General

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

Number of cylinders			4
Displacement, total		litre in^3	4,76 290,7
Firing order			1-3-4-2
Bore		mm in	108 4,25
Stroke		mm in	130 5,12
Compression ratio			18:1
Dry weight	Engine and cooling package	kg lb	575 1268
Wet weight	Engine and cooling package	kg lb	606 1336
	SAE2	kg lb	36 79

Performance		**r/min**	**1500**	**1800**
Standby Power	without fan	kW hp	89 121	95 129
	with fan high temp	kW hp	83,1 113	84,8 115
Prime Power	without fan	kW hp	80,9 110	86,4 118
	with fan high temp	kW hp	75 102	76,2 104
Torque at:	Standby Power	Nm lbft	567 418	504 372
	Prime Power	Nm lbft	515 380	458 338
Mean piston speed		m/s ft/sec	6,5 21,4	7,8 25,7
Effective mean pressure at:	Standby Power	MPa psi	1,5 217	1,3 193
Max combustion pressure at:	Standby Power	MPa psi	12,9 1871	12,8 1856
Total mass moment of inertia, J (mR2)		kgm^2 $lbft^2$	1,43 33,9	
Residual speed droop at load increase from 0 to 100%		%	≤ 5	
Friction Power		kW hp	6,0 8,16	8,6 11,696

Engine noise emission

Test Standards: ISO 3744-1981 (E)
sound power (without fan, intake and exhaust noise)
Tolerans ± 0.75 dB(A)

		r/min	1500	1800
Measured sound power Lw	No load	dB(A)	99,5	101
	Standby Power	dB(A)	102,5	104
	Prime Power	dB(A)	102,5	104
Calculated sound pressure Lp at 1 m	No load	dB(A)	86,5	88
	Standby Power	dB(A)	89,5	91
	Prime Power	dB(A)	89,5	91

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m	r/min	1500	1800
Standby Power	dB(A)	108	108
Prime Power	dB(A)	107,5	108

Load acceptance

Test condition: Warm engine. 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 - EDC4

Load (%)	Speed diff (%)		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-40	4,0	4,5	1,5	2,0	40-100	7,0	9,5	3,0	10,0
0-50	6,0	6,5	2,0	2,0	50-100	6,0	6,5	3,0	4,0
0-60	7,0	7,5	2,0	2,0	60-100	5,0	5,5	2,5	3,5
0-75	8,0	9,0	2,5	3,0	75-100	3,0	3,5	2,0	5,0
0-100	14,0	18,0	4,0	15,5					
100-0	6,0	6,5	1,5	2,0					

Single step load performance at 1800 rpm - EDC4

Load (%)	Speed diff %		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-40	3,0	3,5	1,0	1,5	40-100	4,0	4,5	1,5	2,5
0-50	3,5	4,0	1,5	1,5	50-100	3,0	3,5	1,5	2,5
0-60	4,0	4,5	1,5	1,5	60-100	2,5	2,5	1,5	2,5
0-75	5,0	5,5	1,5	2,0	75-100	2,0	2,0	1,5	2,0
0-100	7,0	7,5	2,0	3,0					
100-0	6,5	6,0	1,5	1,5					

Single step load performance at 1500 rpm - mech

Load (%)	Speed diff (%)		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-75	6,3		0,4						
0-100	15,8		2,4						
100-0	6,7		1,1						

Single step load performance at 1800 rpm - mech

Load (%)	Speed diff %		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-75	5,4		0,4						
0-100	9,0		2,7						
100-0	5,7		0,3						

Cold start performance		1500/1800
Cold start limit temperature	°C	-15
		-30*

* With manifold heater engaged, lubrication oil 15W/40.

Derating, mechanical governer
The engine may be operated up to 1000 m altitude and 40°C ambient air temperature without derating. For operation at higher altitudes and temperatures the power should be derated according to the following factors:

Altitude derating factor < 3000 m	% / m	4 / 500
Altitude derating factor > 3000 m	% / m	6 / 500
Ambient temperature derating factor	% / °C	3 / 5°C
Humidity	%	No derating

Derating, electronic governer
The engine may be operated up to 1000 m altitude and 40°C ambient air temperature without derating. For applications above 1000 m an ECU with automatic derating must be used. For operations with air ambient temperature over 40°C, see mechanical governor.

Lubrication system		**r/min**	**1500**	**1800**
Lubricating oil consumption	Standby Power	liter/h	0,08	0,08
		US gal/h	0,021	0,021
Oil system capacity including filters		liter	13	
		US gal	3,4	
Oil sump capacity:	max	liter	11	
		US gal	2,9	
	min	liter	9	
		US gal	2,4	
Oil change intervals/specifications:				
VDS-2. ACEA: E3, E5. API: CG-4, CH-4*		h	500	
Engine angularity limits:	front up	°	30	
	front down	°	30	
	side tilt	°	30	
Oil pressure at rated speed		kPa	450 - 480	
		psi	65 - 70	
Oil pressure shut down switch setting		kPa	200	
		psi	29	
Lubrication oil temperature:	normal	°C	110	
		°F	230	
	max	°C	125	
		°F	257	
Oil filter micron size		mm	0,040	

* See also general information in Sales Support Tool

Fuel system		r/min	1500	1800
Standby Power	25%	g/kWh	263	286
Specific fuel consumption at:		lb/hph	0,426	0,464
	50%	g/kWh	226	235
		lb/hph	0,366	0,381
	75%	g/kWh	218	222
		lb/hph	0,353	0,360
	100%	g/kWh	218	219
		lb/hph	0,353	0,355
Prime Power	25%	g/kWh	276	302
Specific fuel consumption at:		lb/hph	0,447	0,490
	50%	g/kWh	231	240
		lb/hph	0,374	0,389
	75%	g/kWh	219	223
		lb/hph	0,355	0,361
	100%	g/kWh	217	219
		lb/hph	0,352	0,355

Fuel system	r/min	1500	1800
Recommended fuel to conform to	ASTM-D975-No1 and 2-D JIS KK 2204, EN 590		
Total fuel flow	liter/h	360	450
	US gal/h	95	119
Feed pump pressure	kPa	500 - 550	
	psi	73 - 80	
Feed pump max suction head	m	1,5	
	foot	4,9	
Fuel filter micron size	mm	0,005	
Prefilter / Water separator	mm	0,063	
Governor type/make, standard	Heinzman / EDC4		
Injection pump type/make	PFM 1 P100 S 2005/Bosch		

Intake and exhaust system			r/min	1500	1800
Air consumption at:	Standby Power	27°C 81°F	m^3/min cfm	5,54 196	7 247
	Prime Power	27°C 81°F	m^3/min cfm	5,12 181	6,5 230
Air intake restriction, clean filter(s)			kPa in wc	1 4,0	1 4,0
Max allowable air intake restriction			kPa in wc	3,5 14,1	3,5 14,1
Air filter type			Single stage paper cartridge		
Air filter cleaning efficiency			%	99,85	
Heat rejection to exhaust at:		Standby Power	kW BTU/min	75 4265	75 4265
		Prime Power	kW BTU/min	66 3753	69 3924
Exhaust gas temperature after turbine at:		Standby Power	°C °F	540 1004	496 925
		Prime Power	°C °F	527 981	484 903
Max allowable back pressure in exhaust line			kPa In wc	5 20,1	7 28,1
Exhaust gas flow at:		Standby Power	m^3/min cfm	16,3 575	19,2 678
		Prime Power	m^3/min cfm	14,9 524	17,4 615
Heat rejection to cac:		Standby Power	kW BTU/min	10,0 569	17,0 967
		Prime Power	kW BTU/min	9,0 512	16,0 910

Cooling system			r/min	1500	1800
Heat rejection radiation from engine at:		Standby Power	kW BTU/min	9 512	10 569
		Prime Power	kW BTU/min	8 455	9 512
Heat rejection to coolant at:		Standby Power	kW BTU/min	48 2730	52 2957
		Prime Power	kW BTU/min	43 2445	48 2730
Recommended coolant		Volvo coolant or Volvo anticorrosion additive together with clean fresh water			
Radiator cooling system type			Closed circuit		
Radiator core area (std. size)			m² foot²	0,29 3,12	
Radiator core thickness (std. size) - low temp cooling package			mm in	62 2,44	
Fan diameter - low temp cooling system			mm in	516 20,31	
Fan power consumption - low temp cooling system			kW hp	4,2 6	7,1 10
Fan power consumption - high temp cooling system			kW hp	5,9 8	10,2 14
Fan drive ratio				1,73:1	
Coolant capacity,	engine		liter US gal	7,2 1,90	
	std radiator with hoses		liter US gal	12,5 3,30	
Coolant pump			drive/ratio	1,73:1	
Coolant flow with low temp system			l/s US gal/s	2,71 0,72	3,42 0,90
Maximum external coolant system restriction			kPa in wc	25 100	35 141
Thermostat,		start to open	°C °F	83 181	
		fully open	°C °F	95 203	
Maximum static pressure head			kPa in wc	100 402	
Pressure cap setting on low temp radiator			kPa in wc	90 361	
Maximum top tank temperature			°C °F	105 221	
Shutdown switch setting			°C °F	113 235	
Recommended draw down capacity		10% of total cooling system capacity			

Cooling performance
Cooling air

Engine speed rpm	Air on temp °C	PRIME POWER		NDBY POWER	
		Air flow m^3/s	External restriction Pa	Air flow m^3/s	External restriction Pa
1500	59	1,5	0		
low temp	52	1,2	150		
	39	1,0	200		
high temp	68	2,0	0		
	62	1,6	150		
	59	1,5	200		
	53	1,2	300		
	41	0,9	400		
low temp	56			1,5	0
	48			1,2	150
	35			1,0	200
high temp	65			2,0	0
	60			1,6	150
	56			1,5	200
	49			1,2	300
	36			0,9	400
1800	61	1,9	0		
low temp	55	1,7	150		
	52	1,4	200		
	43	1,1	300		
high temp	69	2,6	0		
	66	2,2	150		
	64	2,1	200		
	62	1,9	300		
	58	1,6	400		
low temp	58			1,9	0
	51			1,7	150
	48			1,4	200
	39			1,1	300
high temp	67			2,6	0
	64			2,2	150
	62			2,1	200
	59			1,9	300
	55			1,6	400

Electrical system		r/min	1500	1800
Voltage and type			12V / 1 pole system	
Alternator:	make/output	Amp	Iskra/55	
	tacho output	Hz/alt. Rev	6	
	drive ratio		3,01:1	
Starter motor		make	Bosch	
		type	EV	
		kW	3,1	
Starter motor solenoid,	pull current	Amp	60	
	hold current	Amp	12	
Number of teeth on:	flywheel		129	
	cam wheel		96	
	starter motor		9	
Inrush current at +20°C		Amp	1110	
Cranking current at +20°C		Amp	370	
Crank engine speed at 20°C		rpm	160	
Starter motor battery capacity:	max	Ah	176	
	min at +5°C	Ah	110	
Stop solenoid,	max	Amp	3	
Inlet manifold heater (at 12V/24V)		kW	2 / 3,6	
Power relay for the manifold heater (at 12V/24V)		Amp	150 / 120	