

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	1325
		lb	2921
	Engine incl. cooling system and air filtration system	kg lb	1596 3519
	Engine incl. cooling system, air filtration system, and frame	kg lb	1790 3946

Performance

			rpm	1500	1800
Standby Power	without fan	kW		372	395
		hp		506	537
	with fan	kW		361	376
		hp		491	511
Prime Power	without fan	kW		339	363
		hp		461	494
	with fan	kW		328	344
		hp		446	468
Torque at:	Standby Power	Nm		2368	2096
		lbft		1747	1545
	Prime Power	Nm		2158	1926
		lbft		1592	1420
Mean piston speed		m/s		7,9	9,5
		ft/sec		26,0	31,2
Effective mean pressure at:	Standby Power	MPa		2,3	2,1
		psi		338	299
Effective mean pressure at:	Prime Power	MPa		2,1	1,9
		psi		308	275
Max combustion pressure at:	Standby Power	MPa		17,8	15,8
		psi		2582	2292
Max combustion pressure at:	Prime Power	MPa		16,9	15,1
		psi		2451	2190
Total mass moment of inertia, J (mR ²)		kgm ²		3,43	
		lbft ²		81,4	
Friction Power		kW		31	44
		hp		42,16	59,84
Derating 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)	113,8	111,3
	Standby Power	dB(A)	115,4	114,4
	Prime Power	dB(A)	115,3	114
Calculated sound pressure Lp at 1 m	No load	dB(A)	102,8	100,3
	Standby Power	dB(A)	104,4	103,4
	Prime Power	dB(A)	104,3	103

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m

	rpm	1500	1800
Standby Power	dB(A)	114	118
Prime Power	dB(A)	113	118

Test conditions for load acceptance data

Warm engine.	Generator	Model	Type of AVR
	Stamford	HCI 434 F1	MX 341
AVR Settings	Frequency:50/60HZ, Voltage:400/440V, UFRO:47/57Hz, STAB:50/70%, DIP:50/50%		

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	1,7	1,9	1,1	1,3	20-100	13,0	13,9	2,7	2,8
0-40	3,2	3,7	1,4	1,5	40-100	5,8	5,1	1,7	1,9
0-55		7,0		2,2	55-100		3,1		1,7
0-57	7,0		1,9		57-100	2,8		1,7	
0-60	7,9	8,3	2,0	2,4	60-100	2,5	2,8	1,4	1,5
0-66		10,0		2,6	66-100		2,4		1,4
0-69	10,0		2,4		69-100	2,1		1,3	
0-80	13,8	15,2	2,5	2,8	80-100	1,3	1,3	1,1	1,2
0-100	20,9	27,6	3,7	4,8					
100-0	-5,3	-6,0	1,6	1,6					

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	1,6	1,8	0,9	0,9	20-100	7,4	7,5	1,7	2,2
0-40	3,0	3,1	1,1	1,2	40-100	4,1	4,9	1,2	2,1
0-60	4,7	5,5	1,0	1,0	60-100	2,9	3,7	1,0	1,5
0-70		7,0		1,3	70-100		2,1		1,0
0-77,5	7,0		1,3		77,5-100	1,4		0,8	
0-80	7,8	9,4	1,3	1,7	80-100	1,1	1,2	0,7	0,7
0-82		10,0		1,8	82-100		1,2		0,6
0-90,5	10,0		1,7		90,5-100	0,6		0,0	
0-100	11,7	13,5	2,2	2,7					
100-0	-3,7	-3,8	1,5	1,5					

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Cold start performance

	°C	rpm	1500	1800
Time from start to stay within 0.5% of no load speed at ambient temperature:	20	s	5,2	5,7
	5	s	6,0	6,4
	-15*	s	6,2	7,0
	-30**	s	7,3	9,1

* 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	2	12	10°C 50°F

Lubrication system

		rpm	1500	1800
Lubricating oil consumption	Standby Power	litre/h	0,04	0,05
		US gal/h	0,011	0,013
	Prime 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:	VDS 3	h	600	
	VDS 2	h	400	
		h		
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	40,000	

* See also general section in the sales guide

Fuel system		rpm	1500	1800
Standby Power Specific fuel consumption at:	25%	g/kWh lb/hph	239 0,387	253 0,410
	50%	g/kWh lb/hph	216 0,350	214 0,347
	75%	g/kWh lb/hph	206 0,334	210 0,340
	100%	g/kWh lb/hph	199 0,323	208 0,337
Prime Power Specific fuel consumption at:	25%	g/kWh lb/hph	241 0,391	252 0,408
	50%	g/kWh lb/hph	216 0,350	218 0,353
	75%	g/kWh lb/hph	204 0,331	209 0,339
	100%	g/kWh lb/hph	196 0,318	205 0,332

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		106,0	116,0
	US gal/h		28,0	30,6
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		0,0	0,0
	psi			
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		60	60
	°F		140	140
Prefilter / Water separator micron size	μ		10,000	
Fuel filter micron size	μ		5,000	
Governor type/make, standard	Volvo / EMS 2.2			
Injection pump type/make	Delphi E3.18			

Intake and exhaust system

		rpm	1500	1800
Air consumption at: (+25°C and 100kPa)	Standby Power	m ³ /min cfm	24 848	26 918
	Prime Power	m ³ /min cfm	22 777	26 918
Max allowable air intake restriction including piping		kPa psi	5 0,7	5 0,7
Air filter restriction clean Volvo Penta filter		kPa psi		
Heat rejection to exhaust at:	Standby Power	kW BTU/min	251 14274	300 17061
	Prime Power	kW BTU/min	225 12796	269 15298
Exhaust gas temperature after turbine at:	Standby Power	°C °F	500 932	535 995
	Prime Power	°C °F	470 878	470 878
Max allowable back pressure in exhaust line	Standby Power	kPa psi	10 1,5	10 1,5
	Prime Power	kPa psi	8 1,2	8 1,2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	Standby Power	m ³ /min cfm	59,0 2084	67,7 2391
	Prime Power	m ³ /min cfm	54,8 1935	62,7 2214

Cooling system

		rpm	1500	1800
Heat rejection radiation from engine at:	Standby Power	kW	13	9
		BTU/min	739	512
	Prime Power	kW	12	8
		BTU/min	682	455
Heat rejection to coolant at:	Standby Power	kW	152	177
		BTU/min	8644	10066
	Prime Power	kW	146	164
		BTU/min	8303	9327
Radiator cooling system type		Closed circuit		
Standard radiator core area		m ²	0,8	
		foot ²	8,61	
Fan diameter		mm	890	
		in	35,04	
Fan power consumption		kW	11	19
		hp	15	26
Fan drive ratio		0.99:1		
Coolant capacity,	engine	litre	20	
		US gal	5,28	
	engine with std radiator and hoses	litre	24	
		US gal	6,34	
Coolant pump		drive/ratio	Belt / 1.43:1	
Coolant flow with standard system		l/s	5	5,5
		US gal/s	1,32	1,45
Minimum coolant flow		l/s	4,7	5,0
		US gal/s	1,24	1,32
Maximum outer circuit restriction, including piping		kPa	29	40
		psi	4,2	5,8
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	100	
		psi	14,5	
Minimum static pressure head (expansion tank height + pressure cap setting)		kPa	70	
		psi	10,2	
Standard pressure cap setting		kPa	75	
		psi	10,9	
Maximum top tank temperature		°C	107	
		°F	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 is functioning		litre	1,8	
		US gal	0,48	

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Charge air cooler system

		rpm	1500	1800
Heat rejection to charge air cooler	Standby Power	kW	79	87
		BTU/min	4493	4948
	Prime Power	kW	68	83
		BTU/min	3867	4720
Charge air mass flow	Standby Power	kg/s	0,46	0,5
	Prime Power	kg/s	0,44	0,49
Charge air inlet temp. (Charge air temp after turbo compressor)	Standby Power	°C	213	215
		°F	415	419
	Prime Power	°C	195	208
		°F	383	406
Charge air outlet temp. (Charge air temp after intercooler)	Standby Power	°C	51	45
		°F	124	113
	Prime Power	°C	48	43
		°F	118	109
Maximum pressure drop over charge air cooler incl. piping		kPa	8	
		psi	1,16	
Charge air pressure (After charge air cooler)		kPa	264	
		psi	38,29	
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	40				
	54			5,7	260
	56	5,5	340	6,1	140
	58	5,9	205	6,6	0
	61	6,6	0		
1800	40	4,5	1350	5,0	1140
	50	4,9	1170	5,5	975
	55	5,6	940	6,2	685
	60	6,6	510	7,1	250
	61			7,7	0
	65	7,7	0		

Note! External restrictions are calculated for values >0 Pa

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Isochronus
Governor droop	0-8 %	4,0
Governor response	Adjustable PID-constants (VODIA)	Standard
Dual speed	1500 / 1800 rpm	According to customer
Idle speed	600-1200 rpm	900 rpm
Fine speed adjustment	± 120 rpm	0,0
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	-	150,0	120,0	Shut down
	1500 rpm	kPa	-	250,0	220,0	Shut down
	1800 rpm	kPa	-	300,0	270,0	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		-	On	Low level	Shut down.	
Fuel feed pressure	Low idle	kPa	-	150	-	-
	>1400 rpm		-	300	-	-
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	85,0		
Charge air pressure	kPa	-	310	320,0		
Engine speed	rpm	100 - 120% of rated speed	120%	Alarm level	Shut down.	

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

Electrical system

Voltage and type		24 V / insulated from earth	
Alternator:	make/output	A	Bosch / 80
	tacho output	Hz/alt. Rev	6
	drive ratio		5.3 : 1
Starter motor	make	Melco	
	type	105 P70	
	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	280
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 lbft	-	
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW hp	-	-
	max down	kW hp	-	-
	max right	kW hp	-	-
Timing gear at compressor PTO max:		Nm lbft	160 118	
Speed ratio direction of rotation viewed from flywheel side			1.31:1/ccw	
Timing gear at servo pump PTO max:		Nm lbft	100 74	
Speed ratio direction of rotation viewed from flywheel side			1.75:1 / ccw	
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 lbft	15000 11063	
Max. rear main bearing load		N lbf	4000 899,2	









