

VOLVO PENTA D11B4-A (R4-625IPS)	Document No	Issue Index
	22678600	05

General

4-stroke direct injected, turbocharged and aftercooled diesel engine

Number of cylinders		6
No of valves		24
Displacement, total	litres in ³	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 Crankshaft power 1), 5) R4	rpm	2400
Propeller selection range Crankshaft power 1), 5)	rpm	2400-2450
Dry weight engine BT	kg lb	1195 2635

Performance		Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Crankshaft power 1), 5)	4	kW	105	180	250	287	358	428	457	459	459		
			hp	143	245	340	390	487	582	622	625	625	
Propeller shaft power 1) (At full load) With drive IPS	4	kW	99	170	236	271	338	404	432	434	434		
			hp	135	231	321	369	460	550	587	590	590	
Propellershaft power at prop. load x ^{2,5} With drive IPS	4	kW	20	37	62	94	157	242	311	390	434		
			hp	27	51	84	127	214	329	422	530	590	
Propellershaft power at prop. load x ³ With drive IPS	4	kW	11	23	42	69	129	215	291	382	434		
			hp	15	31	57	94	175	293	395	519	590	
Torque at crankshaft 2)	4	Nm	1432	1910	2170	2108	2137	2151	2078	1906	1826		
			lbf ft	1056	1409	1601	1555	1576	1587	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	1,66	2,21	2,52	2,44	2,48	2,49	2,41	2,21	2,12		
			psi	240,9	321,2	365,0	354,6	359,4	361,8	349,5	320,5	307,2	
Max combustion pressure 2)	4	MPa	18,5	19,1	20,1	19,1	18,7	19,7	19,6	18,1	17,9		
			psi	2683	2770	2915	2770	2712	2857	2843	2625	2596	

Lubricating system

Specific lubricating oil consumption.	g/kWh	0,1
Max. oil volume including filters for all allowed installation inclinations:	litres	38
	US gal	10,04
Max. oil volume excluding filters for all allowed installation inclinations:	litres	33
	US gal	8,72
Min. oil volume excluding filters for all allowed installation inclinations:	litres	29
	US gal	7,66

1) ISO 3046, fuel temp 40°C

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

2) At power according to 1).

3) If reverse gear is used, 4% in heat rejection will be added for its oil cooler.

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	217 0,352	212 0,343	214 0,347	219 0,355	198 0,321	200 0,324	206 0,334	217 0,352	219 0,355	
Fuel consumption, Test cycle E5	5	g/kWh lb/hph	227,3 0,37									
Fuel consumption, Test cycle E5	4	g/kWh lb/hph	225,8 0,37									
Fuel consumption, Test cycle E3	3	g/kWh lb/hph	219,1 0,35									
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	27,3 7,2	45,7 12,1	64,0 16,9	75,2 19,9	84,8 22,4	102,4 27,1	112,7 29,8	119,2 31,5	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	%	88	74	69	66	71	80	84	89	90		
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	4	°C °F	426 799	490 914	536 997	612 1134	495 923	460 860	464 867	473 883	471 880		
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)		kPa psi kPa psi							Max Min	15 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	4	m³/min cu.ft./min	7,2 254,3	10 353,1	12,9 455,6	15,1 533,3	21,2 748,7	28 988,8	31,5 1112	34,3 1211	35,2 1243	
Charge air pressure Inlet manifold	4	kPa psi	112 16,2	129 18,7	141 20,5	140 20,3	178 25,8	215 31,2	223 32,3	223 32,3	221 32,1	
Exhaust gas flow	4	m³/min cu.ft./min	19 671	28 988,8	38 1342	49 1730	57 2013	69 2437	77 2719	83 2931	84 2966	

Cooling system	Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Radiated heat in percent of crankshaft power.	4	%	2,4	2,3	2,7	2,4	1,3	1,1	1,1	1,1	1,1	
Heat rejection to charge air cooler in percent of crankshaft power.	4	%	16	14	15	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	%	48	65	85	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
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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Raw water circuit	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Nominal raw water design flow	l/min cu.ft/min	91 3,2	99 3,5	121 4,3	141 5,0	174 6,1	204 7,2	227 8,0	249 8,8	258 9,1	266 9,4
Maximum raw water pump suction head	kPa psi	-10 -1,5									
Maximum raw water temperature entering heat exchanger	°C °F	32 90									

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 $x^{2,5} \cdot 4)$	4	dBA	103,1	106,3	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 temperaure	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

* 50% remaining torque from 1500 rpm

** 80% remaining torque

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

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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	2250/2400/2450 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

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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

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Technical data - Drive unit

Drive line		IPS650 & IPS800
Transmission type		IPS2-C
Gear ratio (total)		1,70:1
Steering angle, max.		+/- 27°
Total weight of drive unit (1)	kg	586
Oil capacity, approx.	litres	26
Oil volume difference MIN-MAX	litres	0,5
Oil type		Volvo Penta API GL5 75W/90
Propeller range		PS4-PS5, P1-P7

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

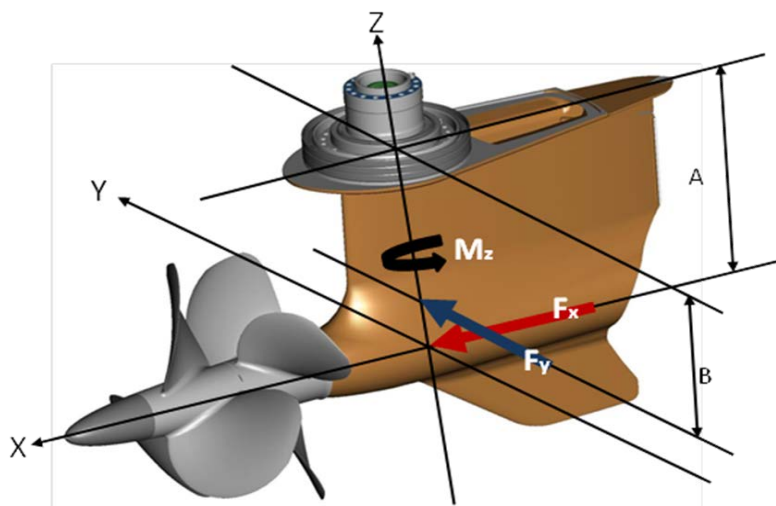
"Generalized maximum load document" for IPS3

Valid products	Drive Unit	Gear Ratio
IPS650	IPS2	1,70:1
IPS800	IPS2	1,70:1

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	37 kN
	F _y (+/-)	24 kN
	M _z (+/-)	12 kNm
28-42 kn	F _x	26 kN
	F _y (+/-)	49 kN
	M _z (+/-)	12 kNm

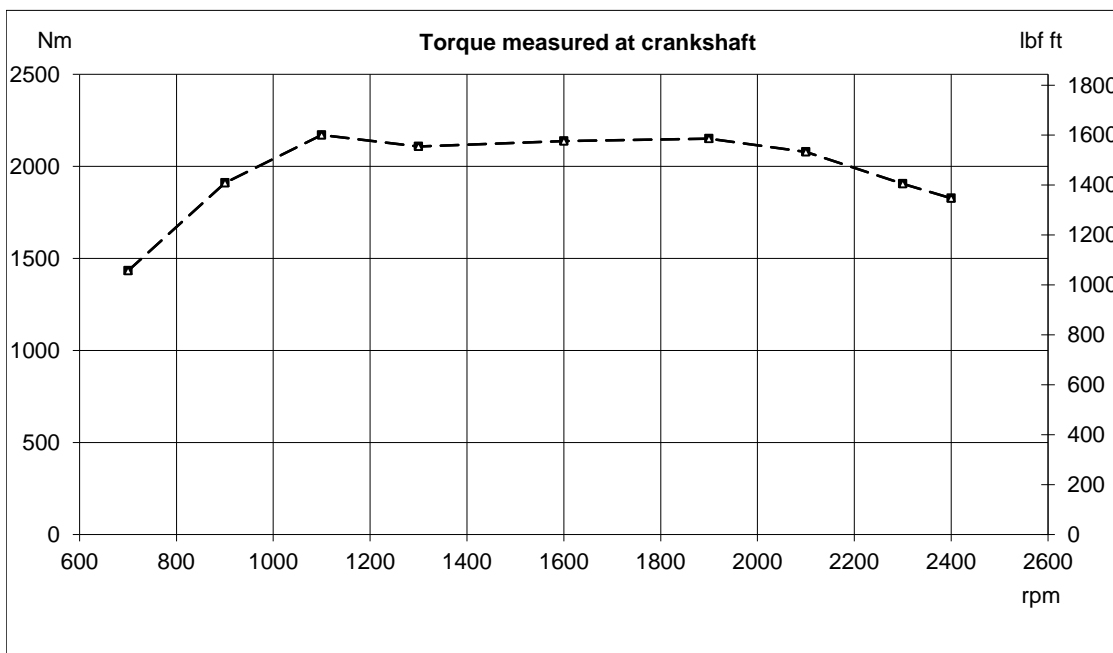
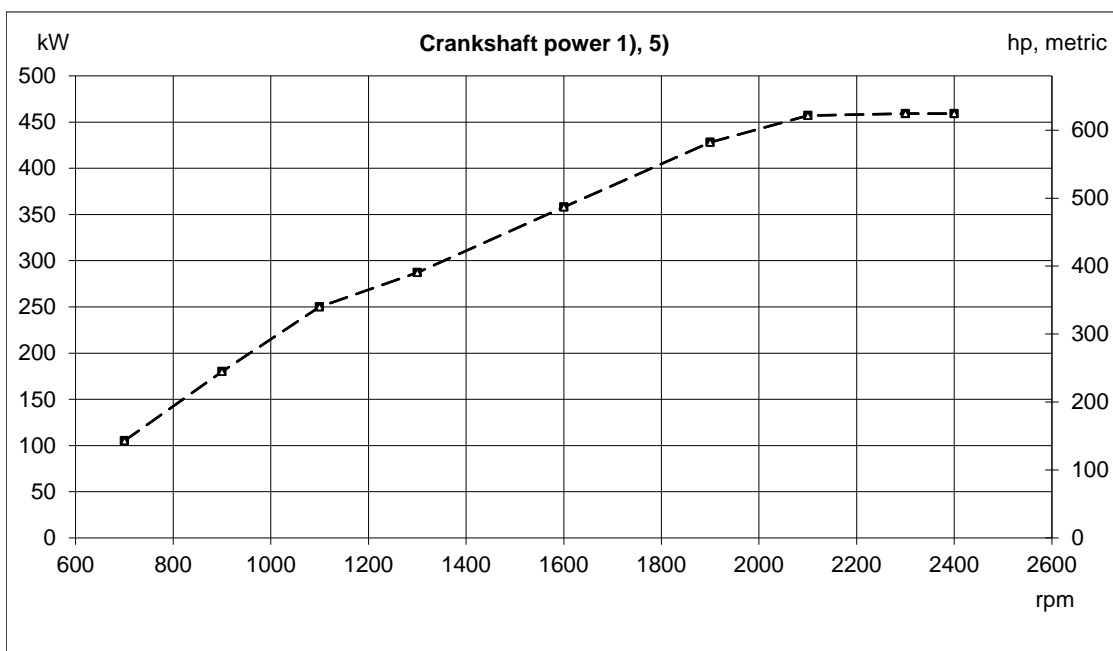
A	450 mm
B	382 mm



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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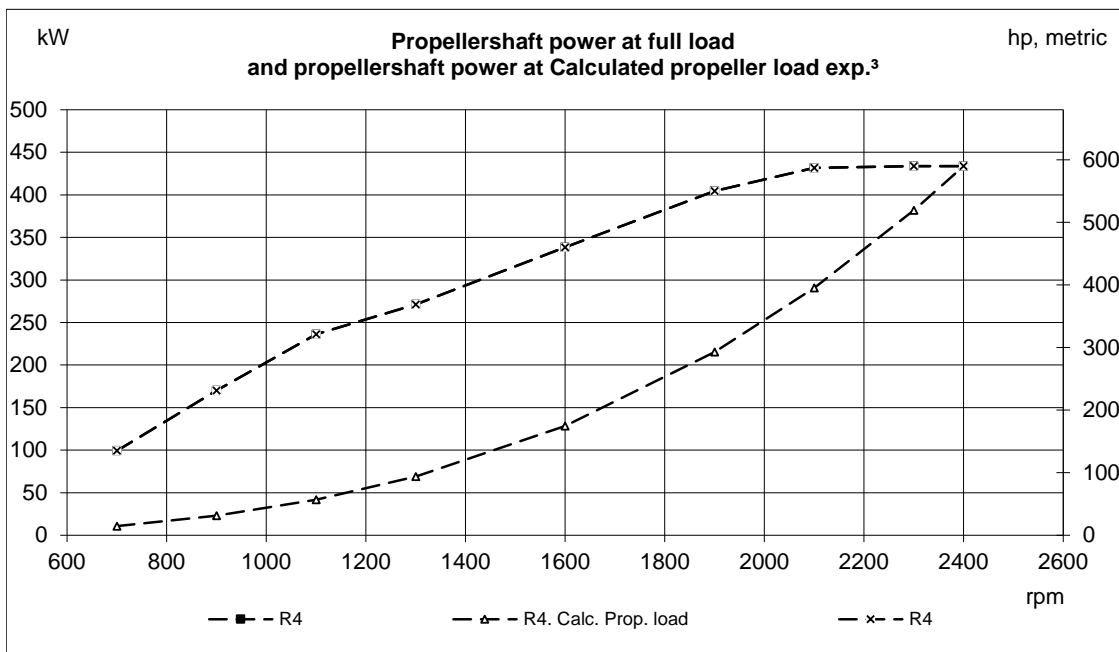
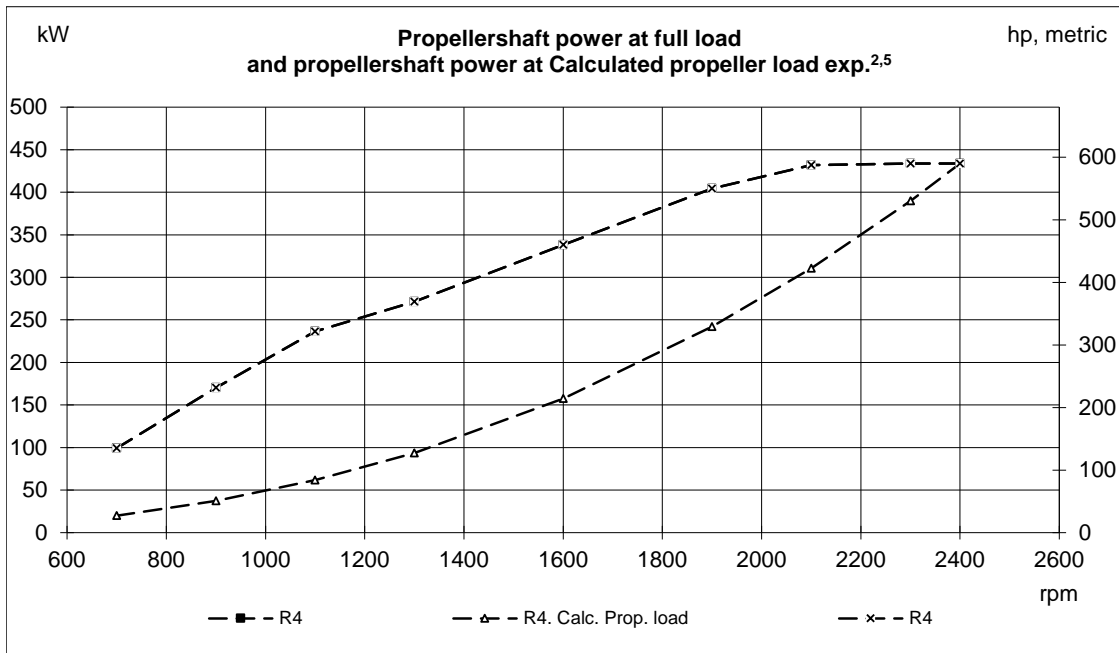
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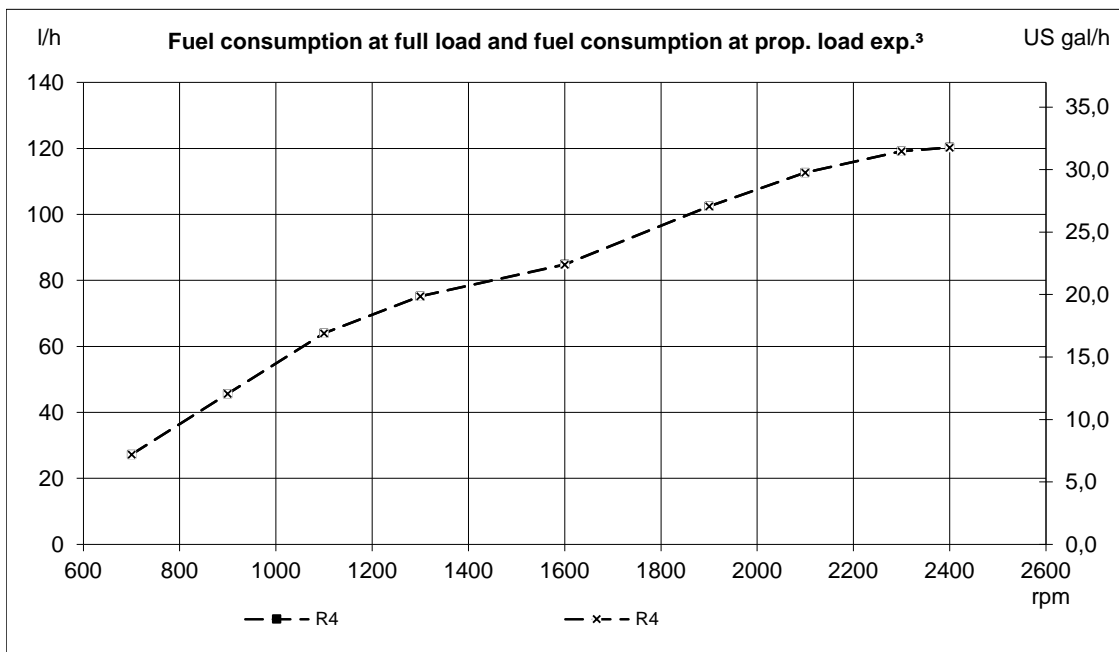
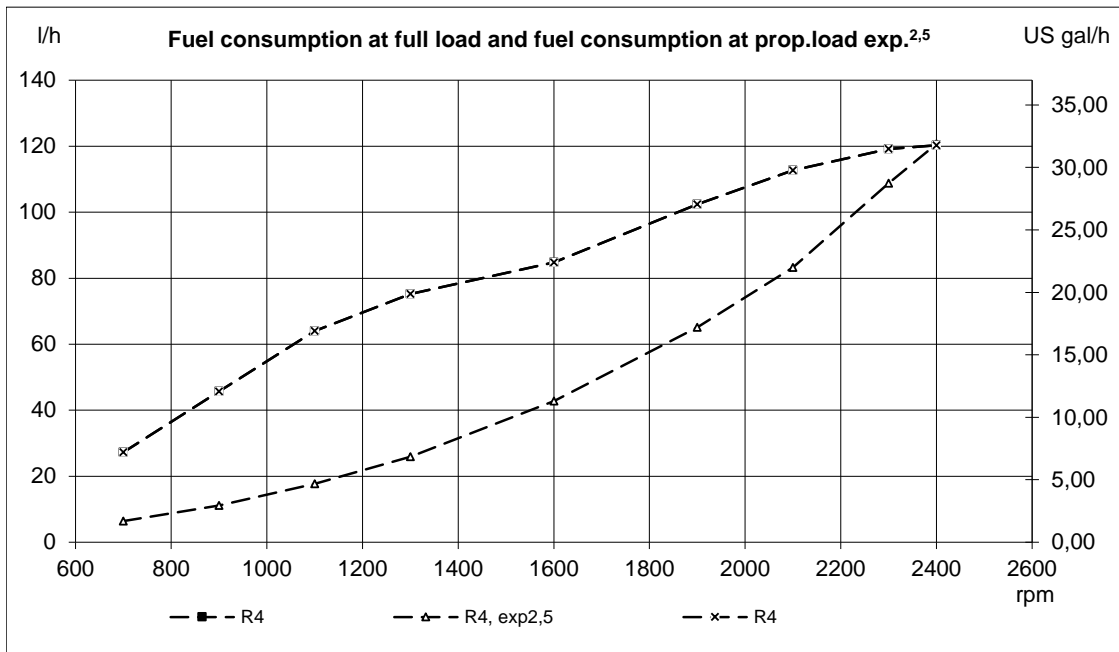
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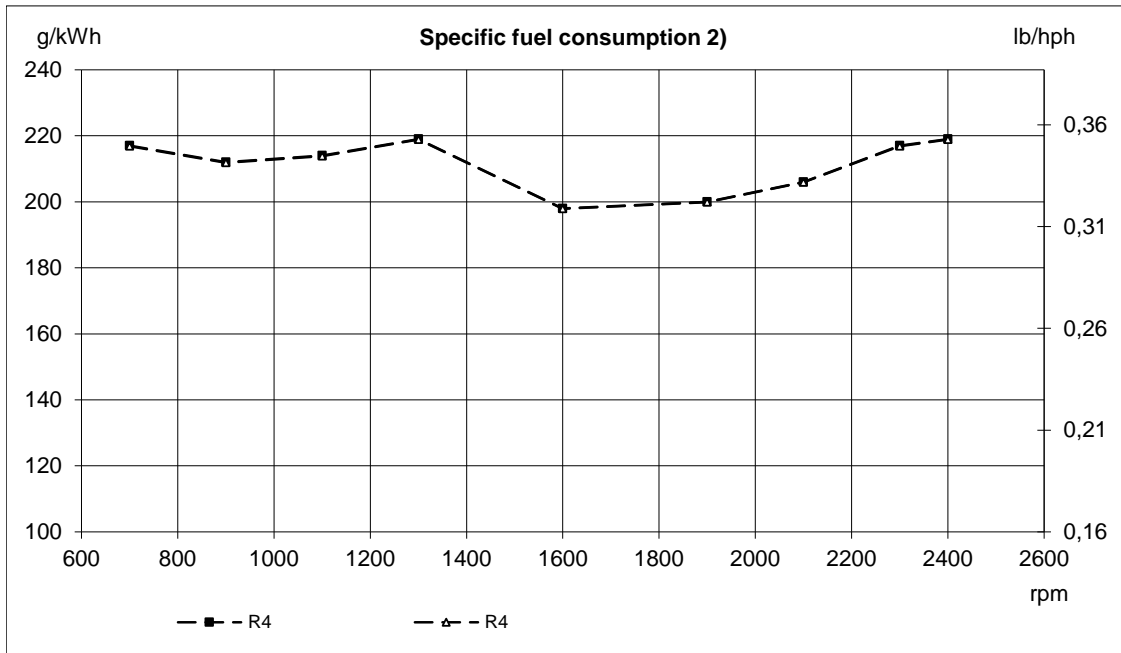
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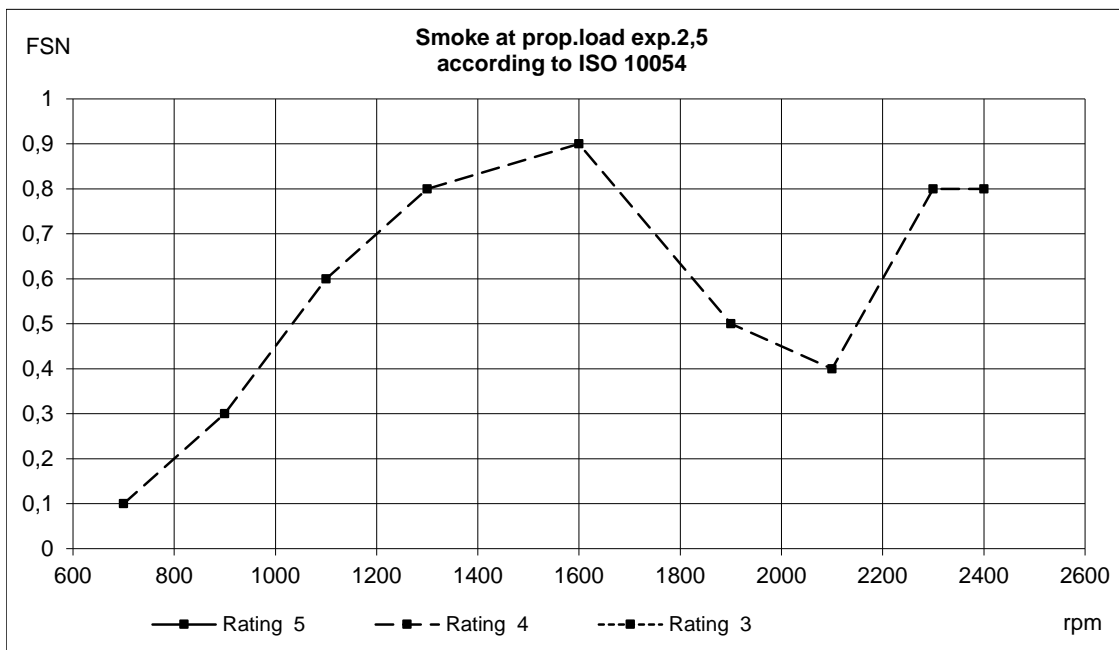
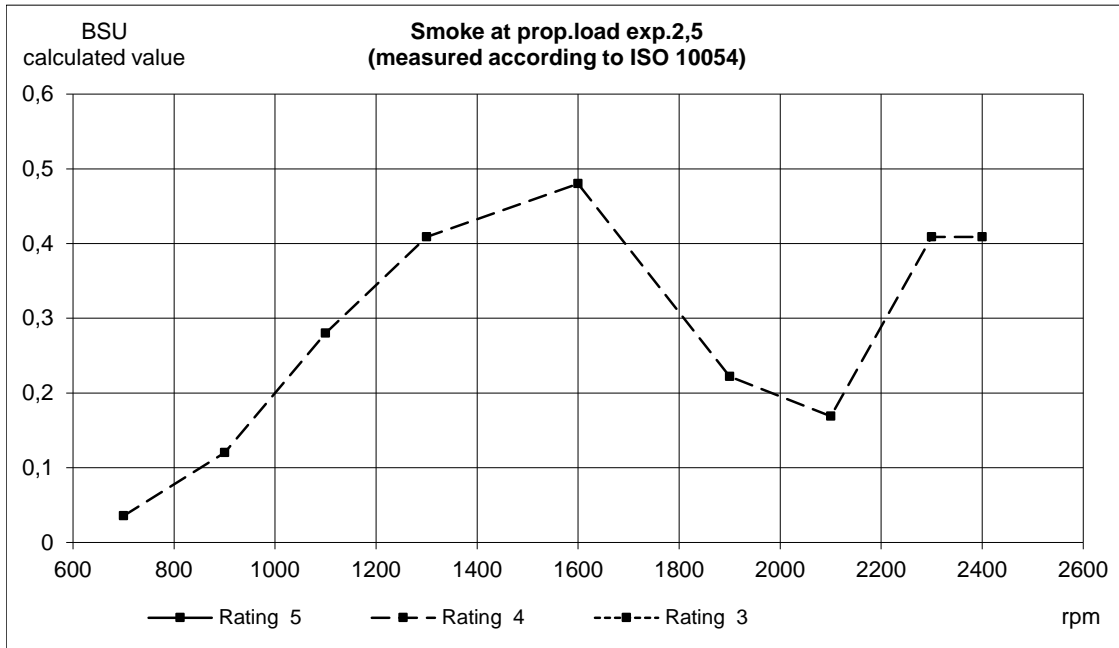
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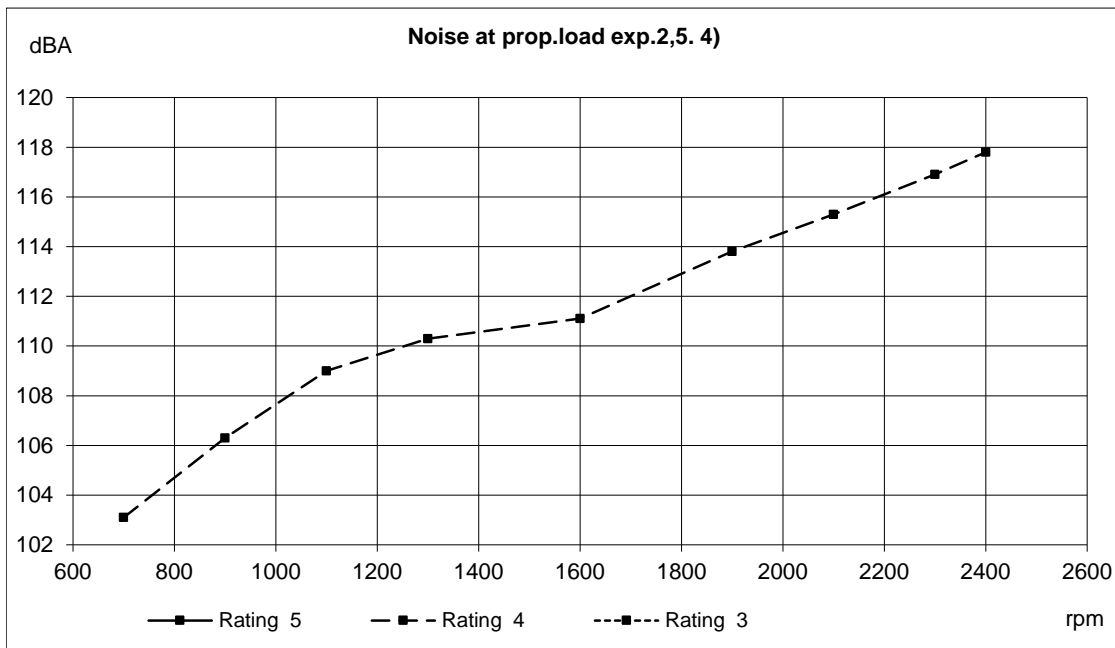
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