests Carried Out
According To Requirements Of Part C, Chapter 1, Section 2 of RINA Rules for the Classification of Ships On Engine: Type D13B-E MH (R2-600) having No. 6 cylinders and Serial No. D13-277912 and Type D13B-F MG (RC-400) having No. 6 cylinders and Serial No. D13-277900.

Remarks
Crankshaft Conforming To Drawings Approved With No.: HMMC-2328, dated 04/10/2011
Maximum Allowable Alternating Torsional Stress (Referred To The Crankpin) [N/mm2]: D13-500 (R1): 368kW at 1800 rpm: 100.0 N/mm2 D13 MG 400 (Prime): 360kW at 1500 rpm: 97.0 N/mm2 D13 MG 400 (Prime): 400kW at 1800 rpm: 98.0 N/mm2 D13 MG 400 (St-By): 396kW at 1500 rpm: 97.0 N/mm2 D13 MG 400 (St-By): 440kW at 1800 rpm: 98.0 N/mm2
(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. ● The approval is intended for multiple engine installations only, single Engine installation is subject to special consideration. ● 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. ● Foundation arrangement to be submitted for each installation. ● Torsional Vibration calculations has to be submitted for each installation.

Hamburg October 24, 2011



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TYPE APPROVAL CERTIFICATE
No. MAC087811XG/001

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

<i>Description</i>	Reciprocating Internal Combustion Engine For Medium Duty
<i>Type</i>	D13
<i>Applicant</i>	D13-600 (R2) 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 Yachts Designed for Commercial Use

Issued in **Hamburg** on **October 24, 2011**. This Certificate is valid until **October 23, 2016**



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This certificate consists of this page and 1 enclosure

Test Certificates issued in compliance to the present Type Approval Certificate shall clearly state the Medium Duty for D13-600 (R2) operating profile's limitation of use.

TYPE APPROVAL CERTIFICATE

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Reference Documents	
File and Test Report no.	Report of tests No. 173515-1 carried out 20 Juni - 01 July 2011 and relevant enclosures. File 2011XG01878; Report No. HMMC/2011/301/MBT, dated 04.10.2011.

Technical Characteristics			
Type Approved MCR(s) [kW/cyl] - rpm	D13-600 (R2): 441kW at 1900 rpm		
Declared Running Hours Per Year:	3000h	Hours	See Remark (1)
Cycle	Diesel	2 or 4 stroke	4
Cooling	Water	Distance Between Conrod Bearings [mm]	267.5
Cylinder Bore [mm]	131	Stroke [mm]	158
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	18.5
Max Firing Pressure [N/mm ²]	16.5	Mean Effective Pressure [N/mm ²]	2.18
Specific Fuel Consumption [g/kWh]	211		

Fields Of Application	
The Engine May Be Intended For The Following Services:	Propulsion Service only

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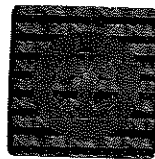
Manufacturer Of Injection Pumps	Type Of Injection Pumps	Plunger Bore [mm]
Haldex Concentric Pumps Limited	4565-02MA acc. to Volvo Penta dwg: 21639414	---

Manufacturer Of The Turbocharger	Number And Type Of Turbocharger:
Holset	1xHX55W acc. to Volvo Penta Dwg.:21343024

Tests Carried Out
According To Requirements Of Part C, Chapter 1, Section 2 of RINA Rules for the Classification of Ships On Engine: Type D13B-E MH (R2-600) having No. 6 cylinders and Serial No. D13-277912 and Type D13B-F MG (RC-400) having No. 6 cylinders and Serial No. D13-277900.

Remarks
Crankshaft Conforming To Drawings Approved With No.: HMMC-2328, dated 04/10/2011
Maximum Allowable Alternating Torsional Stress (Referred To The Crankpin) [N/mm ²]: 99.0 N/mm ²
(1) The declared running Hours per Year of 3000 h, is associated with running at full power max. 4h per 12h operation period. Between full load operation periods, engine speed should be reduced at least 10% from the obtained full load engine speed. <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. ● The approval is intended for multiple engine installations only, single Engine installation is subject to special consideration. ● 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. ● Foundation arrangement to be submitted for each installation. ● Torsional Vibration calculations has to be submitted for each installation.

Hamburg October 24, 2011



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