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Important

This Technical Data Sheet and the corresponding Installation Instructions provide important information to ensure the installed engine will operate according to the design specification in the Volvo Penta application for certification.

Requirements marked with  are considered as critical for exhaust emissions compliance according to the design specification in the Volvo Penta application for certification.

Failing to follow and meet these instructions and requirements when installing a certified engine in a piece of nonroad equipment for use in the United States violates U.S. federal law (40 CFR 1068.105(b)), subject to fines or other penalties as described in the Clean Air Act.

General

In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel

Number of cylinders		6	
Displacement, total	liters	7,15	
	in ³	436	
Firing order		1-5-3-6-2-4	
Bore	mm	108	
	in	4,25	
Stroke	mm	130	
	in	5,12	
Compression ratio		17,3	
Wet weight	Engine only	kg	650
		lb	1433

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Performance		rpm	1200	1500	1900	2200
185 kW	without fan	kW hp	133,2 181	180,6 246	185,0 252	185,0 252
	with fan mm	kW hp				
	without fan	kW hp				
	with fan mm	kW hp				
Torque at:		Nm lbf ft	1060 782	1150 848	930 686	803 592
Max torque at engine speed	1320 rpm	Nm lbf ft	1199 884			
Power tolerance		%	2%			
Mean piston speed		m/s ft/sec	5,2 17,1	6,5 21,3	8,2 27,0	9,5 31,3
Effective mean pressure at:		MPa psi	1,86 270	2,02 293	1,64 237	1,41 205
Max combustion pressure at:		MPa psi	17,1 2480	15,8 2291	14 2030	15,1 2190
		MPa psi				
Total mass moment of inertia, J (mR ²) (not including flywheel)		kgm ² lbft ²	0,46005 10,9			
Friction Power		kW	5	9	12	17
		hp	7	12	17	23
Derating see Technical Diagrams						

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Cold start performance

*Cold start limit temperature	without starting aid	°C	-15
		°F	5
	with manifold heater 3,0 kW	°C	-25
		°F	-13
	with manifold heater 3,0 kW and block heater	°C	
		°F	
*Specify oil and fuel quality	oil:VDS3 fuel: din en 590 / astm D975 grade No.1-D / JIS K2204 Grade1+2		
Block heater type	Make	Power kW	Engaged hours
	DEFA	0,75	
			Cooling water temp engine block

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption at max rpm at:		liter/h	0,05
		US gal/h	0,013
Oil system capacity including filters		liter	27
		US gal	7,13
Oil sump capacity:	Max	liter	24
		US gal	6,34
	Min	liter	19
		US gal	5,02
Oil change intervals/specifications	VDS3	h	500
		h	
		h	
Engine angularity limits:	front up	°	30
	front down	°	30
	side tilt	°	35

Lubrication system




Lubrication oil temperature in sump:	max	°C	127
		°F	261
Oil filter micron size		μ	17

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Fuel system		rpm	1200	1500	1900	2200
Specific fuel consumption at:	25%	g/kWh lb/hph				
	50%	g/kWh lb/hph				
	75%	g/kWh lb/hph				
	100%	g/kWh lb/hph				
Specific fuel consumption at:	25%	g/kWh lb/hph				
	50%	g/kWh lb/hph				
	75%	g/kWh lb/hph				
	100%	g/kWh lb/hph				
Specific fuel consumption at:	25%	g/kWh lb/hph				
	50%	g/kWh lb/hph				
	75%	g/kWh lb/hph				
	100%	g/kWh lb/hph				
Fuel to conform to						

Fuel system		
System supply flow at max. speed	liter/h	240
	US gal/h	63,4
Fuel supply line max. restriction (Measured at fuel inlet connection)	kPa	35
	psi	5,1
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection)	kPa	10
	psi	1,5
System return flow at max. speed	liter/h	240,0
	US gal/h	63,4
Fuel return line max. restriction (Measured at fuel return connection)	kPa	50
	psi	7,3
Max. allowable inlet fuel temp (Measured at fuel inlet connection)	°C	70
	°F	158
Prefilter / Water separator micron size	μ	10
Fuel filter micron size	μ	5
Governor type/make, standard	EMS II	
Injection pump type/make	PF45 Bosch	



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Intake and exhaust system		Inlet air temp	rpm	1200	1500	1900	2200
Air consumption at: (+25°C and 100kPa)			m ³ /min cfm	7,0 246	11,3 399	14,6 517	16,3 577
 See front page for important information Max allowable air intake restriction including piping			kPa psi		6,5 0,9		
Heat rejection to exhaust at:			kW BTU/min	90,3 5135	131,4 7475	149,1 8482	154,9 8811
			kW BTU/min				
			kW BTU/min				
Exhaust gas temperature after turbine at:			°C °F	549 1020	510 950	462 863	437 819
			°C °F				
			°F				
 See front page for important information Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 110 mm			kPa psi	16 2,3	28 4,0	36 5,2	41 5,9
 See front page for important information Max allowable temperature drop between turbine and SCR muffler inlet.			°C °F	30 54	25 45	20 36	15 27
SCR muffler pressure drop			kPa psi	10 1,5	17 2,4	21 3,0	23 3,3
Pre-catalyst pressure drop			kPa psi	4 0,6	8 1,2	11 1,6	12 1,8
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)			m ³ /min cfm	18 648	26 901	29 1015	30 1057
			m ³ /min cfm				
			m ³ /min cfm				
Exhaust gas smoke			*Bosch Units	0,011	0,004	0,015	0,020

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Cooling system		rpm	1200	1500	1900	2200
Heat rejection radiation from engine at:		kW BTU/min		19,9 1132	20,5 1164	20,5 1164
Heat rejection to coolant at:		kW BTU/min		83 4735	89,28 5077	80,5 4578
Coolant	Volvo Penta coolant "ready mix" or Volvo Penta coolant mixed with clean fresh water 40 / 60					
Radiator cooling system type	Closed circuit					
Standard radiator core area		m ²	0,65			
		foot ²	7,00			
		m ²				
		foot ²				
Fan diameter	750 mm	mm	750			
		in	29,53			
Fan power consumption	750 mm	mm				
		in				
		kW		6,5		14,0
		hp		9		19
Fan drive ratio	fan Ø750	kW				
		hp				
Coolant capacity:	engine	liter	9,8			
		US gal	2,6			
	std. 0,65m ² radiator with hoses	liter				
Coolant pump		US gal				
		liter				
		US gal				
		liter				
		US gal				
Coolant pump		drive/ratio	belt/2:1			
Coolant flow with standard system		l/s		3,2		4,9
		US gal/s		0,8		1,3
Minimum coolant flow		l/s		2,8		4,1
		US gal/s		0,7		1,1
Maximum outer circuit restriction incl. piping		kPa	35,0			
		psi	5,1			
Thermostat:	start to open	°C	86			
		°F	187			
	fully open	°C	98			
		°F	208			
Maximum static pressure head (expansion tank height + pressure cap setting)		kPa	110			
		psi	16,0			
Minimum static pressure head (expansion tank height + pressure cap setting)		kPa	90			
		psi	13,1			
Standard pressure cap setting		kPa	100			
		psi	14,5			
Maximum top tank temperature		°C	108			
		°F	226			
Recommended Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still are functioning		liter US gal	2			

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Charge air cooler system		rpm	1200	1500	1900	2200
Heat rejection to charge air cooler		kW	11,3	25,9	36,1	40,6
		BTU/min	642	1472	2051	2310
Charge air mass flow		kg/s	0,14	0,22	0,29	0,32
Charge air inlet temp. (Charge air temp after turbo compressor)		°C	122	146	159	167
		°F	251	294	319	332
 See front page for important information Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)	#REF!	°C	41	46	48	50
		°F	105	115	118	122
 See front page for important information Maximum pressure drop over charge air cooler incl. piping		kPa	15			
		psi	2,18			
Charge air pressure (After charge air cooler)		kPa	19	25	26	26
		psi	2,8	3,6	3,8	3,8
Standard charge air cooler core area		m ²	0,5			
		foot ²	5,38			

Cooling performance: 0,65 m² radiator and 750 fan

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 108°C TTT and 40% coolant. Valid at 1 atm.

Engine speed	Engine power	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
rpm	kW hp						
2200		77	172	5,6	197,8	0	
2200		76,5	171	5,4	190,7	100	0,015
2200		75,5	170	5,2	183,6	200	0,029
2200		75	169	5	176,6	300	0,044
2200		74	167	4,9	173,0	400	0,058
2200		73	165	4,7	166,0	500	0,073

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Cooling performance: 0,65 m² radiator and 750 fan

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 108°C TTT and 40% coolant. Valid at 1 atm.

Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1900		71	164	4,7	148,3	0	
1900		70	163	4,5	141,3	100	0,015
1900		68,5	160	4,3	134,2	200	0,029
1900		67	157	4,1	127,1	300	0,044
1900		65,5	154	3,9	120,1	400	0,058
1900		64	151	3,8	113,0	500	0,073

Cooling performance: 0,65 m² radiator and 750 fan

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 108°C TTT and 40% coolant. Valid at 1 atm.

Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1500		68	162	3,6	127,1	0	
1500		66	159	3,4	120,1	100	0,015
1500		64	155	3,2	113,0	200	0,029
1500		61	151	2,9	102,4	300	0,044
1500		58	146	2,7	95,3	400	0,058
1500		54	140	2,4	84,8	500	0,073

Cooling performance: m² radiator and fan

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 108°C TTT and 40% coolant. Valid at 1 atm.

Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi

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Electrical system

Voltage and type			24V
Alternator:	make		Melko
	output	A	120A
	tacho output	Hz/alternator rev.	W
	drive ratio		01:03,2
Starter motor:	make		Melko
	type		90 P55
	output	kW hp	5,5 7,5
Number of teeth on:	flywheel		129
	starter motor		12
Max wiring resistance main circuit	mΩ		2
Cranking current at +20°C	A		400
Crank engine speed at 20°C	rpm		97
Starter motor battery capacity	max	Ah/A	2x180Ah / 950A
	min at +5°C	Ah/A	2x135aH / 420A
Inlet manifold heater (at 20 V)	kW		3,0
Power relay for the manifold heater	A		300

Power take off

	rpm	1200	1500	1900	2200
Front end in line with crank shaft max:	Nm lbf ft	1300 959			
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW hp max 5000N all directions			
	max down	kW hp max torque for main bearing < 1100Nm			
	max right	kW hp			
Timing gear at compressor PTO max:	Nm lbf ft	187 138			
Speed ratio direction of rotation viewed from flywheel side		1:1,12 CCW			
Timing gear at servo pump PTO max:	Nm lbf ft				
Speed ratio direction of rotation viewed from flywheel side					
Timing gear at hydraulic pump PTO max:	Nm lbf ft				
Speed ratio direction of rotation viewed from flywheel side					
Max allowed bending moment in flywheel housing	Nm lbf ft				
Max. rear main bearing load	N lbf	950 incl. Flywheel			

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Engine management system

Functionality	Alternatives			Default setting
Governor mode	Drop	Isochronous		Isochronous
Governor droop	10	125	Nm/rpm	25 Nm/Rpm
Governor response	adjustable PI constants			
Idle speed	550	800		600,000
Stop function	ETS	ETR		Energized to stop
Preheating function	ignition	request	request+temp	on request
Lamp test	ON	OFF		ON

Parameter		Warning level	Alarm level	Engine protection
Parameter for Stationary		Warning	Alarm	Action. Default/Alternative
Oil pressure	Low idle	90	65	65 Shut down, ON/OFF
	Rated speed	250	225	225 Shut down, ON/OFF
Coolant temp	°C	108	110	110 Shut down,
Coolant level			Low level	Shut down, ON/OFF*
Fuel feed pressure	Low idle	450	NA	NA
	Rated speed	380	NA	NA
Water in fuel		High level		
Charge air temp	°C	75	80	80 Shut down, ON/OFF
Charge air pressure	kPa	380	390	390 Shut down, ON/OFF
Engine speed	rpm	120%		

* OFF :disables funktion, i.e. no shut down.

Parameter	Warning level	Alarm level	Engine Protection			
	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	#REF!	#REF!
Coolant temp (°C)	108°C	110°C	110°C	111°C	NA	NA
Coolant level	NA	Low level	NA	NA	NA	NA
Oil pressure	Low idle (kPa)	90	65	NA	NA	65 kPa
	Rated speed (kPa)	250	225	NA	NA	225 kPa
Fuel feed pressure	Low idle (kPa)	450	NA	NA	NA	NA
	Rated speed (kPa)	380	NA	NA	NA	NA
Water in fuel	High level	NA	NA	NA	NA	NA
High charge air temp (°C)	75°C	80°C	80°C	81°C	NA	NA
High charge air pressure (kPa)	380kPa	390 kPa	390 kPa	390 kPa	NA	NA
Engine speed	120%	NA	NA	NA	NA	NA
SCR protection temp (°C)	NA	NA	550°C	>550°C	NA	NA