



Lloyd's
Register

Type Approval Certificate Extension

This is to certify that Certificate No. 05/ 00025(E2) for the undernoted products is extended and renumbered as shown.

This certificate is issued to:

PRODUCER Volvo Penta, AB

PLACE OF PRODUCTION Gropegårdsgatan
SE-40508 Gothenburg
Sweden

DESCRIPTION Six cylinder, four stroke internal combustion engine

TYPE D9

APPLICATION Main propulsion, and auxiliary and emergency power, in marine application

SPECIFIED STANDARDS Lloyd's Register's Rules and Regulations for the Classification of Ships, Part 5, Chapter 2;
Lloyd's Register's Rules and Regulations for the Classification of Special Service Craft, Part 10, Chapter 1

RATINGS

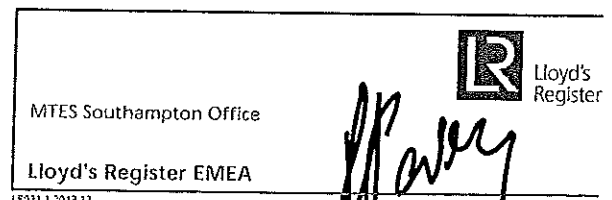
Function:	Propulsion				Auxiliary/ emergency	
Power (kW):	261	313	368	423	247	278
Speed (rpm):	1800	2200	2600	2500	1500	1800
Max. press. (bar):	178	185	194	198	178	180
m.i.p. (bar):	21.8	21.4	21.3	25.5	24.8	23.2

Certificate No. 05/ 00025(E3)

Issue Date 20 January 2015

Expiry Date 23 February 2020

Sheet 1 of 2



R.J Parry
Marine Technology and Engineering Services
Lloyd's Register EMEA

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Southampton Bddrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF

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OTHER CONDITIONS

To ensure the validity of this certificate, production facilities are to be inspected by an LR Surveyor who shall verify that the engines conform to the approval documentation referenced in the Design Appraisal Document that forms part of this certificate.

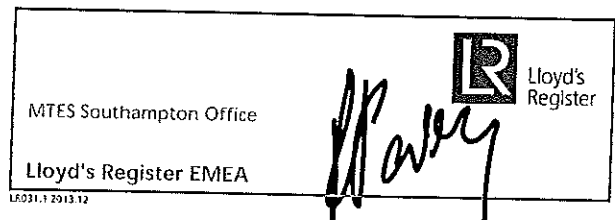
This Type Approval relates to the mechanical aspects of the engine only. The engine management system should be subject to its own independent LR Type Approval.

"This Certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register EMEA of any modification or changes to the equipment in order to obtain a valid certificate."

The attached Design Appraisal Document No. 05/00025(E3) and its supplementary Type Approval Terms and Conditions form part of this Certificate

All other details remain as the previous Certificate No. 05/ 00025(E2) to which this extension should be attached.

Certificate No.	05/ 00025(E3)
Issue Date	20 January 2015
Expiry Date	23 February 2020
Sheet	2 of 2



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Marine Design Appraisal Document

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 Marine Technology & Engineering Service,
 Global Technology Centre,
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Date
 20 January 2015

Please quote this reference number on all future communications
 MTES/ENG/RJP/WP 20102123

MACHINERY GENERAL DESIGN APPRAISAL VOLVO PENTA MODEL D9 ENGINE

Valid to 23rd February 2020

- The Document(s) listed in paragraph 1 of the appendix have been examined for compliance with Part 5, Chapter 2 of the Rules and Regulations for the Classification of Ships, *or* Part 10, Chapter 1 of the Rules and Regulations for the Classification of Special Service Craft and will be assigned an appraisal status, as indicated, subject to the following conditions and comments

2. Machinery

Engine Builder's designation	VOLVO PENTA D9						
Number of Cylinders/Type	Six cylinder, four stroke						
Firing order (from non-driving end) and interval:	1-5-3-6-2-4, 120°						
Bore and stroke	120 mm x 138 mm						
purpose	Propulsion					Aux. /Emerg'y	
power	221	261	261	313	368	239	265
speed	1800	1800	2200	2200	2600	1500	1800
max. press.	171	178	181	185	194	178	179
m.i.p.	18.5	21.9	17.9	21.4	21.3	23.7	22.1

3. System Details

Manufacturing method	Continuous Grain Flow	$K_1 = 1.05$
Fatigue enhancement process	Induction Hardened Pin Fillets	$K_2 = 1.24$
Half Range Torsional Vibratory Stress, N/mm ²	Crankpin	$\tau_a = 34$
	Crank Journal	$\tau_a = 18.4$

FINAL ACCEPTANCE OF ACTUAL ITEM(S) DEPEND(S) ON SATISFACTORY SURVEY AND TESTING

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Shafts	Diameter, mm		Material	Min UTS, N/mm ²
	OD	ID		
Crankpin	88	0	V-1649-01 Steel	600
Crank journal	108	0	V-1649-01 Steel	600

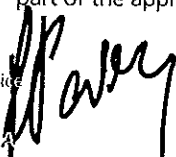

4. Conditions of Approval

- 4.1 A torsional and axial (if applicable) vibration analysis for the full dynamic system is to be submitted for each installation to demonstrate that the vibratory stresses in the crankshaft do not exceed the values given in 3 above.
- 4.2 Approval is subject to the remaining requirements for survey, testing and installation as required by the Rules stated above
- 4.3 This approval does not cover the turbocharger, the drawing of which is retained for information only.
- 4.4 In general, filter bodies are to be of steel or equivalent material.




5. General Comments

- 5.1 The maximum allowable ½ range torsion vibratory stress (τ), as indicated above is as recommended by the Engine Designers.
- 5.2 This approval has only considered mechanical and piping aspects of the engine, and the control system does not form part of the approval.

Southampton Office
 Lloyd's Register EMEA

Lloyd's Register

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	www.lr.org

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20 January 2015

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Appendix

1. The documents listed below have been examined

Document No.	Rev.	Title	Status	Date
-	-	D9 Engine Design and Function	SI	11 th February 2005
-	-	EVC EC-B Inst. Proc. Electronics Vessel Cont. D9	SI	11 th February 2005
-	-	Test report dated 1 st July 2004	SI	11 th February 2005
M44	-	Data Sheet for Crankshaft Calculations	SI	11 th February 2005
P-10854	-	DnV Type Approval Certificate	SI	11 th February 2005
P-10852	-	DnV Type Approval Certificate	SI	11 th February 2005
D9-500	-	Engine Description	SI	11 th February 2005
STD 1103,15	-	Corporate Standard (Grey Iron)	SI	11 th February 2005
STD 1123, 2	-	Corporate Standard (Stainless Steel)	SI	11 th February 2005
STD 1142, 5	-	Corporate Standard (Aluminium)	SI	11 th February 2005
STD 1143, 55	-	Corporate Standard (Aluminium)	SI	11 th February 2005
STD 1142, 61	-	Corporate Standard (Aluminium)	SI	11 th February 2005
STD 1129, 091	-	Corporate Standard (Precipitation Hardening Steel)	SI	11 th February 2005
STD 1215, 42	-	Corporate Standard (FRP)	SI	11 th February 2005
STD 1116, 491	-	Corporate Standard (Steel for Crankshaft)	SI	11 th February 2005
66327	1	TVCs 221 kW @ 1800 rpm	SI	11 th February 2005
66328	1	TVCs 261 kW @ 1800 rpm	SI	11 th February 2005
66329	1	TVCs 261 kW @ 2200 rpm	SI	11 th February 2005
66330	1	TVCs 313 kW @ 2200 rpm	SI	11 th February 2005
66332	1	Torsional Vibration Calculations	SI	11 th February 2005
66452	1	Engineering Report	SI	11 th February 2005
66453	1	Engineering Report	SI	11 th February 2005
66454	1	Engineering Report	SI	11 th February 2005
66455	1	Engineering Report	SI	11 th February 2005
69740-1		Inclining Test Report, dated 17 th March 2005	SI	16 th Sept. 2010
308082	01	Turbo Charger	SI	11 th February 2005
888256	01	Vibration Damper	SI	11 th February 2005
888375	04	Sump	SI	11 th February 2005
889524	05	Flywheel Assembly	SI	11 th February 2005

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Appendix

Document No.	Rev.	Title	Status	Date
889525	05	Flywheel	SI	11 th February 2005
3077164	12	Screw M16, Highly Loaded	SI	11 th February 2005
3077798	06	Piston Pin	SI	11 th February 2005
3161415	07	Crankshaft (2 sheets)	A	11 th February 2005
3161475	03	Connecting Rod	SI	11 th February 2005
3587248	02	Air Cooler	SI	11 th February 2005
3587407	02	Unit Injector	SI	11 th February 2005
3587608-03		Flywheel Housing Assembly	SI	11 th February 2005
3807230	01	Starter Motor	SI	11 th February 2005
3807598	03	Piston (2 sheets)	SI	11 th February 2005
3808547	01	Skeleton Diagram Cooling Water	AQ	11 th February 2005
3808548	01	Skeleton Diagram, Fuel System	AQ	11 th February 2005
3808549	01	Skeleton Diagram Oil System	AQ	11 th February 2005
3808700	01	Fuel Filter Housing	SI	11 th February 2005
3812954	01	EVC EC/B System Drawing D9	SI	11 th February 2005
3837998	B01	Fuel Pump Assembly	SI	11 th February 2005
20365073	01	Oil Cooler	SI	11 th February 2005
20381122	05	Cylinder Liner	SI	11 th February 2005
20397500	08	Housing Fuel Filter	SI	11 th February 2005
20450066	06	Camshaft	SI	11 th February 2005
20463776	13	Cylinder Block Assembly	SI	11 th February 2005
20464550	04	Oil Filter Housing	SI	11 th February 2005
20512729	06	Oil Pan Bus Version	SI	11 th February 2005
20569855	01	Oil Pump New for Cavitation PB	SI	11 th February 2005
20574284	01	Cylinder Head Assembly	SI	11 th February 2005
38088597	02	Coolant Pump Assembly	SI	11 th February 2005

Appraisal Status Key

- AQ Approved subject to the matters raised that require resolution - and provided the arrangements are to the surveyor's satisfaction
 SI Retained as supporting documentation for information only

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MTES/TA/WO3924486/RJP/WP20102123

LLOYD'S REGISTER TYPE APPROVAL SYSTEM, 2002.

Issued to: VOLVO PENTA, AB
for: MARINE DIESEL ENGINE, TYPE D9
TYPE APPROVAL CERTIFICATE No. 05/00025(E3)

The undernoted documents have been reviewed for compliance with the requirements of the Lloyd's Register Type Approval System, 2002 and this Design Appraisal Document forms part of the Certificate.

APPROVAL DOCUMENTATION

Request form 2571
LR Machinery General Design Appraisal Document. ENG 72328, Issue 5
LR Gothenburg visit report, ref. GOT 1410142
Type approval certificate for engine management system
Type approval certificate for programmable control and safety system (expired)

18th October 2014
20th January 2015
20th March 2014
11/70019(E4)
04/00017(E2)

Supplementary Type Approval Terms and Conditions

Type Approval certifies that a representative sample of the product(s) referred to herein has/have been found to meet the applicable design criteria for the use specified herein. It does not mean or imply approval for any other use, nor approval of any product(s) designed or manufactured otherwise than in strict conformity with the said representative sample.

Type Approval is based on the understanding that the manufacturer's recommendations and instructions and any relevant requirements of the Rules and Regulations are complied with.

Type Approval does not eliminate the need for normal inspection and survey procedures required by the Rules and Regulations.

Lloyd's Register EMEA reserves the right to cancel or withdraw this Type Approval Certificate in accordance with the Lloyd's Register Type Approval System Procedure.

MTES Southampton Office
Lloyd's Register EMEA



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**Subject: Main and Auxiliary Propulsion
Product: Diesel Engines (Part 1A)**

Producer/ Licence No.	Type	Description of Product			Cert. No.															
		Details of Approval	Application	Remarks																
Volvo Penta, AB, Gropégårdsgatan, SE-40508 Gothenburg, Sweden.	D9	<p>Six cylinder, four stroke internal combustion engine</p> <p>Firing order (from non-driving end): 1-5-3-6-2-4</p> <p>Function:</p> <table border="0"> <tr> <td></td> <td>Propulsion</td> <td>Auxiliary/ emergency</td> </tr> <tr> <td>Power (kW):</td> <td>261 313 368 423</td> <td>247 278</td> </tr> <tr> <td>Speed (rpm):</td> <td>1800 2200 2600 2500</td> <td>1500 1800</td> </tr> <tr> <td>Max. press.(bar):</td> <td>178 185 194 198</td> <td>178 180</td> </tr> <tr> <td>m.i.p.(bar):</td> <td>21.8 21.4 21.3 25.5</td> <td>24.8 23.2</td> </tr> </table>		Propulsion	Auxiliary/ emergency	Power (kW):	261 313 368 423	247 278	Speed (rpm):	1800 2200 2600 2500	1500 1800	Max. press.(bar):	178 185 194 198	178 180	m.i.p.(bar):	21.8 21.4 21.3 25.5	24.8 23.2	Main propulsion and auxiliary power in marine application	Expires: 23 February 2020	05/ 00025(E3)
	Propulsion	Auxiliary/ emergency																		
Power (kW):	261 313 368 423	247 278																		
Speed (rpm):	1800 2200 2600 2500	1500 1800																		
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