

<b>VOLVO PENTA</b> D11B1 (R4-625 IB)	Document No	Issue Index
	<b>22191140</b>	<b>02</b>

## General

4-stroke direct injected, turbocharged and aftercooled diesel engine

Number of cylinders		6
No of valves		24
Displacement, total	litres in <sup>3</sup>	10,84 661,3
Firing order		1-5-3-6-2-4
Rotational direction, viewed from the front		Clockwise
Bore	mm in	123 4,84
Stroke	mm in	152 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	
Rated speed Crankshaft power 1), 5) R4	rpm	2400
Propeller selection range Crankshaft power 1), 5)	rpm	2400-2450
Dry weight engine BT	kg lb	1145 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 US gal	30 7,93
Max. oil volume excluding filters for all allowed installation inclinations:	litres US gal	25 6,60
Min. oil volume excluding filters for all allowed installation inclinations:	litres US gal	21 5,55

1) ISO 3046, TUEI temp 40°C.

ISO 8665 (=SAE J 1228=ICOMIA 28-83)

2) At power according to 1).

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4) Acc. to ISO 3744

5) At installed back pressure

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, Test cycle E5	4	g/kWh lb/hph	222 0,36									
Fuel consumption at prop. load x <sup>2,5</sup>	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	528	635	675	611	493	464	472	478	476		
		°F	982	1175	1247	1132	919	867	882	892	889		
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)		kPa psi								Max	15 2,2		
		kPa psi								Min			
Engine air consumption at 25°C / 77°F	4	m³/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	m³/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	
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.	46 12,15									
Max. additional coolant for cabin heater etc. with std. Expansion tank		litres US gal.	40 10,57									
Maximum coolant flow to cabin heater etc.		l/min cu.ft./min	76 2,68									
Thermostat, start open at		°C °F	76 169									
Thermostat, fully open at		°C °F	86 187									

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<b>Raw water circuit</b>		<b>rpm</b>	<b>700</b>	<b>900</b>	<b>1100</b>	<b>1300</b>	<b>1600</b>	<b>1900</b>	<b>2100</b>	<b>2300</b>	<b>2400</b>	<b>2500</b>
Nominal raw water design flow		l/min cu.ft./min	76 2,7	99 3,5	121 4,3	141 5,0	174 6,1	204 7,2	227 8,0	249 8,8	255 9,0	
Maximum raw water pump suction head		kPa psi	30 4,4									
Maximum raw water temperature entering heat exchanger		°C °F	32 90									

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

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

<b>Emissions</b>		<b>Rating</b>	<b>rpm</b>	<b>700</b>	<b>900</b>	<b>1100</b>	<b>1300</b>	<b>1600</b>	<b>1900</b>	<b>2100</b>	<b>2300</b>	<b>2400</b>	<b>2500</b>
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

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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)
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 temperature	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	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)	NA	NA
Engine speed cam	Frequency	rpm		Instant	Lost signal	Lost signal**	NA	NA
Engine speed crank	Frequency	rpm		Instant	Lost signal	Lost signal**	NA	NA
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

NA = Not applicable

\* 50% remaining torque from 1500 rpm

\*\* 80% remaining torque

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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	
<b>Fuel pressure</b>	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	
<b>Oil pressure</b>	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
Shutdown Level	NA	kPa	NA	NA	NA	NA	NA	NA	NA	
<b>Piston cooling pressure</b>	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

Warning = Yellow Lamp active

Derating = Red Lamp active

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

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

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

<b>Soft 4) Soft derate Exhaust Temp.</b> 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

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Fault Limit table Exhaust Dry Temp.

Nm \ rpm	1000 rpm	1200 rpm	1300 rpm	1400 rpm	1500 rpm	1600 rpm	2000 rpm	2500 rpm
600	575	620	650	620	580	560	560	560
1000	575	620	650	620	580	560	560	560
1400	575	620	650	620	580	560	560	560
1600	575	620	650	620	580	560	560	560
2000	575	620	650	620	580	560	560	560
2200	575	620	650	620	580	560	560	560
2400	575	620	650	620	580	560	560	560
2600	575	620	650	620	580	560	560	560

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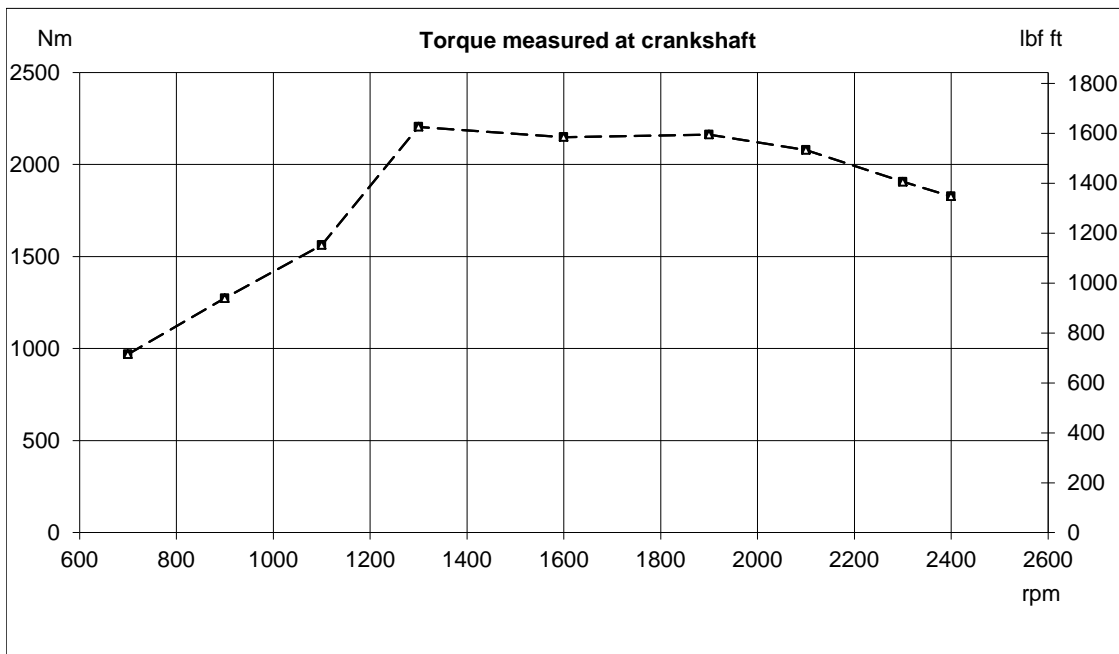
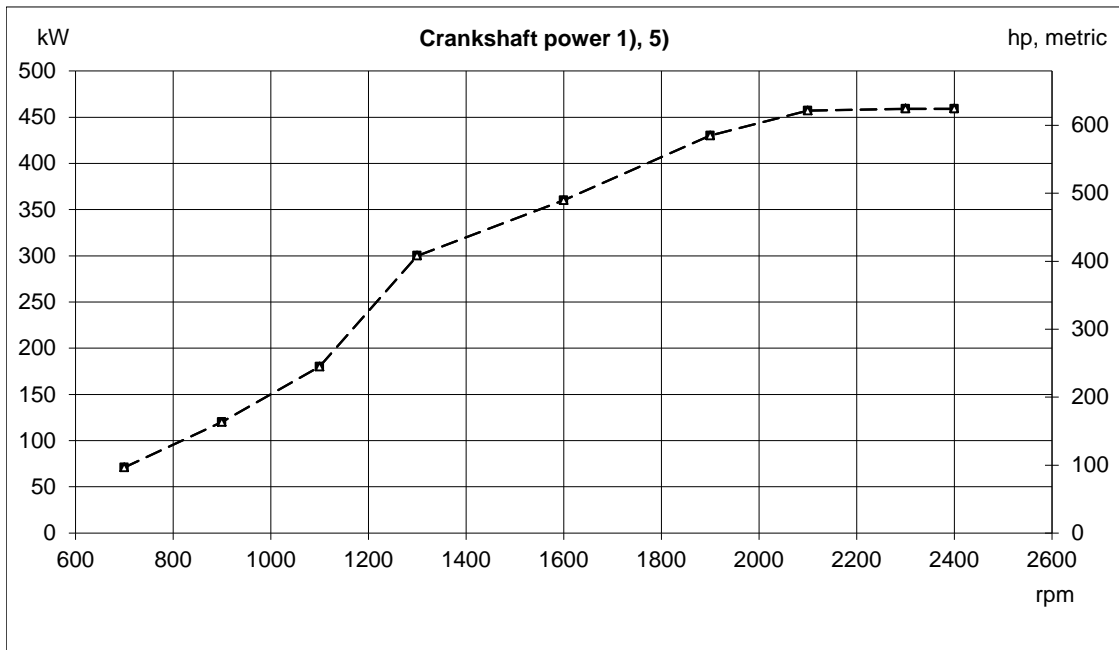
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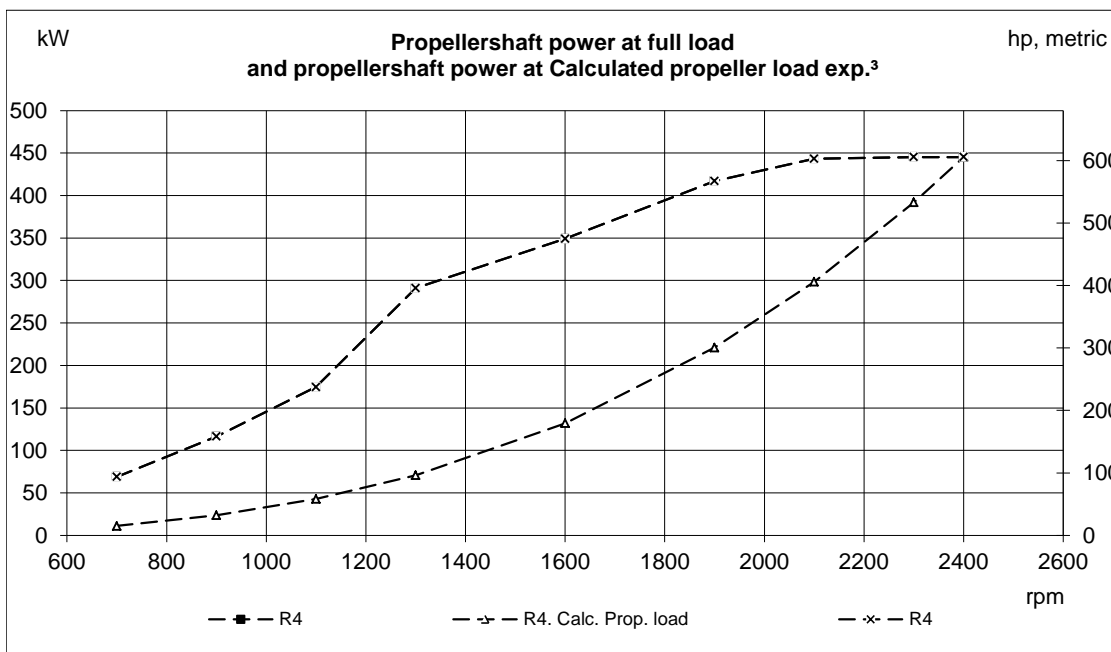
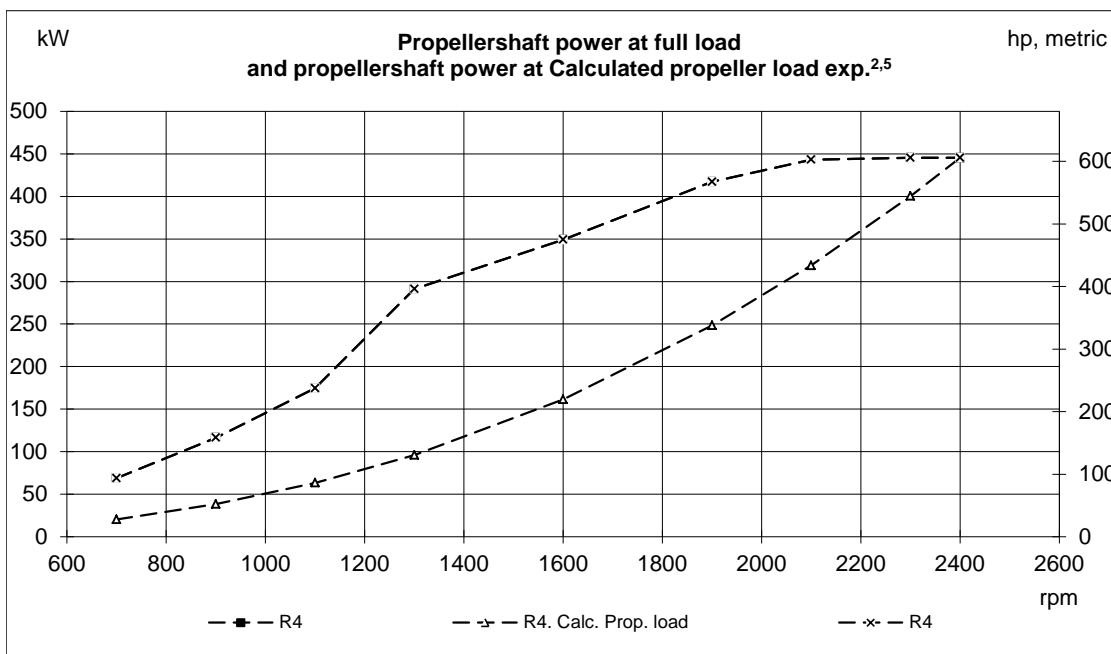
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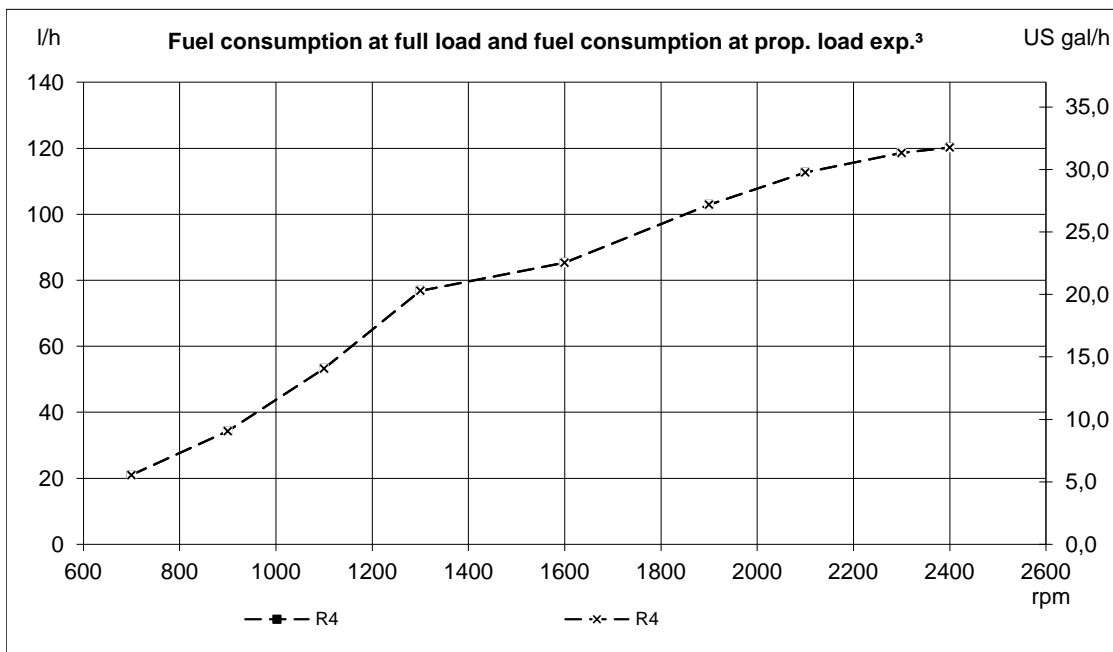
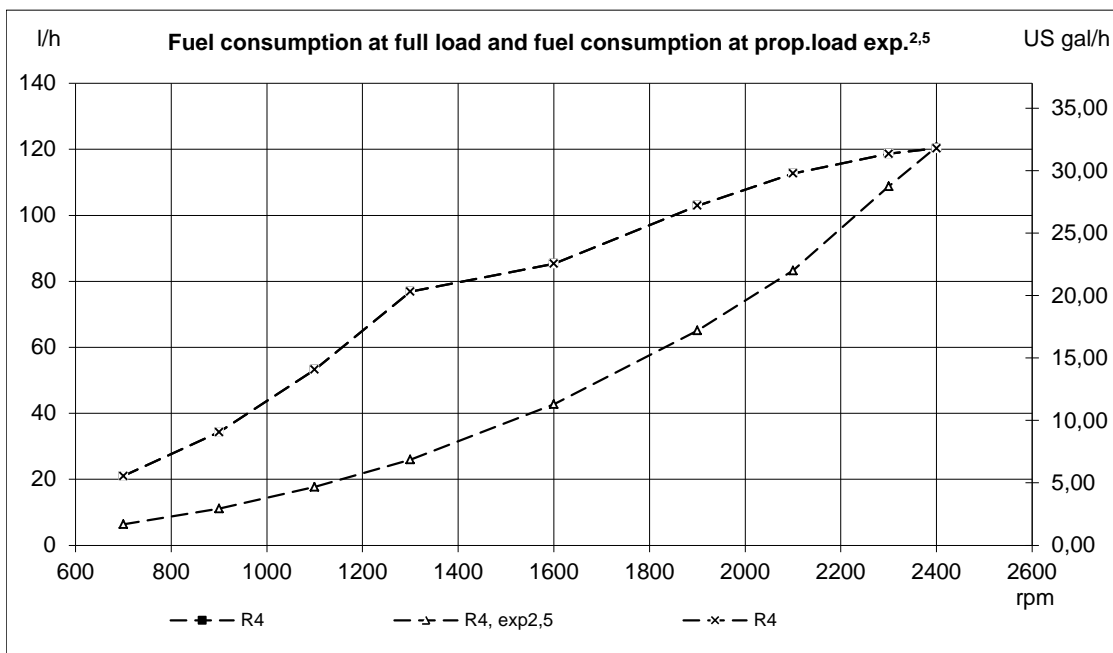


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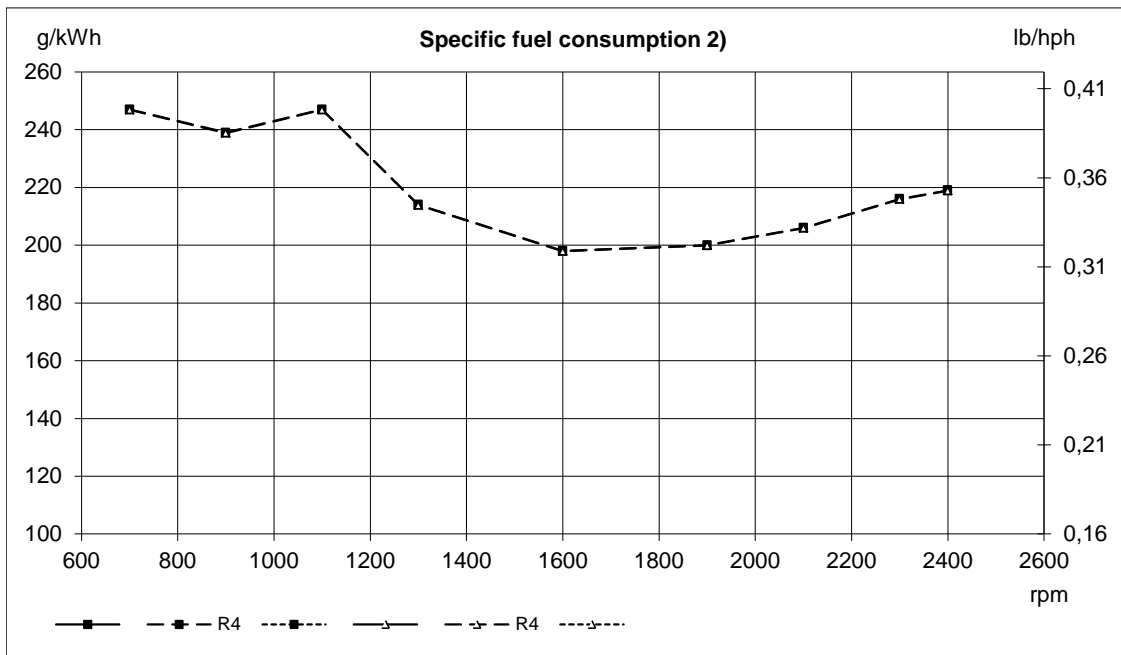




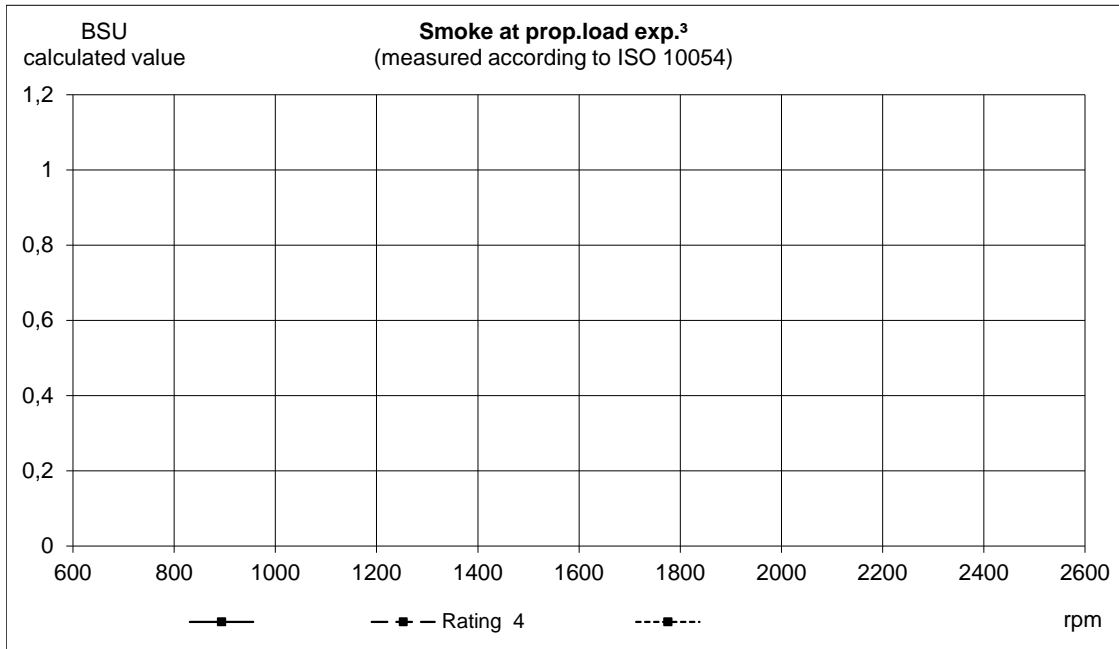
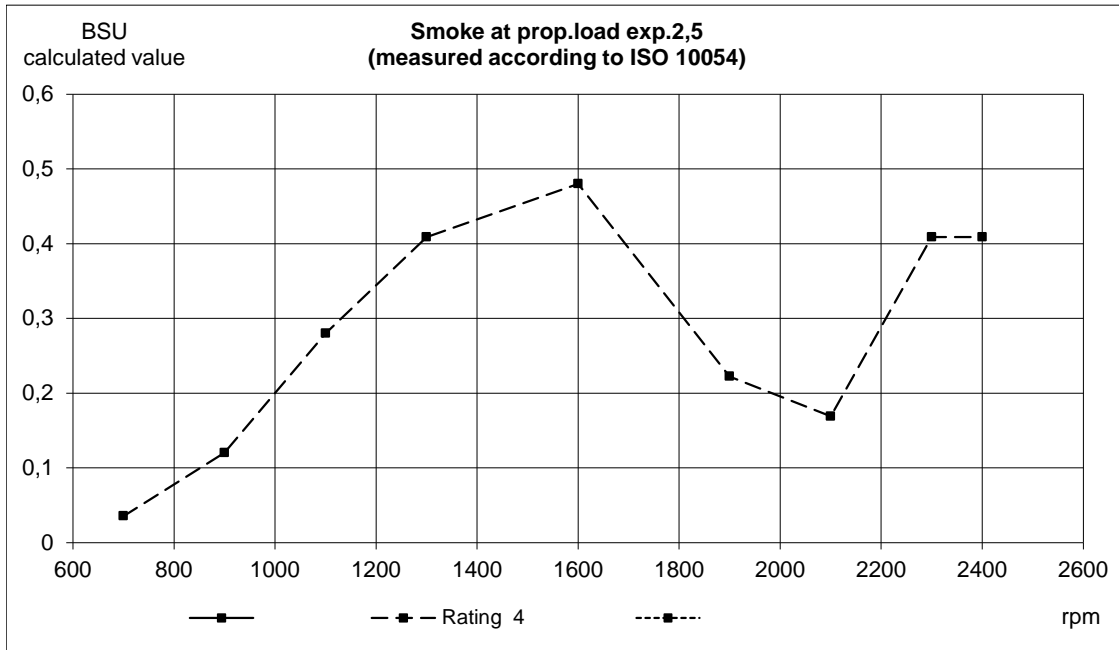
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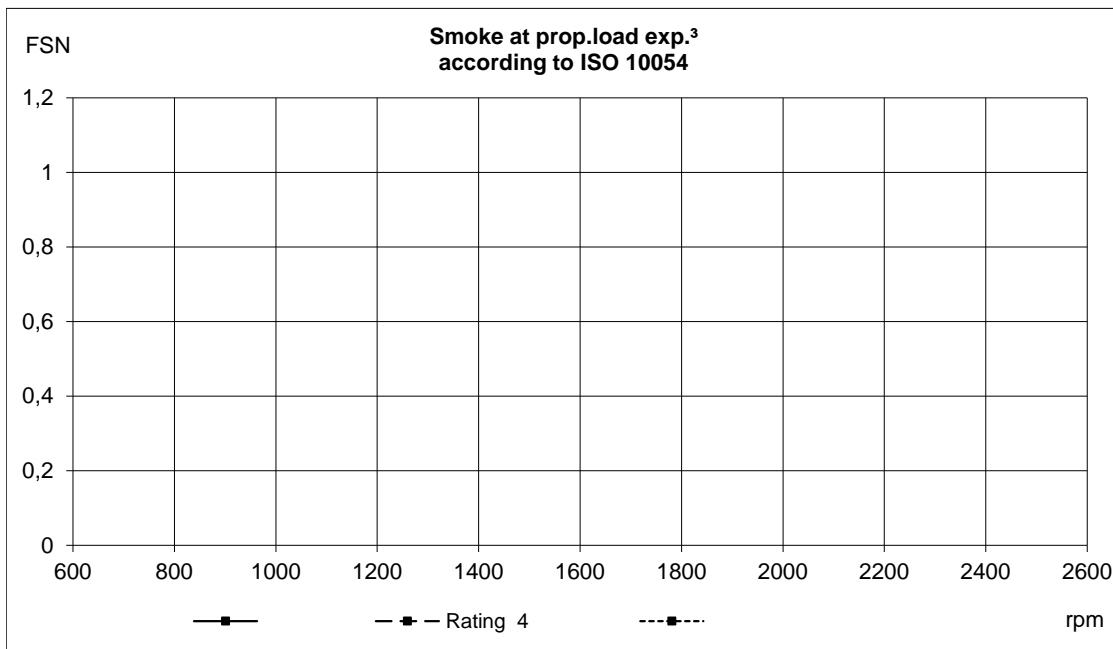
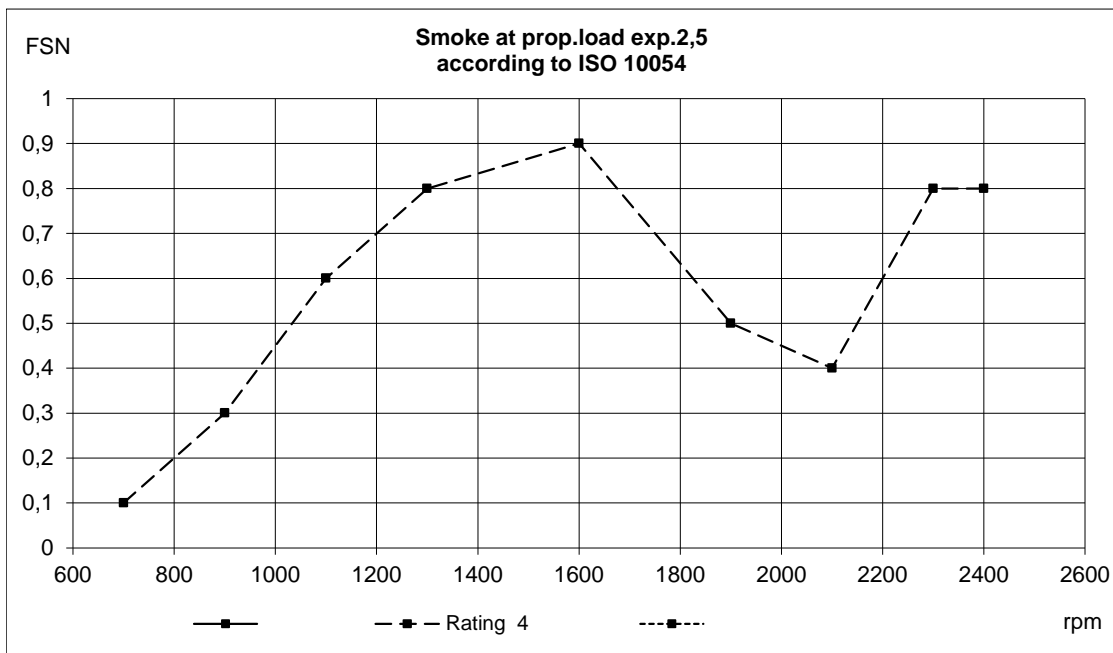
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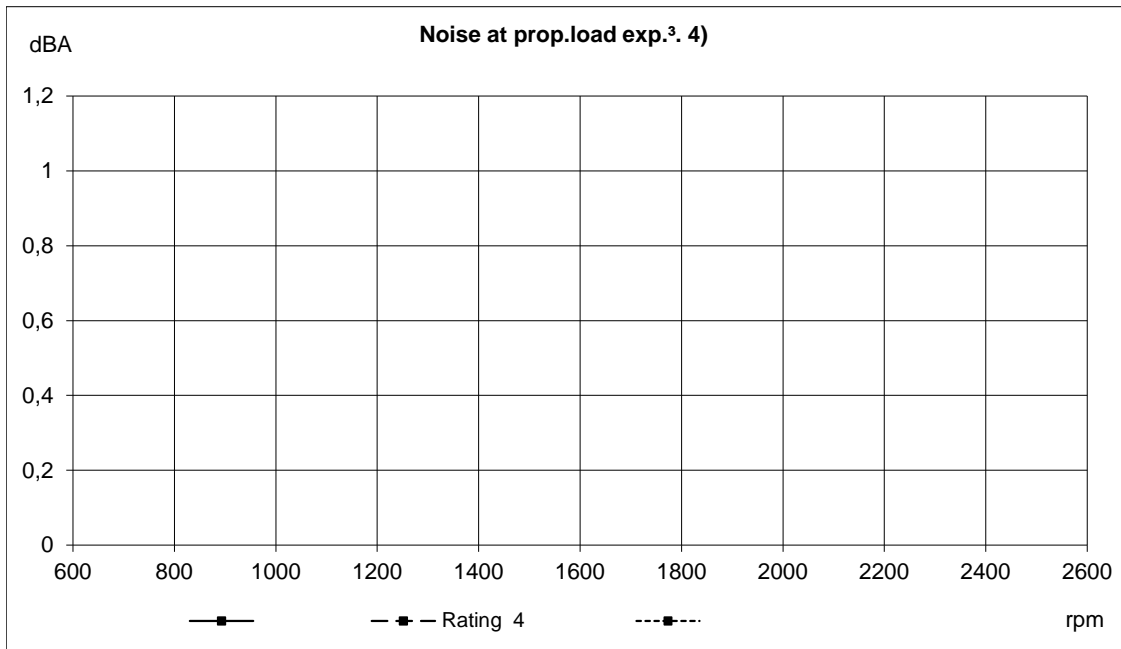
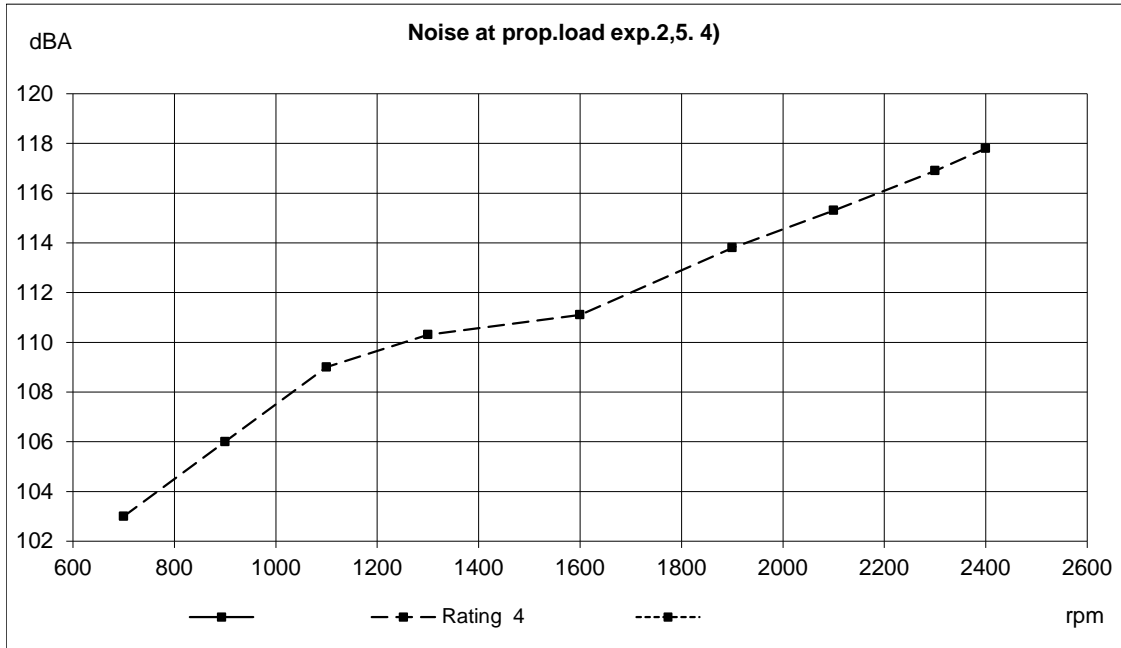
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