

General

4-stroke direct injected, turbocharged and aftercooled diesel engine

Number of cylinders		6
No of valves		24
Displacement, total	litres in ³	12,78 779,7
Firing order		1-5-3-6-2-4
Rotational direction, viewed from the front		Clockwise
Bore	mm in	131 5,16
Stroke	mm in	158 6,22
Compression ratio		16,5
Compression pressure at 240 rpm	MPa psi	N/A
Max. static forward inclination:	°	0
Max. static backward inclination:	°	10
Max. intermittent forward inclination while running:	°	5
Max. intermittent backward inclination while running:	°	17
Max. intermittent side inclination while running:	°	30
Idling speed	rpm	600 + 50
Rated speed R4	rpm	2300
	rpm	
	rpm	
Propeller selection range R4 (recommended)	rpm	2250-2350
Dry weight engine BT	kg lb	1560 3439

Performance	Rating	rpm	600	800	1000	1100	1300	1500	1800	2000	2100	2300
Crankshaft power 1), 5)		kW	84	250	313	346	410	474	571,0	588,0	588,0	588,0
		hp	114	340	426	470	557	644	777	800	800	800
Propeller shaft power 1) (At full load) With drive IPS		kW	77	234	294	325	385	446	538	554	554	554
		hp	105	319	400	442	524	606	731	753	753	753
Torque at crankshaft 2)		Nm	1336,9	2984	2989,9	3001	3009	3015	3029	2807	2674	2441
		lbf ft	986	2201	2205	2213	2220	2224	2234	2071	1972	1801
Mean piston speed		m/s	3,2	4,2	5,3	5,8	6,8	7,9	9,5	10,5	11,1	12,1
		ft/s	10,4	13,8	17,3	19,0	22,5	25,9	31,1	34,6	36,3	39,7
Effective mean pressure 2)		MPa	1,31	2,93	2,94	2,95	2,96	2,97	2,98	2,76	2,63	2,40
		psi	190,7	425,7	426,5	428,1	429,3	430,1	432,1	400,5	381,4	348,2
Max combustion pressure 2)		MPa	11,3	20,2	19,1	18,5	18,4	18,2	18,2	17,8	17,3	16,1
		psi	1638,9	2930	2770,2	2683	2669	2640	2640	2582	2509	2335

Lubricating system

Specific lubricating oil consumption.	g/kWh	0,05
Max. oil volume including filters for all allowed installation inclinations:	litres	45
	US gal	11,89
Max. oil volume excluding filters for all allowed installation inclinations:	litres	40
	US gal	10,57
Min. oil volume excluding filters for all allowed installation inclinations:	litres	32
	US gal	8,45

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Fuel system	Rating	rpm	600	800	1000	1100	1300	1500	1800	2000	2100	2300
Specific fuel consumption 2)		g/kWh	228,7	204,6	191,6	192,9	195,1	197,4	198,9	199,6	201,7	208,6
		lb/hph	0,3705	0,331	0,3104	0,312	0,316	0,32	0,322	0,323	0,327	0,338
Fuel consumption, Test cycle E5		g/kWh	212,3									
		lb/hph	0,34									
Fuel consumption, Test cycle E3		g/kWh	208,5									
		lb/hph	0,34									
Fuel consumption at prop. load x ^{2,5}		l/h	6,1	11,4	19,0	23,5	34,4	49,1	77,6	101,4	115,1	146,9
		US gal/h	1,6	3,0	5,0	6,2	9,1	13,0	20,5	26,8	30,4	38,8
Fuel consumption at prop. load x ³		l/h	3,8	7,5	13,2	17,1	27,2	41,2	70,4	95,6	110,7	146,8
		US gal/h	1,0	2,0	3,5	4,5	7,2	10,9	18,6	25,3	29,3	38,8
Fuel consumption at full load		l/h	23,0	61,2	71,8	79,8	95,7	111,9	135,9	140,5	142,0	146,8
		US gal/h	6,1	16,2	19,0	21,1	25,3	29,6	35,9	37,1	37,5	38,8

Intake and exhaust system	Rating	rpm	600	800	1000	1100	1300	1500	1800	2000	2100	2300	
Specific exhaust heating effect in percent of crankshaft power		%	56	59	54	57	62	65	67	66	66	70	
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.		°C	450	489	394	404	429	448	461	434	425	422	
		°F	842	912	741	759	804	838	862	813	797	792	
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)		kPa								Max	15		
		psi									2,2		
										Min			

Intake and exhaust system	Rating	rpm	600	800	1000	1100	1300	1500	1800	2000	2100	2300
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPA and relative humidity 30%.		m³/min	4,7	14,6	20,6	23,1	27,6	31,8	38,6	42,0	43,6	46,5
		cu.ft./min	166,57	516,2	726,89	814	975,3	1124	1363	1482	1540	1640
Charge air pressure Inlet manifold		kPa	39	223	272	282	290	303	321	325	328	329
		psi	5,7	32,3	39,5	40,9	42,1	43,9	46,6	47,1	47,6	47,7
Exhaust gas flow		m³/min	12,6	40,1	48,4	54,7	66,9	78,1	93,9	97,1	98,8	103,2
		cu.ft./min	443,79	1416	1709,2	1932	2361	2759	3316	3428	3489	3644

Cooling system	Rating	rpm	600	800	1000	1100	1300	1500	1800	2000	2100	2300
Radiated heat in kW (per engine)	4	kW	5	6	6	6	7	7	8	8	8	8
Heat rejection to charge air cooler in percent of crankshaft power.		%	4	16	20	21	21	21	23	24	26	28
Coolant heat rejection to HE, incl. engine oil cooler and excl. charge air cooler, in percent of crankshaft power.		%	60	55	45	43	43	42	42	41	42	44
Coolant flow with fully open thermostat and std cooling system		l/min	90	150	252	282	335	380	480	516	528	600
		cu.ft./min	3,2	5,3	8,9	10,0	11,8	13,4	17,0	18,2	18,6	21,2
Extra water pump flow through charge air cooler		l/min	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		cu.ft./min										
Max. pump pressure at extra pump pressure side (pressure set system)		kPa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		psi										
Max. permissible temperature on coolant in engine outlet		°C	98									
		°F	208									
Coolant volume engine, including heat exchanger and charge air cooler		litres	57									
		US gal.	15,06									
Max. additional coolant for cabin heater etc. with std. Expansion tank		litres	15									
		US gal.	3,96									
Maximum coolant flow to cabin heater etc.		l/min	40									
		cu.ft./min	1,41									
Thermostat, start open at		°C	82									
		°F	180									
Thermostat, fully open at		°C	92									
		°F	198									

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Raw water circuit	rpm	600	800	1000	1100	1300	1500	1800	2000	2100	2300
Nominal raw water design flow	l/min	190	230	270	290	342	387	430	438	428	415
	cu.ft/min	6,7	8,1	9,5	10,2	12,1	13,7	15,2	15,5	15,1	14,7
Nominal raw water pump pressure head at design flow. (measured before and after pump)	kPa	18	30	45	65	84	104	123	123	120	113
	psi	2,6	4,4	6,5	9,4	12,2	15,1	17,8	17,8	17,4	16,4
Maximum raw water pump suction head	kPa	30									
	psi	4,4									
Maximum additional pressure drop excl. reverse gear oil cooler	kPa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	psi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pressure drop over reverse gear oil cooler (optional equipment)	kPa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	psi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Maximum raw water temperature entering heat exchanger	°C	30									
	°F	86									

Emissions	Rating	rpm	600	800	1000	1100	1300	1500	1800	2000	2100	2300
Smoke at prop. load x ^{2.5}		*BSU	0,1	0,5	1,0	1,1	0,7	0,3	0,4	0,3	0,3	0,4
Smoke at prop. load x ³		*BSU	0,1	0,1	0,3	0,6	1,0	0,4	0,4	0,3	0,3	0,4
Noise at prop. load x ^{2.5} . 4)		dBA	100,2	107,6	108,4	108,0	107,8	109,4	111,6	113,6	114,6	115,7
Noise at prop. load x ³ . 4)		dBA	100,0	102,3	108,4	108,7	108,2	109,6	111,4	113,4	114,5	115,9

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

Technical data - Drive unit

Drive line		IPS900 & IPS1050
Transmission type		IPS3-C
Gear ratio (total)		1,99:1 and 1,88:1 for IPS1050 > 37 knots
Steering angle, max.		+/- 27°
Total weight of drive unit (1)	kg	691
Oil capacity, approx.	litres	30
Oil volume difference MIN-MAX	litres	0,5
Oil type		Volvo Penta API GL5 75W/90
Propeller range		QS5, Q1-Q7, QE1-QE4

(1) Including oil, exhaust pipe and elbow, clamping ring and various installation components. Propellers are not included in total weight

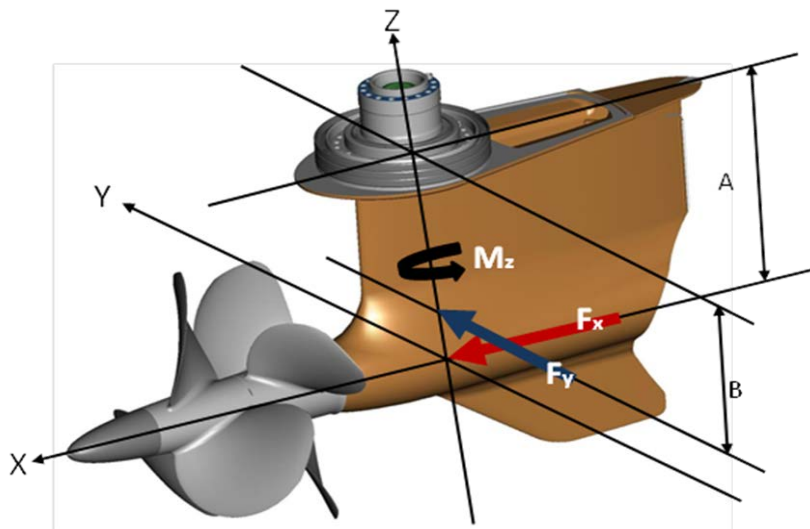
"Generalized maximum load document"for IPS3

Valid products	Drive Unit	Gear Ratio
IPS900	IPS3	1,99:1
IPS1050	IPS3	1,99:1
IPS1050	IPS3	1,88:1

Loads provided in chart are single maximum loads i.e. not to be used for fatigue calculations

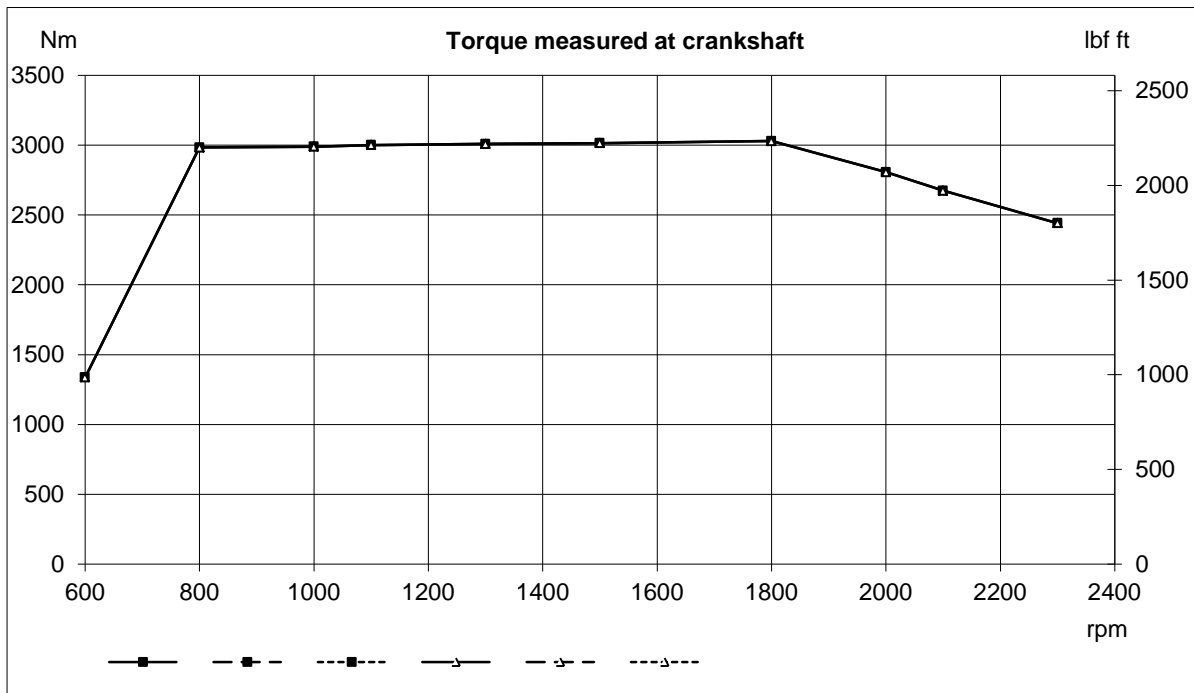
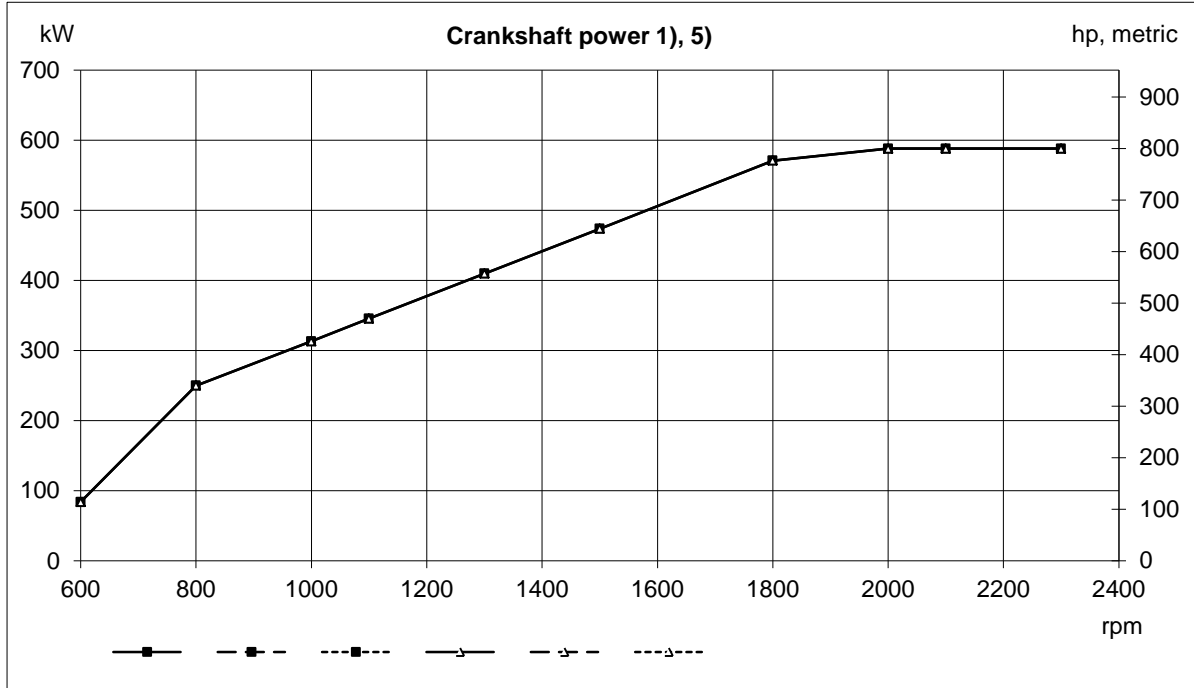
Speed range (top speed)	Load vektor	Maximum load
20-28 kn	F _x	47 kN
	F _y (+/-)	32 kN
	M _z (+/-)	12 kNm
28-42 kn	F _x	32 kN
	F _y (+/-)	65 kN
	M _z (+/-)	12 kNm

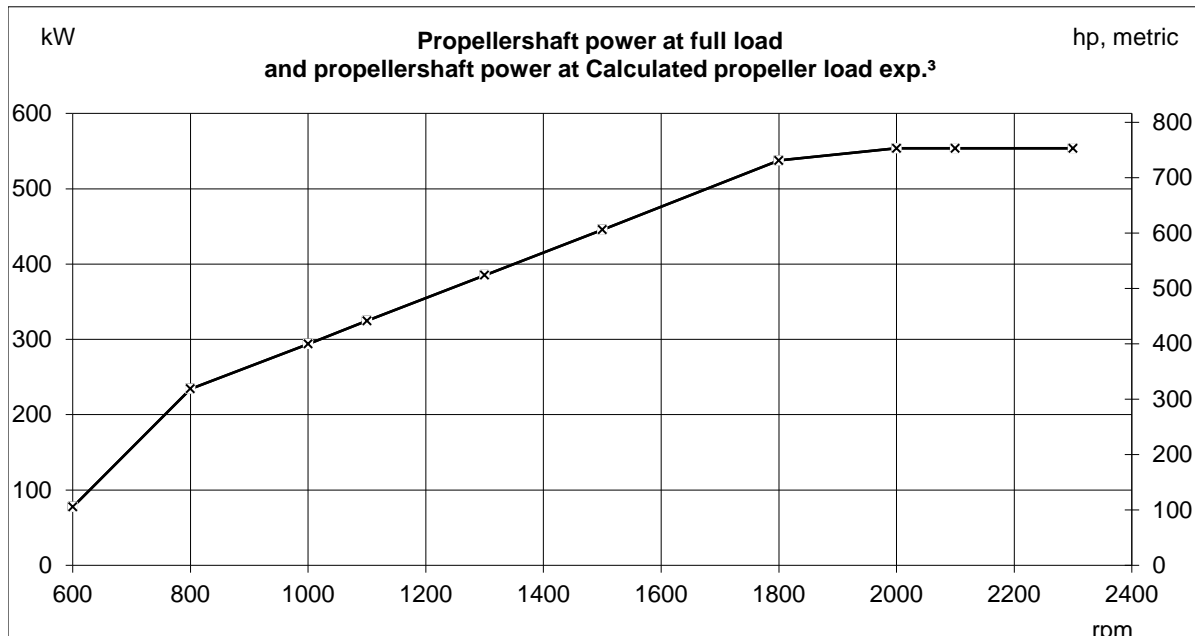
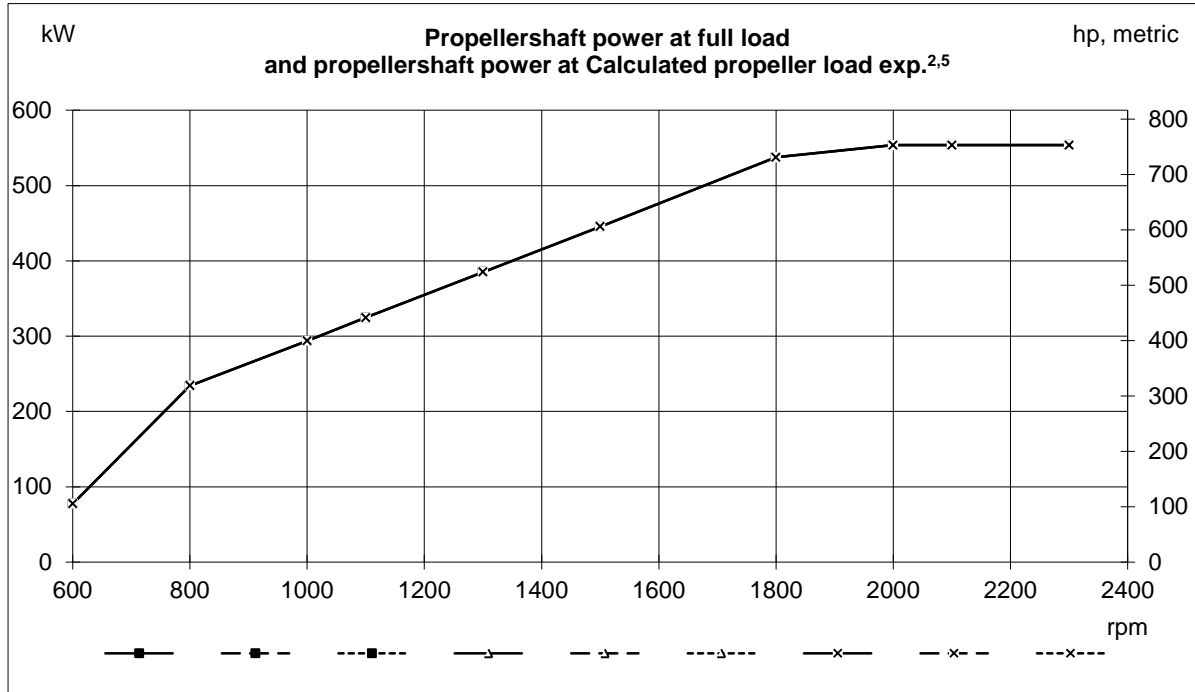
A	530 mm
B	442 mm

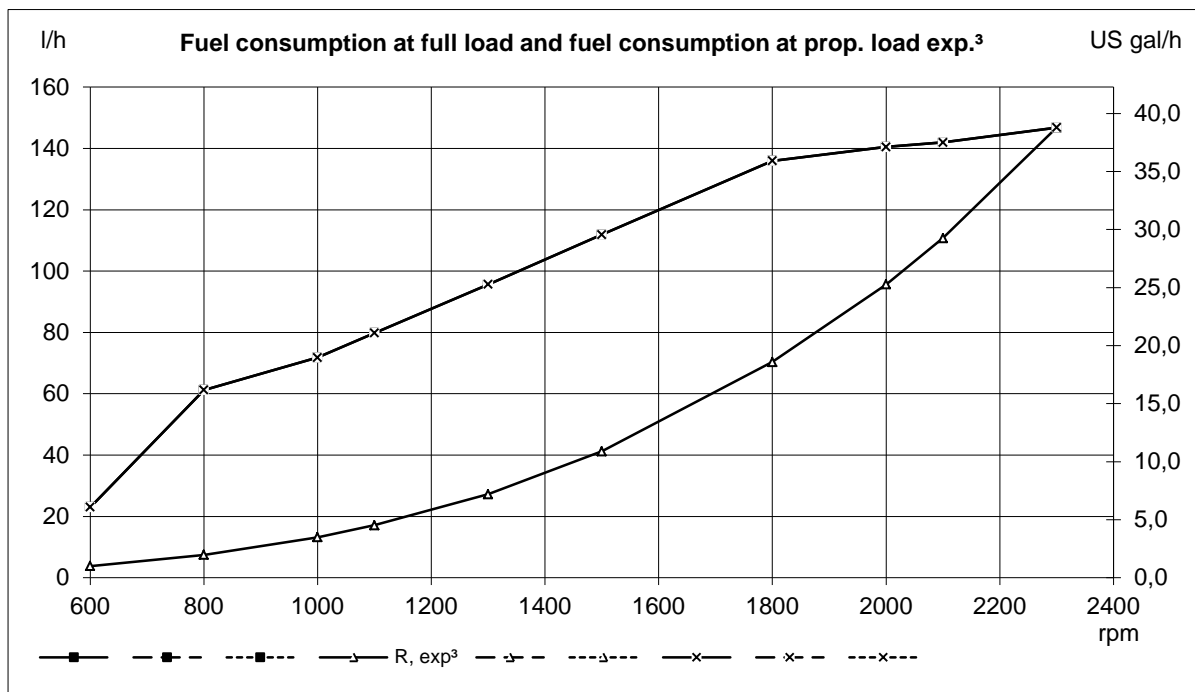
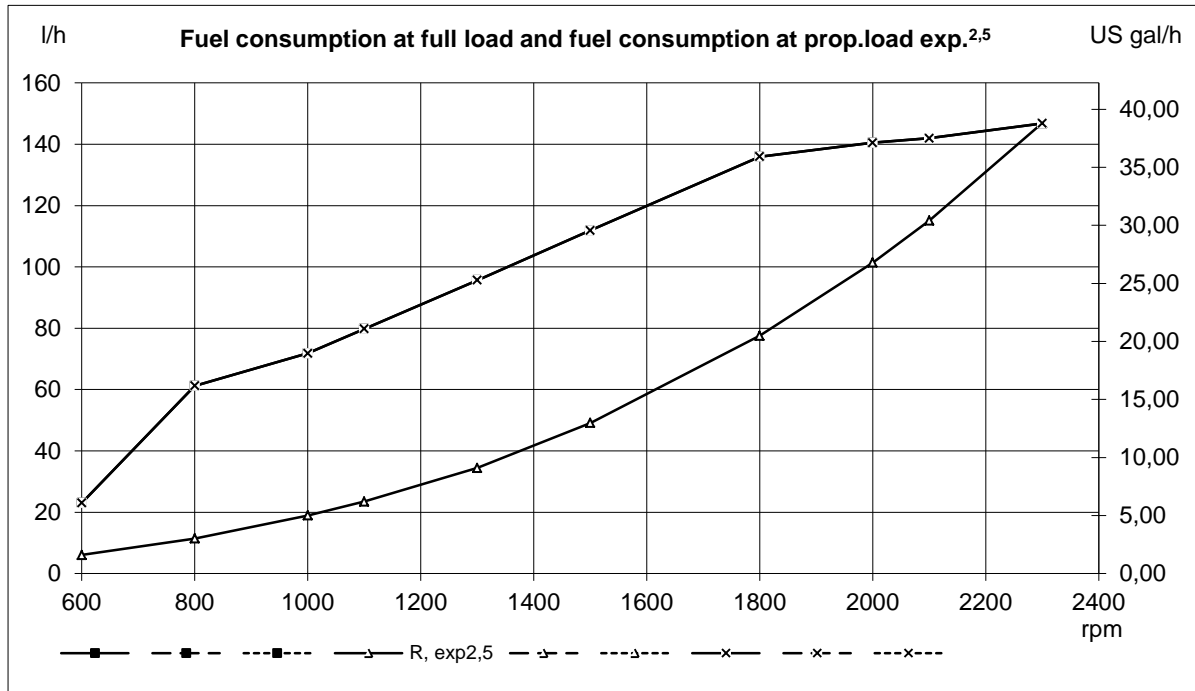


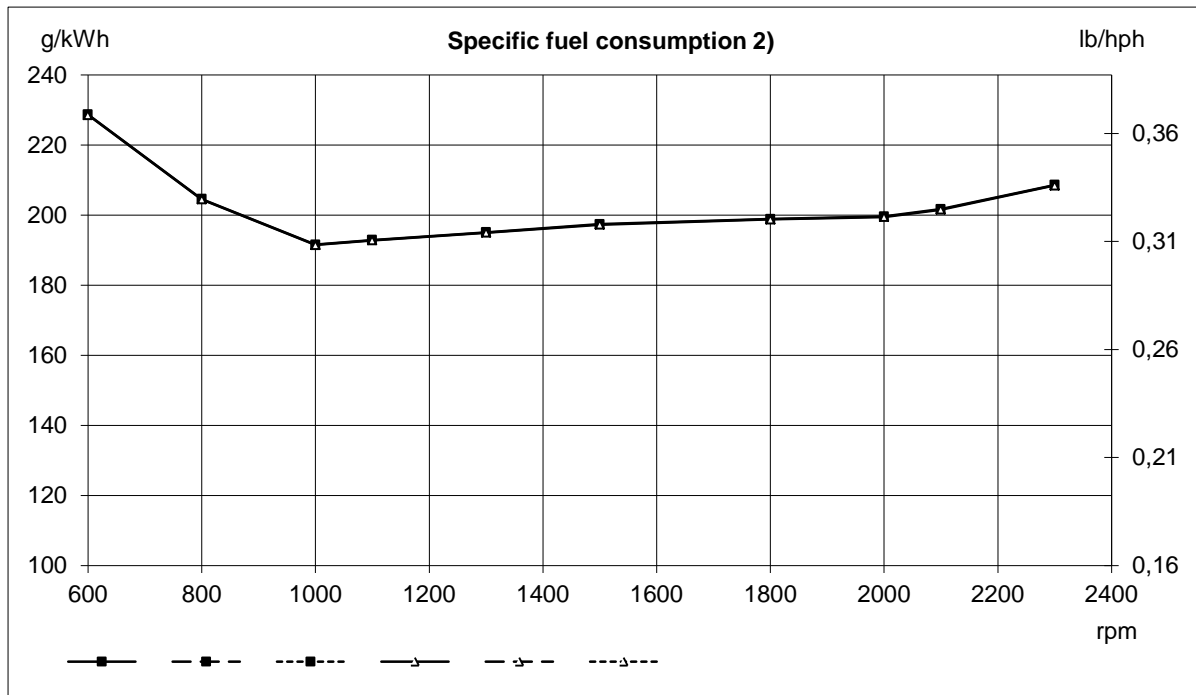
Important Note!

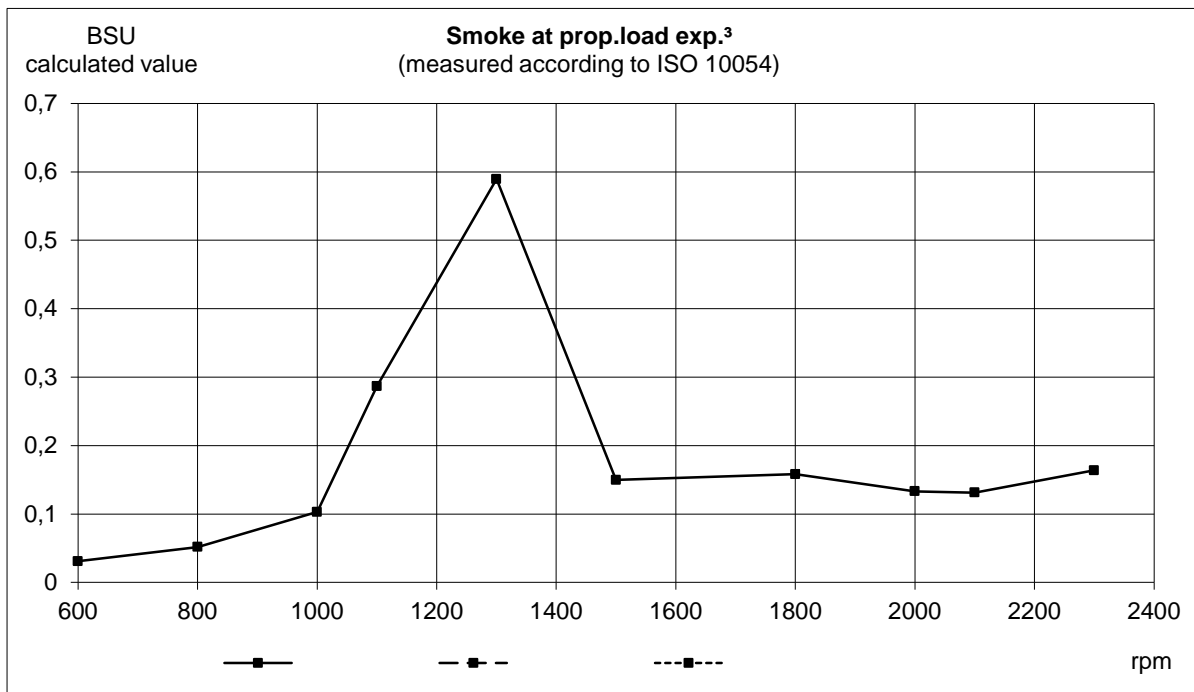
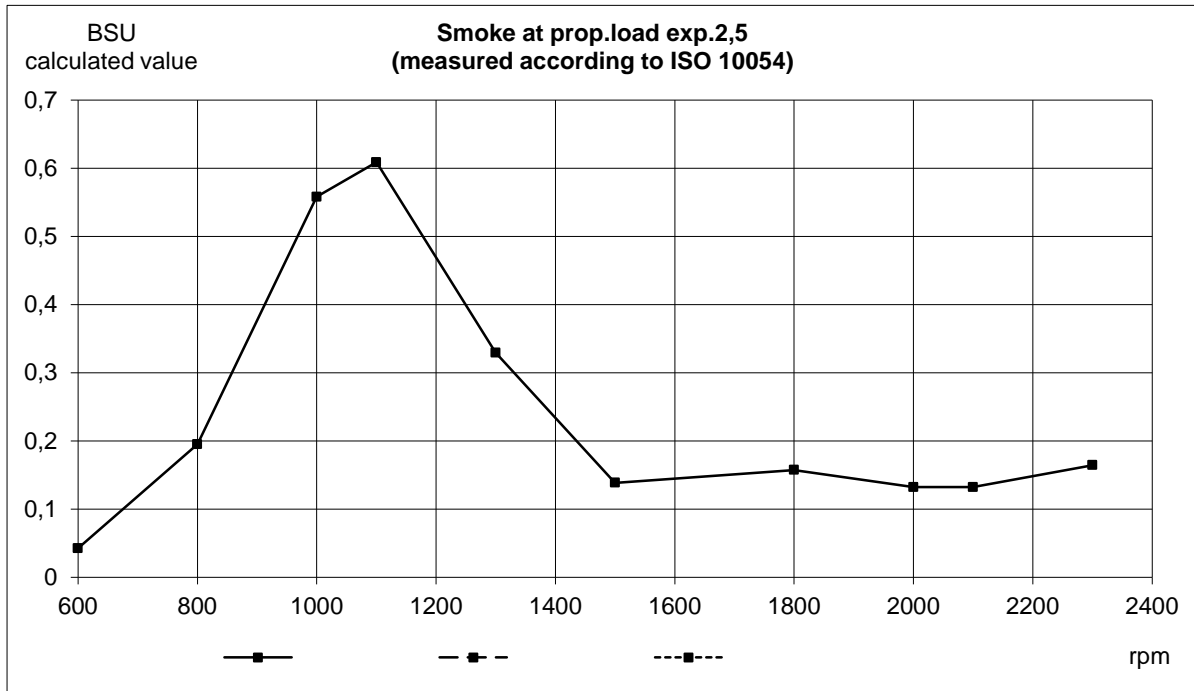
The above forces and torque are to be used as the base for maximum load in normal operations. Volvo Penta requires however that the detailed guidelines for the structure around the IPS unit are followed in order to ensure structural strength in case of grounding.

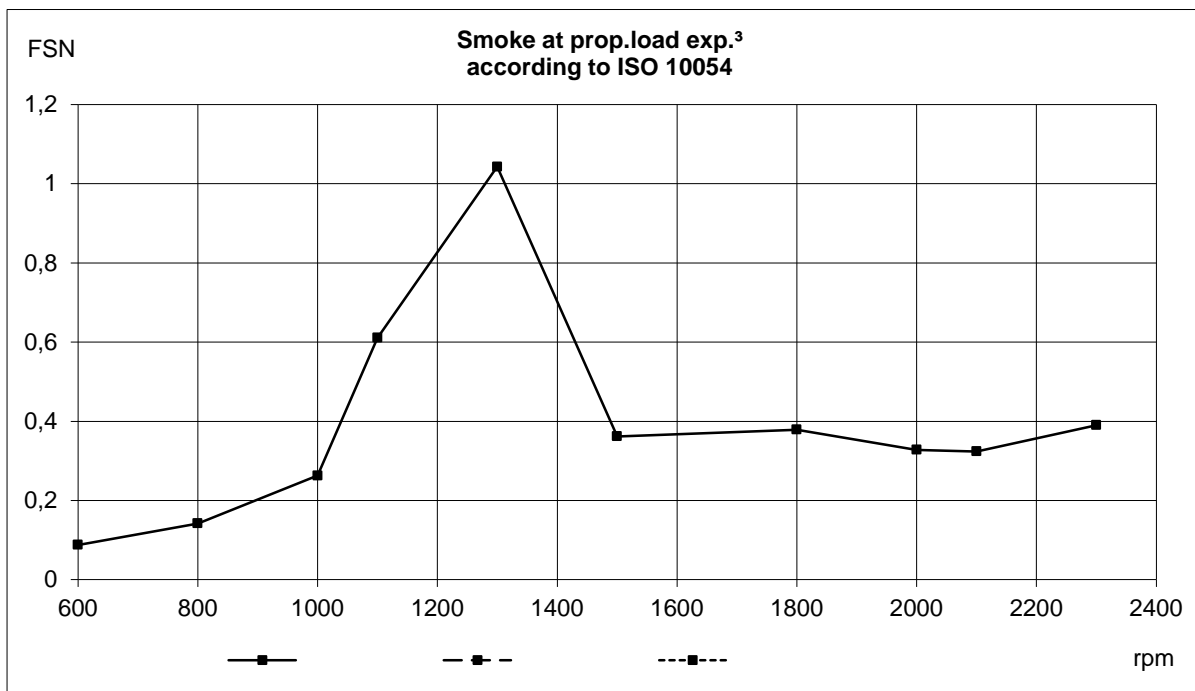
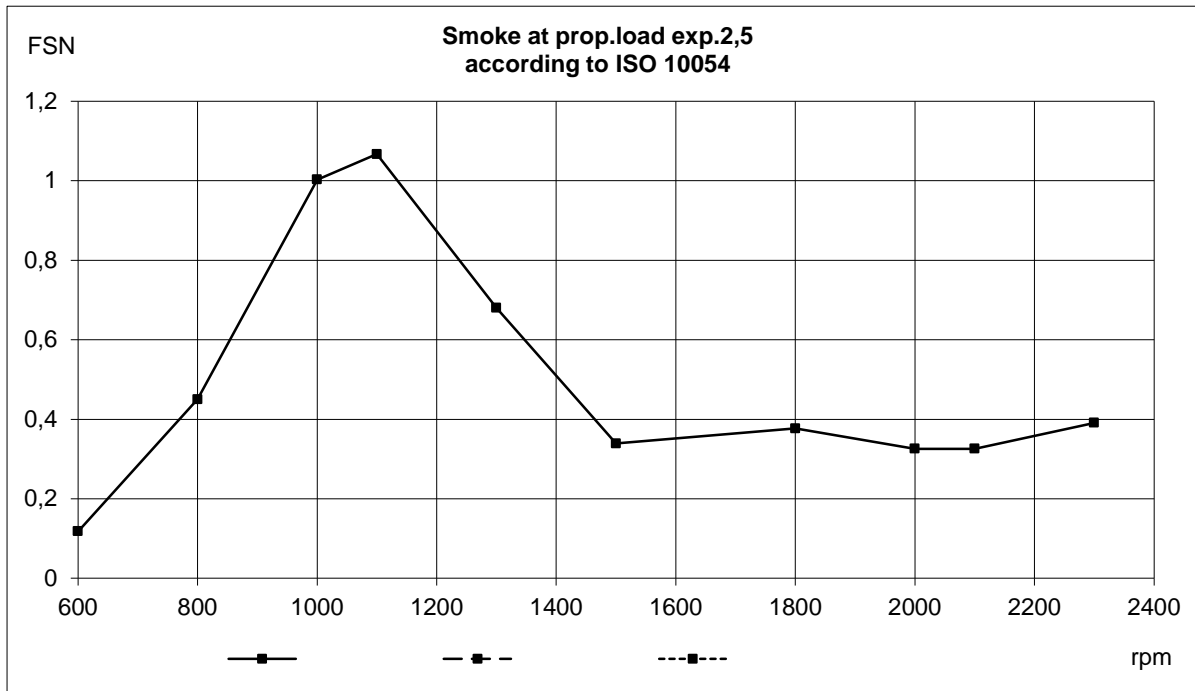












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Sensors Control and Monitoring System							Switches Engine Shutdown System	
Sensors	Signal	Unit	Range	Warning Initial Delay / Warning Delay	Warning Level	Derating Level	Shutdown Initial Delay / Shutdown Delay	Shutdown Level (Tolerance)
Coolant level switch	Digital		ON/OFF	30 sec from start / 75 sec	Low (ON / Closed)	NA	NA	NA
Coolant temperature	50-0 kΩ	°C	- 40 - 140 ±1.5°C	30 sec from start / 2 sec	98	101 (soft 1)	NA	NA
Coolant temperature SDU	Digital	°C	ON/OFF ON = Shutdown (closed contact)	NA	NA	NA	1 sec. from start / 1 sec	105 (±2°C) SDU Ch. S1
Engine speed cam	Frequency	rpm		Instant	Lost signal	NA	NA	NA
Engine speed crank (80% remain trq.)	Frequency	rpm		Instant	Lost signal	2% trq. decr. per sec	NA	NA
Eng. overspeed SDU	Frequency	rpm / Hz	153 puls./rev.	Instant	Lost signal	NA	Instant	2300 + 15% rpm / 6745 Hz (-1 to 0%)
Exhaust gas temperature	PT200	°C	-40 - 750 ± 2.5%	30 sec from start / 1 sec	560	585 (soft 2)	NA	NA
Oil level sensor	Analouge		± 1.9mm	30 sec from start / 5 sec	Low level	NA	NA	NA
Oil temperature	50-0 kΩ	°C	-40 - 140 ±1.5°C	30 sec from start / 23 sec	130	135 (soft 3)	NA	NA
Gear oil temperature (EVC)	50-0 kΩ	°C	-30 - 130 ± 4%	NA	95	NA	NA	NA
Gear oil pressure (EVC)	0,5-4,5V	kPa	0 - 3000 ±3%	60 sec from start / 7 sec	700	NA	NA	NA
Gear oil pressure (SDU) (Shutdown Unit Channel S2)	Digital	kPa	ON/OFF ON = Shutdown (closed contact)	NA	NA	NA	11 s ±20% from start/ 1 s	400 ± 20 Shutdown Unit Setting S2, S3: 510 rpm±2% 1300 Hz ±2% 153 pulses / revolution

NA = Not applicable

Sensors (rpm dependent)	Signal	Unit	Range	Initial Delay / Delay	Warning Level / Derating Level / Shutdown Level rpm Map					Notes
Charge air pressure	0,5-4,5 V	kPa	50 - 600 ± 4.2 kPa		600 rpm	1000 rpm	1500 rpm	2000 rpm	2300 rpm	
Warning Level		kPa		30 sec from start / 2 sec	360	360	360	360	360	0% load
Warning Level		kPa		30 sec from start / 2 sec	360	293	333	353	357	100% load
Derating Level (50% remain trq.)		kPa		10% trq. decr. per sec	370	303	348	363	367	100% load
Charge air temperature	50-0 kΩ	°C	-40 - 130 ± 4%		600 rpm	1000 rpm	1500 rpm	2000 rpm	2300 rpm	
Warning Level		kPa		90 sec from start / 23 sec	80	80	80	65	65	
Derating Level		kPa		Instant after warning	85	85	85	70	70	Soft derate 4
Fuel pressure	0,5-4,5 V	kPa	0-700 ± 2,5%		600 rpm	1000 rpm	1500 rpm	2000 rpm	2300 rpm	
Warning Level		kPa			180	240	255	270	270	
Derating Level		kPa		NA	NA	NA	NA	NA	NA	
Oil pressure	0,5-4,5 V	kPa	0-700 ± 2,5%		600 rpm	1000 rpm	1500 rpm	2000 rpm	2300 rpm	
Warning Level		kPa		30 sec from start / 3 sec	136	200	265	265	265	
Derating Level (30% remain trq.)		kPa		10% trq. decr. per sec	106	170	235	235	235	
Shutdown Level (Shutdown Unit Channel S3)	Digital	kPa	ON/OFF ON = Shutdown (closed contact)	11 s ±20% from start/ 1 s	NA	NA	150 ±20	150 ±20	150 ±20	Shutdown Unit Setting S4: 510 rpm±2% 1300 Hz ±2% 153 pulses / revolution

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Seawater pressure	0,5-4,5 V	kPa	0-300 ± 3%		600 rpm	1000 rpm	1500 rpm	2000 rpm	2300 rpm	Only HE
Warning Level		kPa		30 sec from start / 8 sec	5	20	40	60	60	
Derating Level (65% remain trq.)		kPa		10% trq. decr. per sec	-5	10	30	50	50	
Coolant pressure	0,5-4,5 V	kPa	0-300 ± 3%		600 rpm	1000 rpm	1500 rpm	2000 rpm	2300 rpm	
Warning Level		kPa		30 sec from start / 8 sec	5	30	55	100	125	
Derating Level (50% remain trq.)		kPa		10% trq. decr. per sec	-5	20	45	90	115	

Soft 1) Soft derate Coolant temp	Speed / °C	101°C	103°C	106°C
	1200	100%*	100%*	100%*
Remaining torque in %	1800	100%*	75%	50%
* Derate alarm but no torque reduction	2300	100%*	75%	50%

Soft 2) Soft derate <input type="checkbox"/> Exhaust gas temp	Speed / °C	585°C	590°C	595°C	600°C
	1200	100%*	100%*	100%*	100%*
Remaining torque in %	1800	100%*	70%	60%	50%
* Derate alarm but no torque reduction	2300	100%*	70%	60%	50%

Soft 3) Soft derate oil temp	Speed / °C	135°C	137°C	139°C
	600	100%*	100%*	100%*
Remaining torque in %	1200	100%*	50%	30%
* Derate alarm but no torque reduction	1800	100%*	50%	30%

Soft 4) Soft derate Charge Air Temp	Speed / °C	70°C	75°C	80°C	85°C	90°C	95°C
	1200	100%*	100%*	100%*	100%*	100%*	100%*
Remaining torque in %	1500	100%*	100%*	100%*	100%*	50%	30%
* Derate alarm but no torque reduction	1800	100%*	100%*	60%	34%	30%	30%
	2000	100%*	50%	30%	30%	30%	30%
	2300	100%*	50%	30%	30%	30%	30%