

VOLVO PENTA D13 MP, 515KW/2250RPM, DST	Document No 22346010	Issue Index 05
--	--------------------------------	--------------------------

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		16,7
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 R3	rpm	2250
Propeller selection range R3 (recommended)	rpm	2200-2300
Dry weight engine BT	kg lb	1560 3439

Performance	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2250
Crankshaft power 1), 5)	3	kW hp	80 109	214 291	274 373	329 448	387 527	441 599	497 676	515 700	515 700	516 701
Propeller shaft power 1) (At full load) With drive IPS	3	kW hp	73 100	200 272	257 349	309 421	364 495	414 564	467 636	485 659	485 659	485 660
Torque at crankshaft 2)	3	Nm lbf ft	1271,2 938	2551 1881	2616,1 1930	2622 1934	2641 1948	2630 1940	2636 1944	2459 1813	2342 1727	2188 1614
Mean piston speed		m/s ft/s	3,2 10,4	4,2 13,8	5,3 17,3	6,3 20,7	7,4 24,2	8,4 27,6	9,5 31,1	10,5 34,6	11,1 36,3	11,9 38,9
Effective mean pressure 2)	3	MPa psi	1,25 181,3	2,51 363,8	2,57 373,2	2,58 374,0	2,60 376,8	2,59 375,1	2,59 376,0	2,42 350,7	2,30 334,0	2,15 312,1
Max combustion pressure 2)	3	MPa psi	11,4 1653,8	18,6 2703	18,4 2667,7	18,5 2683	18,2 2643	18,2 2638	17,7 2570	17,3 2502	16,7 2428	15,5 2241

Lubricating system

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

VOLVO PENTA D13 MP, 515KW/2250RPM, DST	Document No 22346010	Issue Index 05
---	--------------------------------	--------------------------

Fuel system	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2250
Specific fuel consumption 2)	3	g/kWh lb/hph	226,7 0,3673	204,3 0,331	190,3 0,3083	188,2 0,305	190,9 0,309	193,7 0,314	197,7 0,32	199,7 0,323	202,4 0,328	209,3 0,339
Fuel consumption, Test cycle E5	3	g/kWh lb/hph	213,8 0,35									
Fuel consumption, Test cycle E3		g/kWh lb/hph	210,7 0,34									
Fuel consumption at prop. load x ^{2,5}	3	l/h US gal/h	5,7 1,5	10,7 2,8	17,7 4,7	26,6 7,0	38,4 10,1	53,7 14,2	72,7 19,2	95,6 25,3	108,1 28,6	129,3 34,2
Fuel consumption at prop. load x ³	3	l/h US gal/h	3,7 1,0	7,1 1,9	12,6 3,3	20,6 5,4	31,7 8,4	46,3 12,2	66,1 17,5	91,1 24,1	105,2 27,8	129,5 34,2
Fuel consumption at full load	3	l/h US gal/h	21,7 5,7	52,3 13,8	62,4 16,5	74,2 19,6	88,5 23,4	102,2 27,0	117,5 31,0	123,1 32,5	124,8 33,0	129,2 34,1

Intake and exhaust system	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2250
Specific exhaust heating effect in percent of crankshaft power	3	%	54	58	53	53	57	59	63	63	64	69
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	3	°C	429	491	396	359	377	383	406	391	385	389
		°F	804	916	745	678	711	722	763	736	725	732
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)		kPa psi							Max	15 2,2		
									Min			
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPA and relative humidity 30%.	3	m³/min cu.ft./min	4,6 161,02	11,4 404	17,5 618,16	23,6 831,9	28,1 992,5	32,8 1158	36,9 1302	40,0 1414	41,5 1467	43,8 1548
Charge air pressure Inlet manifold	3	kPa psi	35 5,1	155 22,5	216 31,3	258 37,5	276 40,1	296 43,0	305 44,2	309 44,9	311 45,1	314 45,5
Exhaust gas flow	3	m³/min cu.ft./min	11,8 415,62	31,7 1120	41,4 1461,3	51,6 1823	62,3 2200	72,2 2549	82,4 2911	86,2 3045	88,1 3111	92,4 3263

Cooling system	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2250
Radiated heat in kW (per engine)	3	kW	5	6	6	6	6	7	7	7	7	7
Heat rejection to charge air cooler in percent of crankshaft power.	3	%	19	18	23	26	27	27	27	28	29	31
Coolant heat rejection to HE, incl. engine oil cooler and excl. charge air cooler, in percent of crankshaft power.	3	%	76	55	40	37	38	37	38	39	40	43
Coolant flow with fully open thermostat and std cooling system		l/min cu.ft./min	90 3,2	150 5,3	252 8,9	282 10,0	335 11,8	380 13,4	480 17,0	516 18,2	528 18,6	600 21,2
Extra water pump flow through charge air cooler		l/min cu.ft./min	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max. pump pressure at extra pump pressure side (pressure set system)		kPa psi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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									

VOLVO PENTA D13 MP, 515KW/2250RPM, DST	Document No 22346010	Issue Index 05
---	--------------------------------	--------------------------

Raw water circuit	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2250
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
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	1200	1400	1600	1800	2000	2100	2250
Smoke at prop. load $x^{2,5}$	3	*BSU	0,1	0,2	0,6	0,8	0,5	0,4	0,4	0,3	0,3	0,4
Smoke at prop. load x^3	3	*BSU	0,1	0,1	0,2	0,8	0,7	0,4	0,5	0,3	0,3	0,4
Noise at prop. load $x^{2,5}$. 4)	3	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)	3	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

VOLVO PENTA D13 MP, 515KW/2250RPM, DST	Document No 22346010	Issue Index 05
--	--------------------------------	--------------------------

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

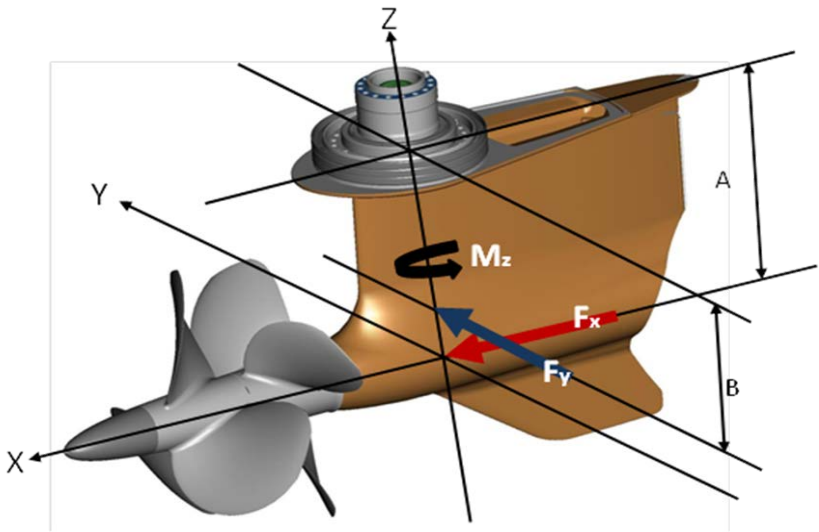
"Generalized maximum load document"for IPS3

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

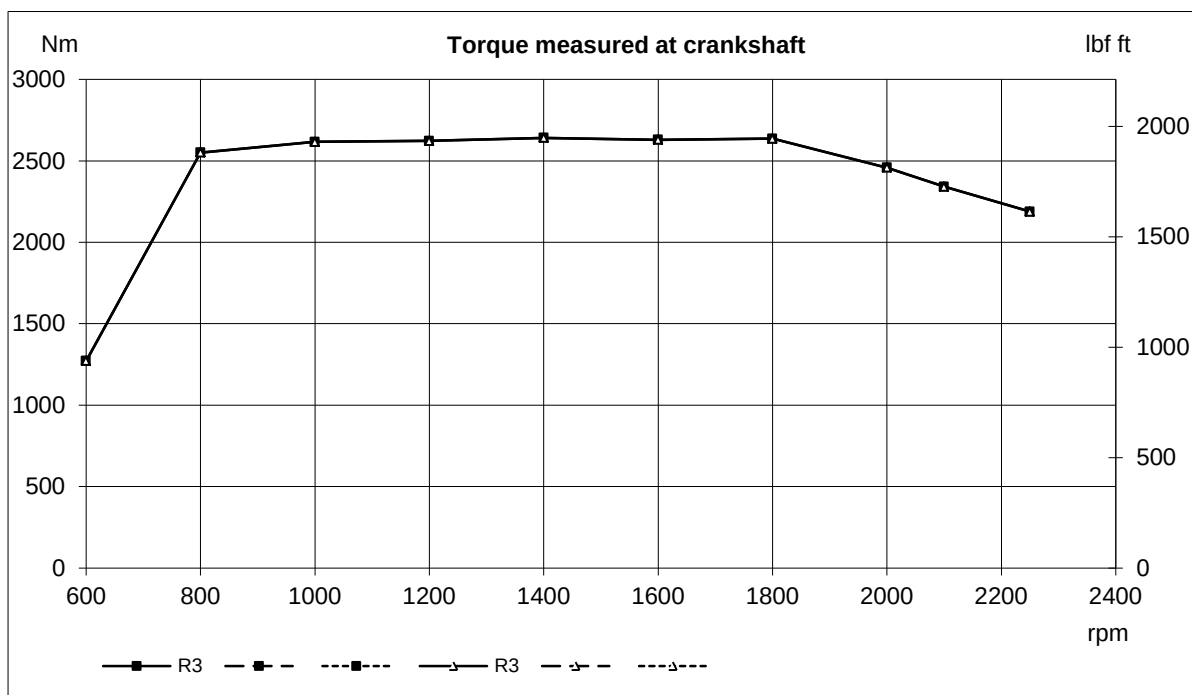
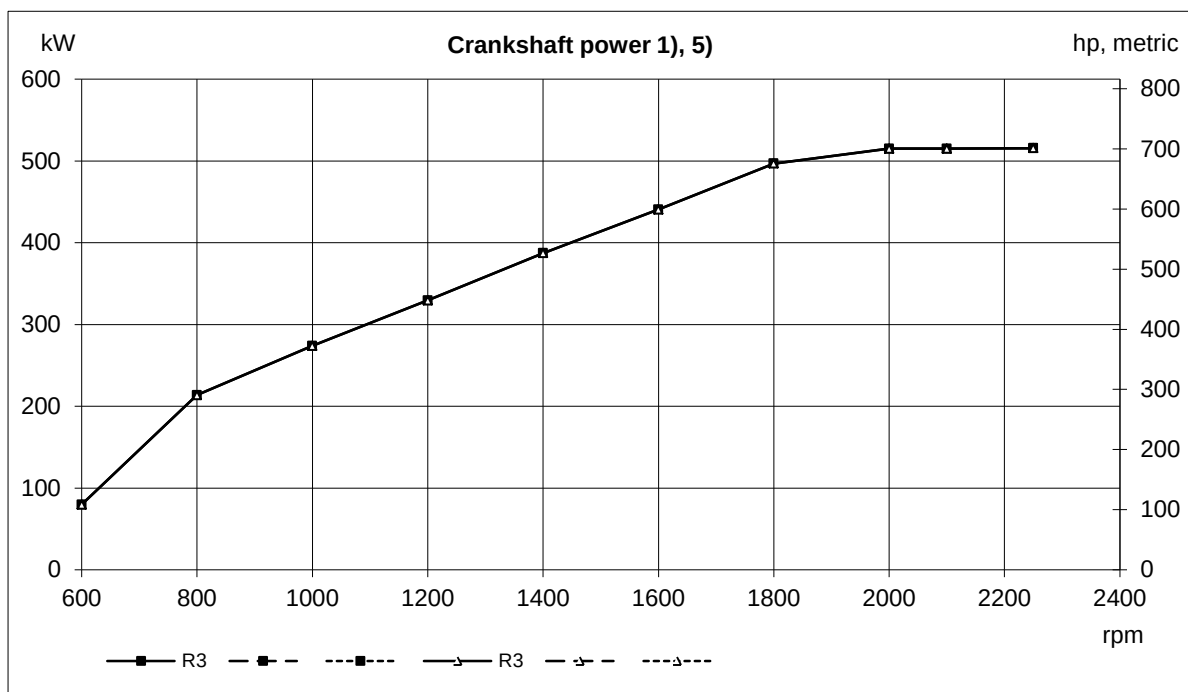
Speed range (top speed)	Load vektor	Maximum load
20-28 kn	F _x	47 kN
	F _y (+/-)	32 kN
	M _z (+/-)	12 kNm
28-42 kn	F _x	32 kN
	F _y (+/-)	65 kN
	M _z (+/-)	12 kNm

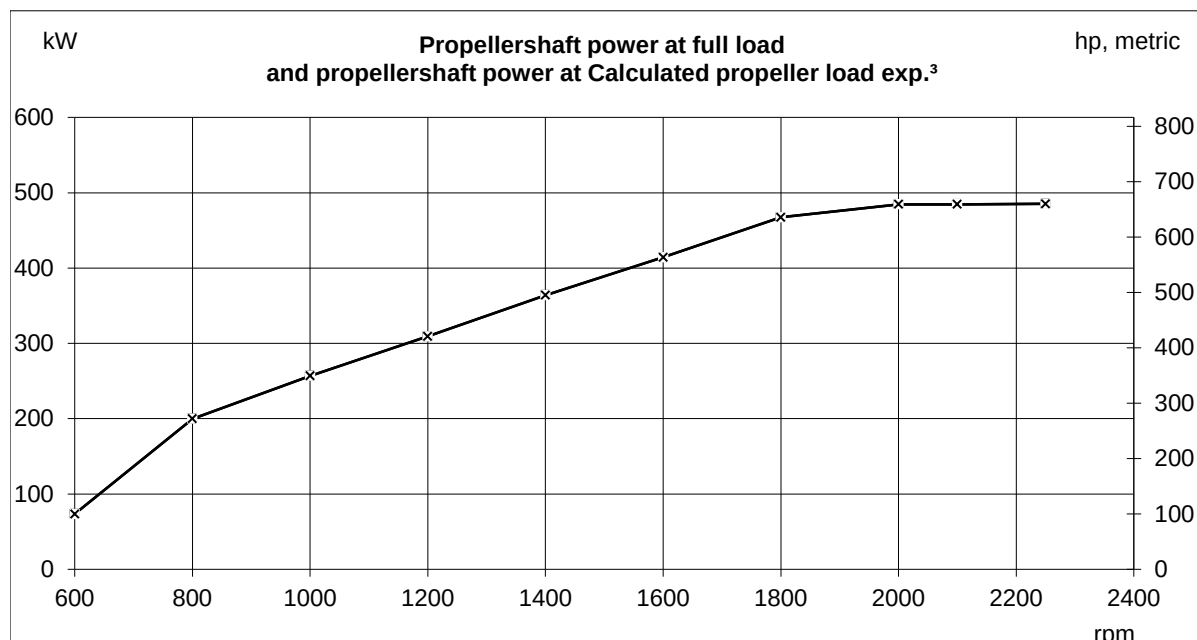
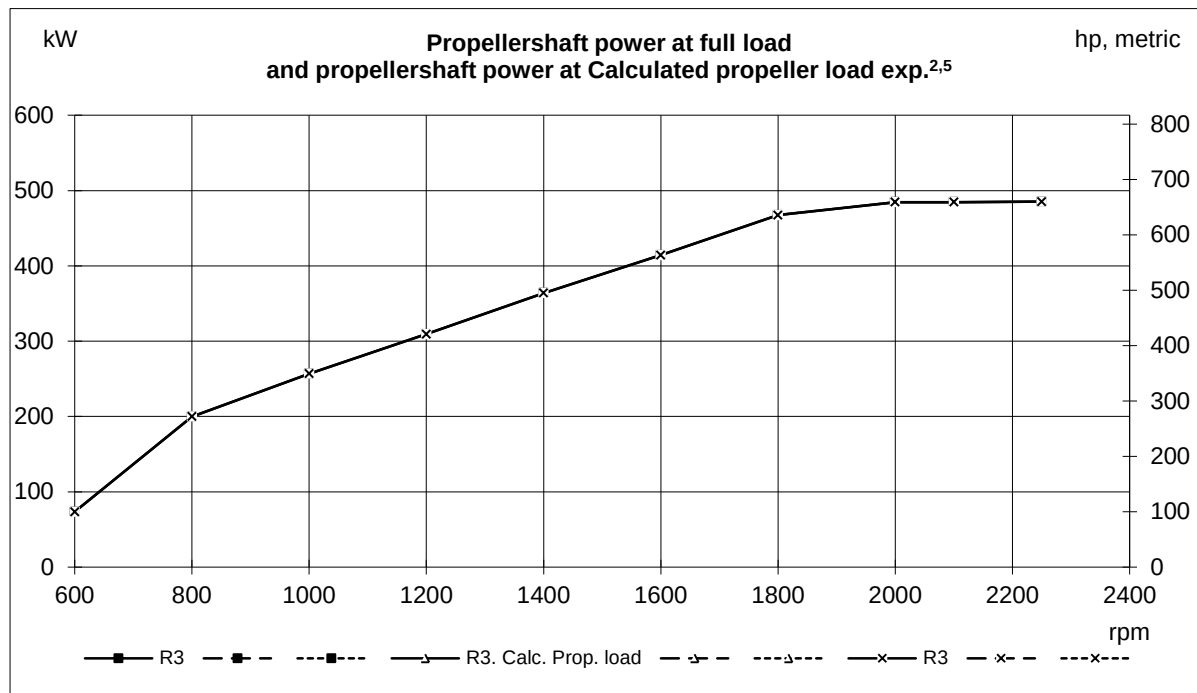
A	530 mm
B	442 mm

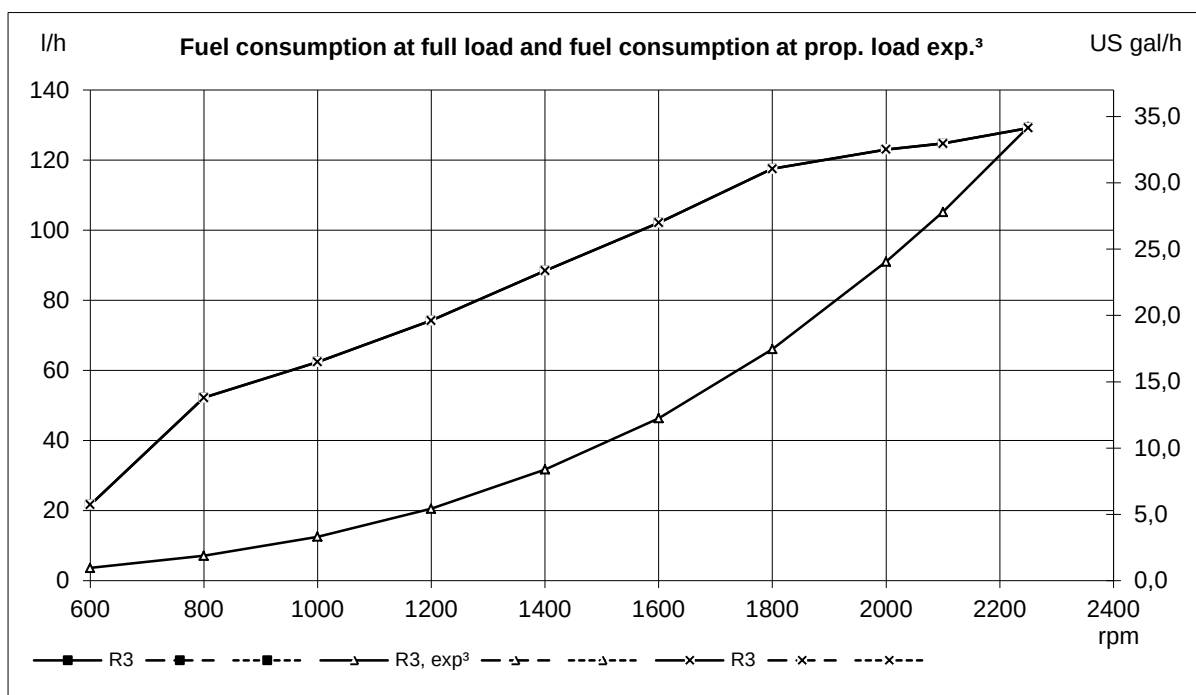
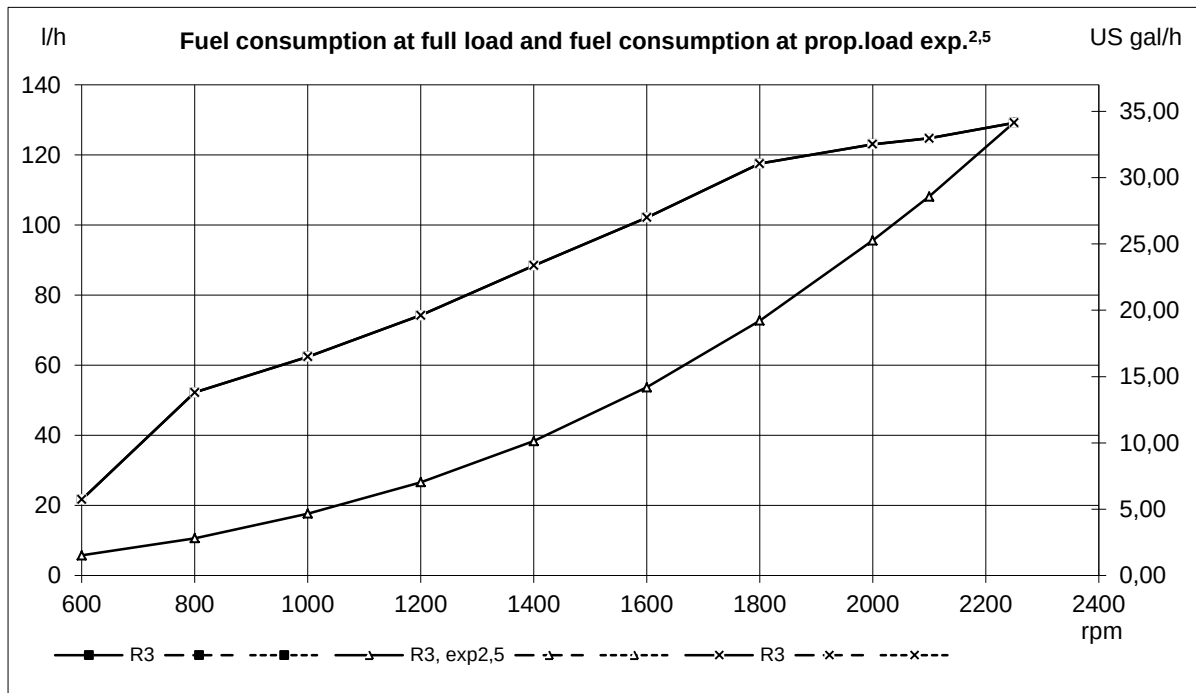


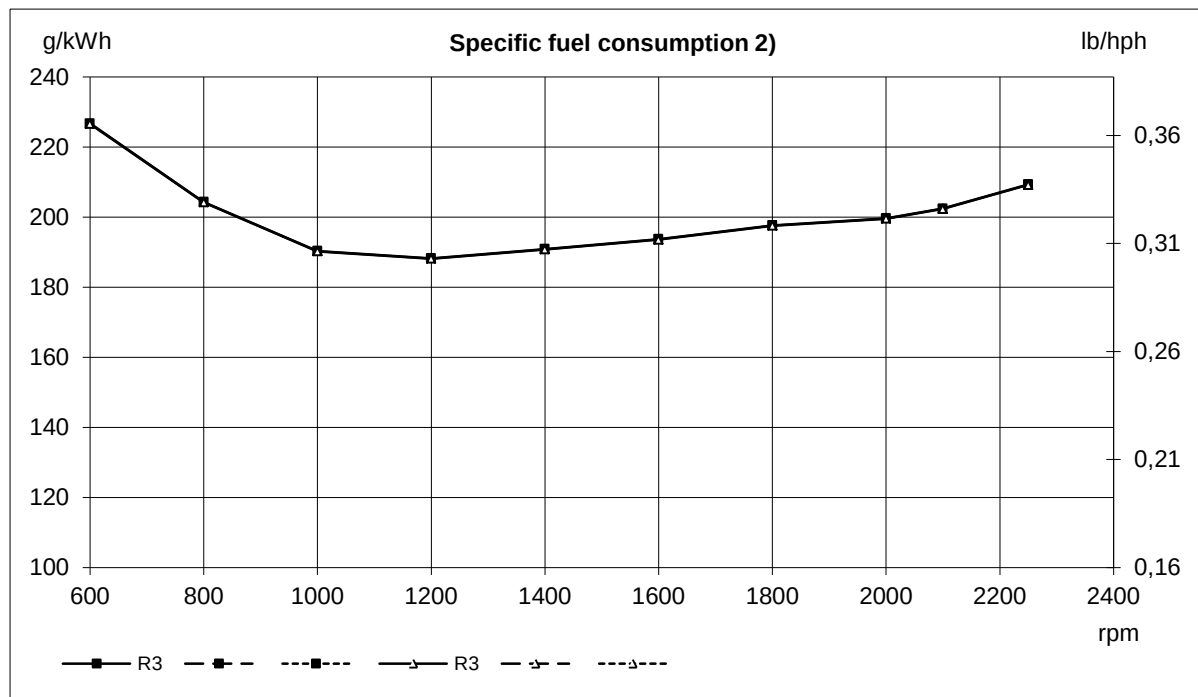
Important Note!

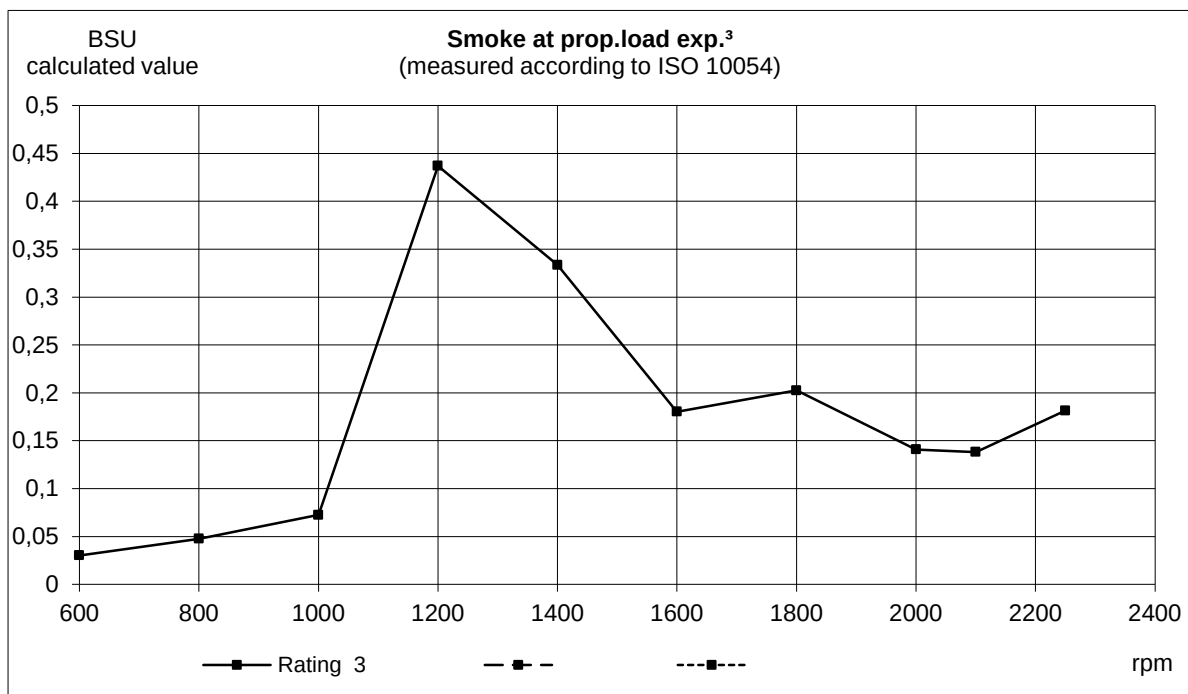
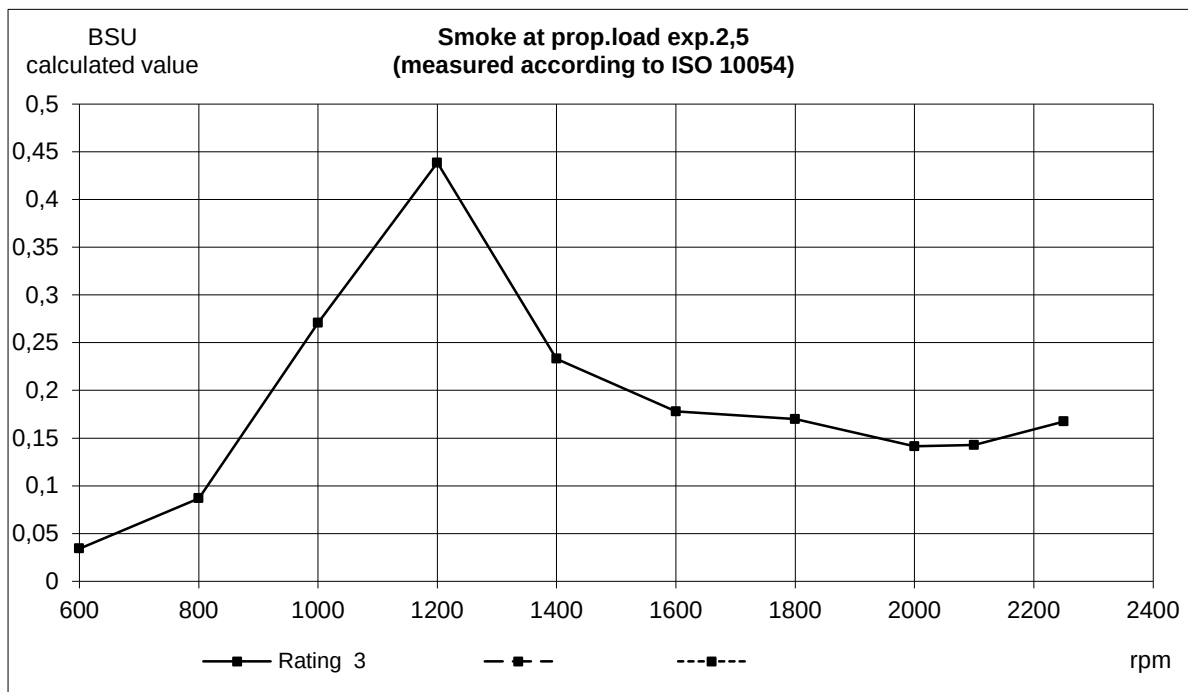
The above forces and torque are to be used as the base for maximum load in normal operations. Volvo Penta requires however that the detailed guidelines for the structure around the IPS unit are followed in order to ensure structural strength in case of grounding.

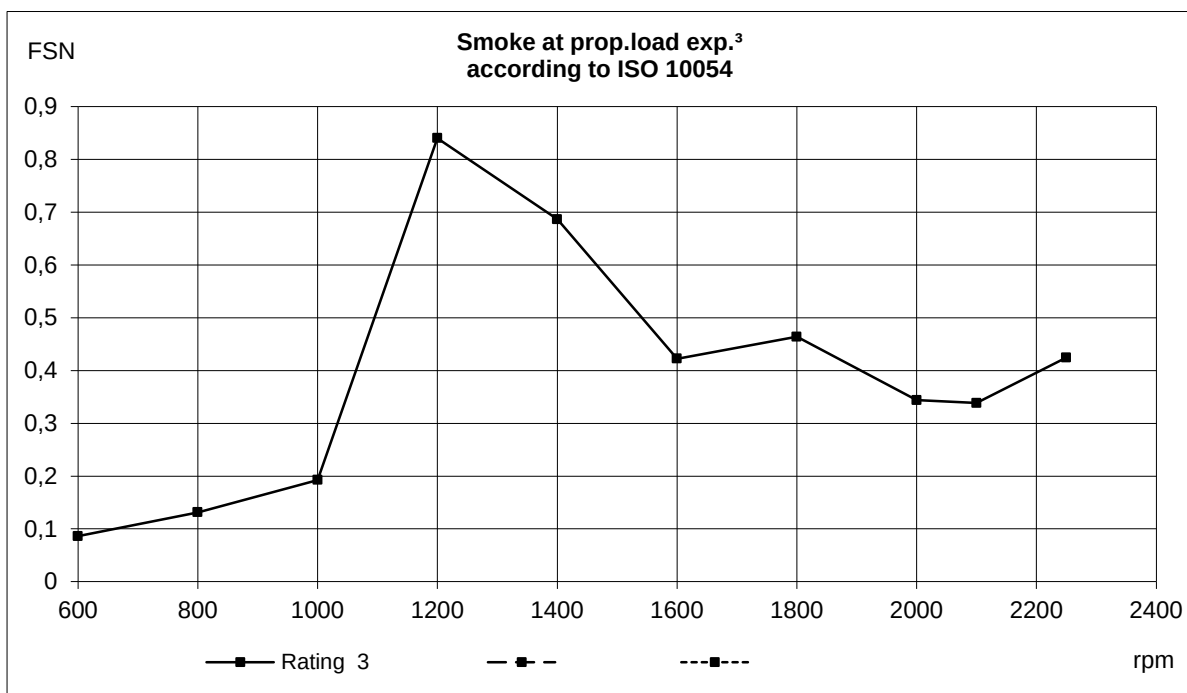
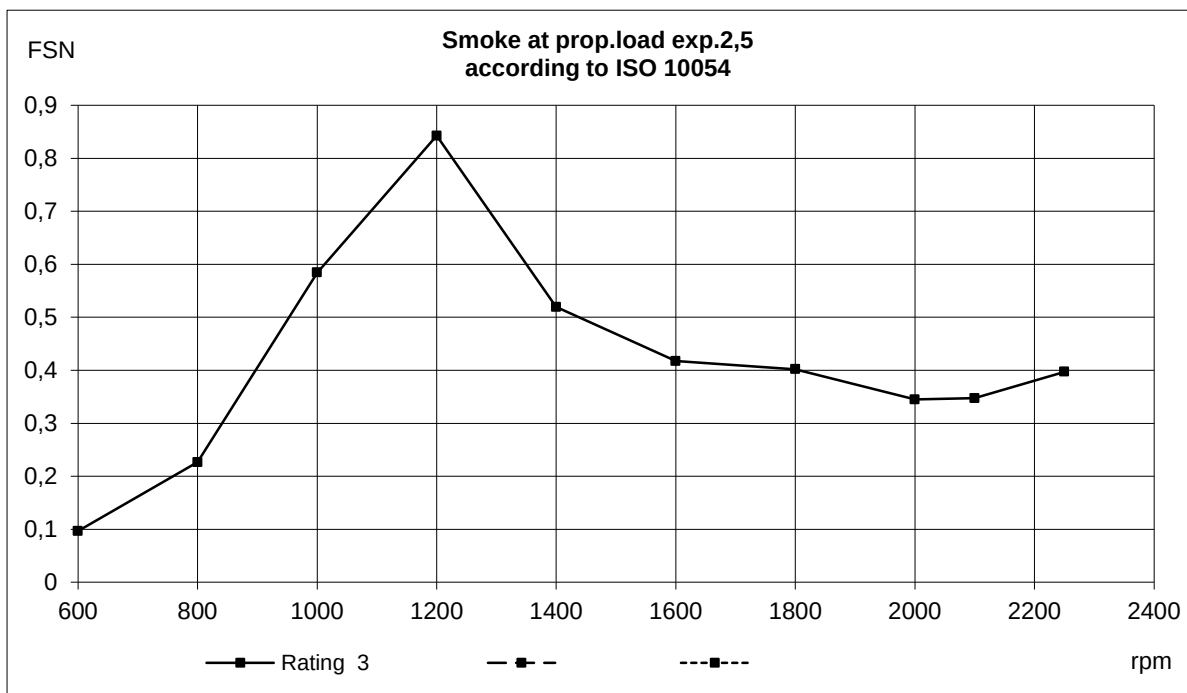












Sensors Control and Monitoring System							Switches Engine Shutdown System	
Sensors	Signal	Unit	Range	Warning Initial Delay / Warning Delay	Warning Level	Derating Level	Shutdown Initial Delay / Shutdown Delay	Shutdown Level (Tolerance)
Coolant level switch	Digital		ON/OFF	30 sec from start / 75 sec	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	2250 + 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	2250 rpm	
Warning Level		kPa		30 sec from start / 2 sec	340	340	340	340	340	0% load
Warning Level		kPa		30 sec from start / 2 sec	340	250	315	338	340	100% load
Derating Level (50% remain trq.)		kPa		10% trq. decr. per sec	350	260	325	348	350	100% load
Charge air temperature	50-0 kΩ	°C	-40 - 130 ± 4%		600 rpm	1000 rpm	1500 rpm	2000 rpm	2250 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	2250 rpm	
Warning Level		kPa		30 sec from start /	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	2250 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

VOLVO PENTA

D13 MP, 515KW/2250RPM, DST

Document No	Issue Index
22346010	05

Seawater pressure	0,5-4,5 V	kPa	0-300 ± 3%		600 rpm	1000 rpm	1500 rpm	2000 rpm	2250 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	2250 rpm	
Warning Level		kPa		30 sec from start / 8 sec	5	30	55	100	121	
Derating Level (50% remain trq.)		kPa		10% trq. decr. per sec	-5	20	45	90	111	

Remarks

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	2250	100%*	75%	50%

Soft 2) Soft derate ☐ 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	2250	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%
	2250	100%*	50%	30%	30%	30%	30%