

General

4-stroke direct injected, turbocharged and aftercooled diesel engine

Number of cylinders		6
No of valves		24
Displacement, total	litres	10,84
	in ³	661,3
Firing order		1-5-3-6-2-4
Rotational direction, viewed from the front		Clockwise
Bore	mm	123
	in	4,84
Stroke	mm	152
	in	5,98
Compression ratio		16,5:1
Compression pressure at 240 rpm	MPa psi	
Max. static forward inclination:	°	0
Max. static backward inclination:	°	7
Max. intermittent forward inclination while running:	°	10
Max. intermittent backward inclination while running:	°	17
Max. intermittent side inclination while running:	°	30
Idling speed	rpm	600 (+50)
Rated speed R	rpm	2500
Rated speed Crankshaft power 1), 5) R4	rpm	2400
Propeller selection range R	rpm	2500-2550
Propeller selection range Crankshaft power 1), 5)	rpm	2400-2450
Dry weight engine BT	kg	1145
	lb	2524

Performance		Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Crankshaft power 1), 5)	4	kW	71	120	180	300	360	430	457	459	459		
			hp	97	163	245	408	490	585	622	625	625	
Propeller shaft power 1) (At full load) With drive Reverse gear	4	kW	69	116	175	291	349	417	443	445	445		
			hp	94	158	237	396	475	567	603	606	606	
Propellershaft power at prop. load x2,5 With drive Reverse gear	4	kW	20	38	63	96	162	248	319	400	445		
			hp	28	52	86	131	220	338	434	544	606	
Propellershaft power at prop. load x3 With drive Reverse gear	4	kW	11	23	43	71	132	221	298	392	445		
			hp	15	32	58	96	179	300	406	533	606	
Torque at crankshaft 2)	4	Nm	968,6	1273	1563	2204	2149	2161	2078	1906	1826		
			lbf ft	714	939	1153	1625	1585	1594	1533	1406	1347	
Mean piston speed		m/s	3,5	4,6	5,6	6,6	8,1	9,6	10,6	11,7	12,2	12,7	
			ft/s	11,6	15,0	18,3	21,6	26,6	31,6	34,9	38,2	39,9	41,6
Effective mean pressure 2)	4	MPa	1,12	1,48	1,81	2,56	2,49	2,51	2,41	2,21	2,12		
			psi	162,9	214,1	262,8	370,6	361,4	363,5	349,5	320,5	307,2	
Max combustion pressure 2)	4	MPa	11,1	13,2	17	19,1	18,6	19,6	19,3	17,9	17,7		
			psi	1610	1914	2466	2770	2698	2843	2799	2596	2567	

Lubricating system

Specific lubricating oil consumption.	g/kWh	0,1
Max. oil volume including filters for all allowed installation inclinations:	litres	30
	US gal	7,93
Max. oil volume excluding filters for all allowed installation inclinations:	litres	25
	US gal	6,60
Min. oil volume excluding filters for all allowed installation inclinations:	litres	21
	US gal	5,55

Fuel system	Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Specific fuel consumption 2)	4	g/kWh lb/hph	247 0,4	239 0,387	247 0,4	214 0,347	198 0,321	200 0,324	206 0,334	216 0,35	219 0,355	
Fuel consumption, Test cycle E5		g/kWh lb/hph	223 0,36									
Fuel consumption at prop. load x ^{2,5}	4	l/h US gal/h	6,4 1,7	11,1 2,9	17,7 4,7	25,9 6,9	42,8 11,3	65,1 17,2	83,2 22,0	108,7 28,7	120,7 31,9	
Fuel consumption at full load	4	l/h US gal/h	21,0 5,5	34,3 9,1	53,2 14,1	76,8 20,3	85,3 22,5	102,9 27,2	112,7 29,8	118,6 31,3	120,3 31,8	

Intake and exhaust system	Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500	
Specific exhaust heating effect in percent of crankshaft power	4	%	75	69	65	64	70	79	83	87	88		
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	4	°C °F	528 982	635 1175	704 1299	611 1132	493 919	464 867	472 882	478 892	476 889		
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)		kPa psi								Max	15		
		kPa psi								Min	2,2		

Intake and exhaust system	Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPa and relative humidity 30%.	4	m ³ /min cu.ft./min	4,2 148,3	6,7 236,6	9,7 342,6	15,2 536,8	21,3 752,2	27,9 985,3	31,1 1098	34 1201	34,9 1232	
Charge air pressure Inlet manifold	4	kPa psi	22 3,2	49 7,1	78 11,3	138 20,0	177 25,7	212 30,7	218 31,6	219 31,8	218 31,6	
Exhaust gas flow	4	m ³ /min cu.ft./min	12 423,8	23 812,2	33 1165	49 1730	57 2013	77 2719	81 2860	83 2931	85 3002	

Cooling system	Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Radiated heat in percent of crankshaft power.		%										
	4	%	5,1	4,3	3,4	2,4	1,3	1,1	1,1	1,1	1,1	
Heat rejection to charge air cooler in percent of crankshaft power.		%										
	4	%	4	6	8	12	16	19	21	23	23	
Coolant heat rejection to HE, incl. engine oil cooler and excl. charge air cooler, in percent of crankshaft power.		%										
	4	%	168	134	104	80	48	39	41	47	49	
Coolant flow with fully open thermostat and std cooling system		l/min cu.ft./min	249 8,8	342 12,1	400 14,1	477 16,8	591 20,9	693 24,5	742 26,2	750 26,5	738 26,1	733 25,9
		°C °F	98 208									
Coolant volume engine, including heat exchanger and charge air cooler		litres US gal.	46 12,15									
		litres US gal.	40 10,57									
Maximum coolant flow to cabin heater etc.		l/min cu.ft./min	76 2,68									
		°C °F	76 169									
Thermostat, start open at		°C °F	86 187									
		°C °F	86 187									

Raw water circuit		rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Nominal raw water design flow	l/min		91	99	121	141	174	204	227	249	258	266
	cu.ft./min		3,2	3,5	4,3	5,0	6,1	7,2	8,0	8,8	9,1	9,4
Maximum raw water pump suction head	kPa		-10									
	psi		-1,5									
Maximum raw water temperature entering heat exchanger	°C		32									
	°F		90									

2 circuit keel cooling system, LT		Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Maximum temperature to charge air	4	°C										32	
		°F											90
Coolant flow through keel cooler, LT-cooling system circuit	4	l/min										255	
		cu.ft./min											9,0
Pressure drop in external LT-cooling system circuit, including piping		kPa										50	
		psi											7,3
Coolant volume charge air cooler		litres										5	
		US gal.											1,32

2 circuit keel cooling system, HT		Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Design point for keel cooler, engine outlet temperature	4	°C										85	
		°F											185
Maximum temperature to engine from external HT-cooling system circuit	4	°C										65	
		°F											149
Coolant flow through keel cooler, HT-cooling system circuit at design point	4	l/min										209	
		cu.ft./min											7,4
Maximum coolant flow through keel cooler, HT-cooling system circuit	4	l/min										231	
		cu.ft./min											8,2
Pressure drop in external HT-cooling system circuit, including piping		kPa										70	
		psi											10,2
Coolant volume engine, excl. heat exchangers		litres										33	
		US gal.											8,72

Emissions		Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Smoke at prop. load $x^{2.5}$	4	*BSU		0,0	0,1	0,3	0,4	0,5	0,2	0,2	0,4	0,4	
Noise at prop. load $x^{2.5}$. 4)	4	dBA		103	106	109	110,3	111,1	113,8	115,3	116,9	117,8	

*NB.! BSU are calculated values. Measured values are acc. to ISO 10054 in FSN units

Sensors Control and Monitoring System							Switches Engine Shutdown System	
Sensors	Signal	Unit	Range	Warning Initial Delay / Warning Delay	Warning Level	Derating Level	Shutdown Initial Delay / Shutdown Delay	Shutdown Level (Tolerance)
Charge air pressure	0.5-4.5 V	kPa	50 - 400 ± 4.2kPa	30 sec from start / 2 sec	270 kPa (relative)	280 kPa*	NA	NA
Charge air tempaure	50-0 kΩ	°C	-40 - 130 ± 4%	30 sec from start / 2 sec	75°C	80°C (soft 3)	NA	NA
Coolant level switch	Digital		ON / OFF	30 sec from start / 100 sec	Low level / Lost signal	NA	NA	NA
Coolant temperature	50-0 kΩ	°C	-40 - 140 ± 1.5°C	30 sec from start / 2 sec	98°C	101°C (soft 1)	4 sec from start / 1 sec	105 (± 2°C) SDU Ch. S1
Engine speed cam	Frequency	rpm		Instant	Lost signal	Lost signal**	NA	NA
Engine speed crank	Frequency	rpm		Instant	Lost signal	Lost signal**	NA	NA
Eng. overspeed SDU 2250 +15%	Frequency	rpm / Hz	54 puls./rev.	Instant	Lost signal	NA	Instant	2588 / 2329 Hz (-1 to 0%)
Eng. overspeed SDU 2400+15%	Frequency	rpm / Hz	54 puls./rev.	Instant	Lost signal	NA	Instant	2760 / 2484 Hz (-1 to 0%)
Eng. overspeed SDU 2450+15%	Frequency	rpm / Hz	54 puls./rev.	Instant	Lost signal	NA	Instant	2818 / 2536 Hz (-1 to 0%)
Exhaust gas dry temperature	PT200	°C	-40 - 750 ± 2.5%	30 sec from start / 5 sec	Fault Limit table 1	655°C (soft 4)	NA	NA
Exhaust gas wet temperature	PT200	°C	-40 - 750 ± 2.5%	30 sec from start / 5 sec	200°C	NA	NA	NA
Oil level switch	Digital		ON / OFF	30 sec from start / 5 sec	Low level / Lost signal	NA	NA	NA
Oil temperature	50-0 kΩ	°C	-40 - 140 ± 3.5%	30 sec from start / 2 sec	120°C	122°C (soft 2)	NA	NA
Water in fuel switch	Digital		ON / OFF	All the time	Water in fuel	NA	NA	NA
Gear oil pressure (EVC)	0.5-4.5 V	kPa	0-3000 ± 3%	60 sec from start / 7 sec	700 kPa	NA	NA	NA
Gear oil temperature (EVC)	50-0 kΩ	°C	-40 - 140 ± 2.5%	NA (IB) 2s (IPS)	95°C Lost signal during slip	NA	NA	NA
Gear oil pressure (SDU) (Shutdown Unit Channel S2)	Digital	kPa	ON / OFF	NA	NA	NA	11 sec ± 20% from start / 1 sec	400 ± 20 Shutdown Unit Setting S2.S3: 510 rpm ± 2% 459 Hz ± 2% 54 pulses / revolution

NA = Not applicable

VOLVO PENTA

D11B3-A (R4-625IB)

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* 50% remaining torque from 1500 rpm

** 80% remaining torque

Run detection S4 should be set to same value as S2, S3

Sensors (rpm dependent)	Signal	Unit	Range	Initial Delay / Delay	Warning Level / Derating Level / Shutdown Level rpm Map					Notes
					0 rpm	600 rpm	1000 rpm	1500 rpm	2300 / 2400 rpm	
Coolant pressure	0.5-4.5 V	kPa	0-300 ± 3%							
Warning Level		kPa		30 sec from start / 2 sec	NA	3	20	50	70	
Derating Level		kPa		Instant after warning	NA	NA	10	40	60	50% remain torque >1500 rpm
Shutdown Level (Shutdown Unit Channel S4)	NA	kPa	NA	NA	NA	NA	NA	NA	NA	Run detection S4 = S2, S3
Fuel pressure	0.5-4.5 V	kPa	0-700 ±1.5%							
Warning Level		kPa		30 sec from start / 2 sec	NA	125	200	260	270	
Derating Level		kPa		NA	NA	NA	NA	NA	NA	
Oil pressure	0.5-4.5 V	kPa	0-700 ±1.5%							
Warning Level		kPa		30 sec from start / 1 sec	NA	136	280	320	330	
Derating Level		kPa		Instant after warning	NA	80	260	300	310	30% remain torque > 1500 rpm
Shutdown Level (Shutdown Unit Channel S3)	Digital	kPa	ON/OFF	11 sec ±20% from start / 1 sec	NA	120 ± 20	120 ± 20	120 ± 20	120 ± 20	Shutdown Unit Setting S2.S3: 510 rpm ± 2% 459 Hz ± 2% 54 pulses / revolution
Piston cooling pressure	0.5-4.5 V	kPa	0-700 ±1.5%							
Warning Level		kPa		30 sec from start / 4 sec	NA	NA	75	230	250	
Derating Level		kPa		Instant after warning	NA	NA	65	220	240	30% remain torque > 1500 rpm
Seawater pressure	0.5-4.5 V	kPa	0-300 ± 3%							
Warning Level		kPa		30 sec from start / 5 sec	NA	1	8	17	30	
Derating Level		kPa		Instant after warning	NA	NA	NA	7	20	Derate active >1500 rpm

Warning = Yellow Lamp active

Derating = Red Lamp active

Soft 1) Soft derate Coolant Temp. Remaining torque in %	Speed / °C	101°C	103°C	106°C
	600	100%*	100%*	100%*
	1000	100%*	100%*	100%*
	1500 ->	100%*	75%	50%

Soft 2) Soft derate Oil Temp. Remaining torque in %	Speed / °C	122°C	124°C	126°C
	600	100%*	100%*	100%*
	1000	100%*	100%*	100%*
	1500 ->	100%*	50%	30%

Soft 3) Soft derate Charge Air Temp. Remaining torque in %	Speed / °C	80°C	85°C	90°C
	600	100%*	100%*	100%*
	1000	100%*	100%*	100%*
	1500 ->	100%*	50%	30%

Soft 4) Soft derate Exhaust Temp. Remaining torque in %	Speed / °C	655°C	665°C	670°C	675°C
	600	100%*	100%*	100%*	100%*
	1000	100%*	100%*	100%*	100%*
	1500 ->	100%*	60%	20%	10%

* = Alarm but no derate













