

<b>VOLVO PENTA</b> D8 R5 IB	Document No	Issue Index
	<b>22890982</b>	<b>04</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>	7,70 469,9
Firing order		1-4-2-6-3-5
Rotational direction, viewed from the front		Clockwise
Bore	mm in	110 4,33
Stroke	mm in	135 5,31
Compression ratio		16,5:1
Compression pressure at 240 rpm	MPa psi	3,2 464
Max. static forward inclination:	°	0
Max. static backward inclination:	°	10
Max. intermittent forward inclination while running:	°	33
Max. intermittent backward inclination while running:	°	17
Max. intermittent side inclination while running:	°	30
Idling speed	rpm	600 ± 10
Rated speed R5	rpm	3000
Rated speed R5	rpm	2900
Propeller selection range R5	rpm	NS4-NS5, N1-N7
Dry weight engine BT	kg lb	840 1852

Performance	Rating	rpm	600	800	1200	1700	2000	2400	2700	2800	2900	3000
Crankshaft power 1), 5)	5	kW	40	59	127	312	368	441	441	441	441	441
		hp	54	80	173	424	500	600	600	600	600	600
	5	kW	40	59	127	296	349	405	405	405	405	
		hp	54	80	173	403	474	550	550	550	550	
Propeller shaft power 1) (At full load) With reverse gear	5	kW	38	57	123	302	357	428	428	428	428	428
		hp	52	77	167	411	485	582	582	582	582	582
With reverse gear	5	kW	38	57	123	288	338	392	392	392	392	
		hp	52	77	167	391	460	534	534	534	534	
Propellershaft power at prop. load x <sup>2,5</sup>	5	kW	8	16	43	103	155	245	329	360	393	428
		hp	10	21	59	141	211	333	447	490	535	582
	5	kW	8	16	43	103	155	244	328	359	392	
		hp	10	21	59	140	211	332	446	489	534	
Propellershaft power at prop. load x <sup>3</sup>	5	kW	3	8	27	78	127	219	312	348	386	428
		hp	5	11	37	106	172	298	424	473	526	582
	5	kW	3	8	28	79	129	222	317	353	392	
		hp	5	11	38	107	175	302	431	480	534	
Torque at crankshaft 2)	5	Nm	629,9	700	1010	1750	1755	1755	1560	1504	1452	1404
		lbf ft	465	516	745	1291	1294	1294	1150	1109	1071	1035
	5	Nm	629,9	700	1010	1665	1665	1609	1431	1380	1332	
		lbf ft	465	516	745	1228	1228	1187	1055	1018	982	
Mean piston speed		m/s	2,7	3,6	5,4	7,7	9,0	10,8	12,2	12,6	13,1	13,5
		ft/s	8,9	11,8	17,7	25,1	29,5	35,4	39,9	41,3	42,8	44,3
Effective mean pressure 2)	5	MPa	1,03	1,14	1,65	2,86	2,86	2,86	2,55	2,45	2,37	2,29
		psi	149,1	165,7	239,1	414,2	415,4	415,4	369,2	356,0	343,7	332,3
	5	MPa	1,03	1,14	1,65	2,72	2,72	2,63	2,33	2,25	2,17	
		psi	149,1	165,7	239,1	394,1	394,1	381,0	338,6	326,5	315,3	

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

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Max combustion pressure 2)	5	MPa psi	9,7 1407	9,9 1436	12,5 1813	19,7 2857	18,9 2741	18,5 2683	17 2466	16,9 2451	16,6 2408	16,9 2451
	5	MPa psi	9,1 1320	9,6 1392	11,8 1711	17,8 2582	17,2 2495	16,9 2451	15,4 2234	15,6 2263	14,9 2161	

**Lubricating system**

Specific lubricating oil consumption.	g/kWh	0,1
Max. oil volume including filters for all allowed installation inclinations:	litres	29,4
	US gal	7,77
Max. oil volume excluding filters for all allowed installation inclinations:	litres	28
	US gal	7,40
Min. oil volume excluding filters for all allowed installation inclinations:	litres	22
	US gal	5,81

Fuel system	Rating	rpm	600	800	1200	1700	2000	2400	2700	2800	2900	3000
Specific fuel consumption 2)	5	g/kWh lb/hph	231 0,374	227 0,368	222 0,36	199 0,322	197 0,319	207 0,335	217 0,352	220 0,356	224 0,363	226 0,366
	5	g/kWh lb/hph	227 0,368	225 0,365	219 0,355	199 0,322	197 0,319	205 0,332	219 0,355	219 0,355	224 0,363	
Fuel consumption at Test cycle?	5	g/kWh lb/hph	NA									
	5	g/kWh lb/hph	NA									
Fuel consumption at prop. load x <sup>2,5</sup>	5	l/h US gal/h	2,7 0,7	4,8 1,3	11,5 3,0	26,9 7,1	40,4 10,7	64,9 17,1	87,8 23,2	98,6 26,0	108,4 28,6	119,4 31,5
	5	l/h US gal/h	2,6 0,7	4,6 1,2	11,2 3,0	26,4 7,0	39,5 10,4	63,7 16,8	87,9 23,2	97,4 25,7	109,5 28,9	
Fuel consumption at prop. load x <sup>3</sup>	5	l/h US gal/h	1,6 0,4	3,0 0,8	7,7 2,0	20,4 5,4	33,3 8,8	58,5 15,5	83,8 22,1	95,3 25,2	106,4 28,1	119,4 31,5
	5	l/h US gal/h	1,6 0,4	3,0 0,8	7,8 2,1	20,5 5,4	33,3 8,8	58,9 15,6	85,4 22,6	96,0 25,4	109,5 28,9	
Fuel consumption at full load	5	l/h US gal/h	11,0 2,9	16,0 4,2	33,5 8,8	75,1 19,8	87,0 23,0	109,4 28,9	114,0 30,1	116,3 30,7	118,7 31,4	120,3 31,8
	5	l/h US gal/h	11,0 2,9	16,1 4,3	33,5 8,8	71,8 19,0	82,6 21,8	100,5 26,5	106,7 28,2	106,6 28,2	109,7 29,0	

Intake and exhaust system	Rating	rpm	600	800	1200	1700	2000	2400	2700	2800	2900	3000	
Specific exhaust heating effect in percent of crankshaft power	5	%	51	57	70	64	63	71	79	81	84	84	
	5		50	57	69	64	63	67	79	79	84		
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	5	°C °F	428 802	499 930	624 1155	551 1024	468 874	490 914	525 977	527 981	530 986	520 968	
	5	°C °F	422 792	494 921	622 1152	552 1026	471 880	436 817	493 919	481 898	508 946		
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)			kPa							Max	30		
			psi								4,4		
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPa and relative humidity 30%.	5	m³/min cu.ft./min	2,2 77,69	3,2 113	6,4 226	16,9 596,8	23,3 822,8	29,9 1056	30,7 1084	31,6 1116	32,4 1144	33,3 1176	
	5	m³/min cu.ft./min	2,2 77,69	3,1 109,5	6,4 226	16,1 568,6	22 776,9	29,7 1049	30,5 1077	31,1 1098	31,1 1098		
Charge air pressure Inlet manifold	5	kPa psi	108 15,7	113 16,4	152 22,0	285 41,3	331 48,0	360 52,2	336 48,7	336 48,7	336 48,7	336 48,7	
	5	kPa psi	109 15,8	115 16,6	153 22,1	275 39,9	318 46,1	362 52,5	334 48,4	332 48,2	323 46,8		
Exhaust gas flow	5	m³/min cu.ft./min	5,7 201,3	8,9 314,3	21 741,6	47,9 1692	57,4 2027	71,6 2529	76,1 2687	77,9 2751	79,5 2808	80,2 2832	
	5	m³/min cu.ft./min	5,7 201,3	8,9 314,3	20,7 731	45,5 1607	54 1907	65 2295	70,8 2500	70,9 2504	73 2578		

- 1) ISO 3046, fuel temp 40°C.  
ISO 8665 (=SAE J 1228=ICOMIA 28-83)
- 2) At power according to 1).
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Cooling system	Rating	rpm	600	800	1200	1700	2000	2400	2700	2800	2900	3000
Radiated heat in percent of crankshaft power.	5	%	1,9	1,8	1,7	1,6	1,5	1,5	1,5	1,5	1,5	1,5
	5		1,9	1,8	1,7	1,6	1,5	1,5	1,5	1,5	1,5	1,5
Heat rejection to charge air cooler in percent of crankshaft power.	5	%	2	2	6	15	20	23	22	23	24	25
	5		2	2	6	15	19	25	24	24	24	
Coolant heat rejection to HE, incl. engine oil cooler and excl. charge air cooler, in percent of crankshaft power.	5	%	105	96	71	51	46	47	50	50	51	52
	5		94	85	76	50	44	45	49	49	51	
Coolant flow with fully open thermostat and std cooling system		l/min	66	88	129	182	212	244	265	269	272	273
		cu.ft./min	2,3	3,1	4,6	6,4	7,5	8,6	9,4	9,5	9,6	9,6
Extra water pump flow through charge air cooler		l/min	NA									
		cu.ft./min										
Max. pump pressure at extra pump pressure side (pressure set system)		kPa	NA									
		psi										
Max. permissible temperature on coolant in engine outlet		°C	NA									
		°F										
Coolant volume engine, including heat exchanger and charge air cooler		litres	25									
		US gal.	6,60									
Max. additional coolant for cabin heater etc. with std. Expansion tank		litres	20									
		US gal.	5,28									
Maximum coolant flow to cabin heater etc.		l/min	34,2									
		cu.ft./min	1,21									
Thermostat, start open at		°C	76									
		°F	169									
Thermostat, fully open at		°C	86									
		°F	187									

Raw water circuit	rpm	600	800	1200	1700	2000	2400	2700	2800	2900	3000
Nominal raw water design flow	l/min	66	88	129	165	200	240	250	255	257	260
	cu.ft./min	2,3	3,1	4,6	5,8	7,1	8,5	8,8	9,0	9,1	9,2
Nominal raw water pump pressure head at design flow. (measured before and after pump)	kPa	5	11	27	50	67	87	101	105	107	107
	psi	0,7	1,6	3,9	7,3	9,7	12,6	14,6	15,2	15,5	15,6
Maximum raw water pump suction head	kPa	-30									
	psi	-4,4									
Maximum additional pressure drop excl. reverse gear oil cooler	kPa	97	93	83	63	50	31	20	16	14	13
	psi	14,1	13,5	12,0	9,1	7,3	4,5	2,9	2,3	2,0	1,9
Pressure drop over reverse gear oil cooler (optional equipment)	kPa	1	1	2	4	5	7	8	9	9	9
	psi	0,2	0,2	0,3	0,6	0,8	1,0	1,2	1,3	1,3	1,3
Maximum sea water temperature	°C	32									
	°F	90									

Emissions	Rating	rpm	600	800	1200	1700	2000	2400	2700	2800	2900	3000
Smoke at prop. load x <sup>2.5</sup>	5	*BSU	0,2	0,2	0,3	0,9	0,8	0,5	0,4	0,5	0,6	0,8
	5	*BSU	0,2	0,2	0,3	0,9	0,7	0,5	0,4	0,4	0,6	
Smoke at prop. load x <sup>3</sup>	5	*BSU	0,2	0,2	0,2	0,7	1,0	0,7	0,4	0,5	0,5	0,8
	5	*BSU	0,3	0,2	0,2	0,6	0,7	0,7	0,4	0,4	0,6	
Noise at prop. load x <sup>2.5</sup> . 4)	5	dBA	97,2	99,1	100,6	103,7	107,1	108,9	111,9	112,1	112,2	112,5
	5	dBA	96,5	99,8	100,6	103,5	107,1	109,0	111,9	112,1	112,3	
Noise at prop. load x <sup>3</sup> . 4)	5	dBA	95,6	98,5	101,3	102,9	107,0	109,0	111,9	112,1	112,3	112,9
	5	dBA	95,8	98,5	101,0	103,2	107,4	109,1	111,9	112,1	112,4	

\*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 / Fault detection time	Warning Level	Derating Level	Shutdown Initial Delay / Shutdown Delay	Shutdown Level (Tolerance)
Charge air pressure	0,5-4,5 V	kPa	50 - 400 (150-500)	30 sec from start / 3 sec	300 (400 absolute)	310 (410 abs.) *	NA	NA
Charge air temperature	50-0 k $\Omega$	°C	-40 - 130	30 sec from start / 3 sec	80	90 (soft 3)	NA	NA
Coolant level switch	Digital		ON/OFF	30 sec from start / 5 sec	Low (ON / Closed)	NA	NA	NA
Coolant temperature	50-0 k $\Omega$	°C	-40 - 140	30 sec from start / 3 sec	98	103 (soft 1)	NA	NA
Engine speed cam	Frequency	rpm		Instant	Lost signal	NA	NA	NA
Engine speed crank	Frequency	rpm		Instant	Lost signal	NA	NA	NA
Exhaust gas temperature wet	PT200	°C	0 - 850	30 sec from start / 3 sec	200	225(soft 4)	NA	NA
Exhaust gas temperature dry	PT200	°C	0 - 850	30 sec from start / 3 sec	650	665(soft 5)**	NA	NA
Oil level sensor	Digital		ON/OFF	30 sec from start / 5 sec	Low level	NA	NA	NA
Oil temperature	50-0 k $\Omega$	°C	-40 - 140	30 sec from start / 5 sec	125	127 (soft 2)	NA	NA
Water In fuel switch	Digital		ON/OFF	All the time	Water in fuel	NA	NA	NA

NA = Not applicable

\* Yes, 50% of engine prot. map.

\*\* Max 1200 rpm at 675°C

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Sensors (rpm dependent)	Signal	Unit	Range	Initial Delay / Fault	Warning Level / Derating Level					Switches
<b>Fuel pressure</b>	0,5-4,5 V	kPa	0-700		<b>600 rpm</b>	<b>1000 rpm</b>	<b>1500 rpm</b>	<b>2000 rpm</b>	<b>3000 rpm</b>	
Warning Level		kPa		30 sec from start / 5 sec	300	335	370	420	450	
Derating Level		kPa		NA	NA	NA	NA	NA	NA	
<b>Oil pressure</b>	0,5-4,5 V	kPa	0-700		<b>550 rpm</b>	<b>600 rpm</b>	<b>1000 rpm</b>	<b>2000 rpm</b>	<b>3000 rpm</b>	
Warning Level		kPa		30 sec from start / 2 sec	-50	100	150	200	300	
Derating Level (100% derate)		kPa		10% trq. decr. per sec	-10	75	125	175	275	
Engine speed		kPa		Max 1000 rpm	0	70	120	170	270	

Warning = Yellow Lamp active

Derating = Red Lamp active

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Remarks

<b>Soft 1) Soft derate Coolant temp</b> Remaining torque in %	<b>Speed / °C</b>	<b>103°C</b>	<b>105.5°C</b>	<b>108°C</b>
	600	100%	100%	100%
	1200	100%	85%	70%
	1800	100%	50%	0%

<b>Soft 2) Soft derate Oil temp</b> Remaining torque in %	<b>Speed / °C</b>	<b>127°C</b>	<b>129°C</b>	<b>131°C</b>
	600	100%	100%	100%
	1200	100%	85%	70%
	1800	100%	50%	0%

<b>Soft 3) Soft derate Charge Air Temp</b> Remaining torque in %	<b>Speed / °C</b>	<b>90°C</b>	<b>95°C</b>	<b>100°C</b>
	600	100%	100%	100%
	1200	100%	85%	70%
	1800	100%	50%	0%

<b>Soft 4) Soft derate Exhaust Temp wet</b> Remaining torque in %	<b>Speed / °C</b>	<b>225°C</b>	<b>235°C</b>	<b>245°C</b>	<b>255°C</b>
	600	100%	100%	100%	100%
	1200	100%	85%	78%	70%
	1800	100%	50%	25%	0%

<b>Soft 5) Soft derate Exhaust Temp dry</b> Remaining torque in %	<b>Speed / °C</b>	<b>665°C</b>	<b>675°C</b>	<b>680°C</b>	<b>685°C</b>	<b>690°C</b>
	600	100%	100%	100%	100%	max 1000rpm 100%
	1200	100%	85%	78%	0%	NA
	1800	100%	50%	25%	0%	NA

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**Technical data - Drive unit**

Drive line		
Transmission type		
Gear ratio (total)		
Steering angle, max.		
Total weight of drive unit (1)	kg	
Oil capacity, approx.	litres	
Oil volume difference MIN-MAX	litres	
Oil type		
Propeller range		

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

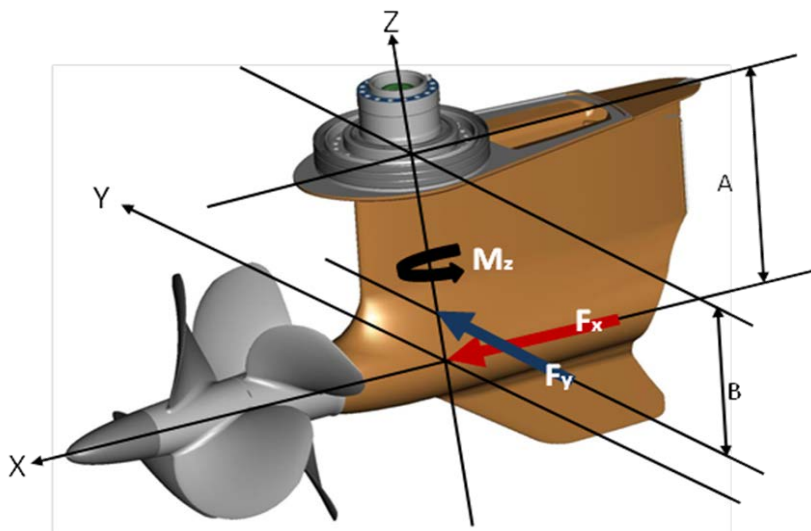
**"Generalized maximum load document" for IPS3**

Valid products	Drive Unit	Gear Ratio
IPSxxxx	IPSx	
IPSxxxx	IPSx	
IPSxxxx	IPSx	

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 <sub>x</sub>	
	F <sub>y</sub> (+/-)	
	M <sub>z</sub> (+/-)	
28-42 kn	F <sub>x</sub>	
	F <sub>y</sub> (+/-)	
	M <sub>z</sub> (+/-)	

A	
B	



**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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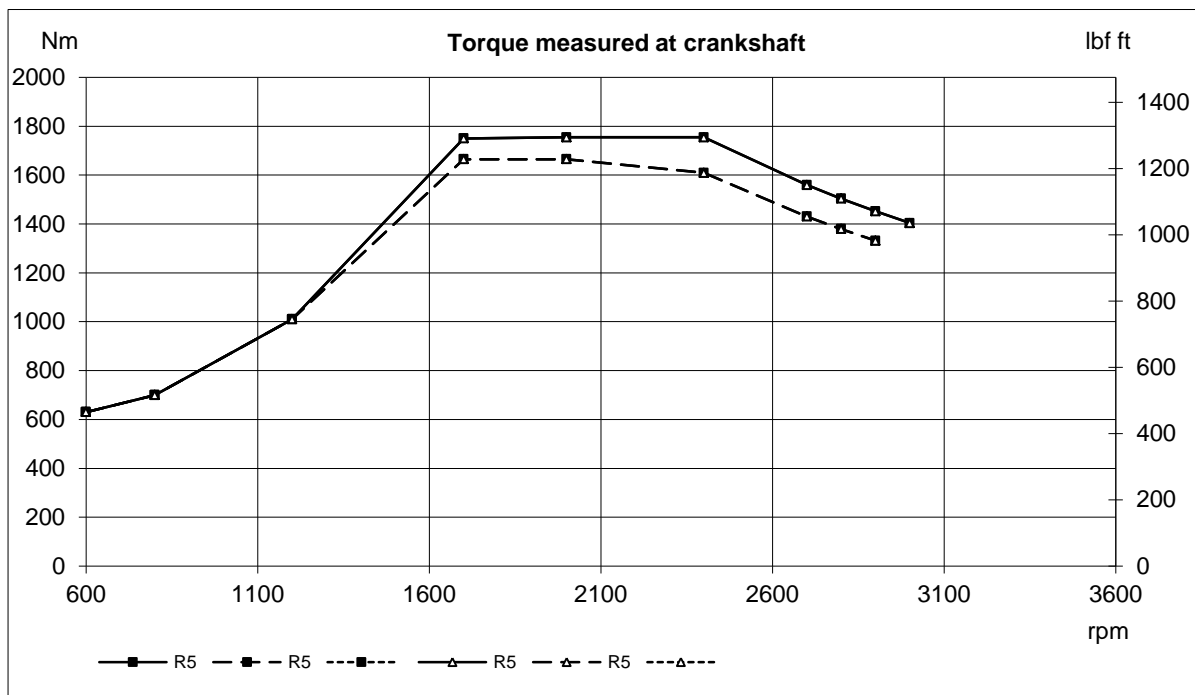
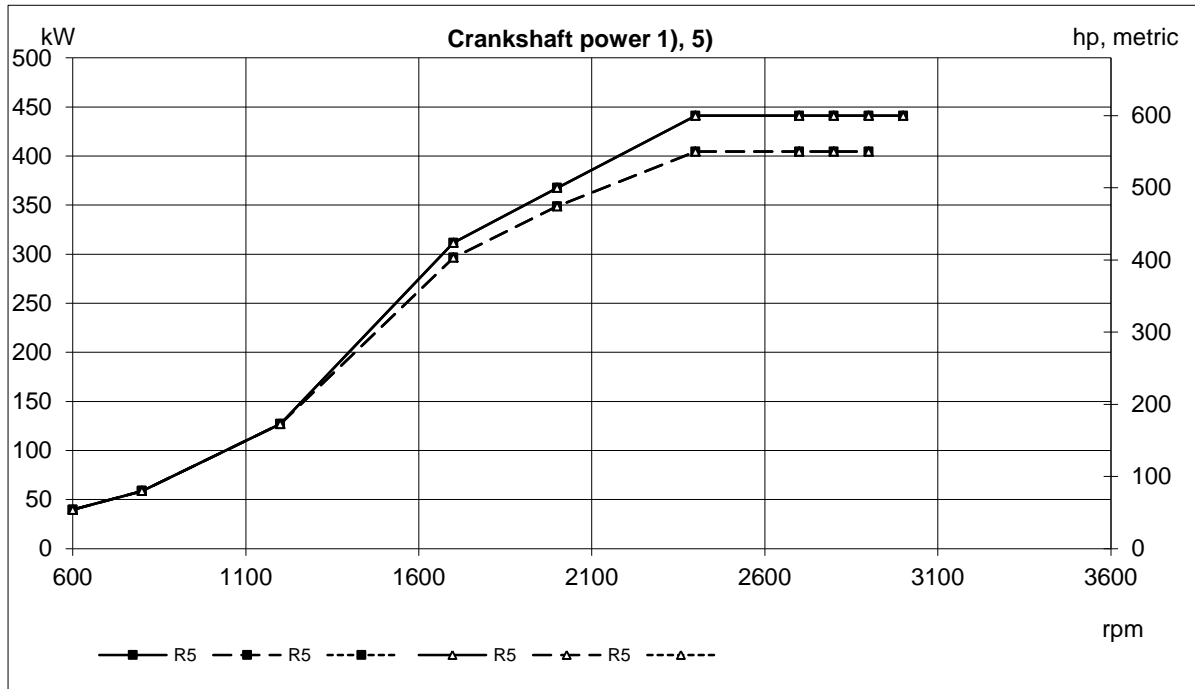
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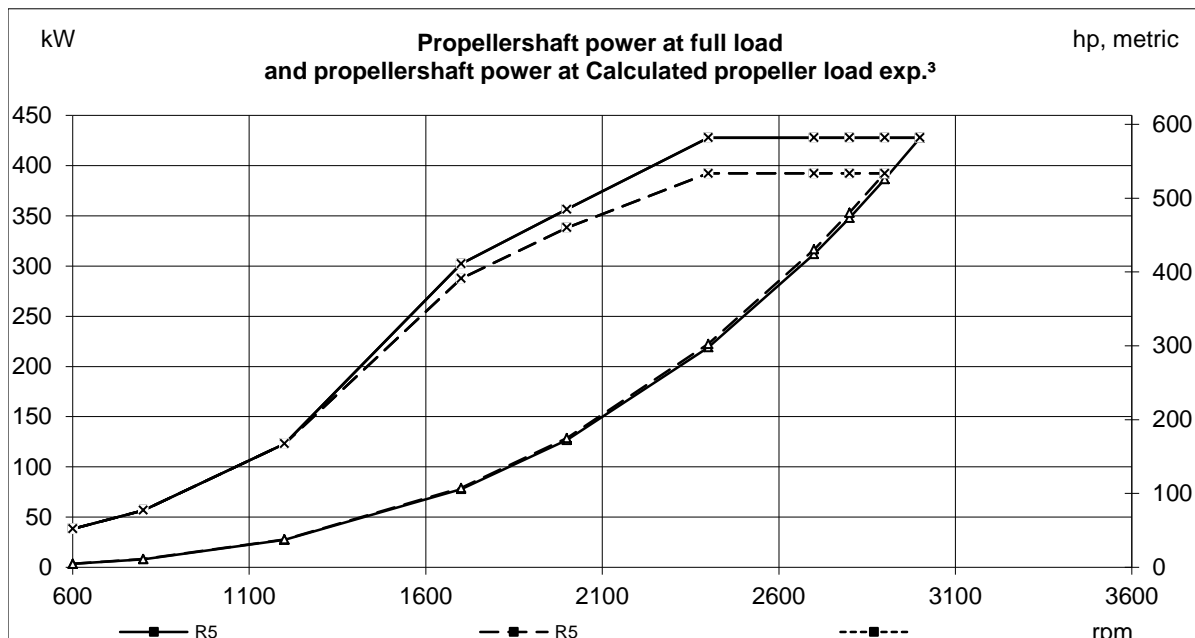
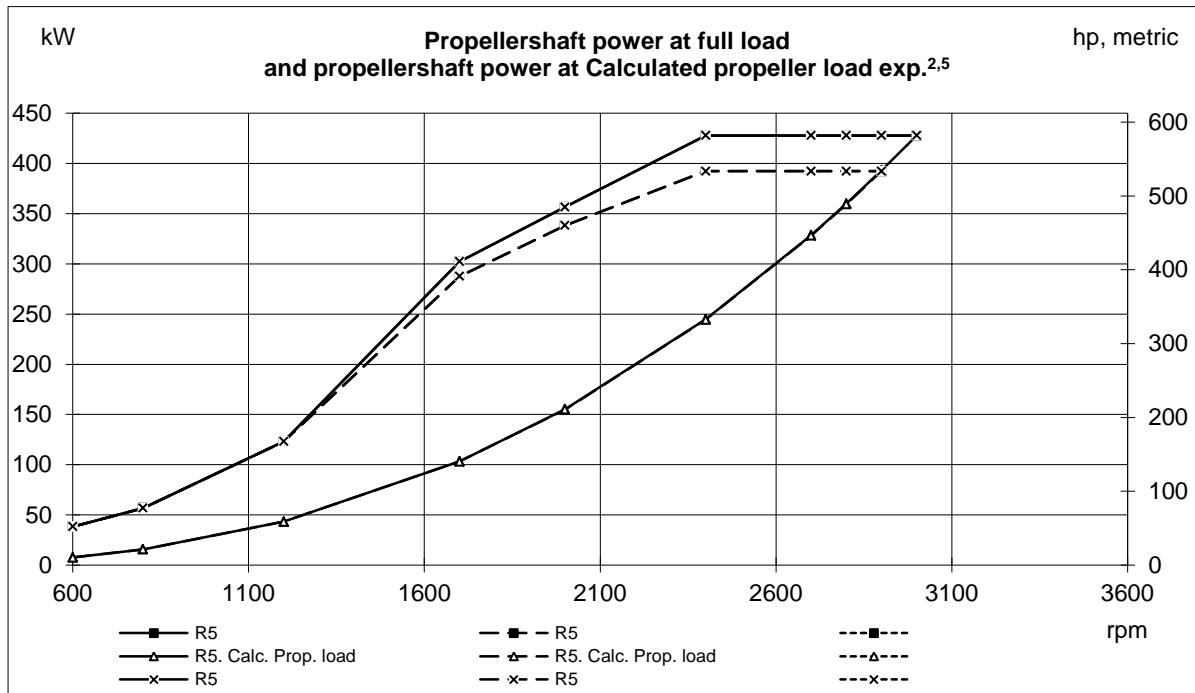
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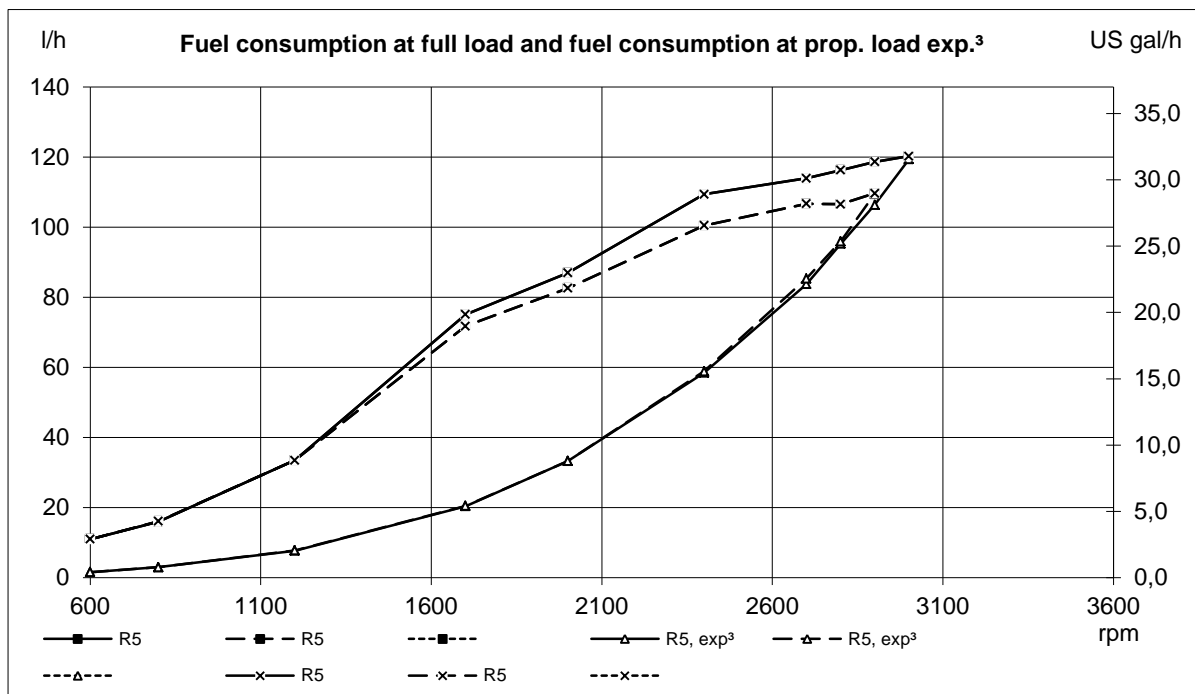
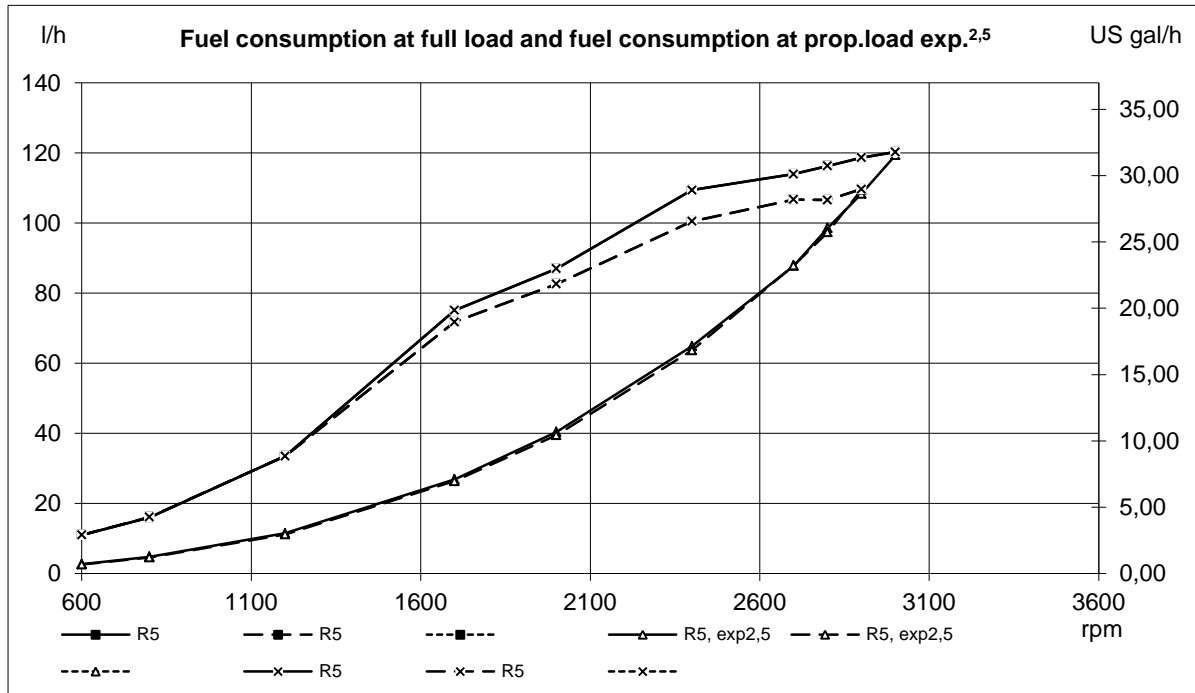
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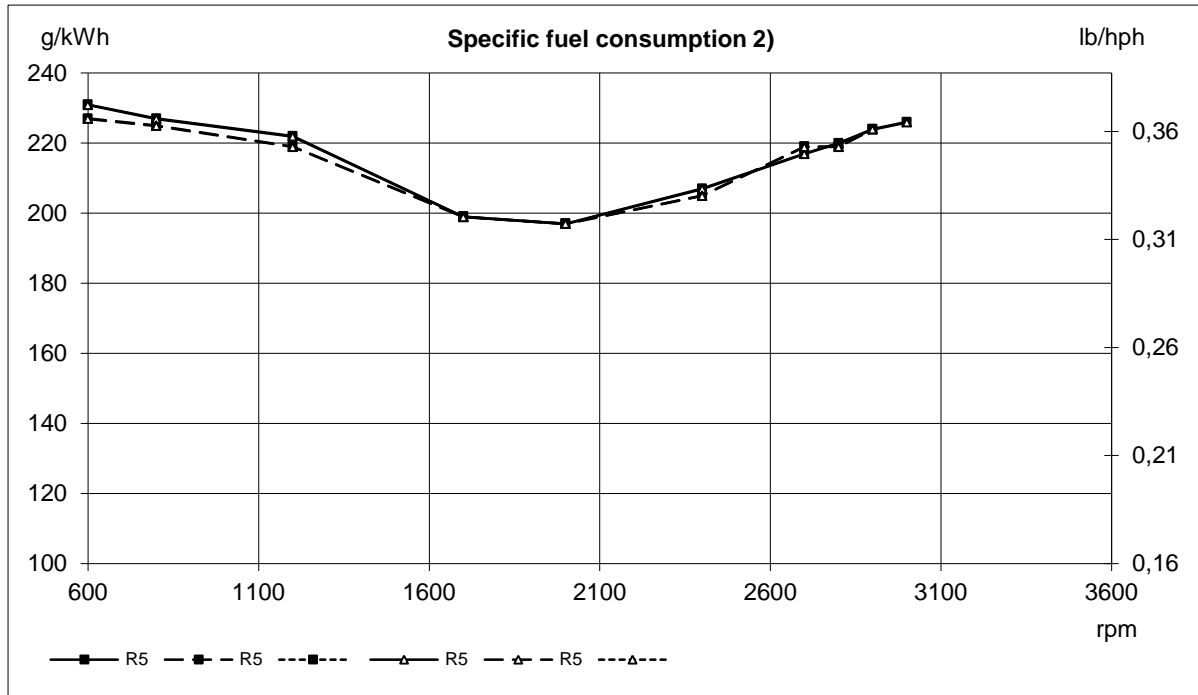
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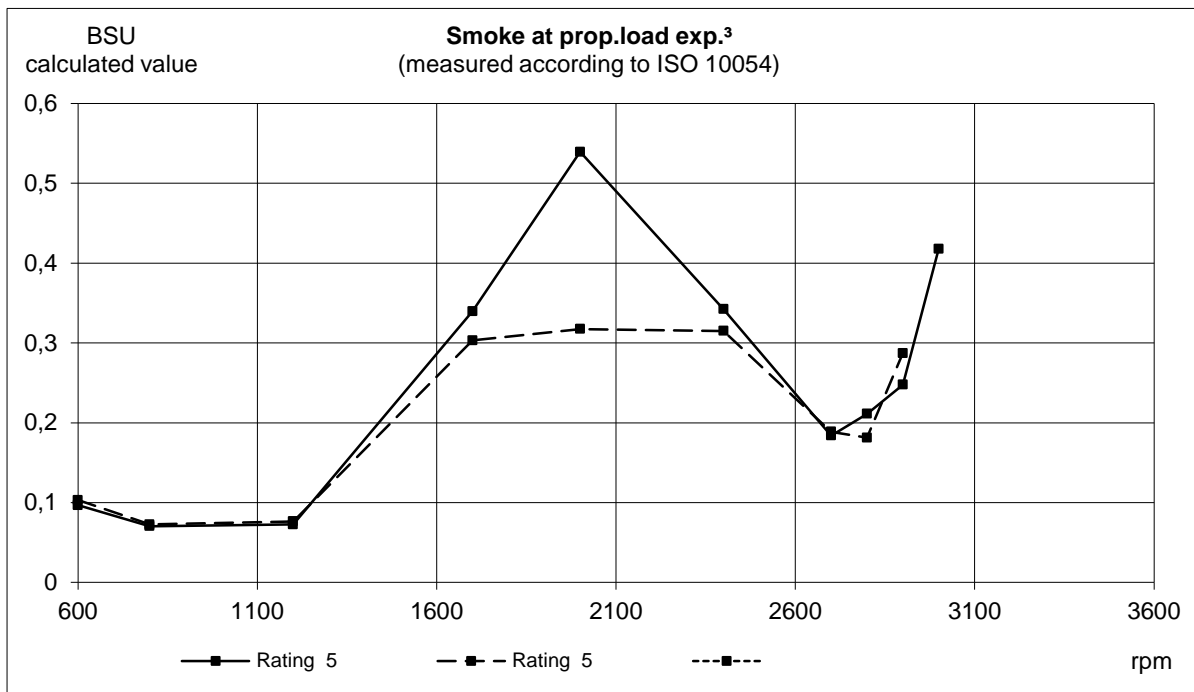
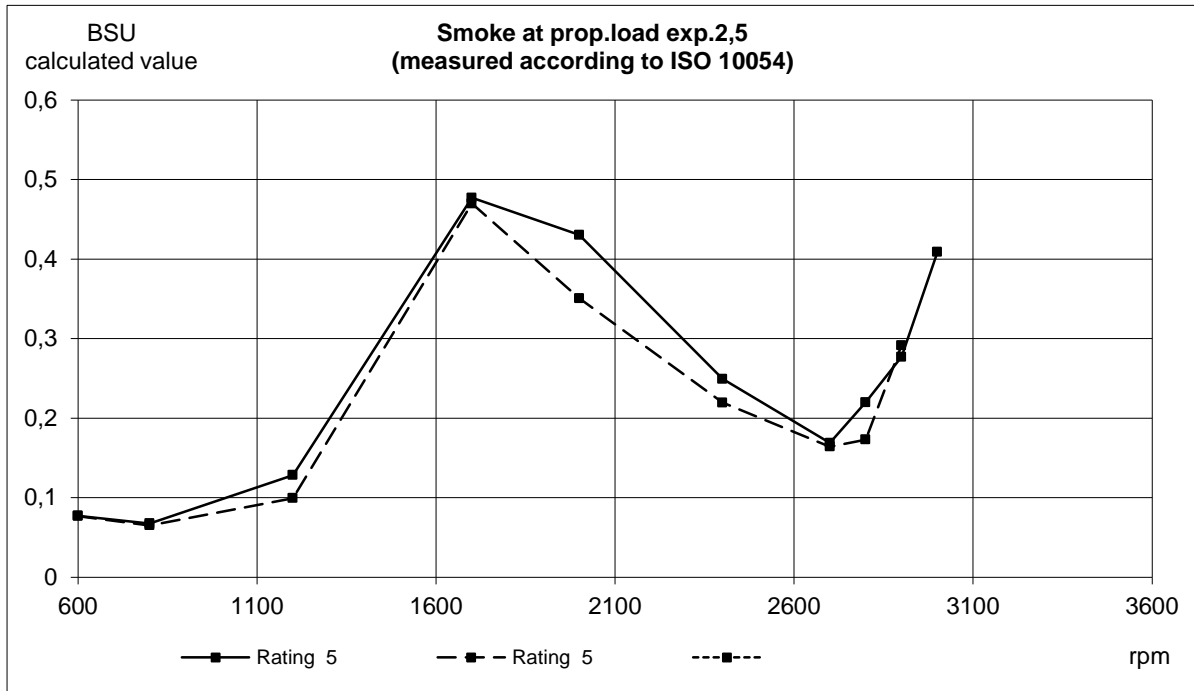
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