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General

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

Number of cylinders			6
Displacement, total		liters in^3	12,13 740
Firing order			1-5-3-6-2-4
Bore		mm in	131 5,16
Stroke		mm in	150 5,91
Compression ratio			18,1 : 1
Dry weight	Engine only, excluding cooling system	kg lb	1220 2690
	Power pac	kg lb	-
Wet weight	Engine only, excluding cooling system	kg lb	1270 2800
	Power pac	kg lb	-

Performance		**r/min**	**1500**	**1600**	**1800**	**1900**
313 kW	without fan	kW hp	300 408	307 418	313 426	280 381
	with fan 890 mm	kW hp	287 390	292 397	293 398	257 350
Torque at:		Nm lbf ft	1910 1409	1832 1351	1661 1225	1407 1038
Max torque at engine speed	rpm 1200	Nm lbf ft	2100 1549			
Mean piston speed		m/s ft/sec	7,5 24,6	8,0 26,2	9,0 29,5	9,5 31,2

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Performance		**r/min**	**1500**	**1600**	**1800**	**1900**
Effective mean pressure at:		Mpa	1,96	1,90	1,70	1,43
		psi	284	275	247	207
Max combustion pressure at:		Mpa	16,5	16,5	15,9	14,3
		psi	2393	2393	2306	2074
Total mass moment of inertia, J (mR^2)		kgm²	3,64			
		lbft²	86,4			
Degree of irregularity at:					1:57	
Friction Power		kW	29	33	41	45
		hp	39	45	56	61

Cold start performance

*Coldstart ambient temperature limit and time from start to no load speed	without starting aid	°C / sec. °F / sec.	-20 / 16 sec. -4
	with manifold heater 4,0 kW	°C / sec. °F / sec.	-20 / 11 sec. -4
	with manifold heater 4,0 kW and block heater	°C / sec. °F / sec.	-20 / 3 sec. -4

* With lubrication oil 15W/40.

Ambient temp. °C	Block heater type and Make	Power kW	Engaged hours	Cooling water temp engine block
-15	Self circulating Volvo 3828643	2	12	26°C
-22	Self circulating Volvo 3828643	2	12	24°C

Lubrication system			**r/min**	**1500**	**1600**	**1800**	**1900**
Lubricating oil consumption at max rpm at:			liter/h	0,08			
			US gal/h	0,021			
Oil system capacity including filters			liter	35			
			US gal	9,25			
Oil sump capacity:		Max	liter	31			
			US gal	8,19			
		Min	liter	19			
			US gal	5,02			
Oil change intervals/specifications	VDS-3		h	600			
	VDS-2		h	400			
	VDS, ACEA, E3*		h	200			

* See also general section in the sales guide

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Lubrication system

Engine angularity limits, standard:	front up	°	11
	front down	°	11
	side tilt	°	11
Oil pressure at rated speed		kPa	400 - 550
		psi	58 - 80
Oil pressure derate switch setting at rated speed		kPa	225
		psi	33
Lubrication oil temperature in sump:	max	°C	130
		°F	266
Oil filter micron size		mm	0,040

Fuel system		**r/min**	**1500**	**1600**	**1800**	**1900**
Specific fuel consumption at:	25%	g/kWh	234	249	270	284
		lb/hph	0,379	0,404	0,438	0,460
	50%	g/kWh	220	222	231	258
		lb/hph	0,357	0,360	0,374	0,418
	75%	g/kWh	208	214	221	249
		lb/hph	0,337	0,347	0,358	0,403
	100%	g/kWh	196	204	213	224
		lb/hph	0,318	0,331	0,345	0,363
Fuel to conform to			ASTM-D975-No2, DIN 51601, EN 590			
System return flow at max. speed		liter/h	12			
		US gal/h	3,2			
System supply flow at max. speed		liter/h	150			
		US gal/h	39,6			
Fuel supply line max. restriction		kPa	15			
		psi	2,2			
Fuel supply line max. pressure, engine stopped		kPa	0			
		psi	0,0			
Fuel return line max. restriction		kPa	30			
		psi	4,4			
Max. allowable inlet fuel temp		°C	60			
		°F	140			
Prefilter / Waterseparator micron size		mm	0,010			
Governor type/make, standard			Electronic / Volvo EMS 2			
Injection pump type/make			Delphi E3			

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Intake and exhaust system	**Inlet air temp**	**r/min**	**1500**	**1600**	**1800**	**1900**
Air consumption at:		m^3/min	21,8	22,6	24,4	24,4
		cfm	770	798	862	862
Max allowable air intake restriction including piping.		kPa	5			
		ln wc	20,1			
Air filter type			Single stage paper cartridge			
Air filter cleaning efficiency		%	99,85			
Heat rejection to exhaust at:		kW	207	228	246	237
		BTU/min	11772	12966	13990	13478
Exhaust gas temperature after turbine at:		°C	434	456	458	444
		°F	813	853	856	831
Max allowable back pressure in exhaust line		kPa			15,0	15,0
		ln wc			60,2	60,2
Exhaust gas flow at:		m^3/min	51,4	54,8	58,6	57,5
		cfm	1815	1935	2069	2031
Exhaust gas smoke		*Bosch	0,2	0,4	0,5	0,7

***N.B!** Bosch units are calculated values. Measured values are acc. to ISO 10054 in FSN units

Cooling system	**r/min**	**1500**	**1600**	**1800**	**1900**
Heat rejection radiation from engine at:	kW	20	25	28	20
	BTU/min	1137	1422	1592	1137
Heat rejection to coolant at:	kW	110	117	133	140
	BTU/min	6256	6654	7564	7962
Coolant	Volvo coolant together with clean fresh water or Volvo ready mix.				
Radiator cooling system type		Closed circuit			

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Cooling system			**r/min**	**1500**	**1600**	**1800**	**1900**
Standard radiator core area			m²	0,8			
			foot²	8,61			
Standard radiator core thickness			mm	50			
			in	1,97			
Fan diameter	890 mm		mm	890			
			in	35,04			
	750 mm		mm	750			
			in	29,53			
Fan power consumption	890 mm		kW	13,0	15,0	20,0	23,0
			hp	18	20	27	31
	750 mm		kW				
			hp	*See fan 750 characteristic			
Fan drive ratio	fan Ø890			1,0 : 1			
	fan Ø750			1,08 : 1			
Coolant capacity:	engine		liter	20			
			US gal	5,3			
	std PP radiator with hoses		liter	24			
			US gal	6,3			
Coolant pump			drive/ratio	gear / 1,41:1			
Coolant flow with standard system			l/s	4,7	5,1	5,7	6,1
			US gal/s	1,2	1,3	1,5	1,6
Minimum coolant flow			l/s	4,7	5,1	5,7	6,1
			US gal/s	1,2	1,3	1,5	1,6
Maximum external coolant system restriction incl. piping			kPa	30,0			
			In wc	120,5			
Thermostat:		start to open	°C	82			
			°F	180			
		fully open	°C	95			
			°F	203			
Maximum static pressure head (expansion tank height + pressure cap setting)			kPa	100			
			in wc	402			
Minimum static pressure head (expansion tank height + pressure cap setting)			kPa	70			
			in wc	281			
Standard pressure cap setting			kPa	75			
			In wc	301			
Maximum top tank temperature			°C	103			
			°F	217			
Minimum temperature entering engine			°C	68			
			°F	154			
Draw down capacity			6% of total cooling system capacity				

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Charge air cooler system		**r/min**	**1500**	**1600**	**1800**	**1900**
Heat rejection to charge air cooler		kW	64	71	75	71
		BTU/min	3640	4038	4265	4038
Charge air mass flow		kg/s	0,422	0,438	0,472	0,473
Charge air inlet temp.		°C	184	196	203	197
(Charge air temp after turbo compressor)		°F	363	385	397	387
Max allowable Comb. Air temp after CAC at 25 degree ambient.		°C	50			
(Charge air temp after intercooler)		°F	122			
Maximum pressure droop over intercooler, incl. Piping at 1800rpm.		kPa	10			
		psi	1,45			
Boost pressure at 1800rpm		kPa	242			
		psi	35,10			
Standard intercooler core area		m²	0,8			
		foot²	8,61			
Standard intercooler core thickness		mm	68			
		in	2,68			

Cooling performance: 0,8 m² radiator and 890 fan

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 103°C TTT and 40% antifreeze

Engine speed	Engine power	Air on temp		Air flow		External restriction	
	kW						
rpm	hp	°C	°F	kg/s	lb/s	Pa	psi
1900	280	65	149	8,85	19,5	0	
	381	60	140	7,42	16,4	571	0,083
		55	131	6,41	14,1	975	0,141
		50	122	5,65	12,5	1279	0,186
		45	113	5,05	11,1	1520	0,220
		40	104	4,57	10,1	1720	0,249

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Cooling performance: 0,8 m² radiator and 890 fan

Cooling air flow and external restriction at different radiator air temperatures based on 103°C TTT and 40% antifreeze

Engine speed	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	kg/s	lb/s	Pa	psi
1800	313	63	145	7,93	17,5	0	
	426	60	140	7,1	15,7	349	0,051
		55	131	6,15	13,6	739	0,107
		50	122	5,43	12,0	1032	0,150
		45	113	4,86	10,7	1263	0,183
		40	104	4,4	9,7	1452	0,211

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Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronous/droop Switchable during operation	Isochronous
Governor droop	1rpm / 10Nm - 1rpm / 125Nm	
Governor response	Adjustable PID-constans	
Idle speed	600 - 900	700 rpm
Stop function	Energized to run / stop	Energized to stop
Preheating function	ON/OFF	OFF
Lamp test	ON/OFF	ON

Engine protection			Alarm level		Engine protection	
Parameter		Unit	Setting range	Default setting	Level	Action. Default/Alternative
Oil temp		°C	120 - 130	125	Setting +3	Torque Reduction
Oil pressure	Low idle	kPa	-	160	Default -30	Torque Reduction
	Rated speed	kPa	-	225	Default -30	Torque Reduction
Oil level			-	Min level	-	-
Piston cooling pressure >1000 rpm		kPa	-	-	-	Torque Reduction
Coolant temp		°C	95 - 101	98	Setting +7	Torque Reduction
Coolant level			-	On	Low level	Torque Reduction
Fuel feed pressure	Low idle	kPa	-	100	-	-
	Rated speed		-	300	-	-
Water in fuel			-	High level	-	-
Crank case pressure		kPa	Rapid increase of Press	-	-	Torque Reduction
Air filter pressure drop		kPa		5		
Altitude, above sea		m				Automatic derating, see section derating
Charge air temp		°C	-	80	90	Torque Reduction
Charge air pressurer		kPa	-	325	350	Torque Reduction
Engine speed		rpm	100 - 120% of maximum speed	115% of maximum speed	-	-
Low voltage		V	-	25,5	-	-

Derating NB! If applicable, describe derating according to the engine control system's functionality.

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Electrical system

Voltage and type				24V / Insulated from earth
Alternator:	make			Bosch
	output	Amp		80
	tacho output	Hz/alternator rev.		6
	drive ratio			3,95:1
Starter motor:		make		Melco
		type		M009T82179
		output	kW	7
			hp	9,5
Starter motor solenoid:		pull current	Amp	< 2
		hold current	Amp	-
Number of teeth on:		flywheel		156
		starter motor		12
Inrush current at +20°C			Amp	1500-1650
Cranking current at +20°C			Amp	400
Crank engine speed at 20°C			rpm	500
Starter motor battery capacity		max	Ah	2x143 570A DIN
		min at +5°C	Ah	2x88 400A DIN
Inlet manifold heater (at 20 V)			kW	4,0
Power relay for the manifold heater			Amp	1,0

Power take off		**r/min**	**1500**	**1600**	**1800**	**1900**
Front end in line with crank shaft max (Without damper):		Nm	600			
		lbf ft	443			
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	30		30	
		hp	41		41	
	max down	kW	19		31	
		hp	26		42	
	max right	kW	30		30	
		hp	41		41	
Timing gear at compressor PTO max:		Nm	140			
		lbf ft	103			
Speed ratio direction of rotation viewed from flywheel side			1,31 : 1 anti-clockwise			
Timing gear at servo pump PTO max:		Nm	40			
		lbf ft	30			
Speed ratio direction of rotation viewed from flywheel side			1,65 : 1 anti-clockwise			
Timing gear at hydraulic pump PTO max:		Nm	400			
		lbf ft	295			
Speed ratio direction of rotation viewed from flywheel side			0,97 : 1 anti-clockwise			
Max. rear main bearing load		N	4000			