

VOLVO PENTA D8 R4-R3 IPS	Document No 22964275	Issue Index 04
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General

4-stroke direct injected, turbocharged and aftercooled diesel engine

Number of cylinders		6
No of valves		24
Displacement, total	litres in ³	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 R4	rpm	2900
Rated speed R3	rpm	2700
Propeller selection range R4	rpm	NS4-NS5, N1-N7
Propeller selection range R3	rpm	NS4-NS5, N1-N7
Dry weight engine BT	kg lb	880 1940

- 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.
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- 5) At installed back pressure

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Performance	Rating	rpm	600	800	1200	1700	2000	2200	2400	2600	2700	2900
Crankshaft power 1), 5)	4	kW hp	50 68	82 111	166 225	296 403	349 474	384 522	405 550	405 550	405 550	405 550
	3	kW hp	44 60	73 99	152 207	261 354	307 417	331 450	331 450	331 450	331 450	
Propeller shaft power 1) (At full load) With drive	4	kW hp	48 65	77 105	157 214	282 383	331 451	364 496	384 523	384 523	384 523	384 523
	3	kW hp	42 57	69 94	144 196	248 337	291 396	314 427	314 427	314 427	315 428	
Propellershaft power at prop. load x ^{2.5}	4	kW hp	7 10	15 21	42 58	101 138	152 206	193 262	239 326	292 398	321 437	384 523
	3	kW hp	7 10	15 20	41 56	99 135	149 202	189 256	234 319	286 389	315 428	
Propellershaft power at prop. load x ³	4	kW hp	3 5	8 11	27 37	77 105	126 171	168 228	218 296	277 377	310 422	384 523
	3	kW hp	3 5	8 11	28 38	79 107	128 174	170 231	221 300	281 382	315 428	
Torque at crankshaft 2)	4	Nm lbf ft	800,1 590	973 718	1319 973	1665 1228	1665 1228	1665 1228	1609 1187	1486 1096	1431 1055	1332 982
	3	Nm lbf ft	700 516	869,9 642	1210 892	1464 1080	1464 1080	1436 1059	1316 971	1215 896	1171 864	
Mean piston speed		m/s ft/s	2,7 8,9	3,6 11,8	5,4 17,7	7,7 25,1	9,0 29,5	9,9 32,5	10,8 35,4	11,7 38,4	12,2 39,9	13,1 42,8
	4	MPa psi	1,31 189,4	1,59 230,3	2,15 312,2	2,72 394,1	2,72 394,1	2,72 394,1	2,63 381,0	2,42 351,7	2,33 338,6	2,17 315,3
	3	MPa psi	1,14 165,7	1,42 205,9	1,97 286,4	2,39 346,5	2,39 346,5	2,34 339,9	2,15 311,6	1,98 287,6	1,91 277,2	
	4	MPa psi	16,7 2422	17,9 2596	18,3 2654	18,3 2654	18,4 2669	18,3 2654	17,8 2582	16,3 2364	15,8 2292	15,5 2248
	3	MPa psi	15,8 2292	17,7 2567	18,4 2669	16 2321	16,8 2437	16,5 2393	15,3 2219	15,5 2248	15,7 2277	

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

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Fuel system	Rating	rpm	600	800	1200	1700	2000	2200	2400	2600	2700	2900
Specific fuel consumption 2)	4	g/kWh lb/hph	222,3 0,36	212 0,343	204,2 0,331	200,2 0,324	196,8 0,319	200,6 0,325	206,4 0,334	215,1 0,348	220,4 0,357	225,3 0,365
	3	g/kWh lb/hph	228 0,369	216 0,35	204 0,33	200 0,324	197 0,319	200 0,324	208 0,337	216 0,35	219 0,355	
Fuel consumption at Test cycle?	4	g/kWh lb/hph	NA									
	3	g/kWh lb/hph	NA									
Fuel consumption at prop. load x ^{2,5}	4	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	50,9 13,4	63,7 16,8	79,3 20,9	87,9 23,2	109,5 28,9
	3	l/h US gal/h	2,5 0,7	4,5 1,2	10,9 2,9	26,5 7,0	38,8 10,2	49,8 13,2	62,8 16,6	78,2 20,7	90,5 23,9	
Fuel consumption at prop. load x ³	4	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	44,6 11,8	58,9 15,6	75,1 19,8	85,4 22,6	109,5 28,9
	3	l/h US gal/h	1,7 0,4	3,0 0,8	7,9 2,1	21,7 5,7	33,9 9,0	45,4 12,0	59,5 15,7	76,8 20,3	90,6 23,9	
Fuel consumption at full load	4	l/h US gal/h	13,4 3,5	20,7 5,5	40,5 10,7	71,0 18,8	82,1 21,7	92,9 24,5	99,9 26,4	104,1 27,5	106,7 28,2	109,5 28,9
	3	l/h US gal/h	11,9 3,1	19,4 5,1	37,4 9,9	63,0 16,6	72,8 19,2	79,9 21,1	83,1 22,0	86,9 23,0	90,1 23,8	

Full load performance at rated speed

	Rating	4	3
Fuel return temperature from engine	°C °F	52 126	49 120
Fuel consumption	l/h US gal/h	109 28,8	88 23,2
Fuel inlet flow to engine	l/h US gal/h	184 48,6	159 42,0
Fuel return flow from engine	l/h US gal/h	75 19,8	71 18,8

Intake and exhaust system	Rating	rpm	600	800	1200	1700	2000	2200	2400	2600	2700	2900
Specific exhaust heating effect in percent of crankshaft power	4	%	20	21	30	64	63	65	68	76	80	84
	3		31	35	46	65	63	65	69	73	74	
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	4	°C °F	309 588	350 662	446 835	545 1013	470 878	439 822	448 838	485 905	503 937	517 963
	3	°C °F	284 543	327 621	409 768	547 1017	469 876	432 810	407 765	396 745	397 747	
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)		kPa psi							Max	30 4,4		
		kPa psi							Min	10 1,5		
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPa and relative humidity 30%.	4	m³/min cu.ft./min	4,48 158,2	6,68 235,9	10,72 378,6	16,55 584,5	22,42 791,8	26,88 949,3	29,83 1053	29,49 1041	30,62 1081	31,22 1103
	3	m³/min cu.ft./min	4,43 156,4	6,63 234,1	10,63 375,4	14,23 502,5	19,54 690	23,58 832,7	26,7 942,9	29,26 1033	30,46 1076	
Charge air pressure Inlet manifold	4	kPa psi	206 29,9	231 33,5	256 37,1	278 40,3	322 46,7	353 51,2	363 52,6	332 48,2	334 48,4	322 46,7
	3	kPa psi	211 30,6	235 34,1	260 37,7	247 35,8	285 41,3	315 45,7	326 47,3	333 48,3	339 49,2	
Exhaust gas flow	4	m³/min cu.ft./min	9,21 325,2	14,8 522,7	27,2 960,6	46,67 1648	54,95 1941	60,87 2150	66,32 2342	68,86 2432	72,03 2544	74,2 2620
	3	m³/min cu.ft./min	8,55 301,9	13,84 488,8	25,36 895,6	40,15 1418	47,66 1683	53,08 1875	56,38 1991	59,45 2099	61,14 2159	

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Cooling system	Rating	rpm	600	800	1200	1700	2000	2200	2400	2600	2700	2900
Radiated heat in percent of crankshaft power.	4	%	1,9	1,8	1,7	1,6	1,5	1,5	1,5	1,5	1,5	1,5
	3		1,9	1,8	1,7	1,6	1,5	1,5	1,5	1,5	1,5	
Heat rejection to charge air cooler in percent of crankshaft power.	4	%	18	21	18	15	20	23	25	23	24	24
	3		24	24	21	13	17	21	24	27	29	
Coolant heat rejection to HE, incl. engine oil cooler and excl. charge air cooler, in percent of crankshaft power.	4	%	72	60	56	48	43	44	47	48	51	53
	3		65	58	50	51	45	43	45	47	48	
Coolant flow with fully open thermostat and std cooling system		l/min cu.ft./min	66	88	129	182	212	229	244	259	265	272
			2,3	3,1	4,6	6,4	7,5	8,1	8,6	9,1	9,4	9,6
Extra water pump flow through charge air cooler		l/min cu.ft./min	NA									
Max. pump pressure at extra pump pressure side (pressure set system)		kPa psi	NA									
Max. permissible temperature on coolant in engine outlet		°C °F	NA									
Coolant volume engine, including heat exchanger and charge air cooler		litres US gal.	25									
			6,60									
Max. additional coolant for cabin heater etc. with std. Expansion tank		litres US gal.	20									
			5,28									
Maximum coolant flow to cabin heater etc.		l/min cu.ft./min	34,2									
			1,21									
Thermostat, start open at		°C °F	76									
			169									
Thermostat, fully open at		°C °F	86									
			187									

Raw water circuit	rpm	600	800	1200	1700	2000	2200	2400	2600	2700	2900
Nominal raw water design flow	l/min	60	82	125	170	200	220	240	245	252	258
	cu.ft./min	2,1	2,9	4,4	6,0	7,1	7,8	8,5	8,7	8,9	9,1
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	40	31	25	20	14
	psi	14,1	13,5	12,0	9,1	7,3	5,8	4,5	3,6	2,9	2,0
Pressure drop over reverse gear oil cooler (optional equipment)	kPa	1	1	2	4	5	6	7	8	8	9
	psi	0,2	0,2	0,3	0,6	0,8	0,9	1,0	1,2	1,2	1,3
Maximum sea water temperature	°C	32									
	°F	90									

Emissions	Rating	rpm	600	800	1200	1700	2000	2200	2400	2600	2700	2900
Smoke at prop. load x ^{2.5}	4	*BSU	0,2	0,2	0,3	0,9	0,7	0,7	0,5	0,4	0,4	0,6
	3	*BSU	0,2	0,2	0,3	0,7	0,8	0,7	0,5	0,5	0,4	
Smoke at prop. load x ³	4	*BSU	0,3	0,2	0,2	0,6	0,7	0,7	0,7	0,5	0,4	0,6
	3	*BSU	0,2	0,2	0,2	0,7	0,8	0,7	0,6	0,5	0,4	
Noise at prop. load x ^{2.5} . 4)	4	dBA	96,5	99,8	100,6	103,5	107,1	107,8	109	111,4	111,9	112,3
	3	dBA	96,5	99,2	100,9	106,4	107	107,8	109,2	111,4	112,1	
Noise at prop. load x ³ . 4)	4	dBA	95,8	98,5	101	103,2	107,4	108,1	109,1	111,4	111,9	112,4
	3	dBA	95,9	97,5	101,5	107,8	107,2	108,1	109,3	111,4	112	

*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	(150-500 abs).	30 sec from start / 3 sec	300 (400 absolute)	310 (410 abs.) *	NA	NA
Charge air temperaure	50-0 kΩ	°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 kΩ	°C	-40 - 140	30 sec from start / 3 sec	98	103 (soft 1)	NA	NA
Coolant temperature (SDU)	Digital	°C	ON/OFF	NA	NA	NA	1 sec.	105
Engine speed cam	Frequency	rpm		Instant	Lost signal	NA	NA	NA
Engine speed crank	Frequency	rpm		Instant	Lost signal	NA	NA	NA
Eng. overspeed (SDU) max rpm+15%	Frequency	rpm	173 pulse./rev	NA	Lost signal	NA	Instant	Nom. Rpm +15% -0 +1%
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 kΩ	°C	-40 - 140	30 sec from start / 5 sec	125	127 (soft 2)	NA	NA
Gear oil pressure (SDU)	Digital	kPa	ON/OFF	NA	NA	NA	11sec. / 1 sec	IPS: 400 kPa IB: Depends on gearbox (see manufactures recommendations)
Gear oil pressure (EVC-IPS)	0,5-4,5 V	kPa	0-3000 ±3%	60 sec. from start / 4 sec.	700	NA	NA	NA
Gear oil pressure (EVC-IB)	0,5-4,5 V	kPa	0-3000 ±3%	60 sec. from start / 4sec.	700 (Can be changed by VODIA, see gearbox manufact. recom.)	NA	NA	NA
Gear oil temperature	50-0 kΩ	°C	-40 - 140 ±2.5%	>95, 2 sec	NA	NA	NA	NA
Fuel leak pressure		kPa		0 sec. from start / 10 sec.	260/270	NA	NA	NA

NA = Not applicable

* Yes, 50% of engine prot. map.

** Max 1200 rpm at 675°C

Sensors (rpm dependent)	Signal	Unit	Range	Initial Delay / Fault	Warning Level / Derating Level					Switches	
Fuel pressure	0,5-4,5 V	kPa	0-700		600 rpm	1000 rpm	1500 rpm	2000 rpm	3000 rpm		
Warning Level		kPa		30 sec from start / 5 sec	300	335	370	420	450		
Derating Level		kPa		NA	NA	NA	NA	NA	NA		
Rail pressure ?											
Derating level											
Oil pressure	0,5-4,5 V	kPa	0-700		550 rpm	600 rpm	1000 rpm	2000 rpm	3000 rpm		
Warning Level		kPa		30 sec from start / 2 sec	NA	100	150	200	300		
Derating Level (100% derate)		kPa		10% trq. decr. per sec	NA	75	125	175	275		
Engine speed limit		kPa		Max 1000 rpm	0	70	120	170	270		
Oil pressure switch (SDU)	Digital	kPa	ON/OFF	11sec. / 1 sec	0	120±20	120±20	120±20	120±20	SDM dataset	
Coolant pressure		kPa			550 rpm	600 rpm	1000 rpm	2000 rpm	3000 rpm		
Warning Level		kPa		30 sec from start / 2 sec	NA	5	15	60	175		
Derating Level (100% derate)		kPa		10% trq. decr. per sec	NA	NA	3	48	163		
Seawater pressure		kPa			550 rpm	600 rpm	1000 rpm	2000 rpm	3000 rpm		
Warning Level		kPa		30 sec from start / 2 sec	NA	5	10	30	45		
Derating Level (100% derate)		kPa		10% trq. decr. per sec	NA	NA	NA	18	33		

Warning = Yellow Lamp active

Derating = Red Lamp active

Remarks

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

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

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

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

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

Technical data - Drive unit

Drive line		D8-IPS800
Transmission type		IPS15-A
Gear ratio (total)		1,84:1
Steering angle, max.		+/- 34
Total weight of drive unit (1)	kg	470
Oil capacity, approx.	litres	23
Oil volume difference MIN-MAX	litres	0,5
Oil type		Volvo Penta API GL5 75W/90
Propeller range		NS4-NS5, N1-N7

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

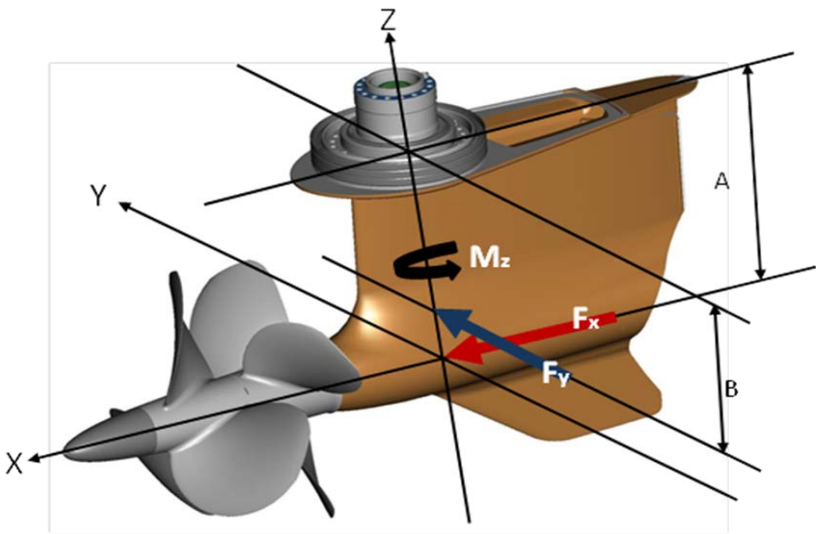
"Generalized maximum load document"for IPS3

Valid products	Drive Unit	Gear Ratio
IPSxxxx	IPSx	1,84:1
IPSxxxx	IPSx	1,xx:1
IPSxxxx	IPSx	1,xx:1

Loads provided in chart are single maximum loads i.e. not to be used for fatigue calculations

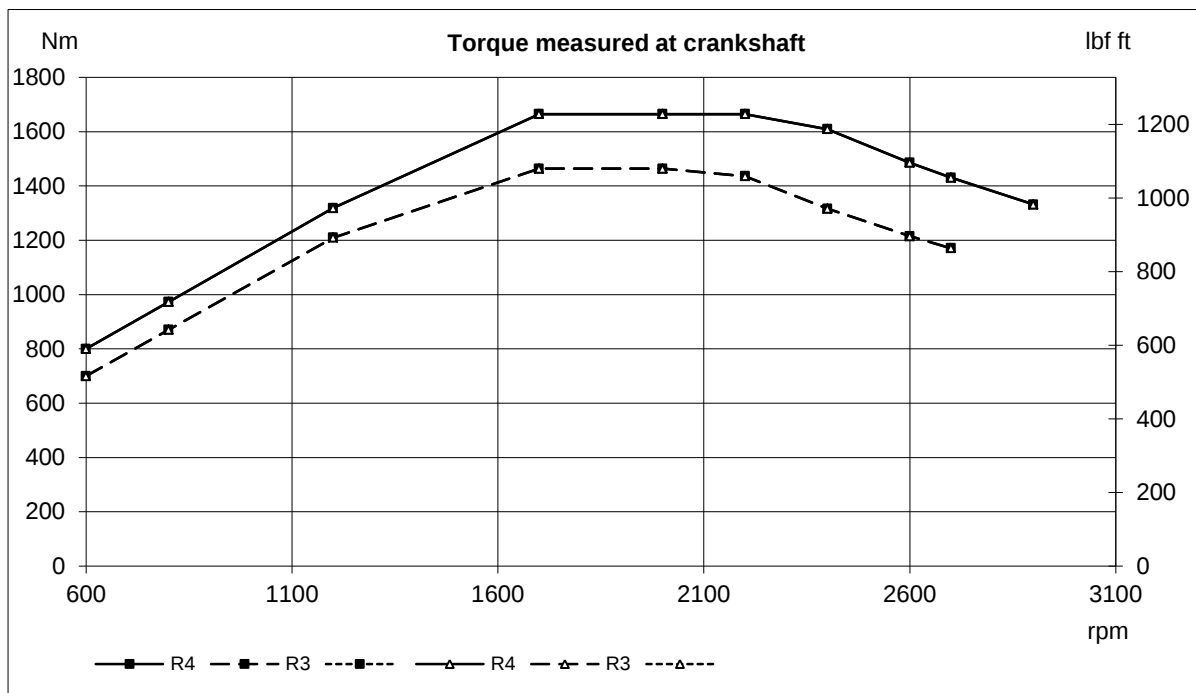
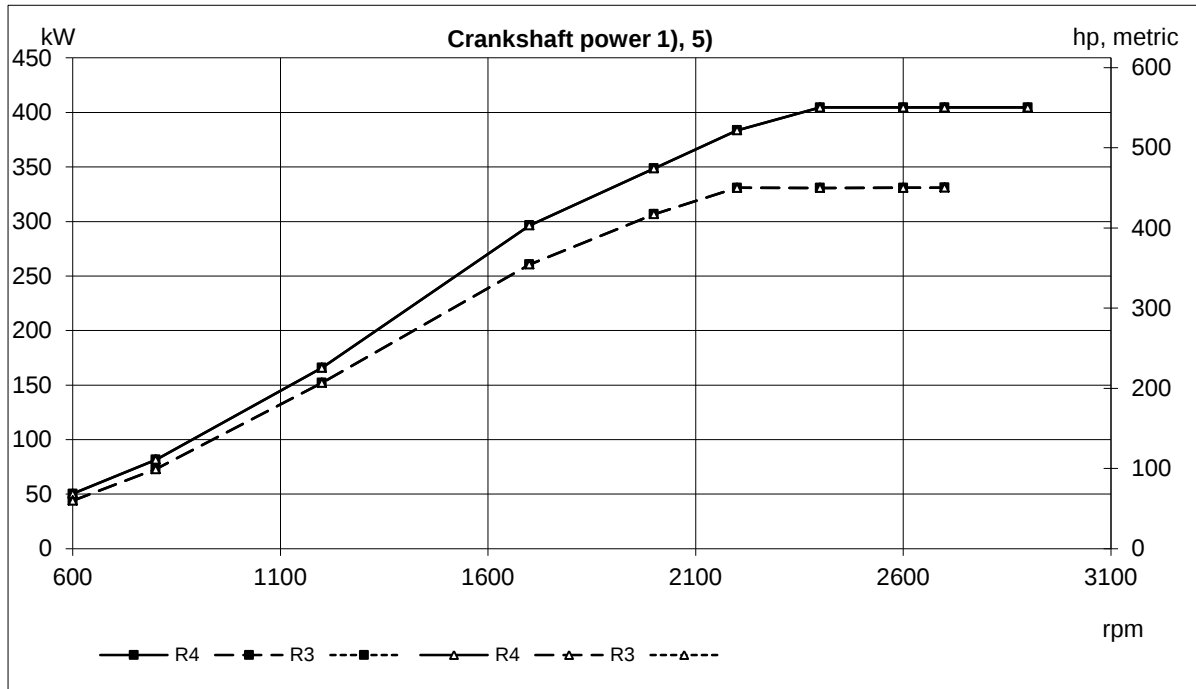
Speed range (top speed)	Load vektor	Maximum load
20-28 kn	Fx	19 kN
	Fy (+/-)	24 kN
	Mz (+/-)	9,5 kNm
28-42 kn	Fx	15 kN
	Fy (+/-)	48 kN
	Mz (+/-)	9,5 kNm

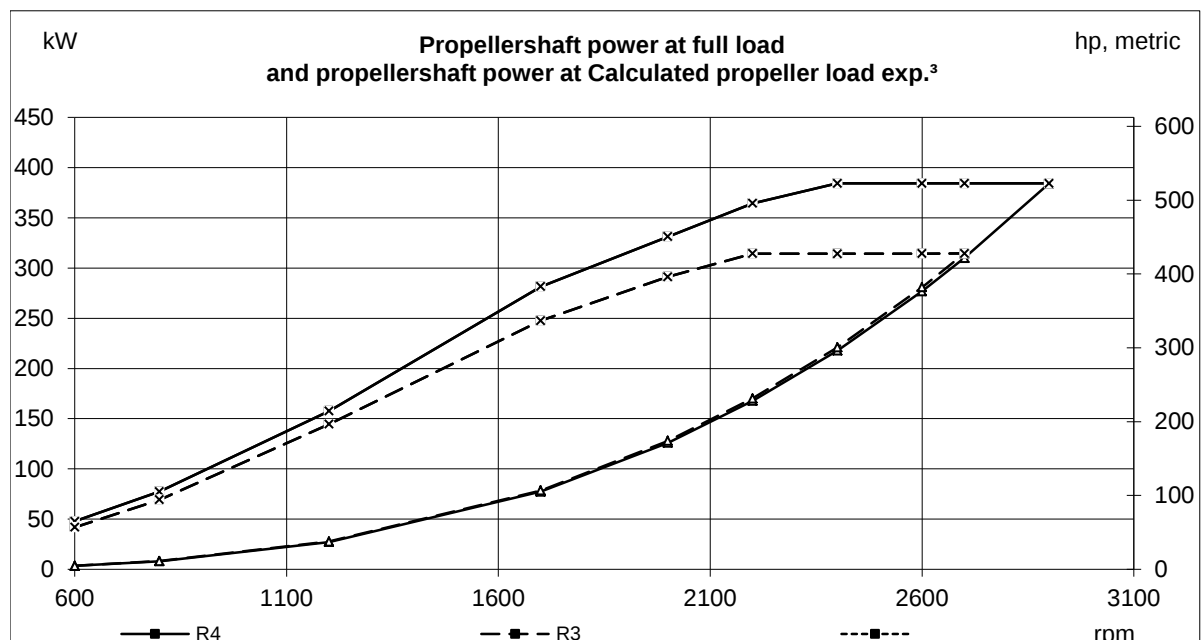
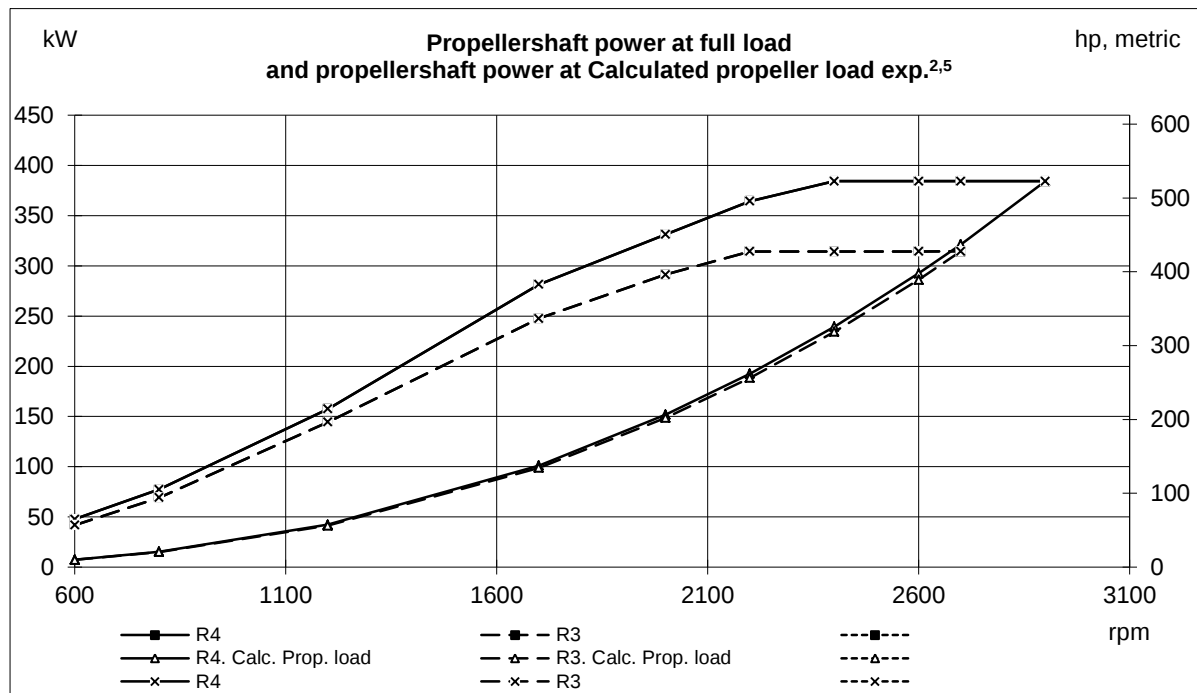
A	425 mm
B	320 mm

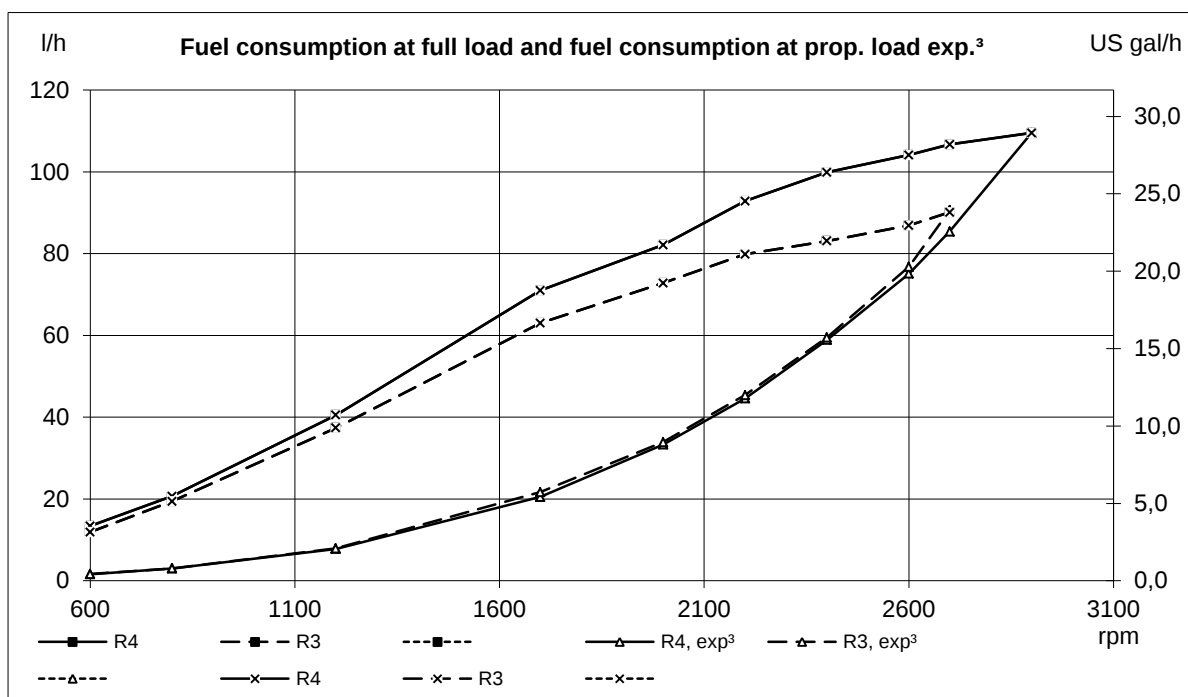
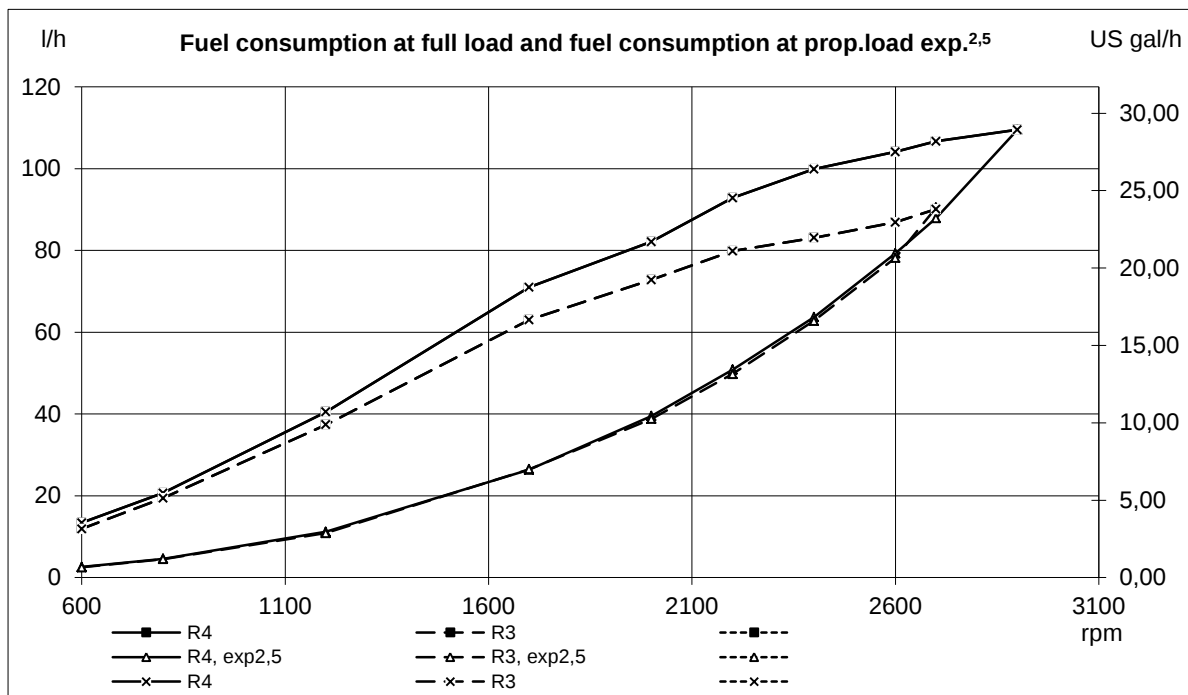


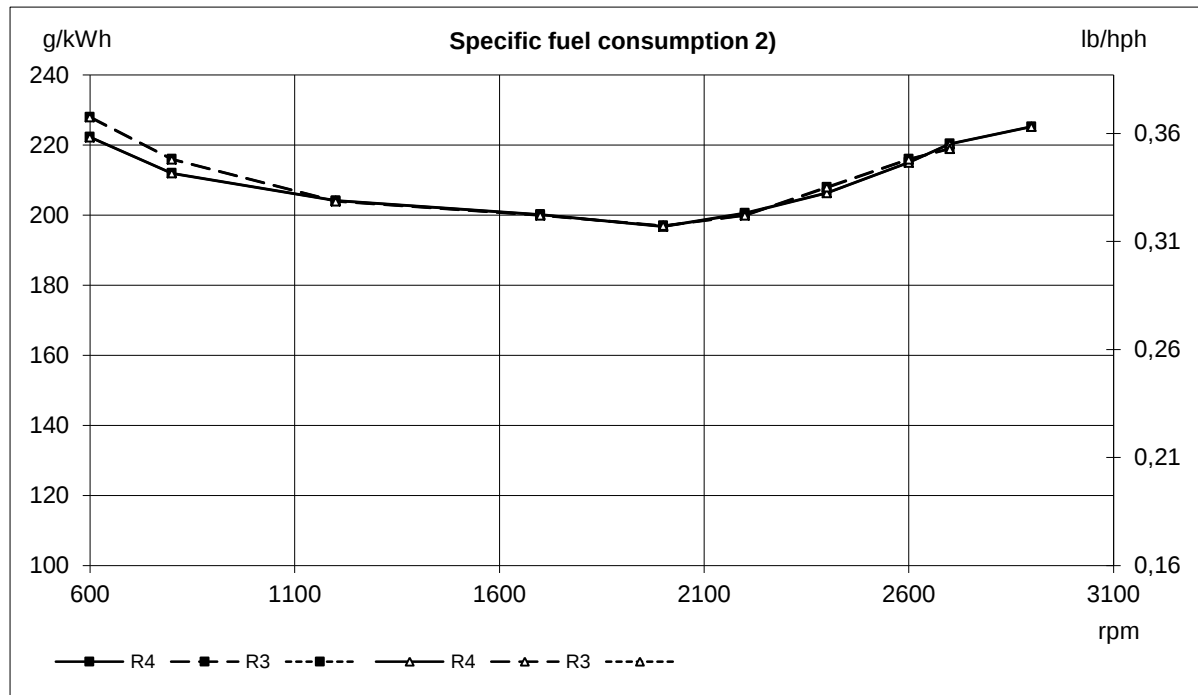
Important Note!

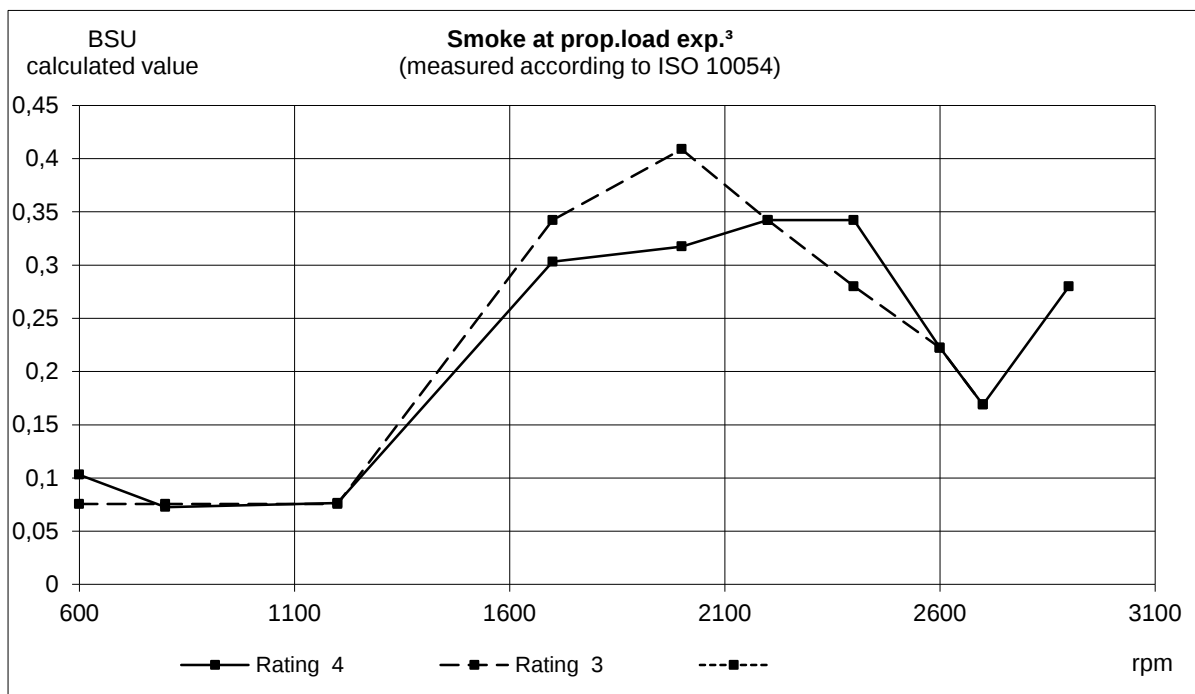
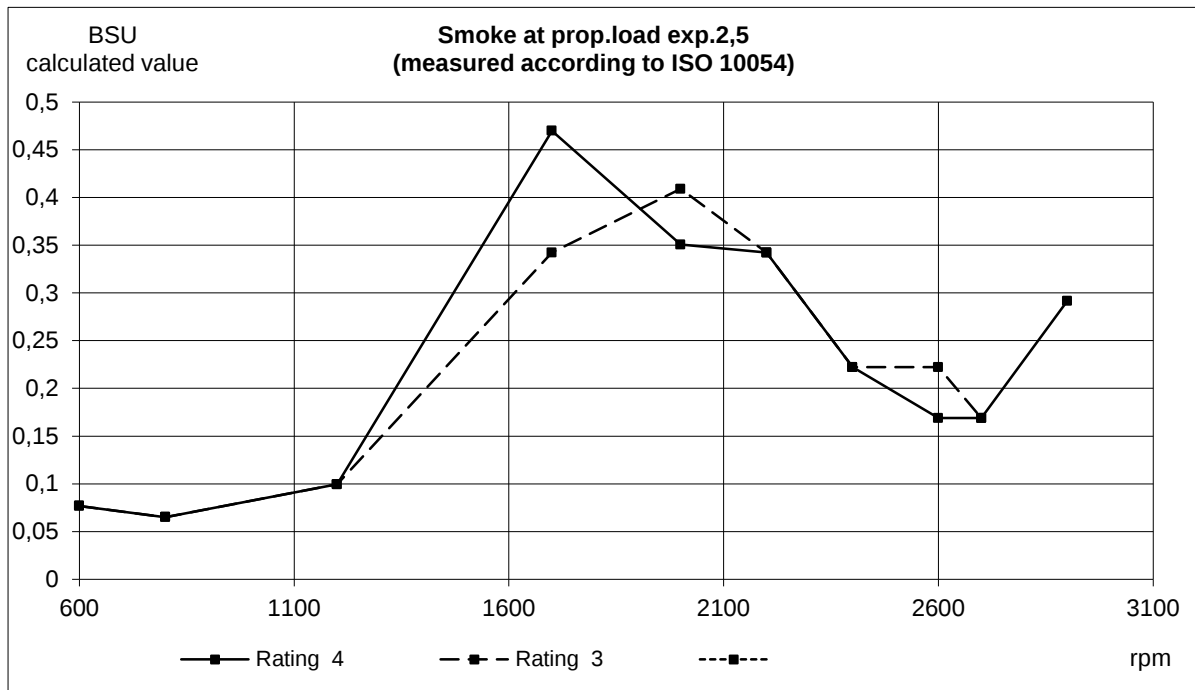
The above forces and torque are to be used as the base for maximum load in normal operations. Volvo Penta requires however that the detailed guidelines for the structure around the IPS unit are followed in order to ensure structural strength in case of grounding.

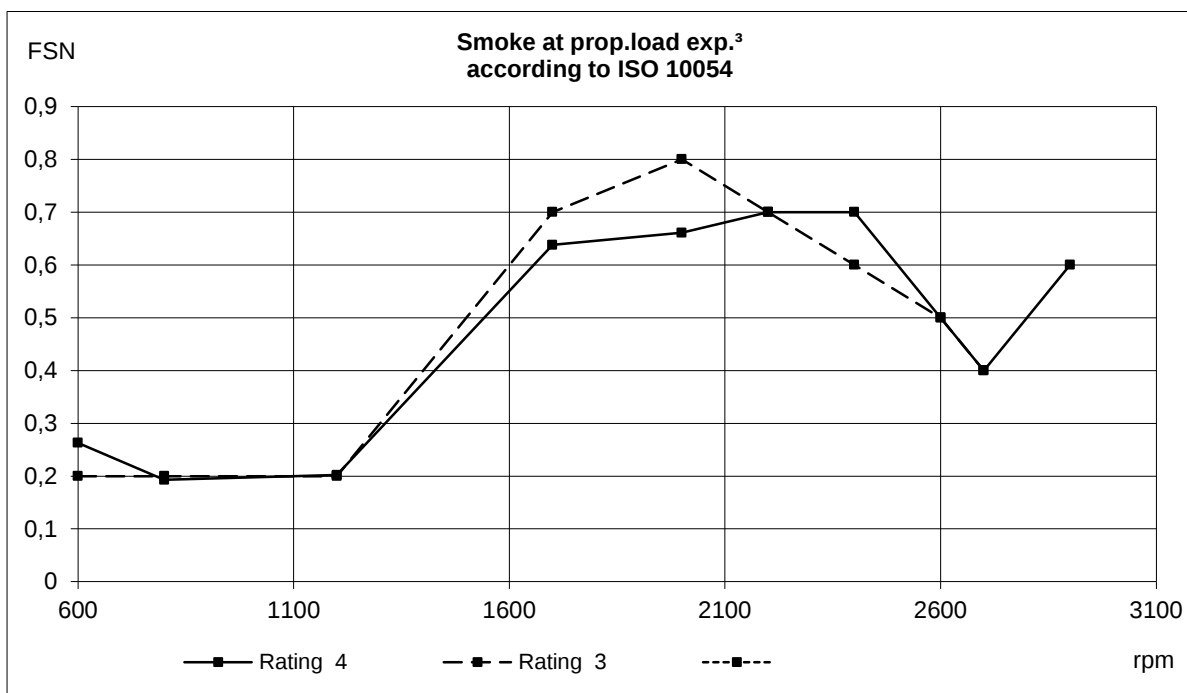
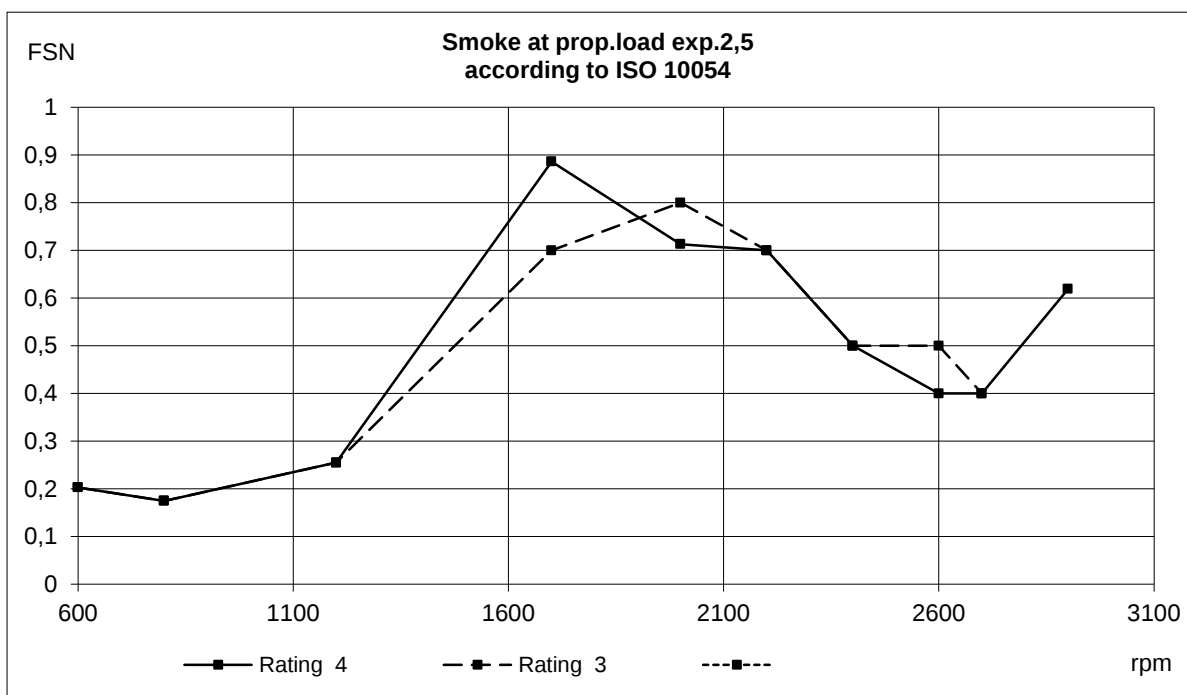


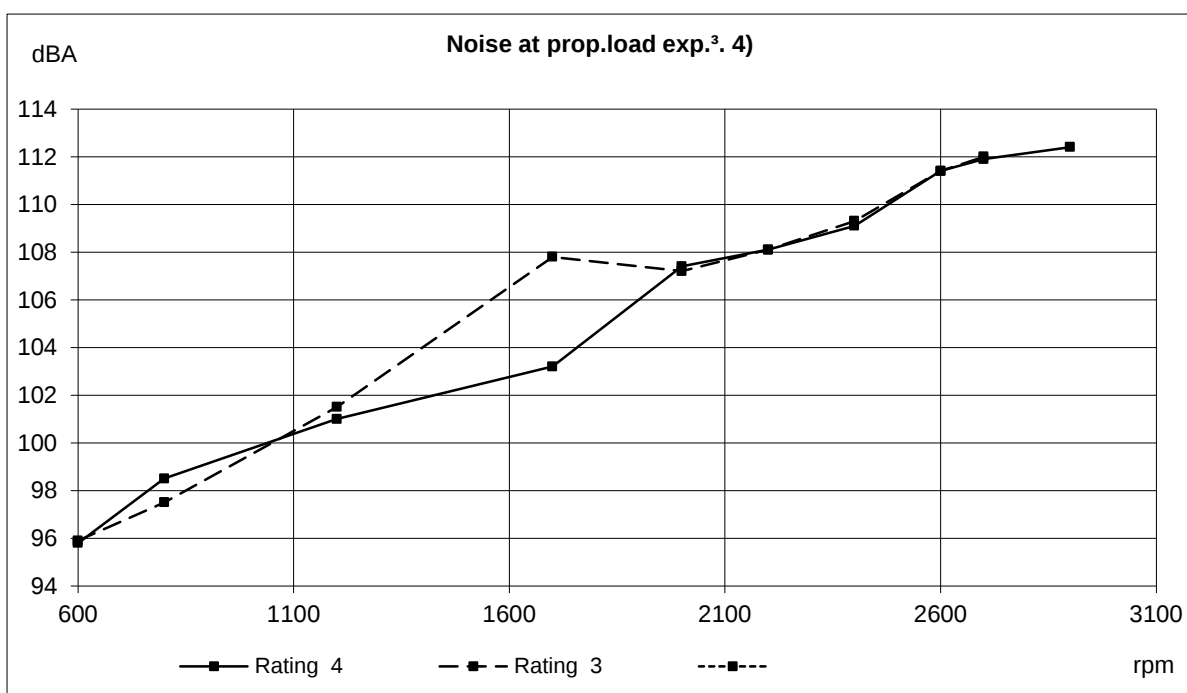
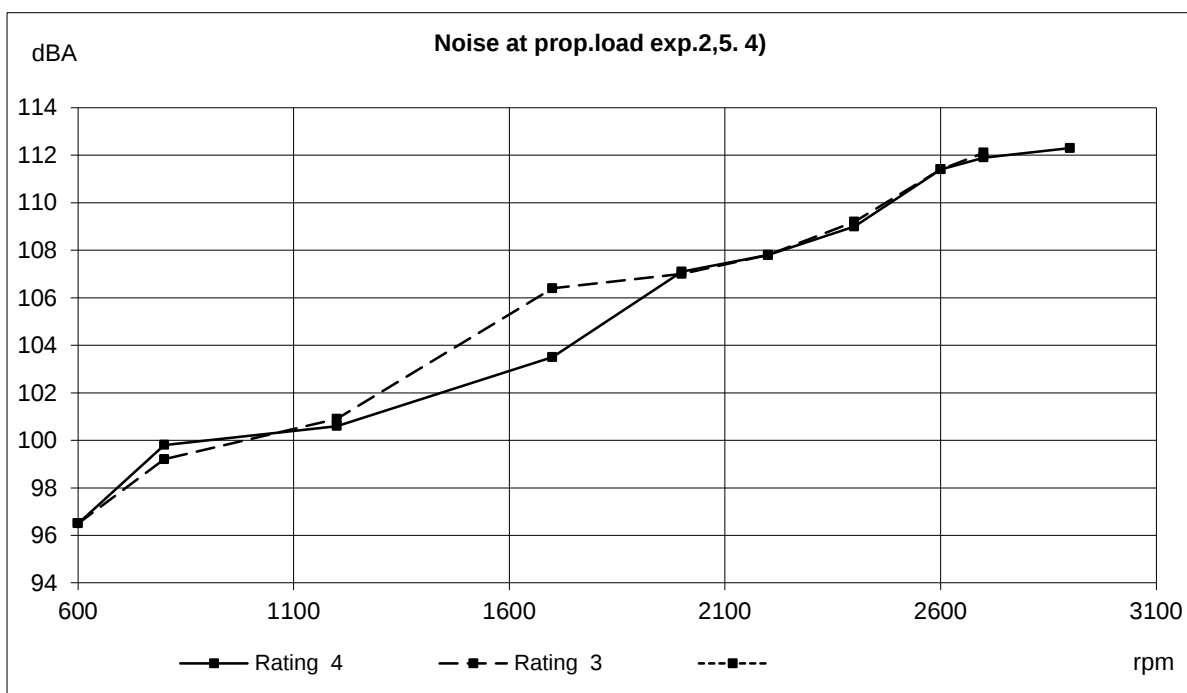






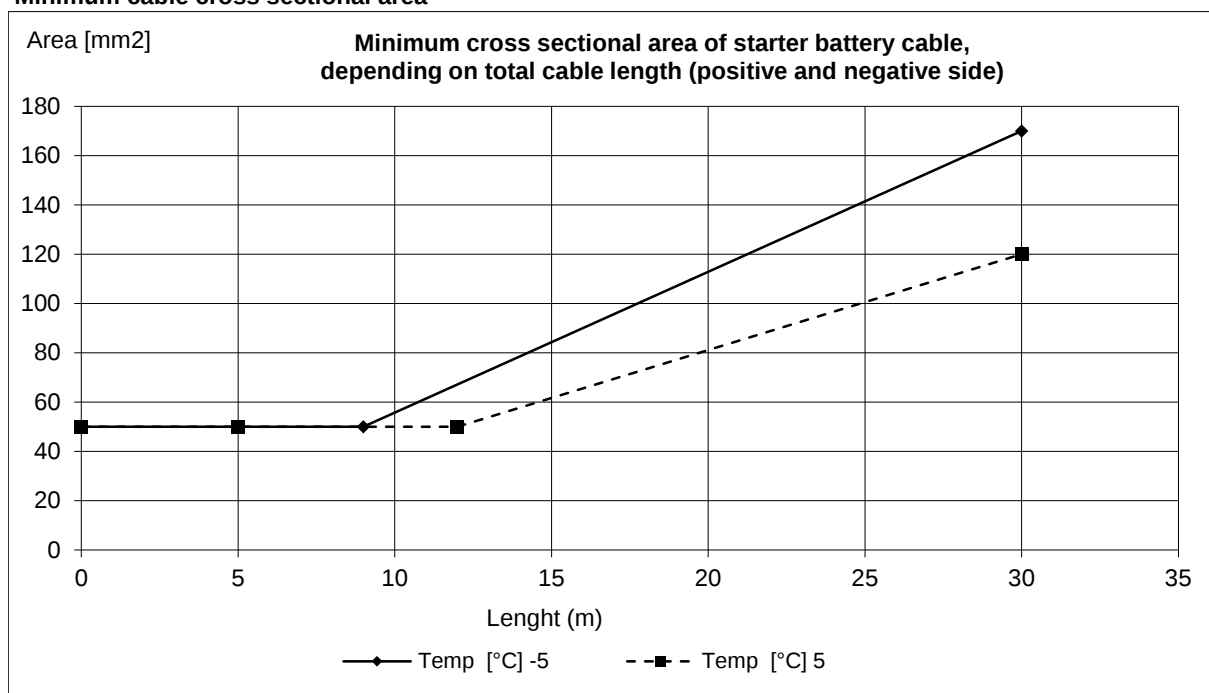






Battery capacity

Temp	Min battery size	CCA EN (Cold cranking Amps)	Max line resistance @ 20°C	Recommended max cable resistance @ 20°C	Min cross sectional area (due to heat increase)
[°C]	[Ah]	[A]	[mΩ]	[mΩ]	[mm²]
5	90	670 EN	5	4	50
-5	100	720 EN	4	3	50

Minimum cable cross sectional area**Fuses size:**

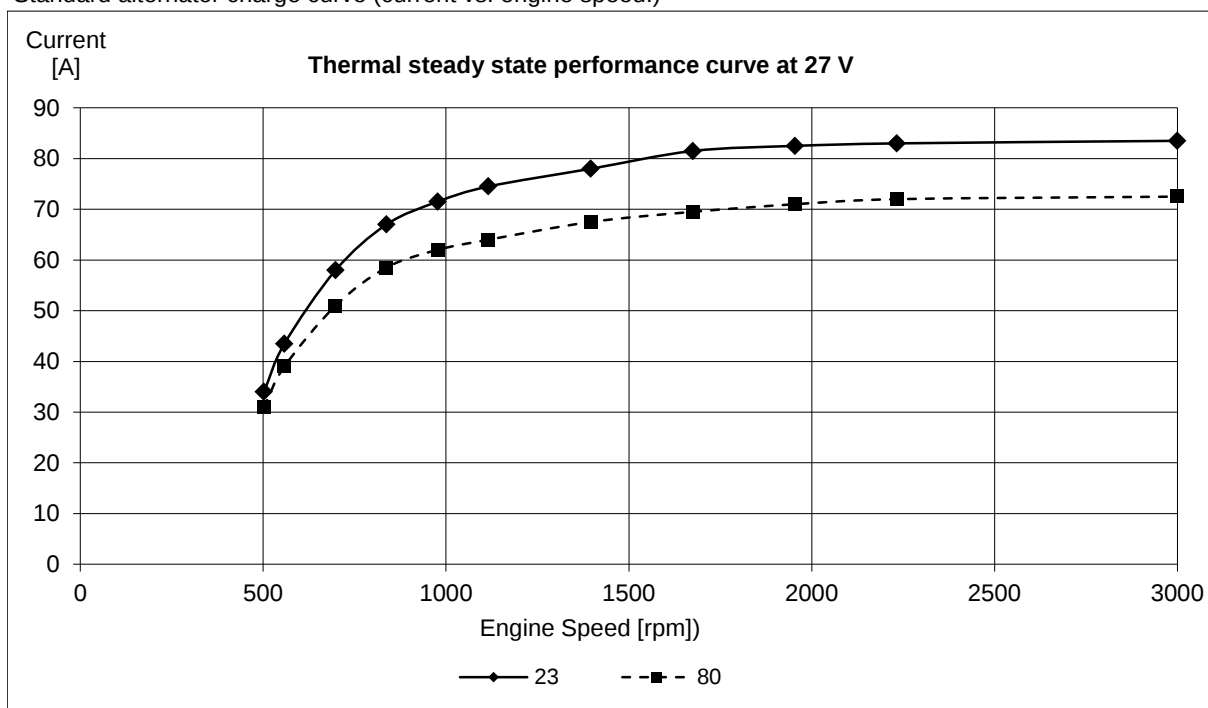
	[A]
Engine:	10
Control system:	10

Max current consumption during normal operation:

	[A]
Engine :	4,5

Alternator data:

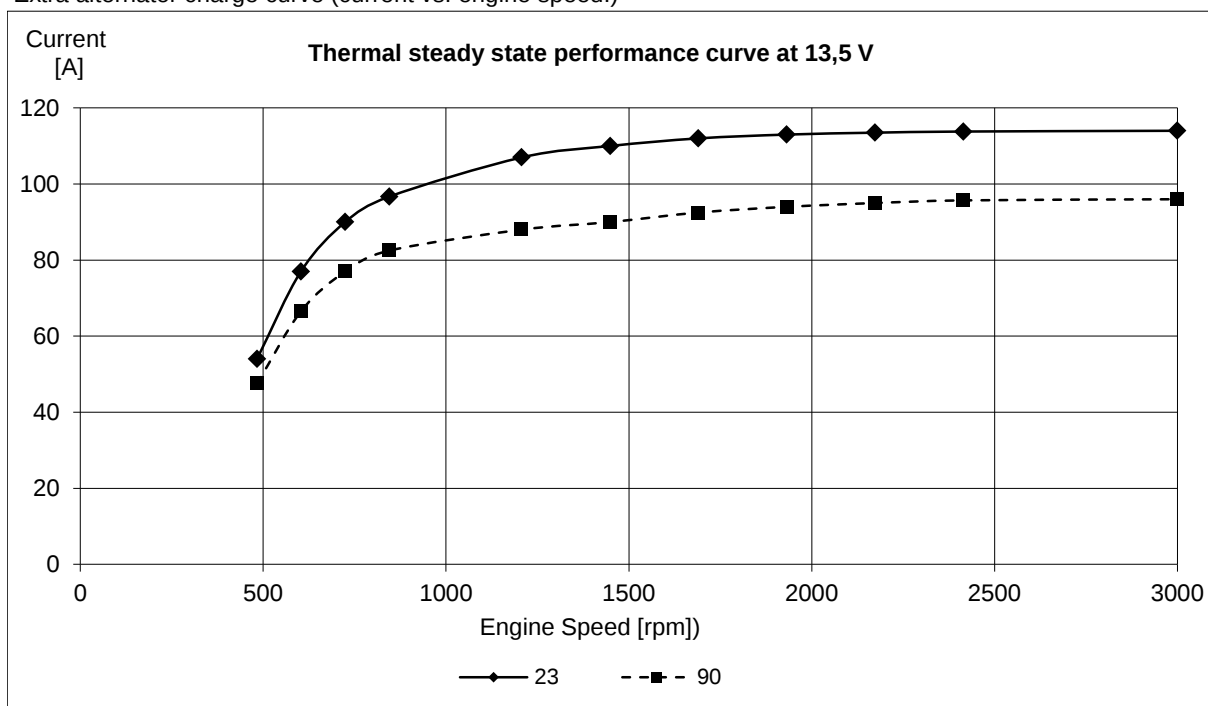
Standard alternator charge curve (current vs. engine speed.)



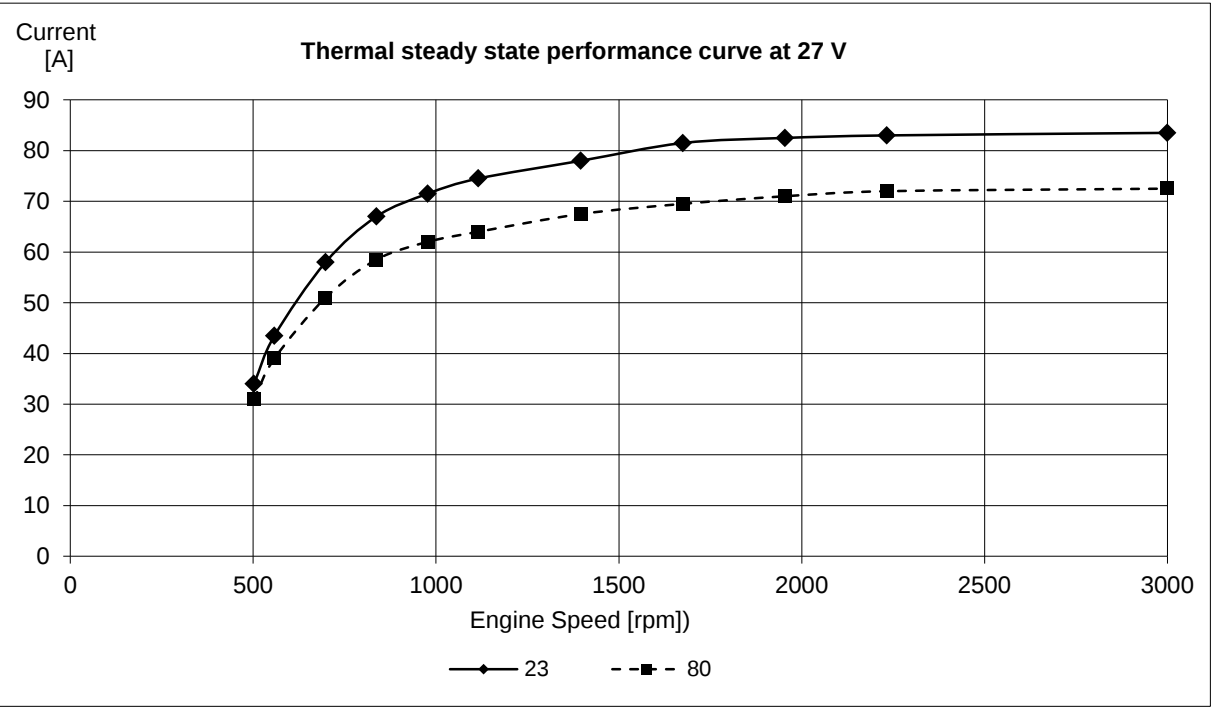
Constant charge voltage: [V]	28,3	+/- 0,3
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Alternator data:

Extra alternator charge curve (current vs. engine speed.)



Constant charge voltage: [V]	14,3	+/- 0,3
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Constant charge voltage: [V]	28,3	+/- 0,3
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