

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
	SAE2	kg lb	36 79
Wet weight	Engine and cooling package	kg lb	606 1336
	SAE2	kg lb	36 79

Performance

Performance		r/min	1500	1800
Standby Power	without fan	kW	102,9	111
		hp	140	151
	with fan high temp	kW	97	100,8
		hp	132	137
Prime Power	without fan	kW	93,5	100,9
		hp	127	137
	with fan high temp	kW	87,6	90,7
		hp	119	123
Torque at:	Standby Power	Nm	655	589
		lbft	483	434
	Prime Power	Nm	595	535
		lbft	439	395
Mean piston speed		m/s	6,5	7,8
		ft/sec	21,4	25,7
Effective mean pressure at:	Standby Power	MPa	1,7	1,6
		psi	247	232
Max combustion pressure at:	Standby Power	MPa	12,9	12,8
		psi	1871	1856
Total mass moment of inertia, J (mR2)		kgm ²	1,43	
		lbft ²	33,9	
Residual speed droop at load increase from 0 to 100%		%	≤ 5	
Friction Power		kW	6,0	8,6
		hp	8,16	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 L _w	No load	dB(A)	99,5	101
	Standby Power	dB(A)	102,5	104
	Prime Power	dB(A)	102,5	104
Calculated sound pressure L _p 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 noiseData calculated as sound pressure L_p.

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	5,0	5,5	2,0	2,0	40-100	12,0	-	4,5	-
0-50	6,0	7,0	2,0	2,0	50-100	9,0	-	4,0	-
0-60	8,0	8,5	2,5	3,0	60-100	7,0	-	3,0	-
0-75	10,0	13,0	3,0	4,0	75-100	4,0	-	2,5	-
0-100	-	-	-	-					
100-0	7,5	9,0	2,0	2,5					

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	1,0	40-100	5,0	5,0	2,0	5,0
0-50	4,0	4,5	1,0	1,5	50-100	4,0	4,0	2,0	4,0
0-60	4,4	4,8	1,1	0,9	60-100	2,5	2,5	1,1	2,5
0-75	6,0	6,5	2,0	2,0	75-100	2,0	2,0	1,5	2,0
0-100	9,5	11,5	3,0	5,0					
100-0	7,5	8,0	1,5	2,0					

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	6,7		0,7						
0-100	16,7		2,2						
100-0	6,9		2,0						

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	4,9		0,2						
0-100	8,1		1,7						
100-0	4,3		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

Lubrication system		r/min	1500	1800
Lubricating oil consumption	Standby Power	liter/h US gal/h	0,08 0,021	0,08 0,021
Oil system capacity including filters		liter US gal	13 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 psi	450 - 480 65 - 70	
Oil pressure shut down switch setting		kPa psi	200 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 Specific fuel consumption at:	25%	g/kWh lb/hph	244 0,396	259 0,420
	50%	g/kWh lb/hph	221 0,358	226 0,366
	75%	g/kWh lb/hph	217 0,351	219 0,355
	100%	g/kWh lb/hph	219 0,355	218 0,353
Prime Power Specific fuel consumption at:	25%	g/kWh lb/hph	259 0,419	277 0,449
	50%	g/kWh lb/hph	225 0,365	232 0,376
	75%	g/kWh lb/hph	218 0,353	221 0,358
	100%	g/kWh lb/hph	218 0,353	218 0,354

Fuel system

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 psi	500 - 550 73 - 80	
Feed pump max suction head	m	1,5	
	foot	4,9	
Max allowable inlet fuel temp under operation conditions	°C	75	
	°F	167	
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	6,089 215	7,75 274
	Prime Power	27°C 81°F	m ³ /min cfm	5,7 201	7,24 256
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	88 5004	92 5232
	Prime Power		kW BTU/min	78 4436	83 4720
Exhaust gas temperature after turbine at:	Standby Power		°C °F	557 1035	516 961
	Prime Power		°C °F	544 1011	518 964
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	18,4 650	22,1 781
	Prime Power		m ³ /min cfm	16,7 589	19,9 704
Heat rejection to CAC	Standby Power		kW BTU/min	13,1 745	21 1194
	Prime Power		kW BTU/min	11,8 671	18,9 1075

Cooling system

Cooling system		r/min	1500	1800
Heat rejection radiation from engine at:	Standby Power	kW	10	11
		BTU/min	585	631
	Prime Power	kW	9	10
		BTU/min	532	574
Heat rejection to coolant at:	Standby Power	kW	52,5	53,3
		BTU/min	2986	3031
	Prime Power	kW	47,4	48,0
		BTU/min	2696	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	0,29	
		foot²	3,12	
Radiator core thickness (std. size) - low temp cooling package		mm	62	
		in	2,44	
Fan diameter - low temp cooling system		mm	516	
		in	20,31	
Fan power consumption - low temp cooling system		kW	4,2	7,1
		hp	6	10
Fan power consumption - high temp cooling system		kW	5,9	10,2
		hp	8	14
Fan drive ratio			1,73:1	
Coolant capacity,	engine	liter	7,2	
		US gal	1,90	
	std radiator with hoses	liter	12,5	
		US gal	3,30	
Coolant pump		drive/ratio	1,73:1	
Coolant flow with low temp system		l/s	2,71	3,42
		US gal/s	0,72	0,90
Maximum external coolant system restriction		kPa	25	35
		in wc	100	141
Thermostat,	start to open	°C	83	
		°F	181	
	fully open	°C	95	
		°F	203	
Maximum static pressure head		kPa	100	
		in wc	402	
Pressure cap setting on low temp radiator		kPa	90	
		in wc	361	
Maximum top tank temperature		°C	105	
		°F	221	
Shutdown switch setting		°C	113	
		°F	235	
Recommended draw down capacity		10% of total cooling system capacity		

Cooling performance

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 105°C TTT and 50% antifreeze (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	53	1,5	0		
	low temp				
	44	1,2	150		
	37	1,0	200		
	high temp				
	63	2,0	0		
	57	1,6	150		
	53	1,5	200		
	46	1,2	300		
	low temp				
	50			1,5	0
	40			1,2	150
	32			1,0	200
	high temp				
	60			2,0	0
	54			1,6	150
	50			1,4	200
	42			1,2	300
1800	59	1,9	0		
	low temp				
	51	1,7	150		
	48	1,4	200		
	37	1,1	300		
	high temp				
	67	2,6	0		
	64	2,2	150		
	62	2,1	200		
	59	1,9	300		
	54	1,6	400		
	low temp				
	55			1,9	0
	47			1,7	150
	44			1,4	200
	32			1,1	300
	high temp				
	64			2,6	0
	61			2,2	150
	59			2,1	200
	56			1,9	300
	51			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