

General

In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel.
Turbocharged, charge air cooled (CAC)

Number of cylinders			4
Displacement, total		litre	4,76
		in ³	290,7
Firing order			1-3-4-2
Bore		mm	108
		in	4,25
Stroke		mm	130
		in	5,12
Compression ratio			18:1
Dry weight	Engine and cooling package	kg	575
		lb	1268
Wet weight	Engine and cooling package	kg	606
		lb	1336
	SAE3	kg	-36
		lb	-79

Performance

			r/min	1500	1800
Standby Power	without fan	kW		130	136
		hp		177	185
	with fan high temp	kW		125	126
		hp		169	172
Prime Power	without fan	kW		118	124
		hp		161	168
	with fan high temp	kW		113	114
		hp		153	155
Torque at:	Standby Power	Nm		828	722
		lbft		610	532
	Prime Power	Nm		752	656
		lbft		555	484
Mean piston speed		m/s		6,5	7,8
		ft/sec		21,4	25,7
Effective mean pressure at:	Standby Power	MPa		2,2	1,9
		psi		312	281
Effective mean pressure at:	Prime Power	MPa		2,0	1,7
		psi		283	248
Total mass moment of inertia, J (mR ²)		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 Lw	No load	dB(A)	101,3	101,9
	Standby Power	dB(A)	103,5	105,1
	Prime Power	dB(A)	103,5	105,1
Calculated sound pressure Lp at 1 m	No load	dB(A)	87,8	88,4
	Standby Power	dB(A)	90,0	91,6
	Prime Power	dB(A)	90,0	91,6

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m

		r/min	1500	1800
Standby Power		dB(A)		
Prime Power		dB(A)		

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
0-20	2,6	3,0	0,6	0,6	20-100	17,4	23,5	3,4	6,3
0-40	5,6	6,0	1,4	1,5	40-100	9,5	11,5	2,4	3,5
0-50	6,8	7,7	1,6	1,7	50-100	8,1	9,0	2,0	2,8
0-60	8,5	9,6	1,9	2,0	60-100	6,8	7,6	1,8	2,3
0-70	10,4	13,0	2,1	2,4	70-100	5,5	6,0	1,7	2,3
0-80	13,9	18,7	2,5	3,2	80-100	3,4	4,0	1,4	1,8
0-100	26,0		4,9						
100-0	7,0	7,0	1,2	1,2					
					G3: 0-53	7,0		1,7	
					G2: 0-67	10,0		2,1	
					G3: 0-48		7,0		1,7
					G2: 0-61		10,0		2,1

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
0-20	1,5	1,8	0,3	0,3	20-100	7,3	8,9	1,2	2,6
0-40	3,2	3,5	0,4	0,5	40-100	5,0	5,8	0,8	2
0-50	3,9	4,4	0,5	1,0	50-100	4,4	5,0	0,6	1,7
0-60	4,8	5,2	1,0	1,2	60-100	3,8	4,4	0,5	1,4
0-70	5,5	6,3	1,2	1,4	70-100	2,8	3,5	0,5	0,9
0-80	6,6	8,4	1,4	1,6	80-100	2,0	2,5	0,4	0,7
0-100	10,3	13,4	1,9	3					
100-0	6,0	6,0	0,8	0,8					
					G3: 0-80	7,0		1,4	
					G2: 0-96	10,0		1,7	
					G3: 0-72		7,0		1,4
					G2: 0-86		10,0		1,7

Cold start performance

1500/1800

Cold start limit temperature	°C	-15
		-30*

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

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 altitude derating must be used. For operations with air ambient temperature over 40°C, see below.

Altitude derating factor < 3000 m	% / m	4 / 500
Altitude derating factor > 3000 m	% / m	6 / 500
Ambient temperature derating factor	% / °C	2 / 5°C
Humidity	%	No derating

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:					
Closed crankcase ventilation	ACEA: E4. API: CH-4, CI-4* full synthetic		h	500	
Open crankcase ventilation	VDS-2. ACEA: E3, E5. API: CG-4, CH-4*		h	500	
Open crankcase ventilation	VDS. ACEA: E2. API: CF, CF-4*		h	250	
Engine angularity limits:	front up		°	10	
	front down		°	10	
	side tilt		°	10	
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 section in the sales guide

Fuel system		r/min	1500	1800
Standby Power Specific fuel consumption at:	25%	g/kWh lb/hph	228 0,370	243 0,393
	50%	g/kWh lb/hph	210 0,340	218 0,354
	75%	g/kWh lb/hph	209 0,339	218 0,353
	100%	g/kWh lb/hph	216 0,350	225 0,365
Prime Power Specific fuel consumption at:	25%	g/kWh lb/hph	239 0,388	261 0,423
	50%	g/kWh lb/hph	213 0,345	224 0,364
	75%	g/kWh lb/hph	210 0,340	218 0,353
	100%	g/kWh lb/hph	214 0,346	222 0,359

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	
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	8,03 284	9,6 339
	Prime Power	27°C 81°F	m ³ /min cfm	7,55 267	9 318
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			Two stage paper cartridge		
Air filter cleaning efficiency			%	99,9	
Heat rejection to exhaust at:	Standby Power		kW BTU/min	104 5914	116 6597
	Prime Power		kW BTU/min	90 5118	99 5630
Exhaust gas temperature after turbine at:	Standby Power	°C °F		532 990	528 983
	Prime Power	°C °F		507 945	484 904
Max allowable back pressure in exhaust line	Standby Power		kPa In wc	3 12,0	5 20,1
	Prime Power		kPa In wc	5 20,1	7 28,1
Exhaust gas flow at:	Standby Power		m ³ /min cfm	23,2 818	27,6 973
	Prime Power		m ³ /min cfm	21,2 749	24,3 857
Heat rejection to CAC	Standby Power		kW BTU/min	23,7 1348	30,7 1746
	Prime Power		kW BTU/min	21,3 1211	27,6 1570

Intercooler system	r/min	1500	1800
Boost pressure	kPa	196	208
	in wc	787	835
Charge air temp after turbo compressor	°C	185	196
	°F	365	385
Max allowable comb. air temp after CAC	°C	50	
	°F	122	
Max pressure droop over intercooler, incl. Piping	kPa	15	
	In wc	60	

Cooling system		r/min	1500	1800
Heat rejection radiation from engine at:	Standby Power	kW	13	14
		BTU/min	762	15
	Prime Power	kW	12	13
		BTU/min	688	745
Heat rejection to coolant at:	Standby Power	kW	63	68
		BTU/min	3566	3873
	Prime Power	kW	56	61
		BTU/min	3207	3475
Recommended coolant	Volvo coolant or Volvo anticorrosion additive together with clean fresh water			
Radiator cooling system type	Closed circuit			
Radiator core area	m ²	0,44		
	foot ²	4,74		
Radiator core thickness	mm	55		
	in	2,17		
Fan diameter - low temp cooling system	mm	546		
	in	21,50		
Fan diameter - high temp cooling system & dual speed rating	mm	596		
	in	23,46		
Fan power consumption - low temp cooling system	kW	3,8	6,6	
	hp	5	9	
Fan power consumption - high temp cooling system & dual speed rating	kW	5,5	9,6	
	hp	7	13	
Fan drive ratio		1,73:1		
Coolant capacity,	engine	liter	7,2	
		US gal	1,90	
	std radiator with hoses	liter	13	
		US gal	3,43	
Coolant pump	drive/ratio	1,73:1		
Coolant flow with low temp cooling system	l/s	2,7	3,4	
	US gal/s	0,71	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	60		
	in wc	241		
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 low temp	58	2,5	0			
	53	2,1	150			
	50	2,0	200			
	45	1,7	300			
	37	1,5	400			
	high temp	62	2,9	0		
		58	2,5	150		
		57	2,4	200		
		53	2,1	300		
		46	1,8	400		
	low temp	55			2,5	0
		49			2,1	150
		46			2,0	200
		40			1,7	300
		32			1,5	400
high temp	59			2,9	0	
	55			2,5	150	
	53			2,4	200	
	49			2,1	300	
	42			1,8	400	
1800 low temp	60	3,1	0			
	57	2,8	150			
	55	2,6	200			
	53	2,4	300			
	49	2,2	400			
	high temp	64	3,6	0		
		61	3,3	150		
		60	3,1	200		
		58	2,9	300		
		56	2,7	400		
	low temp	57			3,1	0
		53			2,8	150
		52			2,6	200
		48			2,4	300
		45			2,2	400
high temp	60			3,6	0	
	58			3,3	150	
	57			3,1	200	
	55			2,9	300	
	52			2,7	400	

Electrical system

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		3,0
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