

VOLVO PENTA D16-750, D16-650 Rating R2, R1	Document No	Issue Index
	3847332	02

General

4-stroke direct injected, turbocharged and aftercooled diesel engine

Number of cylinders		6
No of valves		24
Displacement, total	litres	16,12
	in ³	983,9
Firing order		1-5-3-6-2-4
Rotational direction, viewed from the front		Clockwise
Bore	mm	144
	in	5,67
Stroke	mm	165
	in	6,50
Compression ratio		17,5:1
Compression pressure at 240 rpm	MPa	N/A
Max. static forward inclination:	°	5
Max. static backward inclination:	°	11
Max. intermittent forward inclination while running:	°	10
Max. intermittent backward inclination while running:	°	21
Max. intermittent side inclination while running:	°	30
Idling speed	rpm	550 - 800
Rated speed D16-750 R2	rpm	1900
Rated speed D16-650 R1	rpm	1800
Propeller selection range D16-750 R2	rpm	1880 - 1950
Propeller selection range D16-650 R1	rpm	1780 - 1880

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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4) Acc. to ISO 3744

5) At installed back pressure

Performance	Rating	r/min	600	800	1000	1200	1400	1500	1600	1800	1900	
Crankshaft power 1), 5) D16-750	2	kW	86	164	307	411	475	502	526	551	551	
		hp	117	223	418	559	646	683	715	749	749	
D16-650	1	kW	85	165	305	410	459	473	478	478		
		hp	116	224	415	558	624	643	650	650		
Propeller shaft power 1) (At full load) With reverse gear TD MG 5145	2	kW	83	159	298	399	461	487	510	534	534	
		hp	113	216	405	542	627	662	694	727	727	
With reverse gear TD MG 5170	1	kW	82	160	296	398	445	459	464	464		
		hp	112	218	402	541	606	624	631	631		
Propellershaft power at prop. load $x^{2.5}$ With reverse gear TD MG 5145	2	kW	30	61	107	169	249	296	348	467	534	
		hp	41	84	146	230	339	403	473	635	727	
With reverse gear TD MG 5170	1	kW	30	61	107	168	247	294	345	464		
		hp	40	83	145	229	336	400	470	631		
Propellershaft power at prop. load x^3 With reverse gear TD MG 5145	2	kW	17	40	78	135	214	263	319	454	534	
		hp	23	54	106	183	291	358	434	618	727	
With reverse gear TD MG 5170	1	kW	17	41	80	137	218	268	326	464		
		hp	23	55	108	187	297	365	443	631		
Torque at crankshaft 2)	2	Nm	1369	1958	2932	3271	3240	3196	3139	2923	2769	
		lbf ft	1010	1444	2162	2412	2390	2357	2315	2156	2043	
1	1	Nm	1353	1970	2913	3263	3131	3011	2853	2536		
		lbf ft	998	1453	2148	2406	2309	2221	2104	1870		
Mean piston speed		m/s	3,3	4,4	5,5	6,6	7,7	8,3	8,8	9,9	10,5	
		ft/s	10,8	14,4	18,0	21,7	25,3	27,1	28,9	32,5	34,3	
Effective mean pressure 2)	2	MPa	1,07	1,53	2,28	2,55	2,53	2,49	2,45	2,28	2,16	
		psi	154,7	221,3	331,4	369,7	366,3	361,3	354,9	330,4	313,0	
1	1	MPa	1,05	1,54	2,27	2,54	2,44	2,35	2,22	1,98		
		psi	152,9	222,6	329,2	368,8	353,9	340,4	322,5	286,7		
Max combustion pressure 2)	2	MPa	11,1	13,8	17,4	18	17,4	17,7	17,9	17,6	17,1	
		psi	1610	2002	2524	2611	2524	2567	2596	2553	2480	
1	1	MPa	11	13,9	17,3	17,9	18	18	17,6	15,8		
		psi	1595	2016	2509	2596	2611	2611	2553	2292		

Lubricating system

Specific lubricating oil consumption.	g/kWh	0,08
Max. oil volume including filters for all allowed installation inclinations:	litres	55
	US gal	14,53
Max. oil volume excluding filters for all allowed installation inclinations:	litres	49
	US gal	12,94
Min. oil volume excluding filters for all allowed installation inclinations:	litres	39
	US gal	10,30

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Fuel system	Rating	r/min	600	800	1000	1200	1400	1500	1600	1800	1900
Specific fuel consumption 2)	2	g/kWh lb/hph	245,1 0,397	233,2 0,378	219,6 0,356	197,7 0,32	198,8 0,322	198,9 0,322	202,5 0,328	209,4 0,339	215 0,348
	1	g/kWh lb/hph	214,3 0,347	239 0,387	222,6 0,361	198,6 0,322	193,5 0,313	193,2 0,313	195,8 0,317	210,3 0,341	
Fuel consumption, Test cycle E3	2	g/kWh lb/hph	206,4 0,33								
Fuel consumption, Test cycle E3	1	g/kWh lb/hph	205,3 0,33								
Fuel consumption at prop. load x ^{2,5}	2	l/h US gal/h	8,5 2,2	16,2 4,3	27,3 7,2	42,1 11,1	61,2 16,2	72,5 19,2	84,4 22,3	117,6 31,1	140,1 37,0
	1	l/h US gal/h	8,4 2,2	16,1 4,2	27,3 7,2	41,9 11,1	61,7 16,3	72,7 19,2	85,6 22,6	119,1 31,5	

Fuel system	Rating	r/min	600	800	1000	1200	1400	1500	1600	1800	1900
Fuel consumption at prop. load x ³	2	l/h US gal/h	5,6 1,5	11,2 2,9	20,3 5,4	34,1 9,0	52,8 13,9	64,8 17,1	77,6 20,5	114,0 30,1	140,4 37,1
	1	l/h US gal/h	5,6 1,5	11,3 3,0	20,9 5,5	34,7 9,2	54,7 14,5	66,8 17,6	80,9 21,4	119,7 31,6	
Fuel consumption at full load	2	l/h US gal/h	25,2 6,7	45,8 12,1	80,7 21,3	97,2 25,7	113,0 29,9	119,5 31,6	127,5 33,7	138,1 36,5	141,8 37,4
	1	l/h US gal/h	21,8 5,8	47,2 12,5	81,2 21,5	97,4 25,7	106,3 28,1	109,3 28,9	112,0 29,6	120,3 31,8	

Intake and exhaust system	Rating	r/min	600	800	1000	1200	1400	1500	1600	1800	1900	
Specific exhaust heating effect in percent of crankshaft power	2	%	77	86	81	67	66	67	68	72	75	
	1		75	88	82	68	64	64	65	73		
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	2	°C	566	664	648	515	455	443	440	465		
		°F	1051	1227	1198	959	851	829	824	869		
	1	°C	551	680	654	526	455	439	525	421		
		°F	1024	1256	1209	979	851	822	977	790		
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)		kPa psi							Max	15 2,2		
		kPa psi							Min	0 0,0		

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Intake and exhaust system	Rating	r/min	600	800	1000	1200	1400	1500	1600	1800	1900
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPA and relative humidity 30%.	2	m ³ /min cu.ft./min	5,22 184,3	9,23 326	6,95 245,4	24,85 877,6	33,07 1168	36,35 1284	39,25 1386	42,03 1484	42,43 1498
	1	m ³ /min cu.ft./min	5,183 183	9,2 324,9	16,68 589	24,38 861	30,65 1082	32,73 1156	34,95 1234	39,78 1405	
Charge air pressure Inlet manifold	2	kPa psi	21 3,0	59 8,6	137 19,9	191 27,7	235 34,1	243 35,2	250 36,3	237 34,4	225 32,6
	1	kPa psi	20 2,9	60 8,7	135 19,6	188 27,3	211 30,6	211 30,6	212 30,7	217 31,5	
Exhaust gas flow	2	m ³ /min cu.ft./min	16,2 572,1	31,8 1123	55,37 1955	67,12 2370	79,02 2791	83,8 2959	88,5 3125	95,17 3361	97,5 3443
	1	m ³ /min cu.ft./min	15,58 550,2	31,95 1128	54,67 1931	65,38 2309	72,12 2547	74,32 2625	76,85 2714	85,35 3014	

Cooling system	Rating	r/min	600	800	1000	1200	1400	1500	1600	1800	1900
Radiated heat in percent of crankshaft power.	2	%	20	12	8	4	3	2	3	2	4
	1	%	19	16	10	40	2	2	3	4	
Heat rejection to charge air cooler in percent of crankshaft power.	2	%	2	6	11	14	19	21	22	24	25
	1	%	2	6	11	14	17	18	21	23	
Coolant heat rejection to HE, incl. engine oil cooler and excl. charge air cooler, in	2	%	93	69	61	52	52	48	54	55	58
	1	%	93	71	60	50	49	48	50	57	
Coolant flow with fully open thermostat and std cooling system		l/min	183	263,8	315,4	404,3	484,3	503,5	562,5	638,3	675
		cu.ft./min	6,5	9,3	11,1	14,3	17,1	17,8	19,9	22,5	23,8
Max. permissible temperature on coolant in engine outlet		°C	96								
		°F	205								
Coolant volume engine, including heat exchanger and charge air cooler		litres	56								
		US gal.	14,79								
Max. additional coolant for cabin heater etc. with std. Expansion tank		litres	20								
		US gal.	5,28								
Thermostat, start open at		°C	86								
		°F	187								
Thermostat, fully open at		°C	96								
		°F	205								

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Raw water circuit	r/min	600	800	1000	1200	1400	1500	1600	1800	1900
Nominal raw water design flow	l/min cu.ft/min	153 5,4	205 7,2	258 9,1	306 10,8	351 12,4	371 13,1	394 13,9	432 15,3	446 15,8
Maximum raw water pump suction head	kPa psi	30 4,4								
Maximum additional pressure drop excl. reverse gear oil cooler	kPa psi	7 1,0	10 1,5	13 1,9	17 2,5	21 3,0	26 3,8	31 4,5	33 4,8	
Pressure drop over reverse gear oil cooler (optional equipment)	kPa psi	4 0,6	6 0,9	10 1,5	14 2,0	18 2,6	21 3,0	23 3,3	28 4,1	30 4,4
Maximum raw water temperature entering heat exchanger	°C °F	32 90								

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2 circuit keel cooling system, LT		Rating	r/min	600	800	1000	1200	1400	1500	1600	1800	1900	
Maximum temperature to charge air cooler from external LT-cooling system circuit	2	°C	20	21	28	33	40	43	47	47	48		
		°F	68	70	82	91	104	109	117	117	118		
	1	°C	20	23	28	35	39	40	42	46			
		°F	68	73	82	95	102	104	108	115			
Coolant flow through keel cooler, LT-cooling system circuit	2	l/min	40	48	55	65	75	80	84	90	92		
		cu.ft./min	1,4	1,7	1,9	2,3	2,6	2,8	3,0	3,2	3,2		
	1	l/min	38	47	53	63	72	77	78	87			
		cu.ft./min	1,4	1,6	1,9	2,2	2,5	2,7	2,8	3,1			
Pressure drop in external LT-cooling system circuit, including piping		kPa						50	-				
		psi						7,3	-				
Coolant volume charge air cooler		litres						5					
		US gal.						1,32					

2 circuit keel cooling system, HT		Rating	r/min	600	800	1000	1200	1400	1500	1600	1800	1900	
Design point for keel cooler, engine outlet temperature	2	°C										92	
		°F										198	
	1	°C									91		
		°F									196		
Maximum temperature to engine from external HT-cooling system circuit	2	°C										62	
		°F										144	
	1	°C									63		
		°F									145		
Coolant flow through keel cooler, HT-cooling system circuit at design point	2	l/min										172	
		cu.ft./min										6,1	
	1	l/min									157		
		cu.ft./min									5,5		
Maximum coolant flow through keel cooler, HT-cooling system circuit	2	l/min										474	
		cu.ft./min										16,7	
	1	l/min									453		
		cu.ft./min									16,0		
Pressure drop in external HT-cooling system circuit, including piping		kPa						50	-				
		psi						7,3	-				
Coolant volume engine, excl. heat exchangers		litres						38					
		US gal.						10,04					

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Emissions	Rating	r/min	600	800	1000	1200	1400	1500	1600	1800	1900
Smoke at prop. load $x^{2.5}$	2	*BSU	0,0	0,1	0,3	0,8	0,4		0,2	0,2	0,4
	1	*BSU	0,0	0,1	0,5	0,9	0,5	0,2	0,2	0,3	
Smoke at prop. load x^3	2	*BSU	0,0	0,0	0,2	0,6	0,6		0,2	0,2	0,4
	1	*BSU	0,0	0,0	0,3	0,7	0,6	0,3	0,2	0,3	
Noise at prop. load $x^{2.5}$. 4)	2	dB(A)	103,4	106	108,5	111,4	114	114,4	115,8	117,9	117,1
	1	dB(A)	103,4	105,8	108,8	110,8	114,2	114,1	115,8	121,3	
Noise at prop. load x^3 . 4)	2	dB(A)	104,1	106,1	108,1	110,8	114,1	114,4	116,3	117,6	116,9
	1	dB(A)	104	106	108,5	110,7	114	114,1	116	121,3	

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

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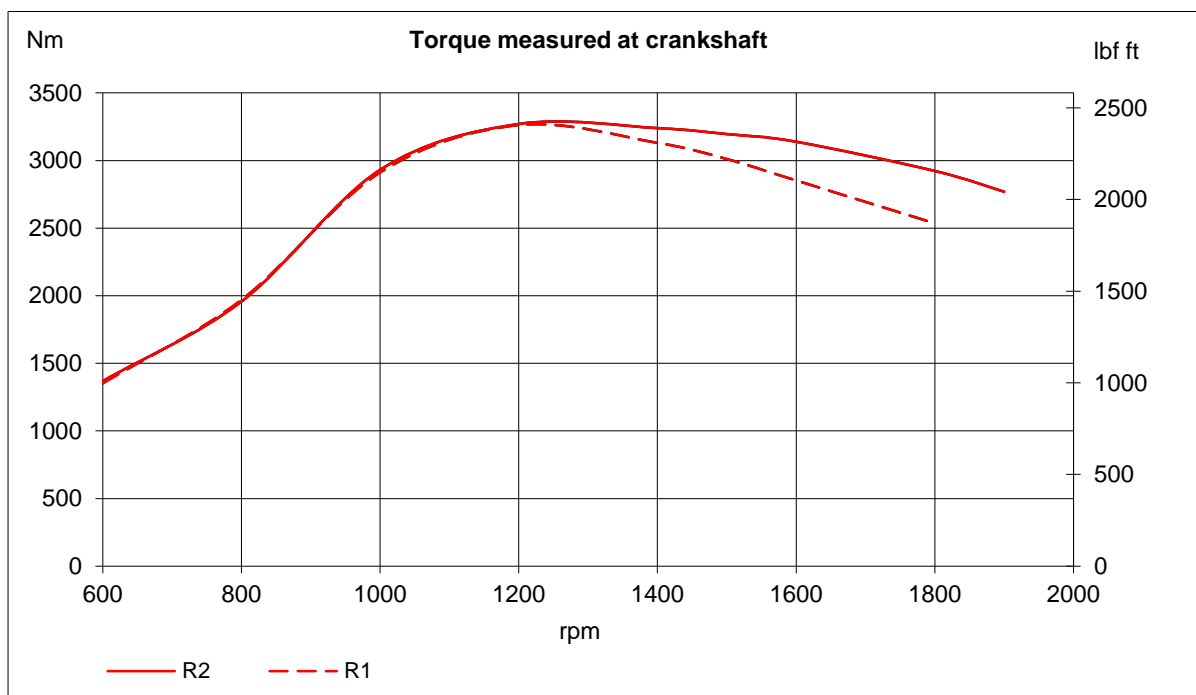
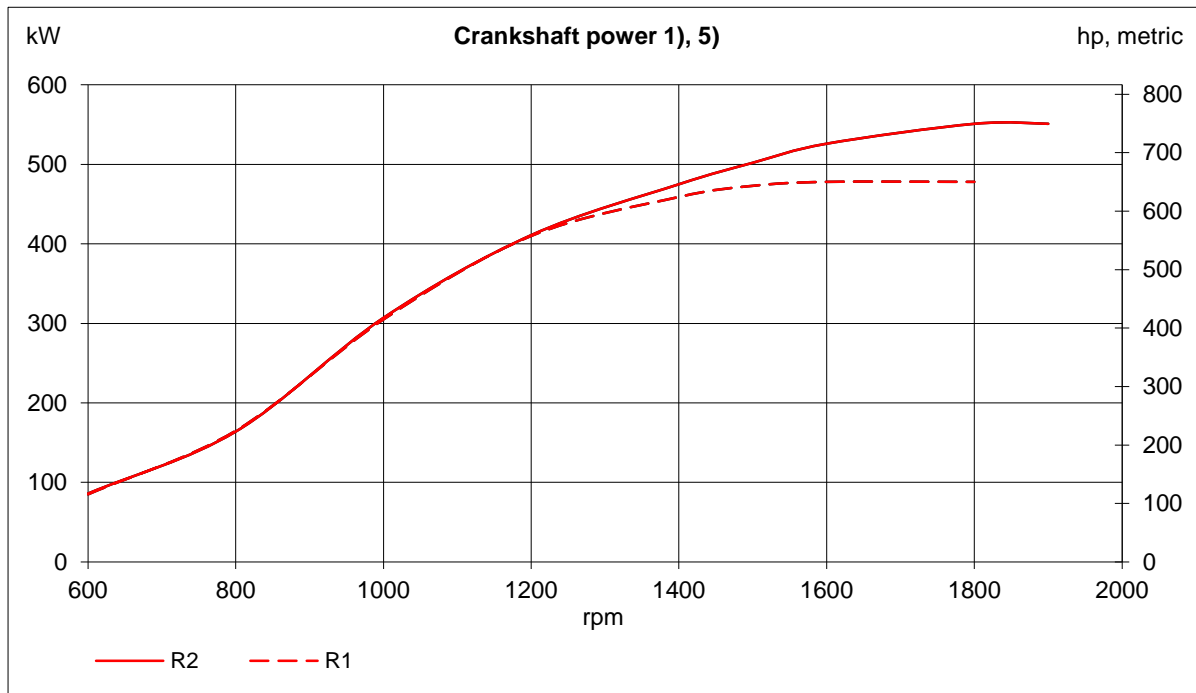
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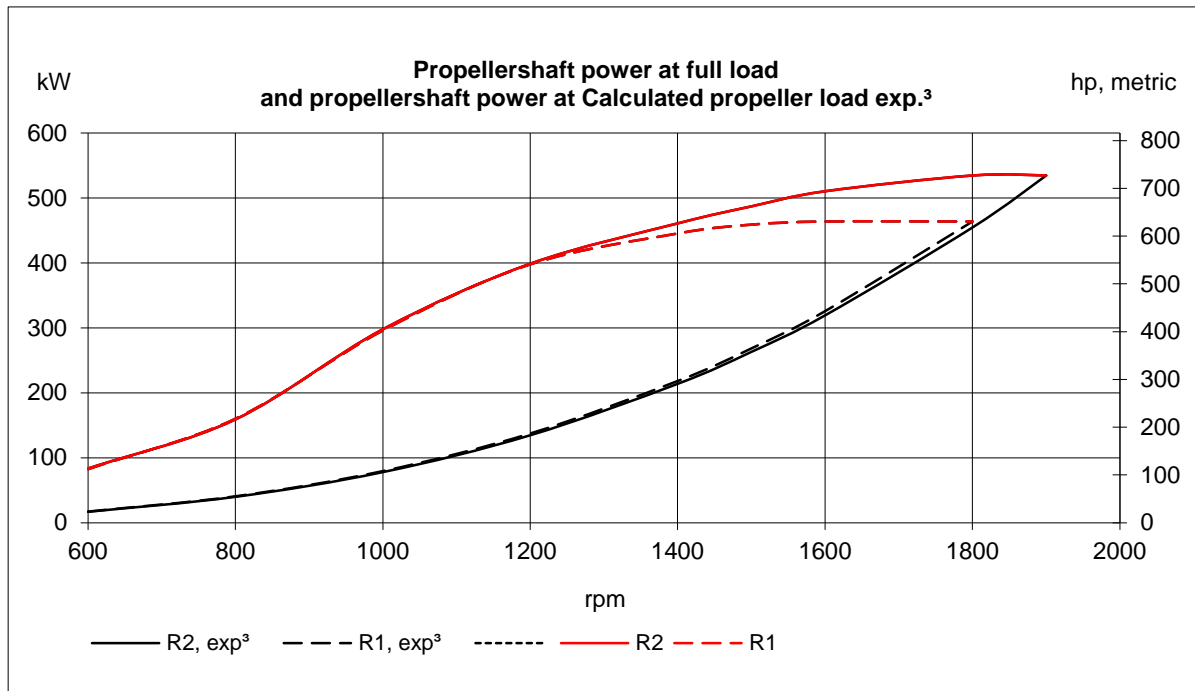
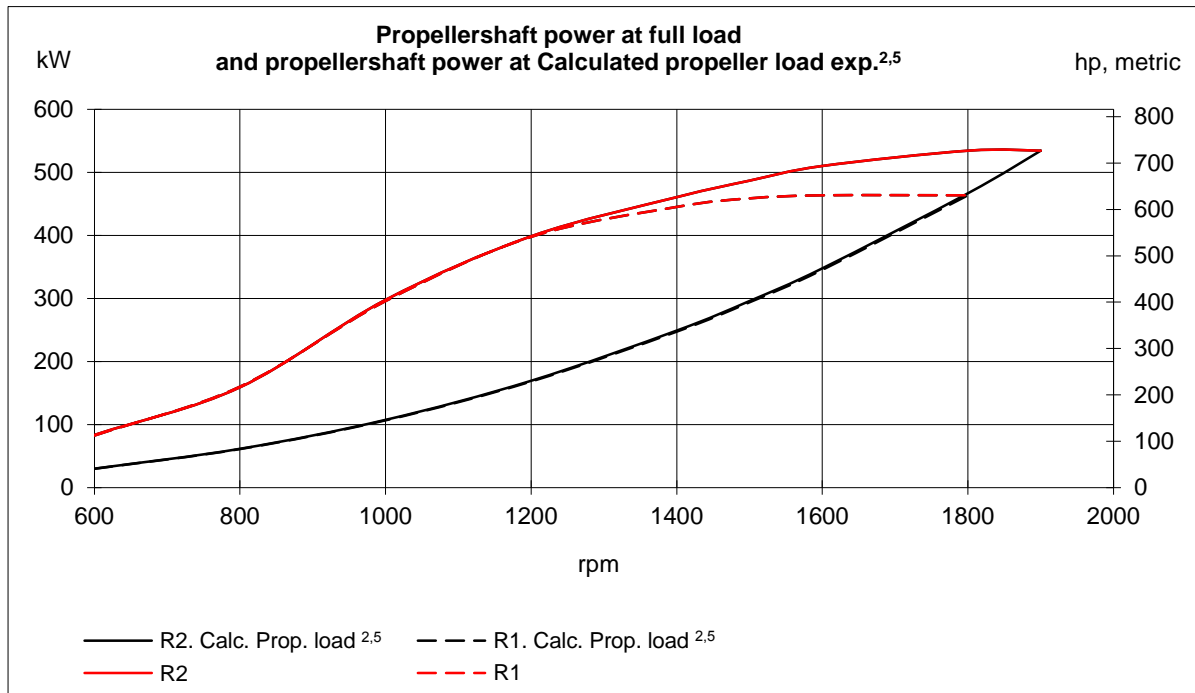
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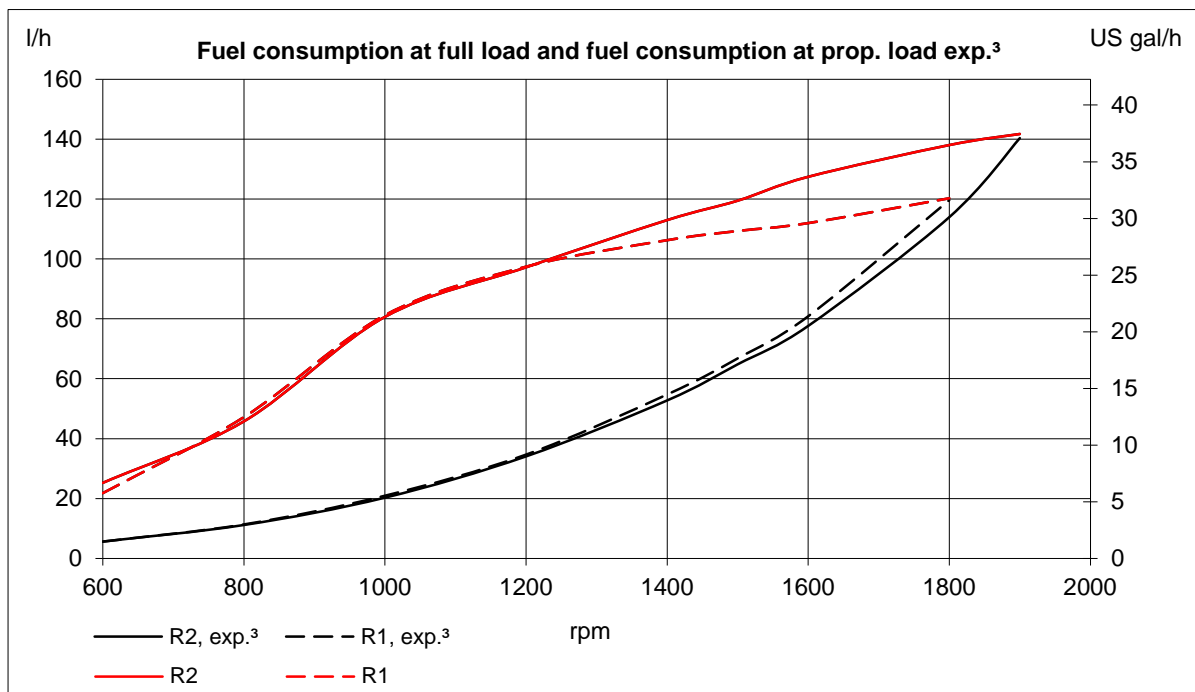
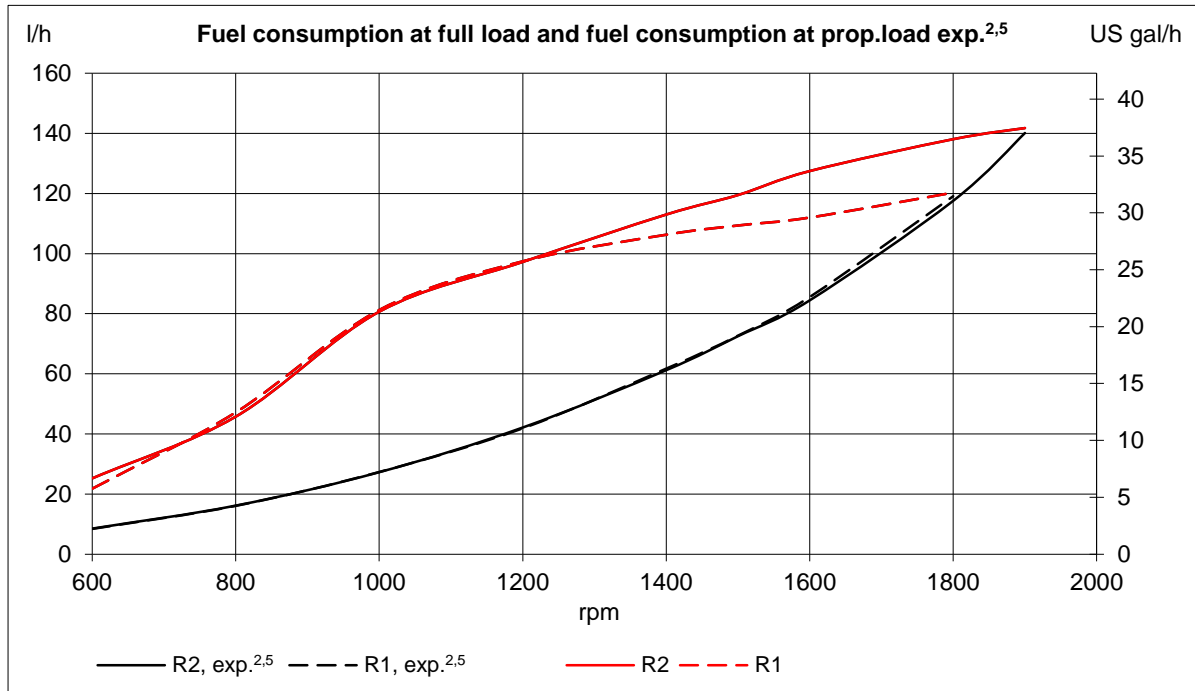
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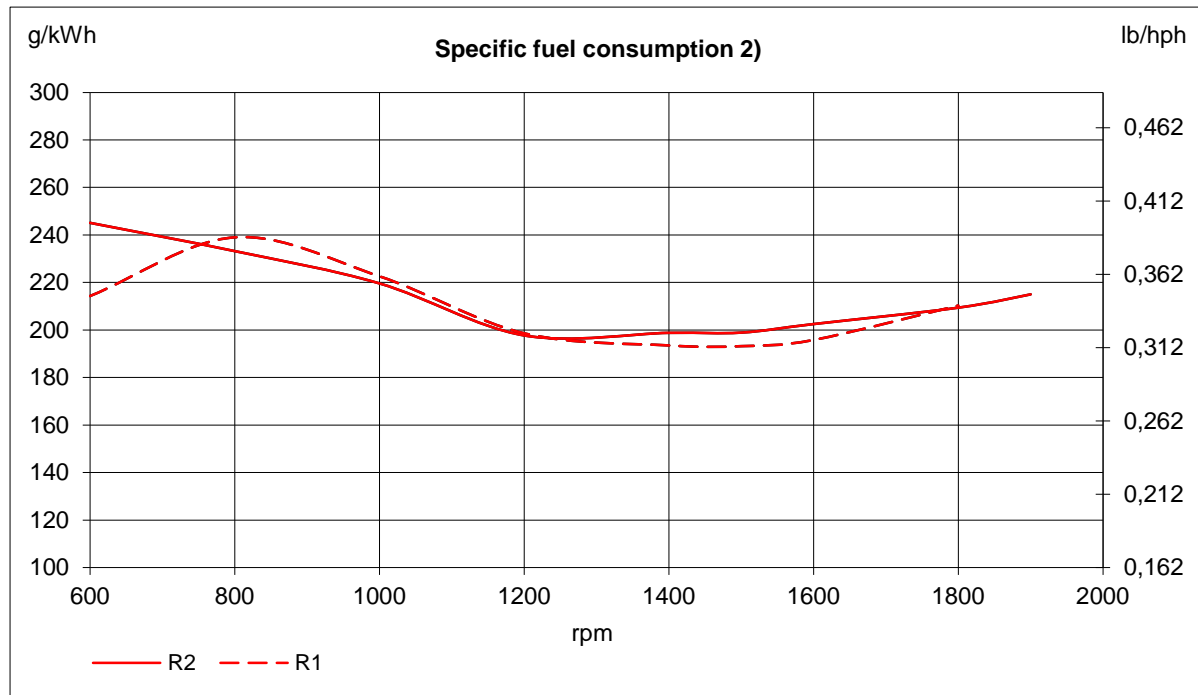
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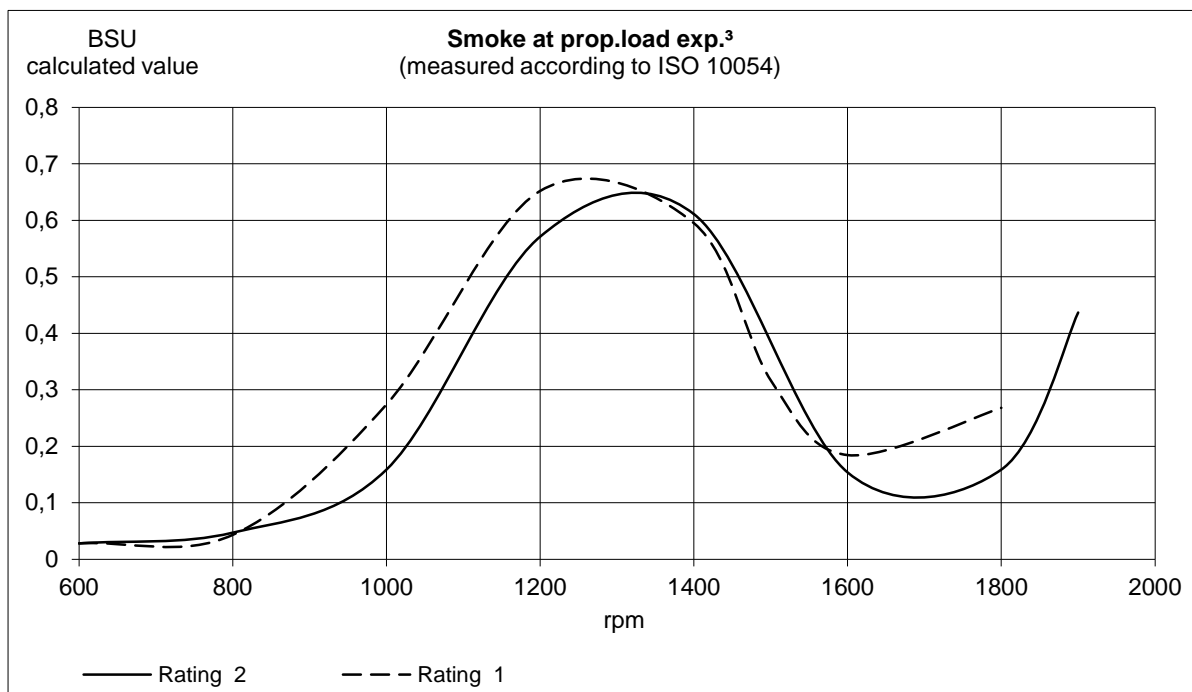
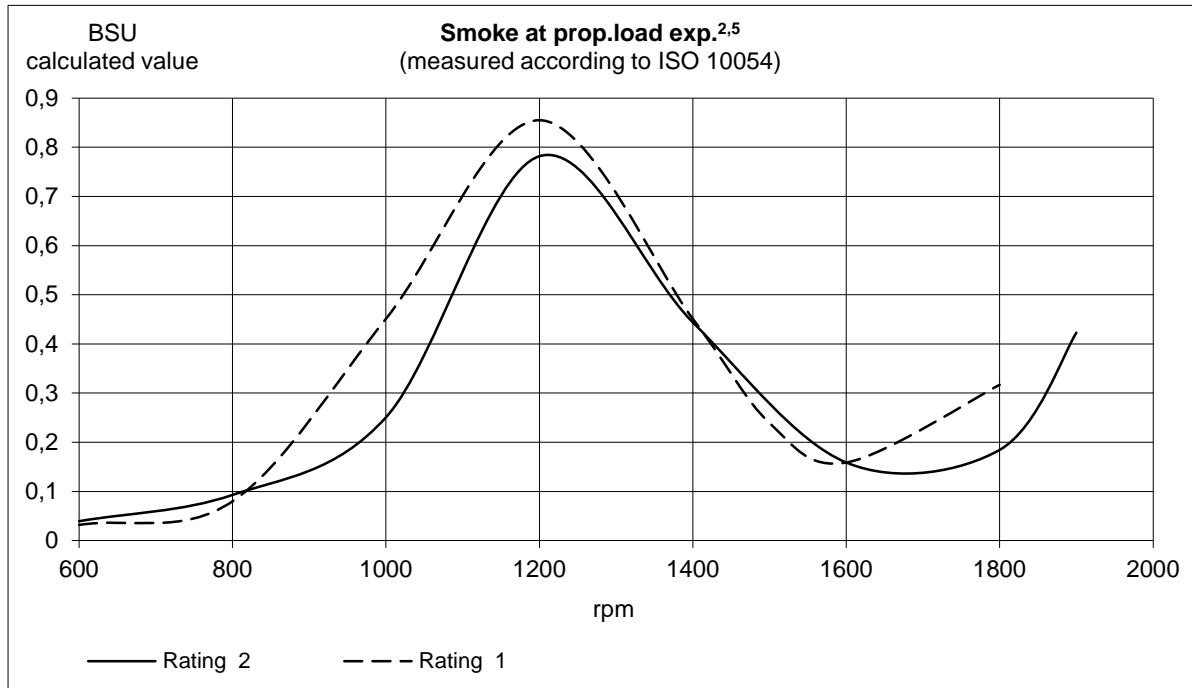
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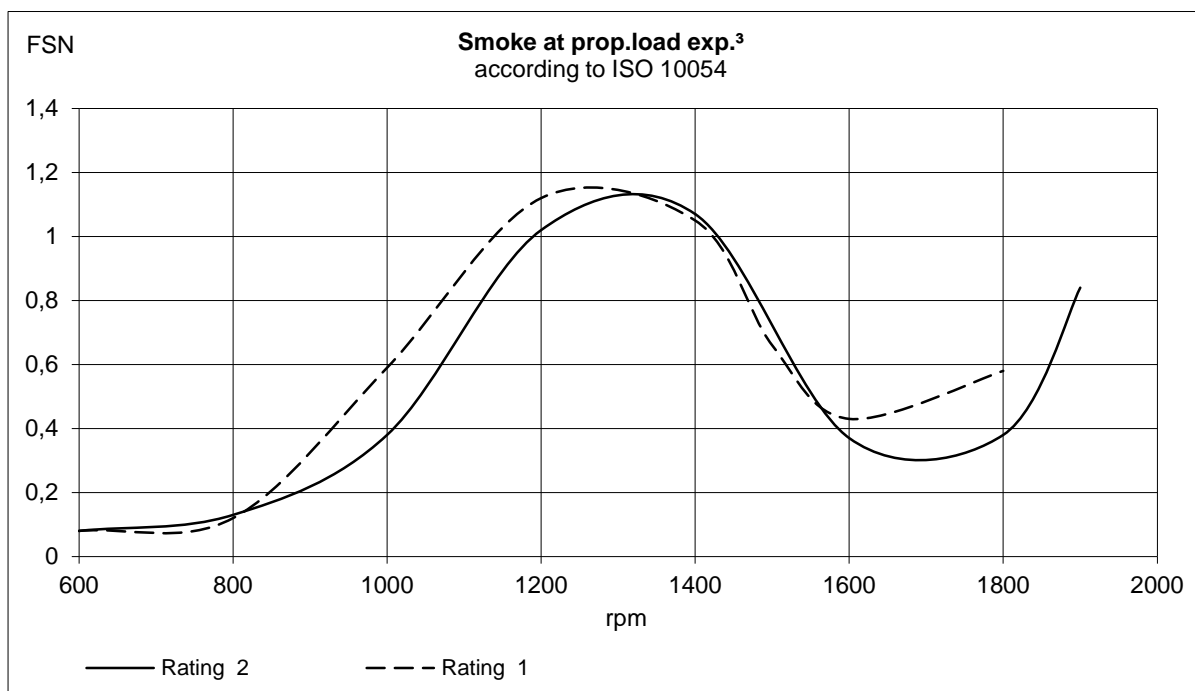
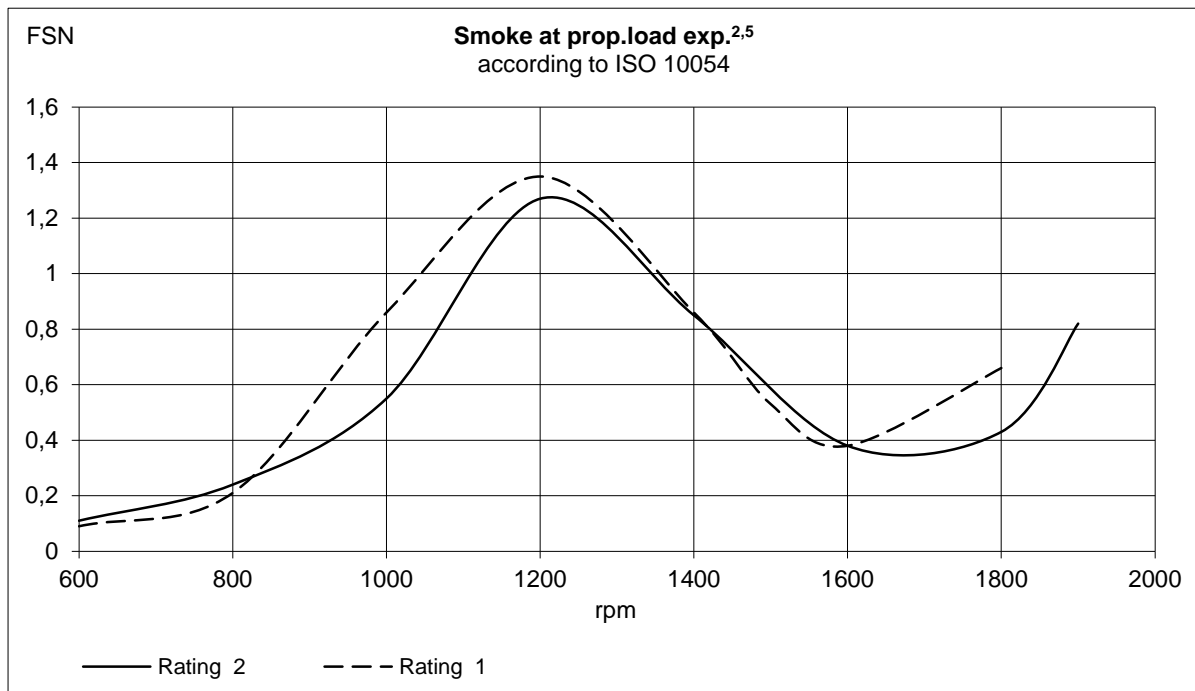
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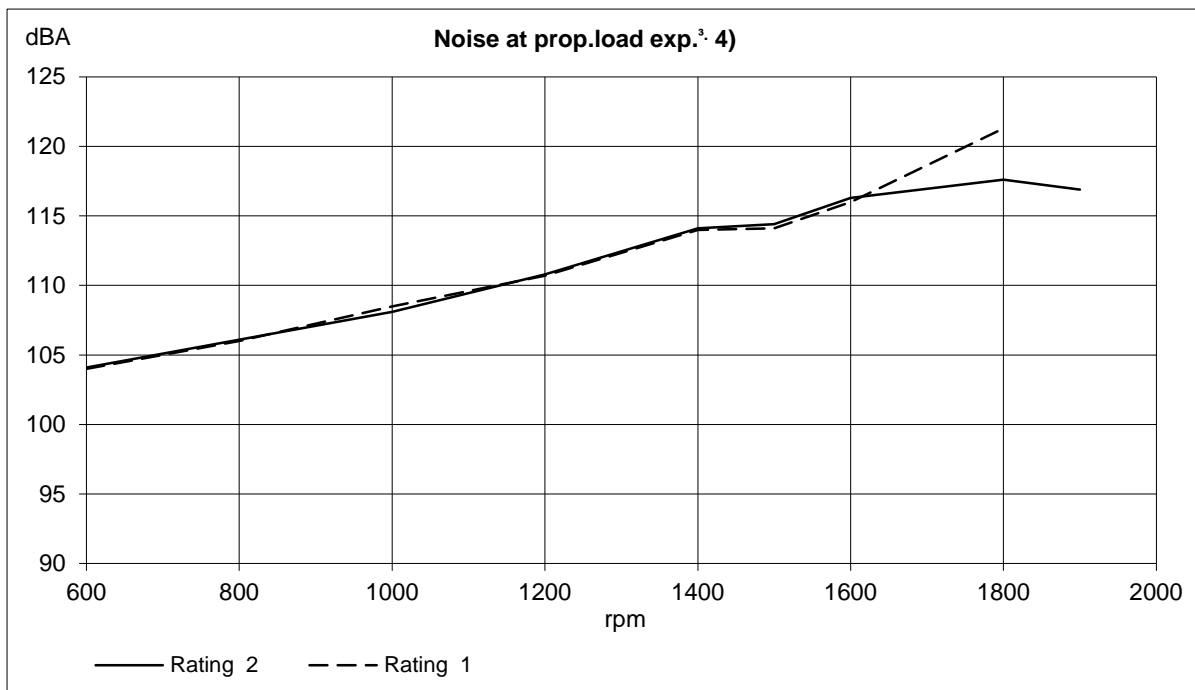
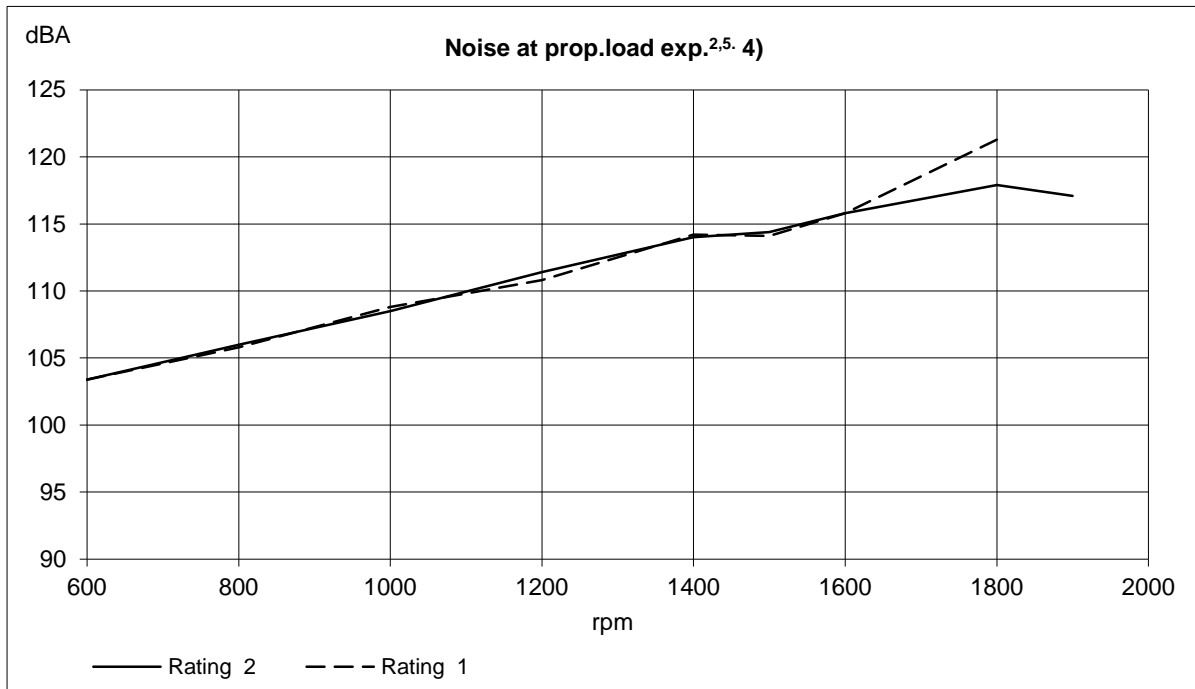
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