

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. Turbocharged

Number of cylinders			6
Displacement, total		litre	16,12
		in ³	983,9
Firing order			1-5-3-6-2-4
Bore		mm	144
		in	5,67
Stroke		mm	165
		in	6,50
Compression ratio			16,8:1
Wet weight (Not including after treatment system)	Engine only	kg	1810
		lb	3990
	Engine incl. cooling system and air filtration system	kg	2217
		lb	4888
	Frame	kg	550
		lb	1213
	Compensator and Mixer pipe	kg	25
		lb	55
	EATS Muffler	kg	188
		lb	414

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Performance		rpm	1500	1800
Prime Power	without fan	kW	NA	562
		hp	NA	764
	with fan	kW	NA	532
		hp	NA	724
Standby Power	without fan	kW	NA	615
		hp	NA	836
	with fan	kW	NA	585
		hp	NA	796
Torque at:	Prime Power	Nm	NA	2982
		lbft	NA	2199
	Standby Power	Nm	NA	3263
		lbft	NA	2406
Mean piston speed		m/s	NA	9,9
		ft/sec	NA	32,6
Effective mean pressure at:	Prime Power	MPa	NA	2,3
		psi	NA	337
Effective mean pressure at:	Standby Power	MPa	NA	2,5
		psi	NA	369
Max combustion pressure at:	Prime Power	MPa	NA	21
		psi	NA	3046
Max combustion pressure at:	Standby Power	MPa	NA	21,8
		psi	NA	3162
Total mass moment of inertia, J (mR ²)		kgm ²	2,50	
		lbft ²	59,3	
Total mass moment of inertia, J (mR ²) without flywheel		kgm ²	1,92	
		lbft ²	45,6	
Friction Power		kW	NA	51
		hp	NA	69,4

Derating due to altitude - see Technical Diagrams

Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power

Tolerance ± 0.75 dB(A)

		rpm	1500	1800
Measured sound power Lw	No load	dB(A)		118,1
	Prime Power	dB(A)		118,4
	Standby Power	dB(A)		118,5
Calculated sound pressure Lp at 1 m	No load	dB(A)		101,1
	Prime Power	dB(A)		101,4
	Standby Power	dB(A)		101,5

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Test conditions for load acceptance data

Warm engine.	Generator	Model	Type of AVR
	Stamford	HCM534F1	MX341
AVR Settings	UFRO (Hz):	57	DIP (%)*: 50
	Stability (%)*:	According to Stamford instructions	Voltage (V): 400
			DWELL (%)*: N/A
			Load factor: 1.0

Applies to Stamford nomenclature,

(%)* : % of max potentiometer setting range

Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions.

Abbreviation:	Full name:	Descriptions
AVR	Automatic Voltage Regulator	Generator performance and safety control unit
UFRO	Under Frequency Roll Off	Overheating protection at under frequency
DIP		Controls the slope of voltage drop when the UFRO is active
DWELL		Controls the slope of voltage recovery when the UFRO is active.

Single step load performance at 1800 rpm - PRIME (Resistiv load)

Load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)	Remaining load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)
0-20	2,2	1,3	0,6	0,0	20-100	9,3	2,9	16,8	1,6
0-40	4,4	1,8	2,1	0,6	40-100	5,7	2,4	7,3	1,2
0-60	6,4	2,3	8,4	1,2	60-100	3,9	1,9	2,5	1,0
0-65	7 (G3)	2,4	9,3	1,2	65-100	3,7	1,8	2,1	0,8
0-80	10 (G2)	2,9	16,4	1,2	74-100	2,3	1,3	1,3	0,3
0-100	14,7	3,2	26,1	1,8					
100-0	4,3	1,4	8,6	1,9					

Single step load performance at 1800 rpm - STAND BY (Resistiv load)

Load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)	Remaining load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)
0-20	2,4	1,4	1,1	0,0	20-100	10,2	3,2	19,8	1,6
0-40	4,6	2,1	4,1	1,2	40-100	6,2	2,5	9,8	1,6
0-59	7 (G3)	2,4	10,7	1,3	59-100	4,6	2,2	3,8	1,2
0-60	7,1	2,3	10,7	1,2	60-100	4,5	2,1	3,4	1,3
0-74	10 (G2)	2,9	17,2	1,2	74-100	3,1	1,6	2,0	0,8
0-80	12,0	3,1	21,1	1,3	80-100	2,6	1,4	1,6	0,3
0-100	17,0	3,5	30,5	2,0					
100-0	4,8	1,6	8,9	1,8					

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Cold start performance

Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	rpm	1500	1800
			s	s
	20	s	NA	4,3
	5	s	NA	5,3
	-15 *	s	NA	5,3
	-30 **	s	NA	5,7
	Min start temp*	°C	-31,0	

* With manifold heater 4 kW engaged, lubrication oil 15W/40 and block heater.

** With manifold heater 4 kW engaged, lubrication oil 5W/30 and block heater, Fuel MK-1.

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
Volvo part No: 22454340 P01	Calix	1.5 kW	10h ambient temp-30 C	-2°C 28°F


Lubrication system

Lubricating oil consumption	Prime Power	rpm	1500	1800
			litre/h US gal/h	litre/h US gal/h
	Standby Power		NA	0,10 0,026
			NA	0,11 0,029
Oil system capacity including filters				48 12,7
Oil sump capacity:	max			42 11,1
	min			32 8,5
Oil change intervals/specifications:	VDS-3*			h 500
				h
				h
Engine angularity limits:	front up			° 30
	front down			° 30
	side tilt			° 30
Oil pressure at rated speed			kPa psi	399 58
Lubrication oil temperature in oil sump:		max	°C °F	130 266
Oil filter micron size			µ	40

* See also general section in the sales guide

Fuel system			rpm	1500	1800
Prime Power Specific fuel consumption at:	25%	g/kWh lb/hph	NA	234	
			NA	0,379	
	50%	g/kWh lb/hph	NA	205	
			NA	0,332	
	75%	g/kWh lb/hph	NA	197	
			NA	0,319	
	100%	g/kWh lb/hph	NA	195	
			NA	0,316	
% adBlue consumption at: (Compare to Fuel consumption by Volyme)	25%	%	NA	6,1	
	50%	%	NA	6,6	
	75%	%	NA	7,1	
	100%	%	NA	7,1	




Standby Power Specific fuel consumption at:	25%	g/kWh lb/hph	NA	229
			NA	0,371
	50%	g/kWh lb/hph	NA	203
			NA	0,329
	75%	g/kWh lb/hph	NA	196
			NA	0,317
	100%	g/kWh lb/hph	NA	196
			NA	0,317
% adBlue consumption at: (Compare to Fuel consumption by Volyme)	25%	%	NA	6,2
	50%	%	NA	6,6
	75%	%	NA	7,3
	100%	%	NA	6,6

Fuel system			rpm	1500	1800
See front page for important information			ASTM D975 (2D)		
Fuel to conform to					
System supply flow at:		litre/h US gal/h	NA NA	210,0 55,5	
Fuel supply line max restriction (Measured at fuel inlet connection)		kPa psi	NA NA	30,0 4,4	
Fuel supply line max pressure, engine stopped		kPa psi	NA NA	16,5 2,4	
System return flow		litre/h US gal/h	NA NA	25,0 6,6	
Fuel return line max restriction (Measured at fuel return connection)		kPa psi	NA NA	20,0 2,9	
Maximum allowable inlet fuel temp (Measured at fuel inlet connection)		°C °F	NA NA	60 140	
Prefilter / Water separator micron size		µ		10	
Fuel filter micron size		µ		5	
Governor type/make, standard	Volvo/EMS 2.3				
Injection pump type/make	Unit injector hybrid				

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Intake and exhaust system

rpm 1500 1800

Air consumption at: (+25°C and 100kPa)	Prime Power	m ³ /min cfm	NA NA	46,06 1627
	Standby Power	m ³ /min cfm	NA NA	48,22 1703
See front page for important information Max allowed air intake restriction including piping  Air filter restriction clean Volvo Penta filter		kPa	NA	5
		psi	NA	0,7
Heat rejection to exhaust at:	Prime Power	kW	NA	409
		BTU/min	NA	23259
Exhaust gas temperature after turbine at:	Prime Power	°C	NA	423
		°F	NA	793
See front page for important information Max allowable back pressure in exhaust line (after turbine)  Pipe dimension Ø: _____ mm	Prime Power	kPa	NA	19
		psi	NA	2,7
See front page for important information Max allowable temperature drop between turbine and SCR muffler inlet. 	Prime Power	Δ°C	NA	10
		Δ°F	NA	18
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)	Prime Power	kPa	NA	9
		psi	NA	1,3
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	Prime Power	m ³ /min cfm	NA NA	114,0 4025
		Standby Power	m ³ /min cfm	NA NA

Cooling system		rpm	1500	1800
Heat rejection radiation from engine at:	Prime Power	kW	NA	24
		BTU/min	NA	1365
	Standby Power	kW	NA	26
		BTU/min	NA	1479
Coolant	Volvo Penta coolant "ready mix or Volvo Penta coolant mixed with fresh water 40/60			
Radiator cooling system type	Closed circuit			
Standard radiator core area	m ²	NA	1,68	
	foot ²	NA	18,08	
Fan diameter	mm	NA	965	
	in	NA	37,99	
Fan power consumption	kW	NA	30	
	hp	NA	41	
Fan drive ratio	1,04:1			
Coolant capacity,	Engine only	litre	NA	33
		US gal	NA	8,72
	CACs (Charge Air Coolers)	litre	NA	10
		US gal	NA	2,64
	Coolant radiators incl piping, Engine circuit	litre	NA	48
		US gal	NA	12,68
	coolant radiators incl piping, CAC- circuit	litre	NA	48
		US gal	NA	12,68
	Expansion tank, Engine circuit	litre	NA	20
		US gal	NA	5,28
Expansion tank, CAC circuit	litre	NA	7	
	US gal	NA	1,85	
Coolant pump, Engine circuit	drive/ratio	Belt / 1,85:1		
Coolant pump, CAC circuit	drive/ratio	Belt / 2,29:1		
Thermostat, Engine circuit	Start to open	°C	NA	82
		°F	NA	180
	Fully open	°C	NA	92
		°F	NA	198
Thermostat, CAC circuit	Start to open	°C	NA	40
		°F	NA	104
	Fully open	°C	NA	52
		°F	NA	126
Maximum static pressure head (expansion tank height + pressure cap setting)	kPa	NA	100	
	psi	NA	14,5	
Minimum static pressure head (expansion tank height + pressure cap setting)	kPa	NA	70	
	psi	NA	10,2	
Standard pressure cap setting	kPa	NA	75	
	psi	NA	10,9	
Maximum top tank temperature	°C	NA	107	
	°F	NA	225	
Charge air pressure (after charge air coolers)	kPa	NA	360	
	psi	NA	52,2	
See front page for important information Max allowed Charge air outlet temp. At air inlet temp. 25°C	Prime Power	°C	NA	50
		°F	NA	122
	Standby Power	°C	NA	50
		°F	NA	122

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**OEM cooling system design:
- move of standard radiators**

		rpm	1500	1800
Maximum additional coolant, Engine circuit with standard expansion tank		litre	NA	15
		US gal	NA	3,96
Maximum additional coolant, CAC circuit with standard expansion tank		litre	NA	5
		US gal	NA	1,32
Maximum distans in vertikal direction with standard pressure cap (75 kPa)		m	NA	2,5
		ft	NA	8,20
Maximum additional pressure drop due to move		KPa	NA	10
		psi	NA	1,5
- replacement of standard radiators				
Heat rejection to coolant engine radiator at:	Prime Power	kW	NA	203
		BTU/min	NA	11544
	Standby Power	kW	NA	223
		BTU/min	NA	12682
Heat rejection to coolant CAC radiator at:	Prime Power	kW	NA	187
		BTU/min	NA	10635
	Standby Power	kW	NA	206
		BTU/min	NA	11715
Minimum coolant flow engine radiator (at fully open thermostat)		litre/s	NA	6
		US gal/s	NA	1,59
Minimum coolant flow CAC radiator (at fully open thermostat)		litre/s	NA	2,5
		US gal/s	NA	0,66
Maximum coolant pressure drop over engine radiator incl. Piping (at coolant flow above)		kPa	NA	70
		psi	NA	10,2
Coolant pressure drop over complete engine circuit cooling system (at coolant flow above)		kPa	NA	160
		psi	NA	23,2
Coolant pressure drop over complete CAC circuit cooling system (at coolant flow above)		kPa	NA	135
		psi	NA	19,6
Nominal coolant pressure before engine circuit coolant pump		kPa	NA	30
		psi	NA	4,4
Nominal coolant pressure before CAC circuit coolant pump		kPa	NA	30
		psi	NA	4,4

Cooling performance

Standard fan: Fan ratio: 1 : 1.04 Fan type: FIX

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% antifreeze.

Valid at 1 atm. (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow m ³ /s	External restriction Pa	Air flow m ³ /s	External restriction Pa
1800	63	15,2	0	15,2	0
	62	14,5	100		
	61	14,1	200		
	60	13,6	300	14,5	100
	59				
	58				
	57				
				13,9	200
				13,6	300

Note! External restrictions are calculated for values >0 Pa

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronous / droop	Isochronous
Governor droop	N/A	N/A
Governor response	Adjustable PID-constants (VODIA)	
Dual speed	Single Speed 1800rpm , 60Hz	1800,0
Idle speed	600-1200rpm	900,0
Fine speed adjustment	+90rpm	0,0
Preheating function	On / Off	Off

Engine sensor and switch settings

Parameter	Unit	Alarm level		Engine protection		
		Setting range	Default setting	Level	Action.	
Oil temp	°C	120 - 130	125	Setting +2.5	Shutdown after 10s	
Oil pressure	Low idle 900 rpm	kPa	NA	170	145	Shutdown
	1800 rpm	kPa	NA	300	275	Shutdown
Oil level		NA	Min level			
DEF dosing injection failure		NA	On	Low level	Shutdown after 10s	
Coolant temp	°C	95 - 101	103	Setting +4	Shutdown after 10s	
Coolant level		See cooling system	On	Low level	Shutdown after 10s	
Fuel feed pressure	Low idle	kPa	NA	100		
	>1400 rpm	kPa	NA	300		
Water in fuel		NA	Max level			
Crank case pressure	kPa	NA	Rapid increase	Rapid increase	Shutdown	
Air filter pressure drop	kPa	NA	5			
Altitude, above sea	m				Automatic derating, see section Smoke, Fuel & Derating	
Charge air temp	°C	NA	80	82,5	Shutdown after 10s	
Charge air pressure	kPa	NA	25 above demand	35 above demand	Shutdown after 10s	
Engine speed	rpm	100 - 120% of rated speed	115% of rated speed	Alarm level	Shutdown.	
Exhaust Temperature (before SCR volume)	°C	NA	530	550	Shutdown after 10s	

Engine protection can be disabled. For consequences please see VP International Limited Warranty Policy

Electrical system

Voltage and type	24V / insulated from earth		
Alternator:	make/output	A	Bosch / 80
	tacho output	Hz/alt. Rev	6
	drive ratio		3,94 : 1
Starter motor	make	Mitsubishi Electric	
	type	24V7.0KW12/3.175F	
	kW	7,0	
Number of teeth on:	flywheel	153	
	starter motor	12	
Max wiring resistance main circuit		mΩ	
Cranking current at +20°C		A	300
Crank engine speed at 20°C		rpm	155
Starter motor battery capacity:	max	Ah/A	2x225
	min at +5°C	Ah/A	
Inlet manifold heater (at 20 V)		kW	4,0
Power relay for the manifold heater		A	1

Power take off

		rpm	1500	1800
Front end in line with crank shaft max:		Nm	NA	NA
		lbft	NA	NA
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	NA	NA
		hp	NA	NA
	max down	kW	NA	NA
		hp	NA	NA
	max right	kW	NA	NA
		hp	NA	NA
Timing gear at compressor PTO max:		Nm	NA	NA
		lbft	NA	NA
Speed ratio direction of rotation viewed from flywheel side			0,91:1/clockwise	
Timing gear at servo pump PTO max:		Nm	NA	NA
		lbft	NA	NA
Speed ratio direction of rotation viewed from flywheel side			1,58:1/clockwise	
Timing gear at hydraulic pump PTO max:		Nm	NA	NA
		lbft	NA	NA
Speed ratio direction of rotation viewed from flywheel side				
Max allowed bending moment in flywheel housing		Nm	15000	
		lbft	11063	
Max. rear main bearing load		N	NA	NA
		lbf	NA	NA

