

VOLVO PENTA	Issue Index 04
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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 in ³	12,78 779,7	
Firing order		1-5-3-6-2-4	
Bore	mm in	131 5,16	
Stroke	mm in	158 6,22	
Compression ratio		18,1:1	
Wet weight	Engine only	kg lb	1325 2921
	Engine incl. cooling system, air filtration system, and frame	kg lb	1790 3946

Performance

			rpm	1500	1800
Prime Power	without fan	kW		313	363
		hp		426	494
	with fan	kW		303	345
		hp		412	469
Standby Power	without fan	kW		343	395
		hp		466	537
	with fan	kW		333	377
		hp		453	513
Torque at:	Prime Power	Nm		1993	1926
		lbft		1470	1420
	Standby Power	Nm		2184	2096
		lbft		1610	1545
Mean piston speed		m/s		7,9	9,5
		ft/sec		26,0	31,2
Effective mean pressure at:	Prime Power	MPa		2,0	1,9
		psi		284	275
Effective mean pressure at:	Standby Power	MPa		2,1	2,1
		psi		311	299
Max combustion pressure at:	Prime Power	MPa		17,1	17,2
		psi		2480	2495
Max combustion pressure at:	Standby Power	MPa		18,5	17,7
		psi		2683	2567
Total mass moment of inertia, J (mR ²)		kgm ²		3,43	
		lbft ²		81,4	
Friction Power		kW		30	44
		hp		40,8	59,84

Derating see Technical Diagrams

VOLVO PENTA	Issue Index 04
--------------------	--------------------------

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)	114,7	117,9
	Prime Power	dB(A)	115,8	118,2
	Standby Power	dB(A)	115,8	118,3
Calculated sound pressure Lp at 1 m	No load	dB(A)	97,7	100,9
	Prime Power	dB(A)	98,8	101,1
	Standby Power	dB(A)	98,8	101,3

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m

	rpm	1500	1800
Prime Power	dB(A)	114	118
Standby Power	dB(A)	114	118

Test conditions for load acceptance data

Warm engine.	Generator Stamford	Model HCI 444 F1	Type of AVR SX 440
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Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions.

Single step load performance at 1500 rpm

Load (%)	Speed diff (%)		Recovery time (s)		Remaining load (%)	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby		Prime	Standby	Prime	Standby
0-20	1,4	1,5	1,0	1,3	20-100	12,0	14,9	2,7	3,4
0-40	2,8	3,2	1,4	1,6	40-100	4,7	5,2	1,8	3,0
0-60	5,1	6,7	1,5	2,7	60-100	2,5	2,6	1,6	1,7
0-80	12,8	16,5	2,5	2,9	80-100	1,2	1,2	1,1	1,1
0-65	7,0		2,5		65-100	2,1		1,6	
0-74	10,0		1,6		74-100	1,5		1,3	
0-60		7,0		2,5	60-100		2,7		1,6
0-66		10,0		1,7	66-100		2,1		1,5
100-0	6,1	6,5	2,0	2,1					

Single step load performance at 1800 rpm

Load (%)	Speed diff %		Recovery time (s)		Remaining load (%)	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby		Prime	Standby	Prime	Standby
0-20	1,3	1,4	1,2	1,3	20-100	5,1	5,3	1,6	2,5
0-40	2,6	2,8	1,5	1,5	40-100	3,2	3,2	1,9	1,7
0-60	4,1	4,5	1,5	1,5	60-100	1,9	2,1	1,6	1,7
0-80	6,4	7,4	1,2	1,6	80-100	0,9	1,0	1,3	1,4
0-88	7,0		1,4		88-100	0,6		0,7	
0-100	10,0		2,8						
0-80		7,0		1,1	80-100		1,0		1,4
0-94		10,0		2,5	94-100		0,3		0,4
100-0	5,7	5,9	2,6	2,6					

VOLVO PENTA	Document No	Issue Index
		04

Cold start performance

	°C		rpm	1500	1800
Time from start to stay within 0.5% of no load speed at ambient temperature:	20	s		4,8	4,6
	5	s		5,7	5,2
	-15*	s		6,6	6,0

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

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo	2	12	10°C 50°F

Lubrication system

			rpm	1500	1800
Lubricating oil consumption	Prime Power	litre/h		0,04	0,05
		US gal/h		0,011	0,013
	Standby Power	litre/h		0,04	0,05
		US gal/h		0,011	0,013
Oil system capacity including filters		litre		36	
		US gal		9,5	
Oil sump capacity:	max	litre		30	
		US gal		7,9	
	min	litre		19	
		US gal		5,0	
Oil change intervals/specifications:	VSD3		h	600	
	VSD2		h	400	
			h	200	
Engine angularity limits:	front up		°	11	
	front down		°	11	
	side tilt		°	11	
Oil pressure at rated speed			kPa	370 - 520	
			psi	54 - 75	
Lubrication oil temperature in oil sump:	max		°C	130	
			°F	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		224	237
		lb/hph		0,363	0,384
		g/kWh		201	207
		lb/hph		0,326	0,336
	75%	g/kWh		193	200
		lb/hph		0,313	0,324
		g/kWh		191	201
		lb/hph		0,310	0,326
Standby Power Specific fuel consumption at:	25%	g/kWh		220	231
		lb/hph		0,357	0,374
		g/kWh		198	205
		lb/hph		0,321	0,332
	75%	g/kWh		193	200
		lb/hph		0,313	0,324
		g/kWh		191	201
		lb/hph		0,310	0,326

VOLVO PENTA	Issue Index 04
--------------------	--------------------------

Fuel system	rpm	1500	1800
Fuel to conform to	ASTM-D975-No1 and 2D JIS KK 2204, EN 590		
System supply flow at:	litre/h	115	130
	US gal/h	30,4	34,3
Fuel supply line max restriction (Measured at fuel inlet connection)	kPa	30,0	30,0
	psi	4,4	4,4
Fuel supply line max pressure, engine stopped	kPa	20,0	20,0
	psi	2,9	2,9
System return flow	litre/h	18,0	18,0
	US gal/h	4,8	4,8
Fuel return line max restriction (Measured at fuel return connection)	kPa	20,0	20,0
	psi	2,9	2,9
Maximum allowable inlet fuel temp (Measured at fuel inlet connection)	°C	50	50
	°F	122	122
Prefilter / Water separator micron size	μ	10	
Fuel filter micron size	μ	5	
Governor type/make, standard	Volvo / EMS 2.2		
Injection pump type/make	Delphi E3		

Intake and exhaust system		rpm	1500	1800
Air consumption at: (+25°C and 100kPa)	Prime Power	m ³ /min	24,6	28,7
		cfm	869	1014
	Standby Power	m ³ /min	25,9	28,7
		cfm	915	1014
Max allowable air intake restriction including piping		kPa	5	5
		psi	0,7	0,7
Air filter restriction clean Volvo Penta filter		kPa	0,8	1,2
		psi	0,1	0,2
Heat rejection to exhaust at:	Prime Power	kW	195	253
		BTU/min	11089	14388
	Standby Power	kW	213	287
		BTU/min	12113	16321
Exhaust gas temperature after turbine at:	Prime Power	°C	395	432
		°F	743	810
	Standby Power	°C	408	481
		°F	766	898
Max allowable back pressure in exhaust line	Prime Power	kPa	9	9
		psi	1,3	1,3
	Standby Power	kPa	10	10
		psi	1,5	1,5
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	Prime Power	m ³ /min	53,8	65,0
		cfm	1900	2295
	Standby Power	m ³ /min	57,0	69,5
		cfm	2013	2454

VOLVO PENTA		Issue Index 04
--------------------	--	--------------------------

Cooling system		rpm	1500	1800
Heat rejection radiation from engine at:	Prime Power	kW BTU/min		
	Standby Power	kW BTU/min		
Heat rejection to coolant at:	Prime Power	kW BTU/min	134 7620	159 9042
	Standby Power	kW BTU/min	144 8189	172 9781
Radiator cooling system type		Closed circuit		
Standard radiator core area		m ² foot ²	0,8 8,61	
Fan diameter		mm in	890 35,04	
Fan power consumption - LOW fan ratio		kW hp	6 8	11 15
Fan power consumption - STD fan ratio		kW hp	10 14	18 24
Fan drive ratio - LOW			0,84 : 1	
Fan drive ratio - STD			0,99 : 1	
Coolant capacity,	engine	litre US gal	20 5,28	
	std radiator and hoses	litre US gal	24 6,34	
Coolant pump		drive/ratio	Belt / 1,43 :1	
Coolant flow with standard system		l/s US gal/s	5 1,32	5,5 1,45
Minimum coolant flow		l/s US gal/s	4,1 1,08	5,0 1,32
Maximum outer circuit restriction, including piping		kPa psi	40 5,8	55 8,0
Thermostat	start to open	°C	82	
		°F	180	
	fully open	°C	92	
		°F	198	
Maximum static pressure head (expansion tank height + pressure cap setting)		kPa psi	100 14,5	
Minimum static pressure head (expansion tank height + pressure cap setting)		kPa psi	70 10,2	
Standard pressure cap setting		kPa psi	70 10,2	
Maximum top tank temperature		°C °F	107 225	
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		litre US gal	1,8 0,48	

VOLVO PENTA	Issue Index 04
--------------------	--------------------------

Charge air cooler system		rpm	1500	1800
Heat rejection to charge air cooler	Prime Power	kW	64	81
		BTU/min	3640	4606
	Standby Power	kW	72	80
		BTU/min	4095	4550
Charge air mass flow	Prime Power	kg/s	0,47	0,55
	Standby Power	kg/s	0,49	0,55
Charge air inlet temp. (Charge air temp after turbo compressor)	Prime Power	°C	181	197
		°F	358	387
	Standby Power	°C	193	197
		°F	379	387
Charge air outlet temp. (Charge air temp after intercooler)	Prime Power	°C	44	44
		°F	111	111
	Standby Power	°C	45	45
		°F	113	113
Maximum pressure drop over charge air cooler incl. piping		kPa	8	
		psi	1,16	
Charge air pressure (After charge air cooler)		kPa	220	
		psi	31,91	
Standard charge air cooler core area		m ²	0,89	
		foot ²	9,58	

Cooling performance

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. 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
1500 (STD 0,99)	60			5,8	250
	63	5,7	310	6,3	103
	65	6,1	180	6,7	0
	68	6,7	0		
1800 STD (0,99)	60			7,3	340
	62	7,1	424	7,7	168
	64	7,6	210	8,2	0
	66	8,2	0		
1500 (LOW 0,84)	52			4,8	202
	55	4,5	280	5,2	82
	58	4,9	186	5,5	0
	62	5,5	0		
1800 (LOW 0,84)	52			6,1	235
	55	6,1	235	6,6	60
	57	6,4	105	6,8	0
	59	6,8	0		

Note! External restrictions are calculated for values >0 Pa

VOLVO PENTA	Issue Index 04
--------------------	--------------------------

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Isochronus
Governor droop	0-8 %	0,0
Governor response	Adjustable PID-constants (VODIA)	Standard
Dual speed	YES	1500 or 1800
Idle speed	600-1200	900
Fine speed adjustment	± 120	0
Stop function	Energized to Run / Stop	Energized to Stop
Preheating function	On / Off	On
Lamp test	On / Off	On

Engine sensor and switch settings

Parameter	Unit	Alarm level		Engine protection		
		Setting range	Default setting	Level	Action. Default/Alternative	
Oil temp	°C	120 - 130	125	Setting +5	Shut down.	
Oil pressure	Low idle	kPa	-	190,0	-30,0	Shut down.
	1500 rpm	kPa	-	250,0	-30,0	Shut down.
	1800 rpm	kPa	-	300,0	-30,0	Shut down.
Oil level		-	Min level	-	-	
Piston cooling pressure >1000 rpm	kPa	-	150	150,0	Shut down.	
Coolant temp	°C	95 - 103	102	Setting +5	Shut down.	
Coolant level		See cooling system	On	Low level		
Fuel feed pressure	Low idle	kPa	-	100	-	-
	>1400 rpm		-	200	-	-
Water in fuel		-	High level	-	-	
Crank case pressure	kPa	-	Increased pressure	Increased pressure	Shut down.	
Air filter pressure droop	kPa	-	5	-	-	
	0,0		Alarm level		Engine protection	
Altitude, above sea	m	-	-	-	Automatic derating, see section derating	
Charge air temp	°C	-	80	85	Shut down.	
Charge air pressure	1500 rpm	kPa	-	360	370	Shut down.
	1800 rpm	kPa	-	350	360	Shut down.
Engine speed	rpm	100 - 120% of rated speed	120% of rated speed	Alarm level	Shut down.	

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

VOLVO PENTA	Document No	Issue Index
		04

Electrical system

Voltage and type		24V / insulated from earth	
Alternator:	make/output	A	Bosch 80 A
	tacho output	Hz/alt. Rev	6
	drive ratio		5,3:1
Starter motor	make	Melco	
	type	105P70	
	kW	7,0	
Number of teeth on:	flywheel	153	
	starter motor	12	
Max wiring resistance main circuit		mΩ	2
Cranking current at +20°C		A	180
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

lb 2921 0

Front end in line with crank shaft max:		Nm	-	
		lbft		
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	-	-
		hp		
	max down	kW	-	-
		hp		
Timing gear at compressor PTO max:		lbft	118	
Speed ratio direction of rotation viewed from flywheel side		0,91:1/clockwise		
Timing gear at servo pump PTO max:		Nm	100	
		lbft	74	
Speed ratio direction of rotation viewed from flywheel side		1,58:1/clockwise		
Timing gear at hydraulic pump PTO max:		Nm		
		lbft		
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	4000	
		lbf	899,2	

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