

VOLVO PENTA D13 MP, 588KW/2300RPM, SST	Document No	Issue Index
	22346008	02

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 + 200/-50
Rated speed R5	rpm	2300
	rpm	
	rpm	
Propeller selection range R5	rpm	2300-2350
	rpm	
	rpm	
Dry weight engine BT	kg lb	1450 3197

Performance	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2300
Crankshaft power 1), 5)	5	kW	67	115	216	360	437	476	532	587	588	588
		hp	91	156	293	489	594	647	723	798	800	800
Propeller shaft power 1) (At full load) With drive	5	kW	62	108	205	344	417	455	508	562	562	562
		hp	85	147	279	467	567	618	691	764	765	765
Propellershaft power at prop. load x ^{2,5}	5	kW	20	40	70	111	163	227	305	397	448	562
		hp	27	55	95	150	221	309	414	539	609	765
Propellershaft power at prop. load x ³	5	kW	10	24	46	80	127	189	270	370	428	562
		hp	14	32	63	109	173	258	367	503	582	765
Torque at crankshaft 2)	5	Nm	1066	1369	2058	2864	2978	2840	2820	2803	2674	2441
		lbf ft	786	1010	1518	2112	2196	2094	2080	2067	1972	1801
Mean piston speed		m/s	3,2	4,2	5,3	6,3	7,4	8,4	9,5	10,5	11,1	12,1
		ft/s	10,4	13,8	17,3	20,7	24,2	27,6	31,1	34,6	36,3	39,7
Effective mean pressure 2)	5	MPa	1,05	1,35	2,02	2,82	2,93	2,79	2,77	2,76	2,63	2,40
		psi	152,1	195,3	293,5	408,5	424,8	405,1	402,3	399,8	381,4	348,2
Max combustion pressure 2)	5	MPa	10,6	12,9	18,5	20,6	20,2	19,4	19,8	20,3	20,1	19,6
		psi	1537	1871	2683	2988	2930	2814	2872	2944	2915	2843

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

Fuel system

	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2300
Specific fuel consumption 2)	5	g/kWh	234	222	224	199	192	194	200	206	209	216
		lb/hph	0,38	0,36	0,363	0,322	0,31	0,314	0,323	0,333	0,339	0,349
Fuel consumption, Test cycle E5	5	g/kWh	214,5									
		lb/hph	0,35									
Fuel consumption, Test cycle E3	5	g/kWh	211,9									
		lb/hph	0,34									
Fuel consumption at prop. load x ^{2,5}	5	l/h	6,0	11,4	19,0	29,1	42,7	58,2	78,3	103,5	117,8	151,8
		US gal/h	1,6	3,0	5,0	7,7	11,3	15,4	20,7	27,3	31,1	40,1

Fuel system

	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2300
Fuel consumption at prop. load x ³	5	l/h	3,8	7,4	13,3	21,9	34,3	49,9	69,4	96,8	113,2	151,8
		US gal/h	1,0	2,0	3,5	5,8	9,1	13,2	18,3	25,6	29,9	40,1
Fuel consumption at full load	5	l/h	18,8	30,5	57,8	85,5	100,1	110,3	126,9	144,6	147,2	151,7
		US gal/h	5,0	8,1	15,3	22,6	26,4	29,1	33,5	38,2	38,9	40,1

Intake and exhaust system

	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2300	
Specific exhaust heating effect in percent of crankshaft power	5	%	57	65	74	66	61	61	64	71	73	78	
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	5	°C	445	523	631	547	455	413	422	478	480	500	
		°F	833	973	1168	1017	851	775	792	892	896	932	
		°C											
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)	5	kPa								Max	15		
		psi									2,2		
		kPa								Min			

Intake and exhaust system

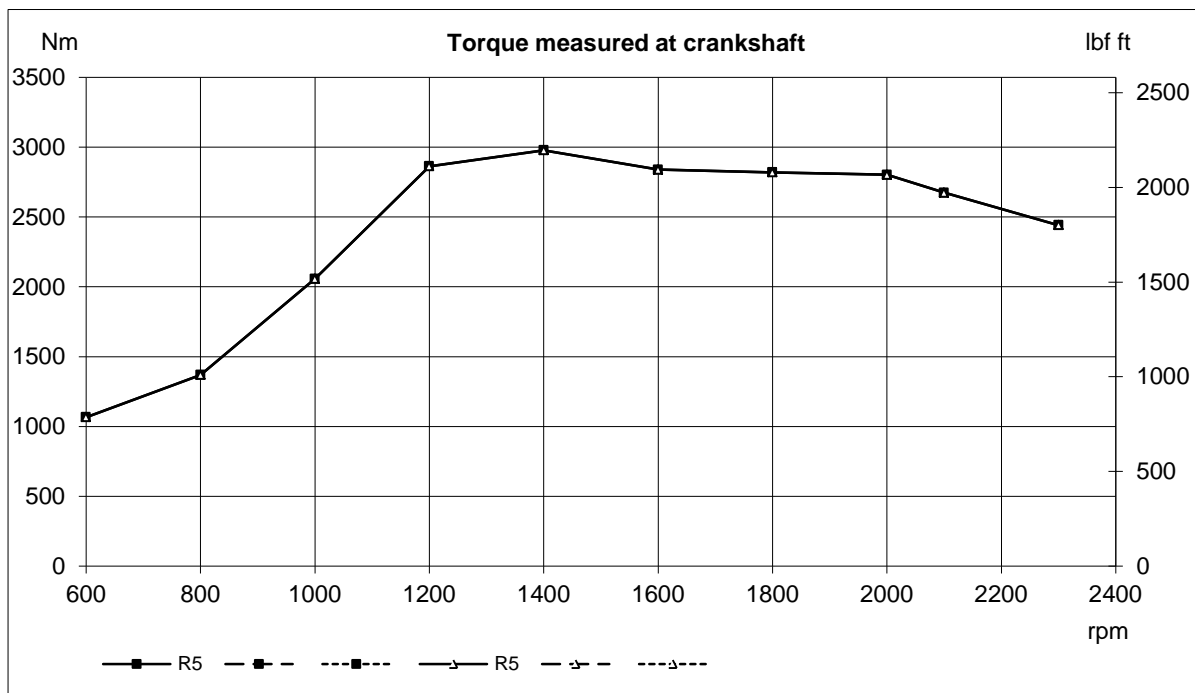
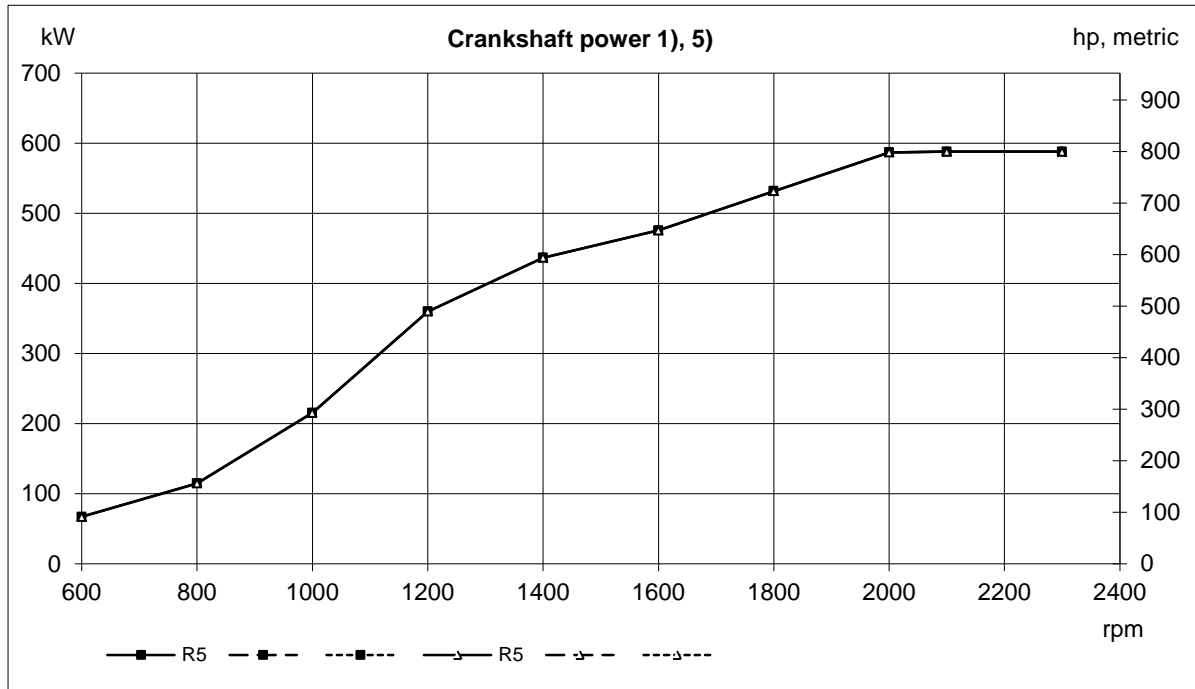
	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2300
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPA and relative humidity 30%.	5	m³/min	3,9	6,3	10,9	19,5	27,6	33,8	38,8	40,8	41,7	42,3
		cu.ft./min	138,3	223,7	383,8	686,9	972,9	1192	1368	1439	1472	1495
		m³/min										
Charge air pressure Inlet manifold	5	kPa	16	37	90	183	241	269	281	264	257	237
		psi	2,3	5,4	13,1	26,5	35,0	39,0	40,8	38,3	37,3	34,4
Exhaust gas flow	5	m³/min	10,4	18,5	36,0	56,2	68,1	76,3	86,5	97,1	99,2	102,7
		cu.ft./min	366,1	653,3	1270	1985	2404	2693	3056	3429	3504	3625

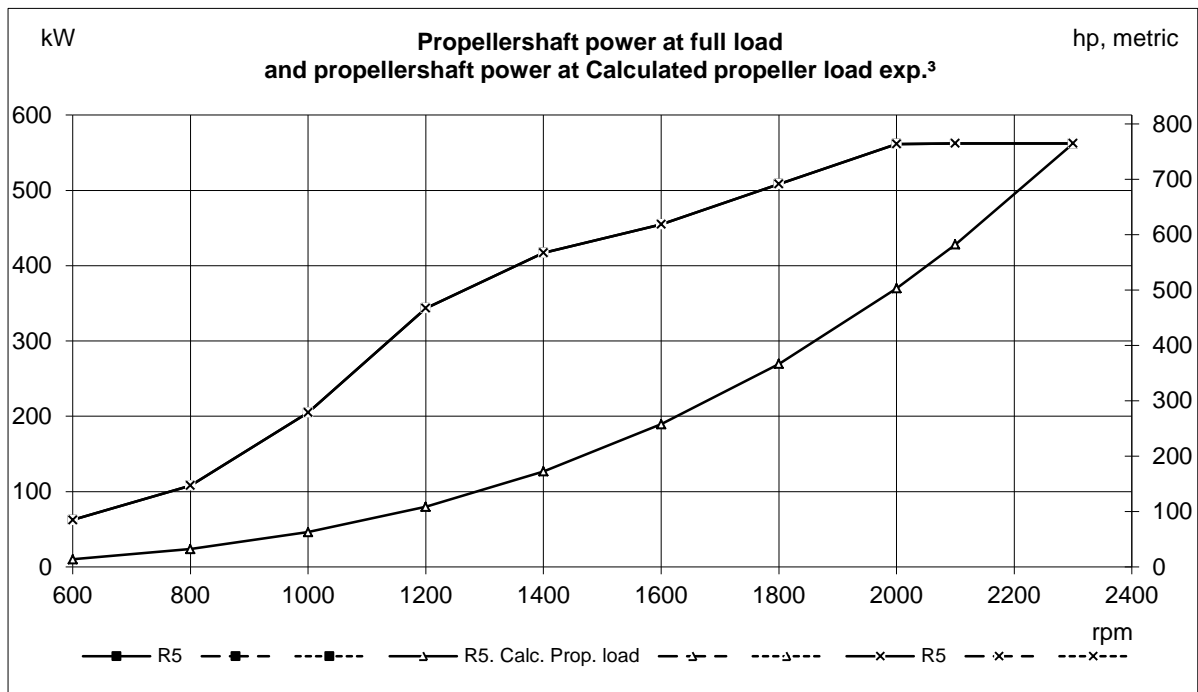
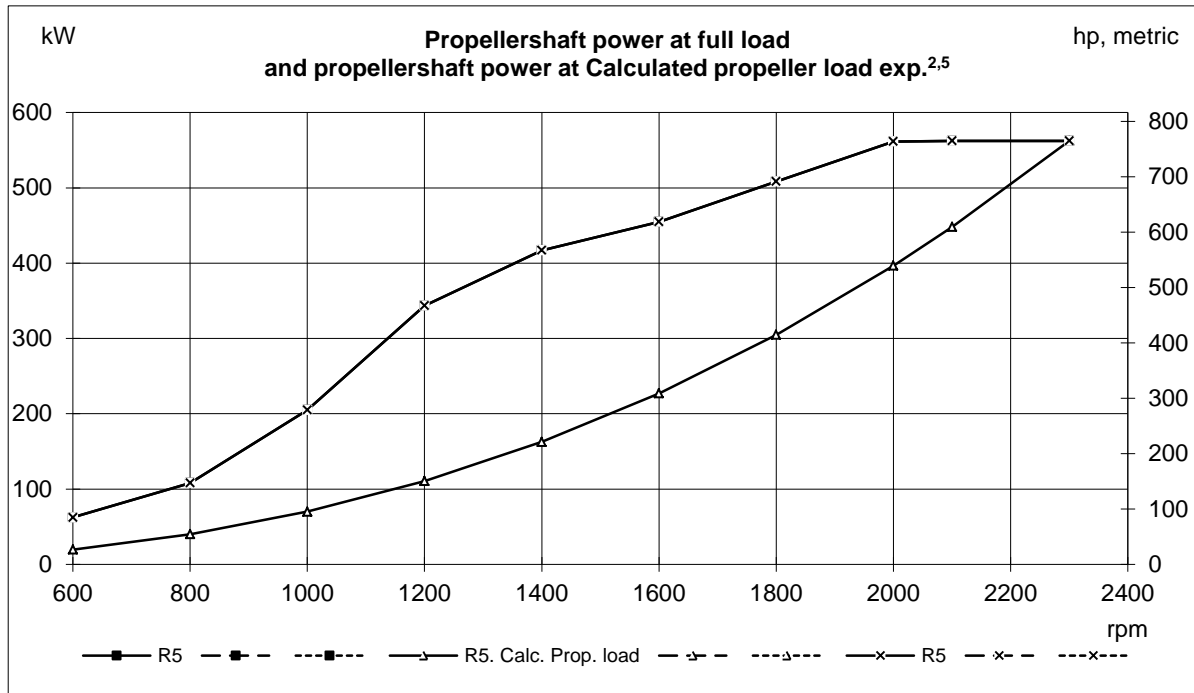
Cooling system	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2300
Radiated heat in kW (per engine)	5	kW	4	4,6	4,3	6,5	7	7,1	7,4	7,6	7,6	7,6
Heat rejection to charge air cooler in percent of crankshaft power.	5	%	2,2	4,4	8,3	14,6	19,8	23,7	25,9	24,5	25,2	25,2
Coolant heat rejection to HE, incl. engine oil cooler and excl. charge air cooler, in percent of crankshaft power.	5	%	105,8	75,4	64,2	48,1	42,1	39,7	41,5	43,7	44,9	47,8
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 °F	98 208									
Coolant volume engine, including heat exchanger and charge air cooler		litres US gal.	51 13,47									
Max. additional coolant for cabin heater etc. with std. Expansion tank		litres US gal.	15 3,96									
Maximum coolant flow to cabin heater etc.		l/min cu.ft./min	42 1,48									
Thermostat, start open at		°C °F	82 180									
Thermostat, fully open at		°C °F	92 198									

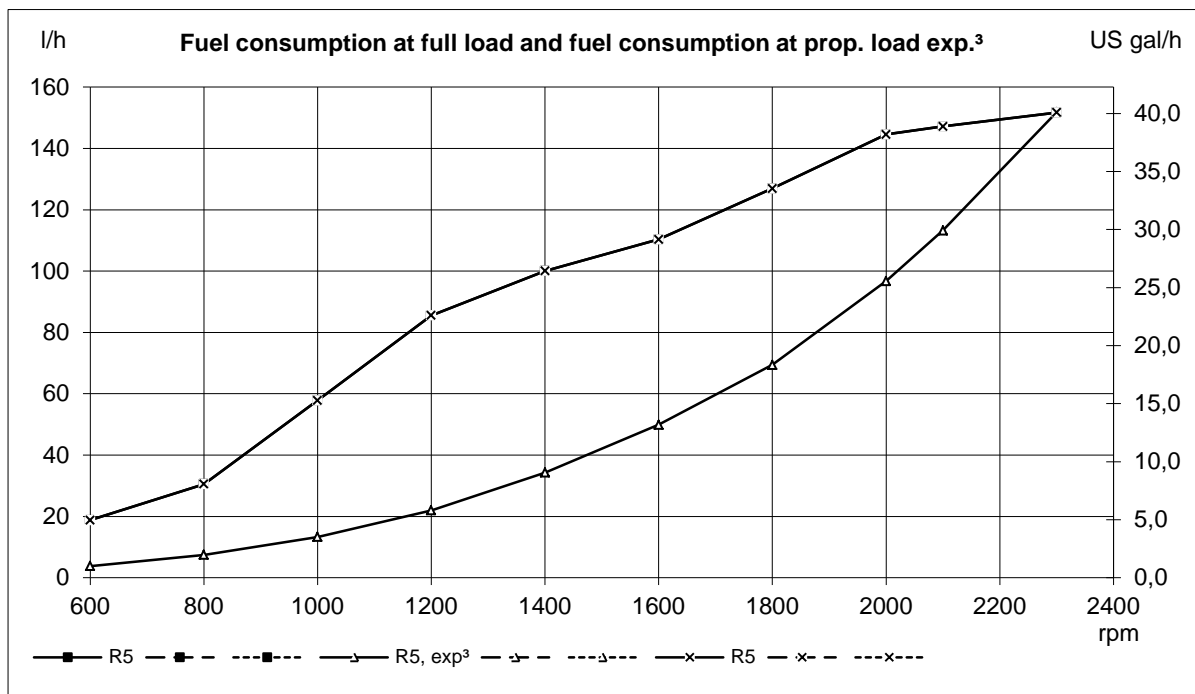
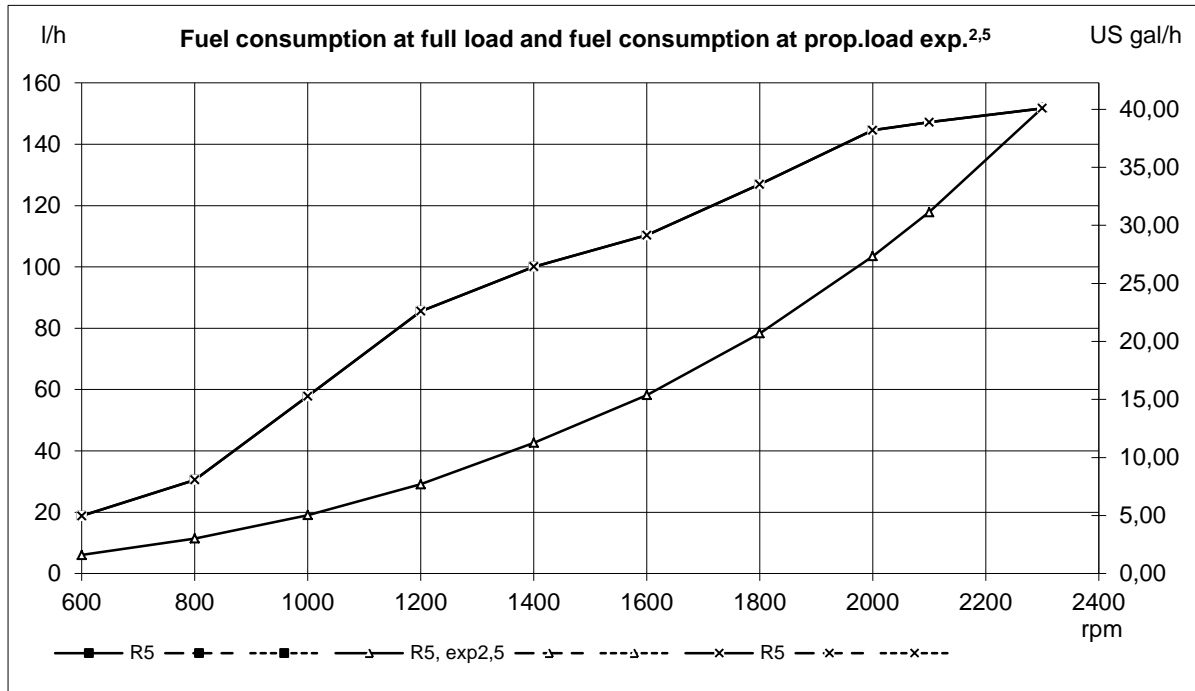
Raw water circuit	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2300
Nominal raw water design flow	l/min cu.ft./min	157 5,5	208 7,3	261 9,2	317 11,2	365 12,9	408 14,4	442 15,6	443 15,6	437 15,4	424 15,0
Nominal raw water pump pressure head at design flow. (measured before and after pump)	kPa psi	18 2,6	30 4,4	45 6,5	65 9,4	84 12,2	104 15,1	123 17,8	123 17,8	120 17,4	113 16,4
Maximum raw water pump suction head	kPa psi	30 4,4									
Maximum additional pressure drop excl. reverse gear oil cooler	kPa 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 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 °F	30 86									

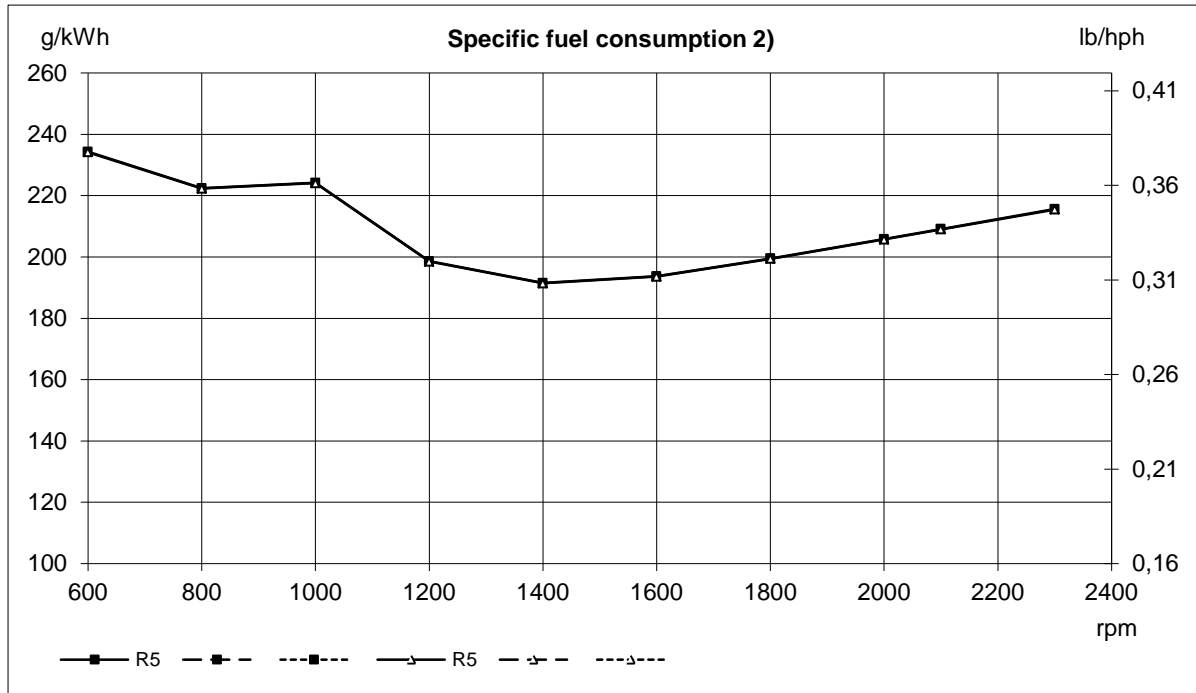
Emissions	Rating	rpm	600	800	1000	1200	1400	1600	1800	2000	2100	2300
Smoke at prop. load $x^{2,5}$	5	*BSU	0,0	0,1	0,2	0,1	0,5	0,1	0,1	0,1	0,1	0,4
Smoke at prop. load x^3	5	*BSU	0,0	0,0	0,1	0,2	0,3	0,1	0,1	0,1	0,1	0,4
Noise at prop. load $x^{2,5}$. 4)	5	dBA	102,0	104,0	107,0	110,0	111,0	112,0	113,0	115,0	116,0	117,0

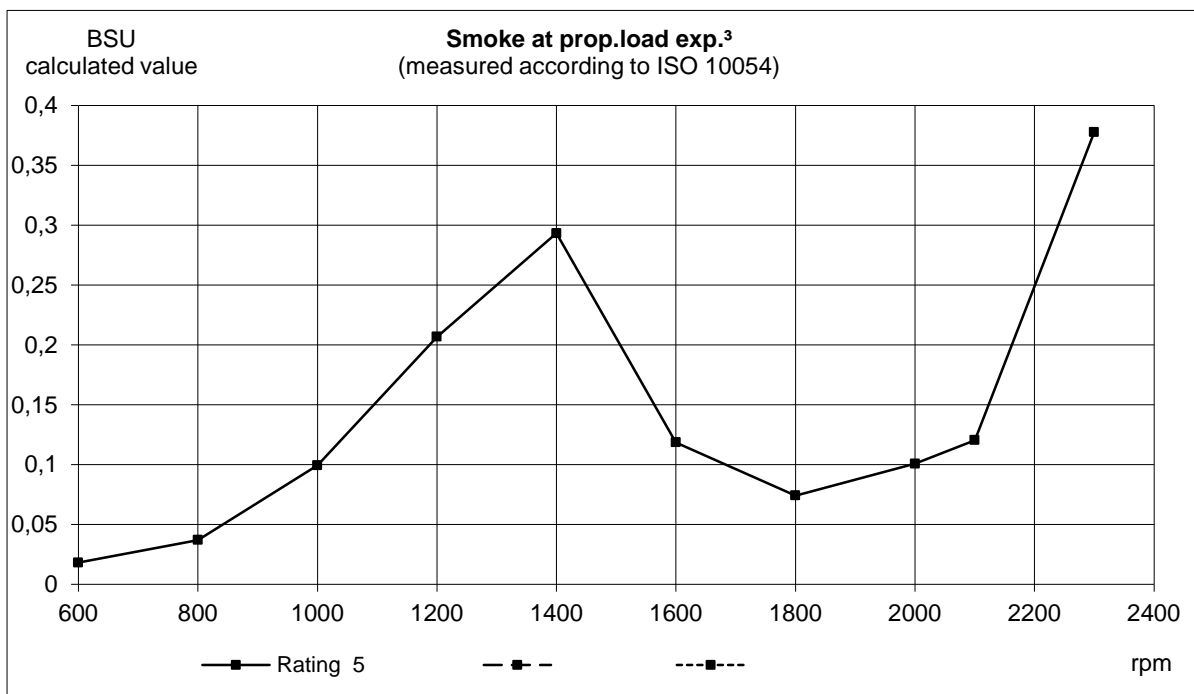
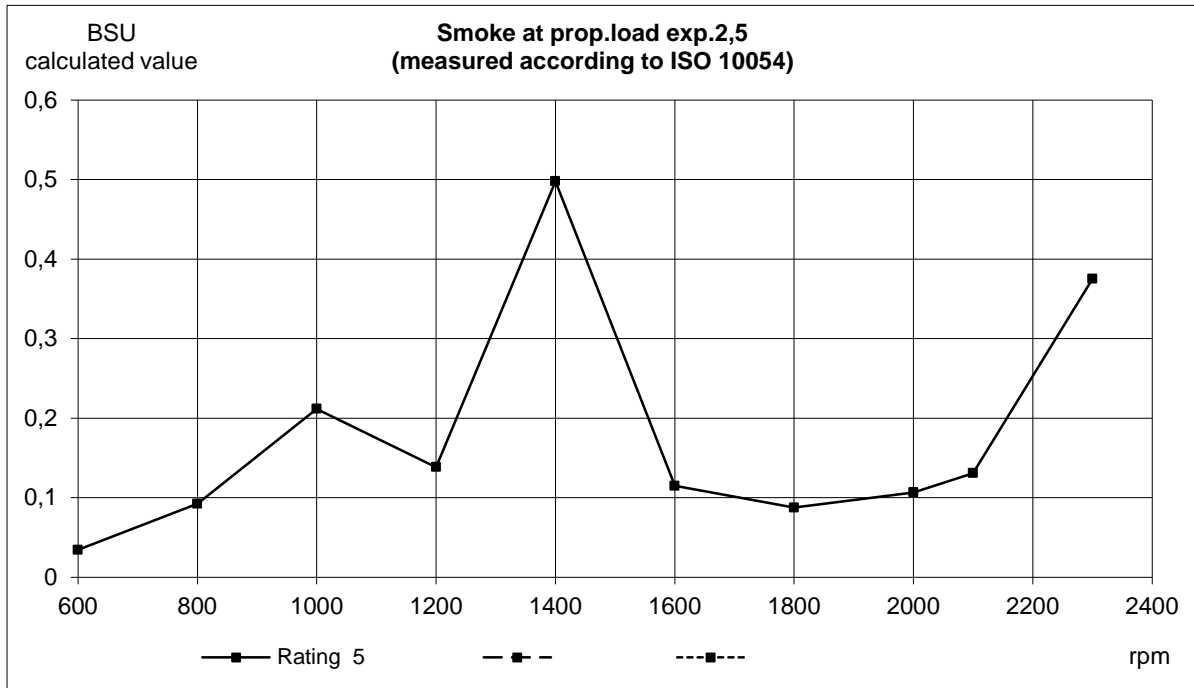
*NB.! BSU are calculated values. Measured values are acc. to ISO 10054 in FSN units

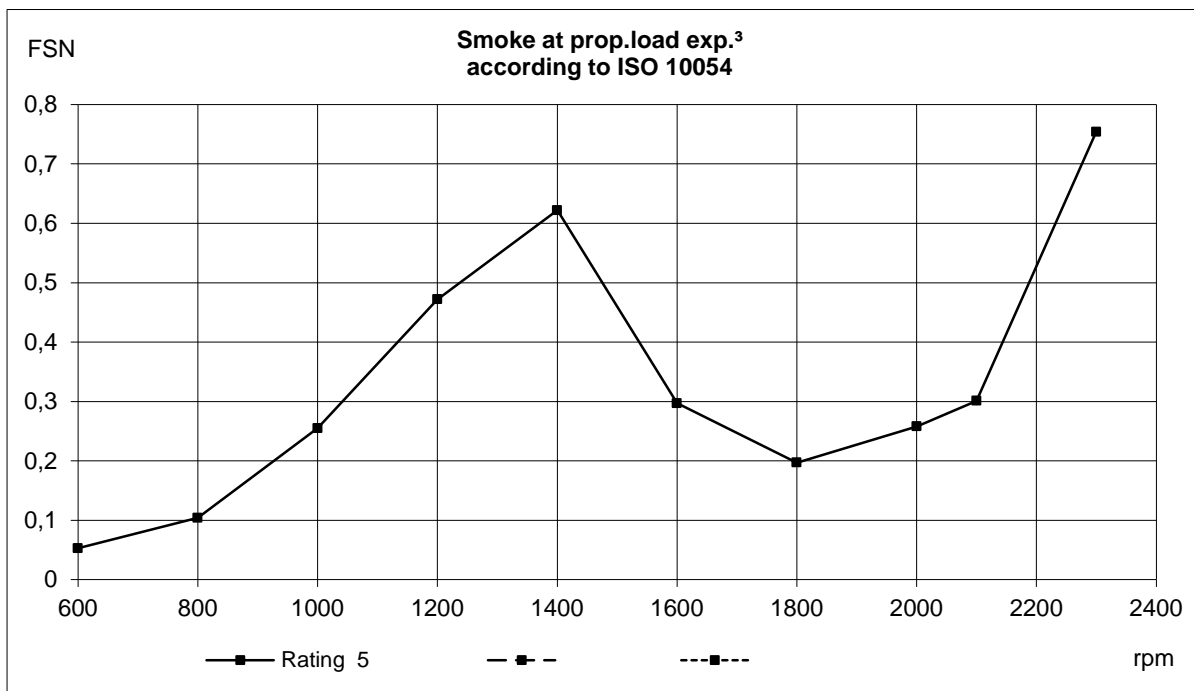
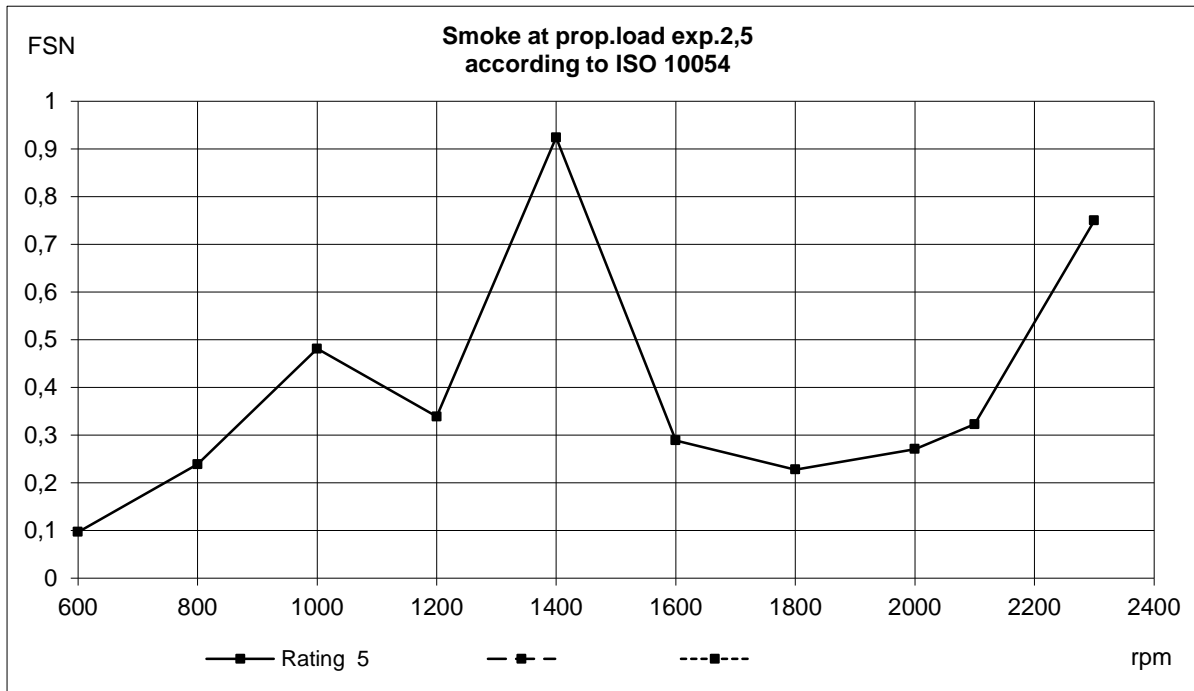


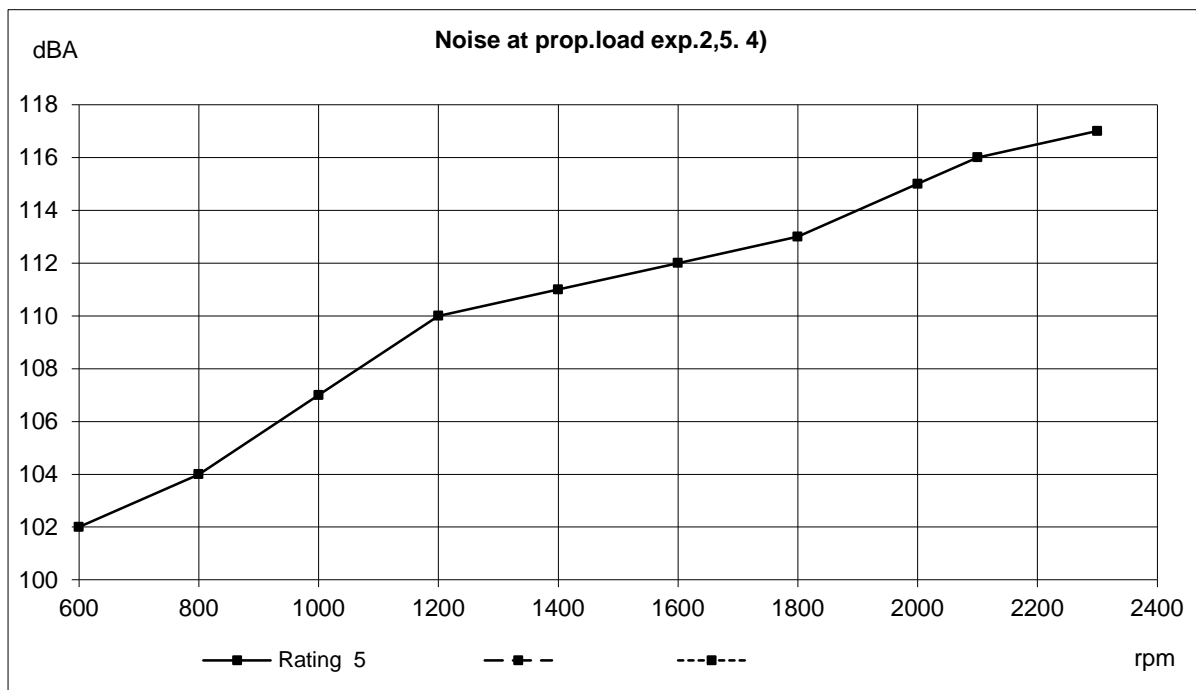












Sensors Control and Monitoring System							Switches Engine Shutdown System	
Sensors	Signal	Unit	Range	Warning Initial Delay / Warning Delay	Warning Level	Derating Level	Shutdown Initial Delay / Shutdown Delay	Shutdown Level (Tolerance)
Coolant level switch	Digital		ON/OFF	30 sec from start / 75 sec	Low (ON / Closed)	NA	NA	NA
Coolant temperature	50-0 kΩ	°C	-40 - 140	30 sec from start / 2 sec	98	101 (soft 1)	NA	NA
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
Dry Exhaust gas temperature	PT200	°C	-40 - 750 ± 2.5%	30 sec from start / 1 sec	560	585 (soft 2)	NA	NA
Wet Exhaust gas temperature	PT200	°C	-40 - 750 ± 2.5%	30 sec from start / 1 sec	175	200 (soft 3)	NA	NA
Oil level sensor	Analogue		± 1.9mm	30 sec from start / 5 sec	Low level	NA	NA	NA
Oil temperature	50-0 kΩ	°C	-40 - 140	30 sec from start / 23 sec	130	135 (soft 4)	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

NA = Not applicable

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Sensors (rpm dependent)	Signal	Unit	Range	Initial Delay / Delay	Warning Level / Derating Level / Shutdown Level rpm Map					Notes
					600 rpm	1000 rpm	1500 rpm	2000 rpm	2300 rpm	
Charge air pressure	0,5-4,5 V	kPa	50 - 600 ± 4.2 kPa							
Warning Level		kPa		30 sec from start / 2 sec	310	291	310	283	255	
Derating Level (50% remain trq.)		kPa		10% trq. decr. per sec	320	301	320	293	265	
Charge air temperature	50-0 kΩ	°C	-40 - 130 ± 4%							
Warning Level		kPa		90 sec from start / 23 sec	80	80	80	65	65	
Derating Limit		kPa		Instant after warning	85	85	85	70	70	Soft derate 5
Fuel pressure	0,5-4,5 V	kPa	0-700 ± 2,5%							
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%							
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	

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	2300	100%*	75%	50%

Soft 2) Soft derate <input type="checkbox"/>	Speed / °C	585°C	590°C	595°C	600°C
Exhaust gas temp	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	Speed / °C	200°C	205°C	210°C	215°C
Exhaust wet gas temp	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 4) 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 5) 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%