

General

4-stroke direct injected, turbocharged and aftercooled diesel engine

Number of cylinders		6
No of valves		24
Displacement, total	litres in ³	12,78 779,7
Firing order		1-5-3-6-2-4
Rotational direction, viewed from the front		Clockwise
Bore	mm in	131 5,16
Stroke	mm in	158 6,22
Compression ratio		18,5
Compression pressure at 240 rpm	MPa psi	3,5 508
Max. static forward inclination:	°	0
Max. static backward inclination:	°	10
Max. intermittent forward inclination while running:	°	35
Max. intermittent backward inclination while running:	°	35
Max. intermittent side inclination while running:	°	35
Idling speed	rpm	550-800
Rated speed R1	rpm	1800
Propeller selection range R1	rpm	1770-1870
Dry weight engine BT	kg lb	HE=1520, KC=1480 HE=3351, KC=3263

Performance	Rating	rpm	600	800	1000	1200	1400	1500	1600	1700	1800
Crankshaft power 1), 5)	1	kW	81	161	218	260	303	324	331	331	331
		hp	111	218	297	354	412	441	450	450	450
Propeller shaft power 1) (At full load) With drive Twin Disc 5114	1	kW	78	154	210	250	291	311	317	318	318
		hp	106	210	285	340	395	423	432	432	432
Propellershaft power at prop. load x ^{2.5} With drive Twin Disc 5114	1	kW	21	42	73	116	170	202	237	276	317
		hp	28	57	100	157	231	275	322	375	431
Propellershaft power at prop. load x ³ With drive Twin Disc 5114	1	kW	12	28	55	95	150	184	223	268	317
		hp	16	38	75	129	204	251	304	365	432
Torque at crankshaft 2)	1	Nm	1296	1916	2084	2070	2064	2063	1973	1860	1757
		lbf ft	956	1413	1537	1527	1522	1521	1455	1372	1296
Mean piston speed	1	m/s	3,2	4,2	5,3	6,3	7,4	7,9	8,4	9,0	9,5
		ft/s	10,4	13,8	17,3	20,7	24,2	25,9	27,6	29,4	31,1
Effective mean pressure 2)	1	MPa	1,27	1,88	2,05	2,04	2,03	2,03	1,94	1,83	1,73
		psi	184,8	273,3	297,2	295,2	294,4	294,2	281,5	265,4	250,6
Max combustion pressure 2)	1	MPa	14,9	15,5	17,1	16,7	17,2	18,1	18,1	16,3	15,1
		psi	2161	2248	2480	2422	2495	2625	2625	2364	2190

Lubricating system

Specific lubricating oil consumption.	g/kWh	0,06
Max. oil volume including filters for all allowed installation inclinations:	litres	49
	US gal	12,94
Max. oil volume excluding filters for all allowed installation inclinations:	litres	44
	US gal	11,62
Min. oil volume excluding filters for all allowed installation inclinations:	litres	35
	US gal	9,25

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	600	800	1000	1200	1400	1500	1600	1700	1800
Specific fuel consumption att full load	1	g/kWh lb/hph	247,4 0,401	218,7 0,354	194,4 0,315	188,8 0,306	188,9 0,306	188,8 0,306	190,3 0,308	194,5 0,315	198,2 0,321
Fuel consumption at prop. load x ^{2,5}	1	l/h US gal/h	6,0 1,6	11,0 2,9	19,0 5,0	29,0 7,7	41,0 10,8	49,0 12,9	57,0 15,1	68,0 18,0	79,0 20,9
Fuel consumption at prop. load x ³	1	l/h US gal/h	4,0 1,1	8,0 2,1	15,0 4,0	24,0 6,3	37,0 9,8	45,0 11,9	54,0 14,3	66,0 17,4	79,0 20,9
Fuel consumption at full load	1	l/h US gal/h	24,1 6,4	42,0 11,1	50,8 13,4	58,8 15,5	68,4 18,1	73,2 19,3	75,3 19,9	77,1 20,4	78,5 20,8

Intake and exhaust system	Rating	rpm	600	800	1000	1200	1400	1500	1600	1700	1800	
Specific exhaust heating effect in percent of crankshaft power	1	%	54,4	50,0	54,9	63,2	68,9	71,4	75,2	71,9	73,9	
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	1	°C °F	488 910	554 1029	472 882	404 759	375 707	364 687	358 676	388 730	393 739	
Exhaust back pressure after turbocharger at rated speed during test.		kPa psi										12 1,7
Permitted exhaust back pressure after turbocharger. (Installed back pressure)		kPa psi										Max 17 2,5
		kPa psi										Min 0 0,0
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPa	1	m ³ /min cu.ft./min	4,6 162,4	8,2 289,6	12,3 434,4	17,2 607,4	21,9 773,4	24,4 861,7	25,8 911,1	25,3 893,5	26 918,2	
Charge air pressure Inlet manifold	1	kPa psi	37 5,4	87 12,6	123 17,8	162 23,5	195 28,3	207 30,0	207 30,0	187 27,1	181 26,3	
Exhaust gas flow	1	m ³ /min cu.ft./min	12,2 430,8	21,7 766,3	31,8 1123	43,9 1550	55,6 1963	61,9 2186	65,3 2306	64,3 2271	65,9 2327	

Cooling system	Rating	rpm	600	800	1000	1200	1400	1500	1600	1700	1800	
Radiated heat (per engine)	1	kW	4	4	5	5	6	6	6	6	7	
Heat rejection to charge air coolers	1	kW	3	12	23	38	56	65	70	64	64	
Coolant heat rejection to HE, incl. engine oil cooler and excl. charge air coolers.	1	kW	113	169	150	127	120	115	112	138	145	
Coolant flow with fully open thermostat and std cooling system		l/min cu.ft./min	120 4,2	192 6,8	246 8,7	306 10,8	360 12,7	384 13,6	408 14,4	420 14,8	450 15,9	
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.										51 13,47
Max. additional coolant for cabin heater etc. with std. Expansion tank		litres US gal.										15 3,96
Maximum coolant flow to cabin heater etc.		l/min cu.ft./min										42 1,48
Thermostat, start open at		°C °F										82 180
Thermostat, fully open at		°C °F										92 198

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ISO 8665 (=SAE J 1228=ICOMIA 28-83)
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Raw water circuit	rpm	600	800	1000	1200	1400	1500	1600	1700	1800
Nominal raw water design flow	l/min	161	216	273	320	368	392	414	436	456
	cu.ft./min	5,7	7,6	9,6	11,3	13,0	13,8	14,6	15,4	16,1
Nominal raw water pump pressure head at design flow. (measured before and after pump)	kPa	19	30	49	66	84	95	107	119	131
	psi	2,8	4,4	7,1	9,6	12,2	13,8	15,5	17,3	19,0
Maximum raw water pump suction head	kPa	-30								
	psi	-4,4								
Maximum raw water temperature entering heat exchanger	°C	32								
	°F	90								

2 circuit keel cooling system, LT	Rating	rpm	600	800	1000	1200	1400	1500	1600	1700	1800
Maximum temperature to charge air cooler from external LT-cooling system	1	°C									43
		°F									109
Coolant flow through keel cooler, LT-cooling system circuit	1	l/min	33	45	58	70	81	85	90	93	96
		cu.ft./min	1,2	1,6	2,0	2,5	2,9	3,0	3,2	3,3	3,4
Pressure drop in external LT-cooling system circuit, including piping		kPa	85								
		psi	12,3								
Coolant volume charge air cooler		litres	5								
		US gal.	1,32								

2 circuit keel cooling system, HT	Rating	rpm	600	800	1000	1200	1400	1500	1600	1700	1800
Design point for keel cooler, engine outlet temperature	1	°C									89
		°F									192
Maximum temperature to engine from external HT-cooling system circuit	1	°C									70
		°F									158
Coolant flow through keel cooler, HT-cooling system circuit at design point	1	l/min									145
		cu.ft./min									5,1
Maximum coolant flow through keel cooler, HT-cooling system circuit	1	l/min									216
		cu.ft./min									7,6
Pressure drop in external HT-cooling system circuit, including piping		kPa	85								
		psi	12,3								
Coolant volume engine, excl. heat exchangers		litres	28								
		US gal.	7,40								

Emissions	Rating	rpm	600	800	1000	1200	1400	1500	1600	1700	1800
Smoke at prop. load x ^{2.5}	1	*BSU	0,06	0,07	0,32	0,21	0,14	0,17	0,09	0,14	0,13
Smoke at prop. load x ³	1	*BSU	0,09	0,08	0,17	0,19	0,15	0,17	0,12	0,15	0,15
Noise at prop. load x ³ . 4)	1	dBA	99,7	102	103,9	107,9	109,3	110,1	111	112,2	112,9

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

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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

Sensors : Control and Monitoring System							Engine protection action
Sensors	Signal	Range	Unit	Warning Initial Delay / Warning Delay	Warning Level	Derating Level	
AUS/DEF concentration			%	N/A	28	N/A	Warning only
AUS/DEF Tank Empty			%	30 sec	0	N/A	Warning only
AUS/DEF Tank Low level			%	30 sec	15	N/A	Warning only
AUS/DEF tank temp High alarm			°C	1 sec	70	N/A	Warning only
Coolant level switch	Digital	ON/OFF		30 sec from start / 11 sec	Low (ON / Closed)	N/A	Warning only
Coolant temperature	50-0 kΩ	-40 - 140 ±1.5°C	°C	30 sec from start / 2 sec	98	101	See derating map
Engine speed cam	Frequency		rpm	Instant	Lost signal	N/A	Warning only
Engine speed crank	Frequency		rpm	Instant	Lost signal	N/A	Warning only
Exhaust gas temperature	PT200	-40 - 750 ± 2.5%	°C	30 sec from start / 2 sec	542	550	See derating map
Oil level sensor	Digital	± 1.9 mm		30 sec from start / 5 sec	Low level	N/A	Warning only
Oil temperature	50-0 kΩ	-40 - 140 ± 1.5°C	°C	30 sec from start/1.5 sec	125	130	See derating map
SCR temp	PT200	-40 - 750 ± 2.5%	°C	30 sec from start / 2 sec	532	540	Engine derate
Water In fuel switch	Digital	ON/OFF		Instant	Water in fuel	N/A	Warning only
Wet Exhaust temp	PT200	0 - 850	°C	30 sec from start / 5 sec	192	200	See derating map

Sensors (rpm dependent)	Signal	Range	Unit	Initial Delay / Delay	Warning Level / Derating Level / Shutdown Level rpm Map					Comment
					600 rpm	1000 rpm	1200 rpm	1500 rpm	1800 rpm	
Charge air pressure	0,5-4,5 V	50-600 ±4.2 kPa	kPa		600 rpm	1000 rpm	1200 rpm	1500 rpm	1800 rpm	<i>From prop curve 2.5 with IPS drive</i>
Warning Level			kPa	30 sec from start / 2.2sec	280	280	280	270	275	
Derating Level			kPa	10% trq. decr. per sec	290	290	290	280	285	
Charge air temperature	50-0 kΩ	-40 - 130 ±4%	°C		600 rpm	1000 rpm	1200 rpm	1500 rpm	1800 rpm	
Warning Level			°C	60 sec from start / 15 sec	80	80	80	80	76	
Derating Level			°C		85	85	85	85	81	See derating map
Coolant pressure	0,5-4,5 V	0-300 ± 3%	kPa		600 rpm	1000 rpm	1200 rpm	1500 rpm	1800 rpm	
Warning Level			kPa	30 sec from start /1.5sec	0	25	35	50	76	
Derating Level			kPa	10% trq. decr. per sec	-5	20	30	45	71	
Fuel pressure	0,5-4,5 V	0-700 ±2.5%	kPa		600 rpm	1000 rpm	1200 rpm	1500 rpm	1800 rpm	
Warning Level			kPa	60 sec from start / 5 sec	80	80	80	205	280	
Derating Level			kPa	NA	NA	NA	NA	NA	NA	
Oil pressure	0,5-4,5 V	0-700 ±2.5%	kPa		600 rpm	1000 rpm	1200 rpm	1500 rpm	1800 rpm	
Warning Level			kPa	30 sec from start / 3 sec	120	200	224	260	260	
Derating Level			kPa	10% trq. decr. per sec	95	175	199	235	235	
Seawater pressure	0,5-4,5 V	0-300 ± 3%	kPa		600 rpm	1000 rpm	1200 rpm	1500 rpm	1800 rpm	
Warning Level			kPa	30 sec from start /5 sec	-5	10	18	30	45	
Derating Level			kPa	10% trq. decr. per sec	-15	0	8	20	35	

Warning = Yellow Lamp active

Derating = Red Lamp active

Remarks

Charge Air Temp [°C]	rpm	90°C	95°C	105°C
Remaining torque in %	600	100%	100%	100%
	1200	100%	82%	74%
	1800	100%	66%	52%

Coolant temp [°C]	rpm	96°C	103°C	106°C
Remaining torque in %	600	100%	100%	100%
	1200	100%	97%	93%
	1800	100%	50%	0%

Exhaust Temp [°C]	rpm	545°C	560°C	575°C	580°C
Remaining torque in %	600	100%	100%	100%	100%
Max 1000 rpm in engine prot map	1200	100%	97%	95%	93%
> 570°C	1800	100%	50%	25%	0%

Oil temp [°C]	rpm	125°C	132°C	134°C
Remaining torque in %	600	100%	100%	100%
	1200	100%	97%	93%
	1800	100%	50%	0%

Wet exhaust temp [°C]	rpm	190°C	200°C	205°C	210°C
Remaining torque in %	600	100%	100%	100%	100%
	1200	100%	96%	93%	89%
	1800	100%	93%	86%	80%

Transmission: Control and Monitoring System						Engine protection action
Sensors	Signal	Range	Unit	Warning Initial Delay / Warning Delay	Warning Level	
Gear oil temperature (EVC)	50-0 kΩ	-30 - 130 ± 4%	°C	N/A	95	Warning only
Gear oil pressure (EVC)	Frequency	0-3000 ±3%	kPa	60 sec from start/7sec	700	Warning only

For SDM only

Sensors Control and Monitoring System						Engine protection action
Sensors	Signal	Range	Unit	Warning Initial Delay / Warning Delay	Shutdown level	
Coolant temperature	Digital	ON/OFF	°C	12sec from start/1 sec	105	Shutdown
Eng. overspeed SDM 1800+15%	Frequency	153 puls./rev	rpm / Hz	Instant	2070 rpm/5278 Hz	Shutdown

Sensors (rpm dependent)	Signal	Range	Unit	Initial Delay / Delay	Warning Level / Derating Level / Shutdown Level rpm Map					Engine protection action
					0 rpm	600 rpm	1000 rpm	1500 rpm	1800 rpm	
Oil pressure	Digital	ON/OFF	kPa	12 sec from start / 1 sec	NA	120 ±20	120 ±20	120 ±20	120 ±20	Shutdown
Gear oil pressure (IPS)	Digital	ON/OFF	kPa	12 sec from start / 1 sec	NA	400 ±20	400 ±20	400 ±20	400 ±20	Shutdown
Gear oil pressure (Reverse gear ZF)	Digital	500-3000	kPa	12 sec from start / 1 sec	NA	2100±20	2100±20	2100±20	2100±20	Shutdown
Gear oil pressure (Reverse gear Other)	Digital	500-3000	kPa	12 sec from start / 1 sec	NA	X±20	X±20	X±20	X±20	Shutdown Level depending on type of gearbox

Technical data - Drive unit

Drive line		IPSxxx
Transmission type		IPSx-y
Gear ratio (total)		1,xx:1 and 1,xx:1
Steering angle, max.		+/- xx
Total weight of drive unit (1)	kg	xxx
Oil capacity, approx.	litres	xx
Oil volume difference MIN-MAX	litres	0,x
Oil type		Volvo Penta API GL5 75W/90
Propeller range		

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

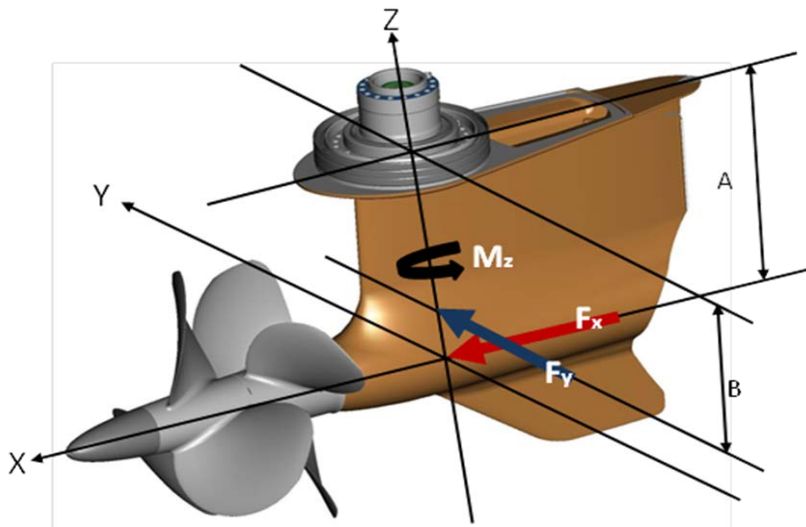
"Generalized maximum load document"for IPS3

Valid products	Drive Unit	Gear Ratio
IPSxxxx	IPSx	1,xx: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	F _x	xx kN
	F _y (+/-)	xx kN
	M _z (+/-)	xx kNm
28-42 kn	F _x	xx kN
	F _y (+/-)	xx kN
	M _z (+/-)	xx kNm

A	xxx mm
B	xxx 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.

Technical data - Exhaust AfterTreatment System data (EATS)**Weight data:**

SCR system weight: (incl SCR unit, AUS injector pipe, AUS sensor and bracket)			kg	115,7
			lb	255,1
Total SCR system weight for IPS: (incl SCR unit, AUS injector pipe, AUS sensor and bracket, exhaust piping)			kg	115,7
			lb	255,1
AUS pump			kg	3,1
			lb	6,8
AUS cabinet 20l weight: (incl tank, pump,UQS, ACM)			kg	36,4
			lb	80,2
AUS tank 160l weight:			kg	45,0
			lb	99,2
UQS - Lenght/Weight	mm	439,0	kg	1,2
	in	17,3	lb	2,6
UQS - Lenght/Weight	mm	597,0	kg	1,2
	in	23,5	lb	2,6
UQS - Lenght/Weight	mm	715,0	kg	1,3
	in	28,1	lb	2,9

Dimension data:

SCR Surface area		m2/ft2	2.2 / 23.7
SCR Flange:	Standard type		
	Diameter:	in/mm	6 / 152
	Number of Inlet / Outlet:	1 inlet / 2 outlet	

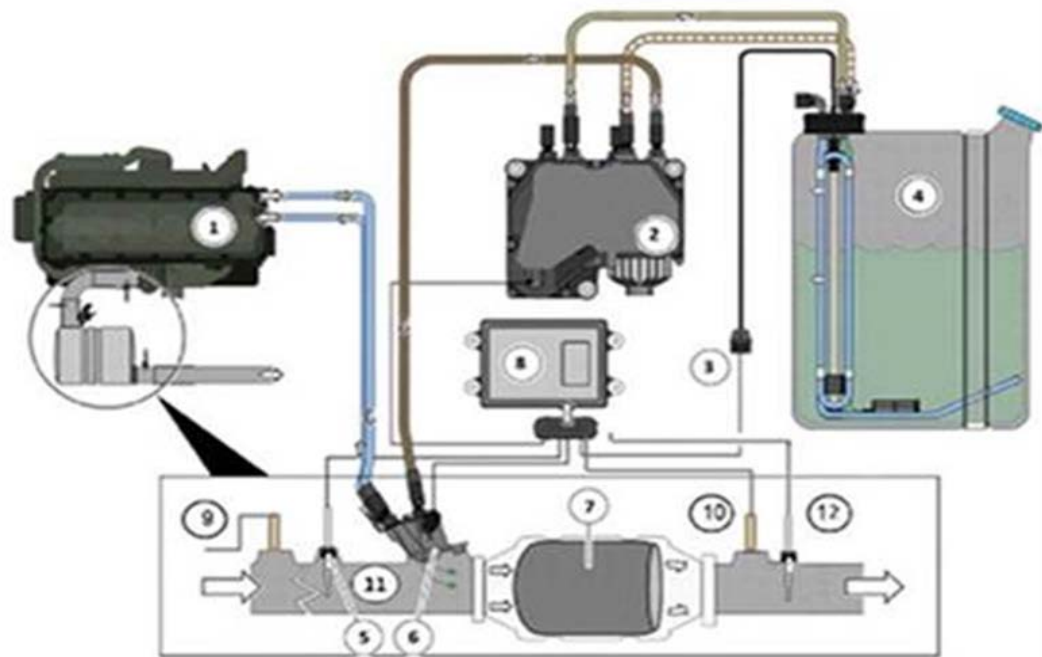
Flow data:

Max AUS flow to injector	l/h	7,9
	US gal/h	2,1
Max collant flow to AUS injector	l/h	6,7
	US gal/h	1,8

Exhaust system	Rating	rpm	600	800	1000	1200	1300	1400	1500	1600	1700	1800
Max allowable temperature drop between turbine and SCR muffler inlet.		°C	10	10	10	10	10	10	10	10	10	10
		°F	50	50	50	50	50	50	50	50	50	50
SCR muffler pressure drop at prop. load x ³		kPa	0	0	1	1	2	2	3	4	4	5
		psi			0,1	0,1	0,3	0,3	0,4	0,6	0,6	0,7
SCR muffler pressure drop at Full load		kPa	1	2	2	3	3	3	4	5	5	5
		psi	0,1	0,3	0,3	0,4	0,4	0,4	0,6	0,7	0,7	0,7

AUS system	Rating	rpm	600	800	1000	1200	1300	1400	1500	1600	1700	1800
Specific AUS consumption		g/kWh	8,44	8,99	14,22	13,43	13,10	12,38	12,96	13,15	12,44	11,65
		lb/hph	0,01	0,01	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
AUS consumption at prop. load $x^{2.5}$		l/h	0,00	0,48	0,76	1,24	1,83	2,26	2,79	3,47	3,85	4,27
		US gal/h		0,13	0,20	0,33	0,48	0,60	0,74	0,92	1,02	1,13
AUS consumption at prop. load x^3		l/h	0,00	0,16	0,45	0,82	1,26	1,84	2,42	3,21	3,67	4,22
		US gal/h		0,04	0,12	0,22	0,33	0,49	0,64	0,85	0,97	1,11
AUS consumption at Full load		l/h	0,75	1,58	3,38	3,81	4,01	4,09	4,58	4,75	4,49	4,20
		US gal/h	0,20	0,42	0,89	1,01	1,06	1,08	1,21	1,25	1,19	1,11

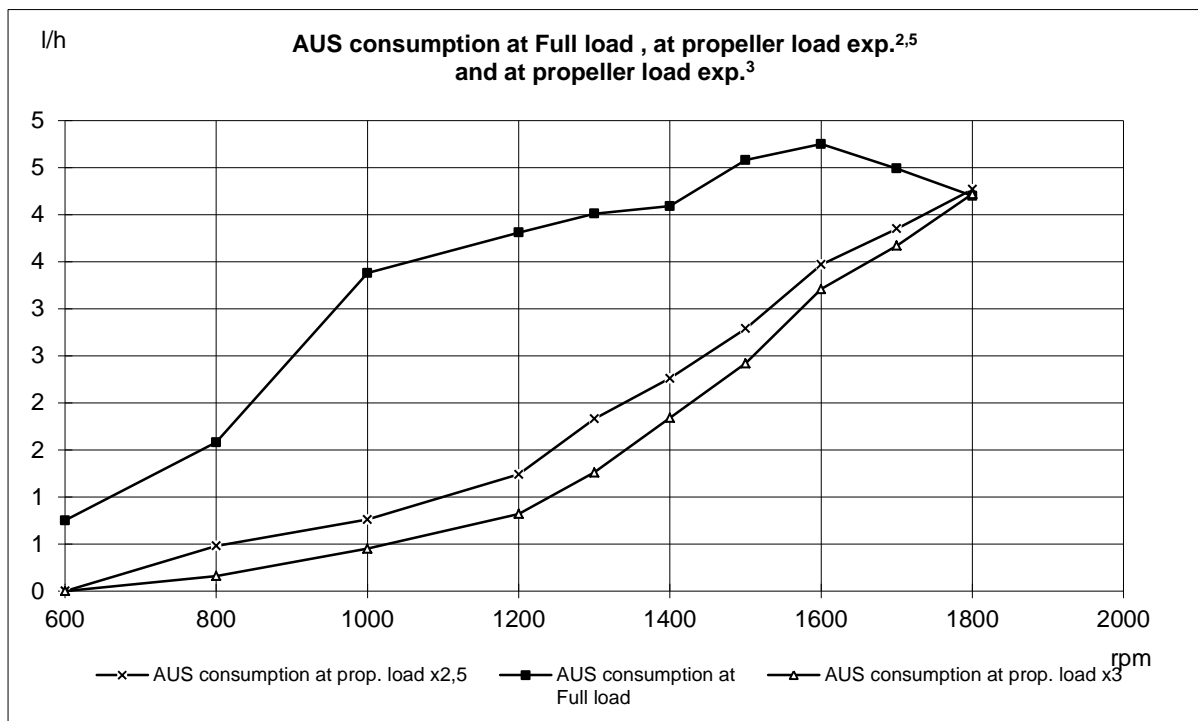
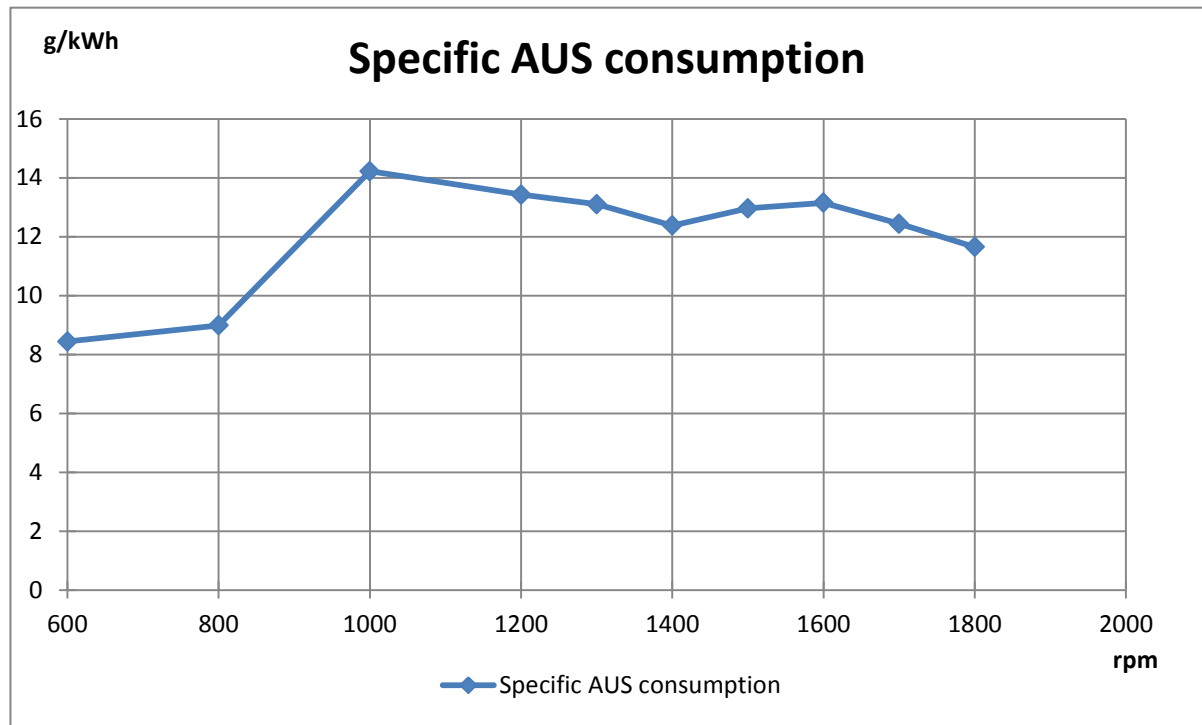
AUS concentration 32.5%

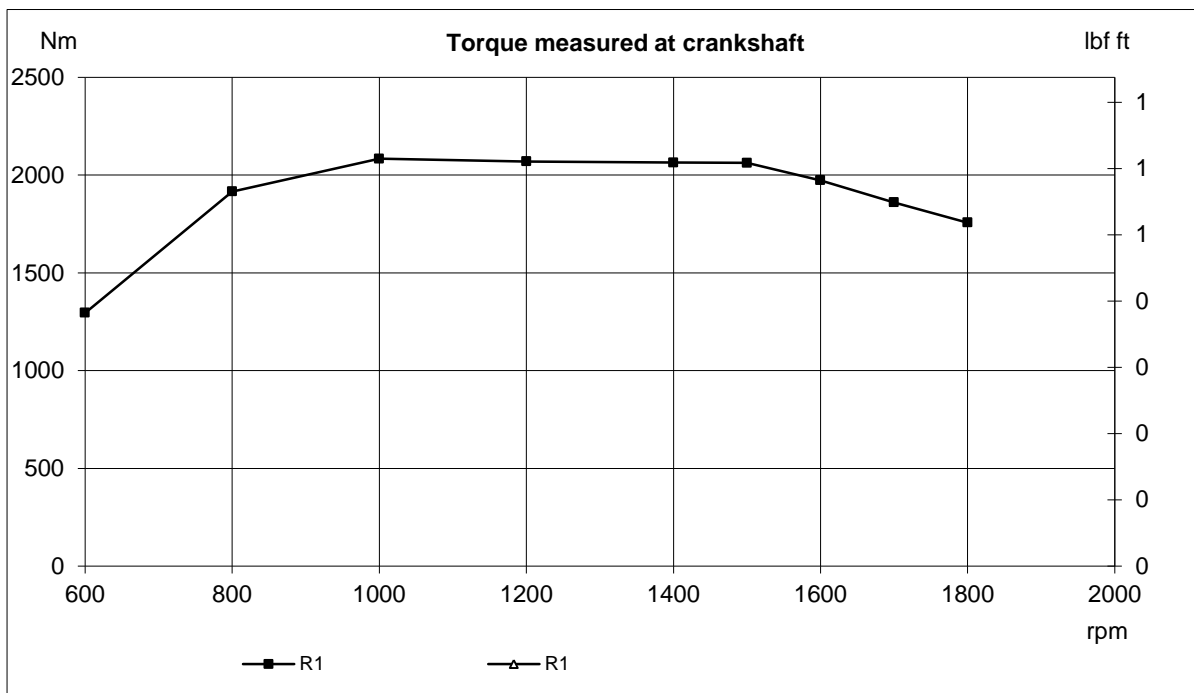
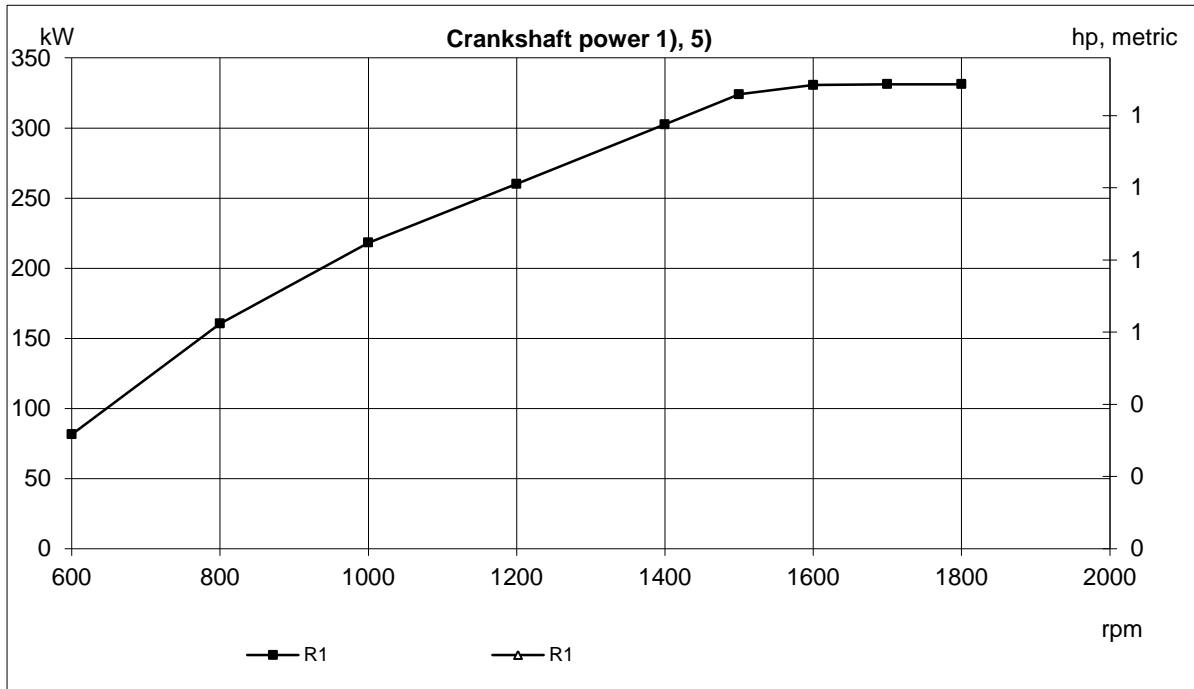


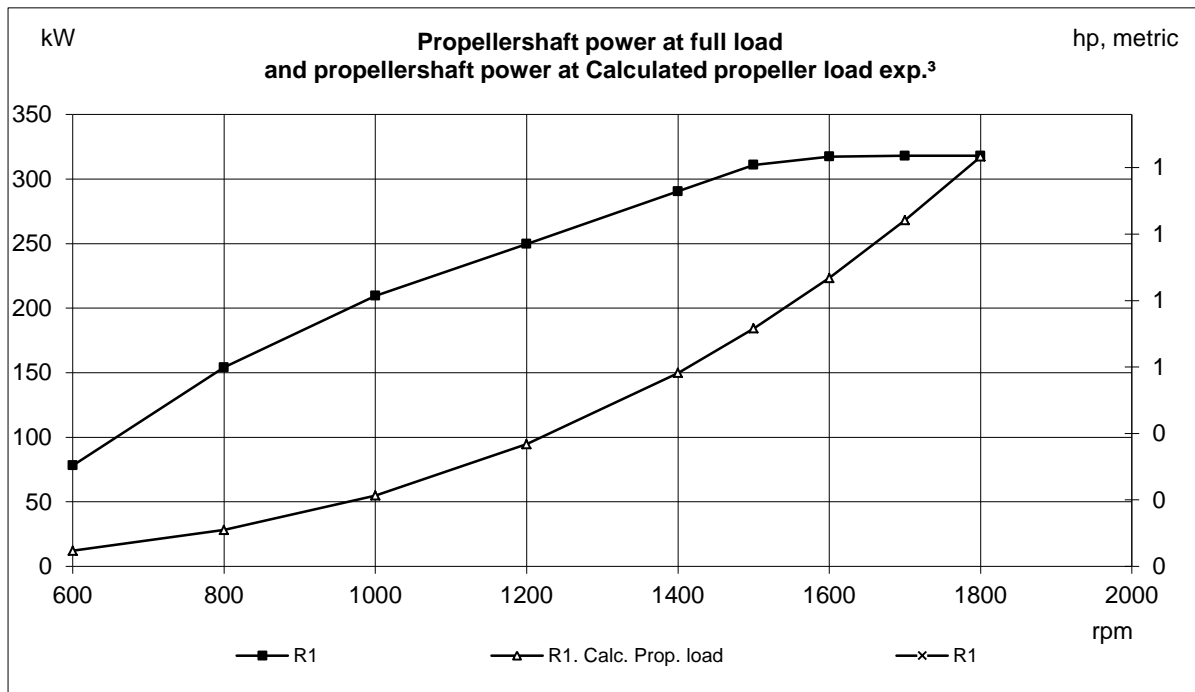
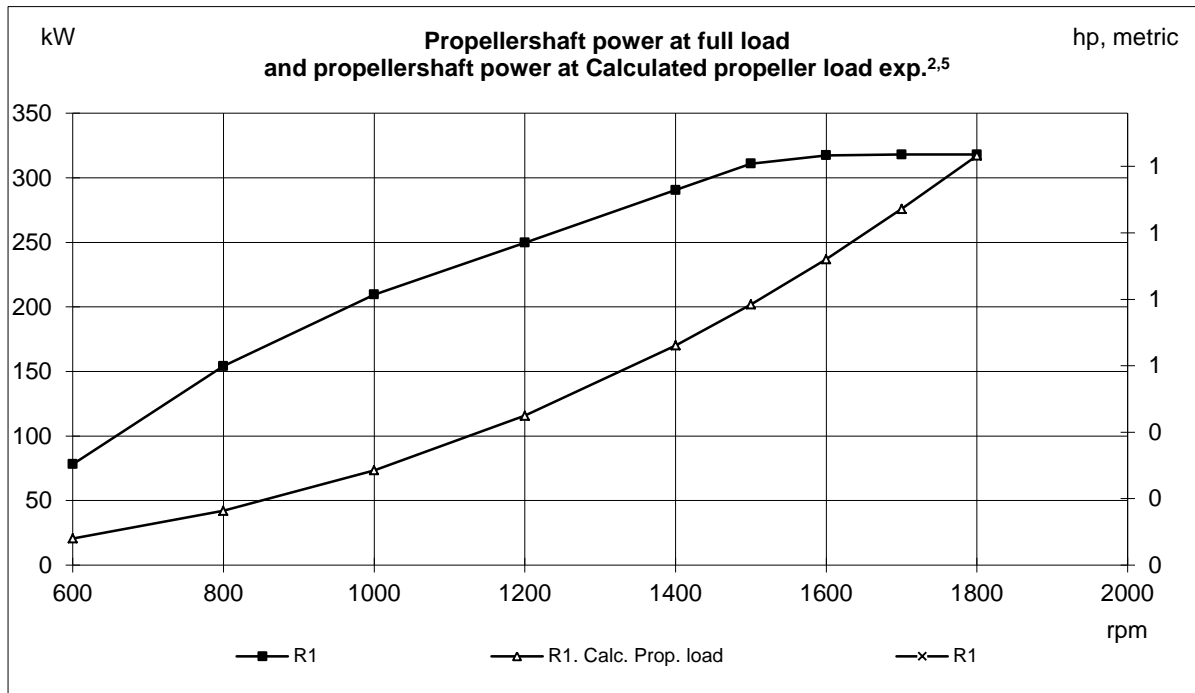
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|-------------------------------------|-------------------------------------|
| 1. Engine | 7. Catalytic converter (SCR) |
| 2. AUS pump | 8. ACM (After Treatment Module) |
| 3. Sensor connector QLT | 9. Front NOx sensor |
| 4. AUS tank with QLT | 10. Rear NOx sensor |
| 5. Front exhaust temperature sensor | 11. Injector pipe |
| 6. AUS injector | 12. Rear exhaust temperature sensor |

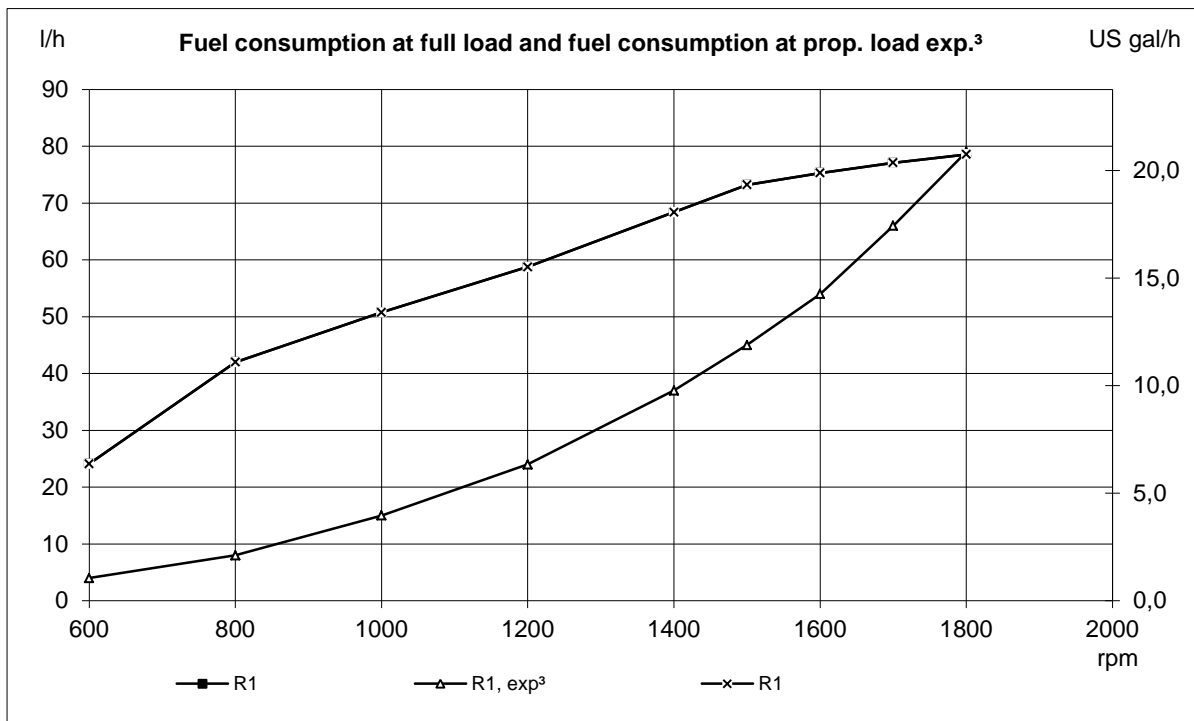
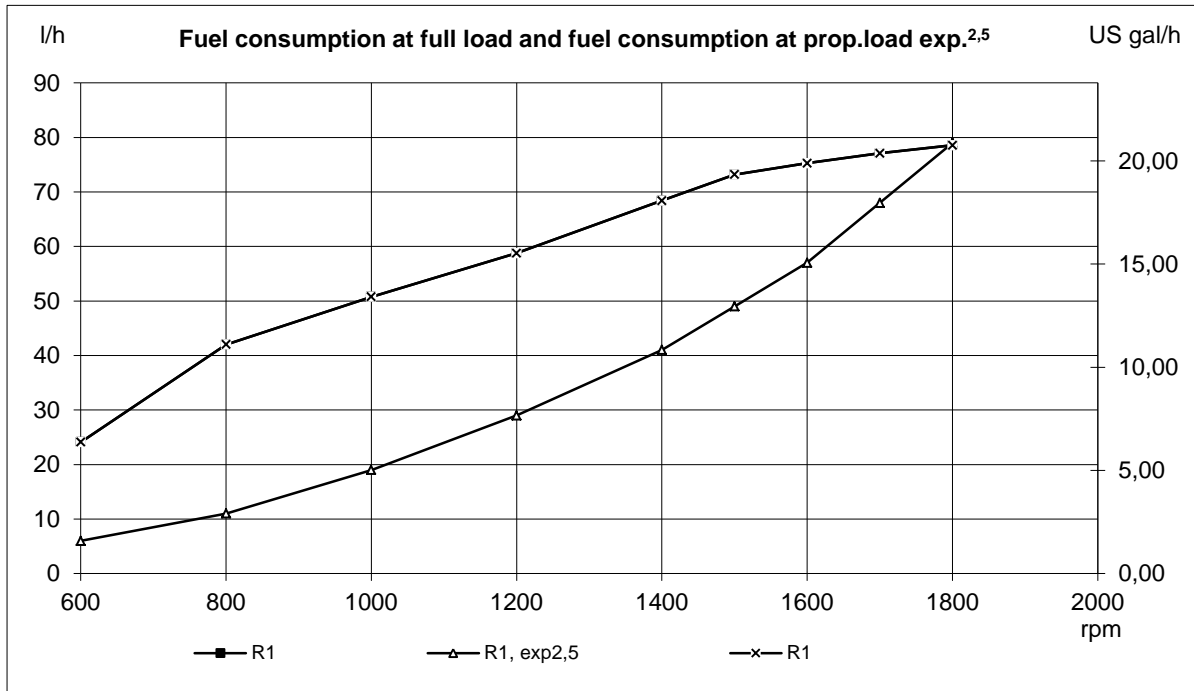
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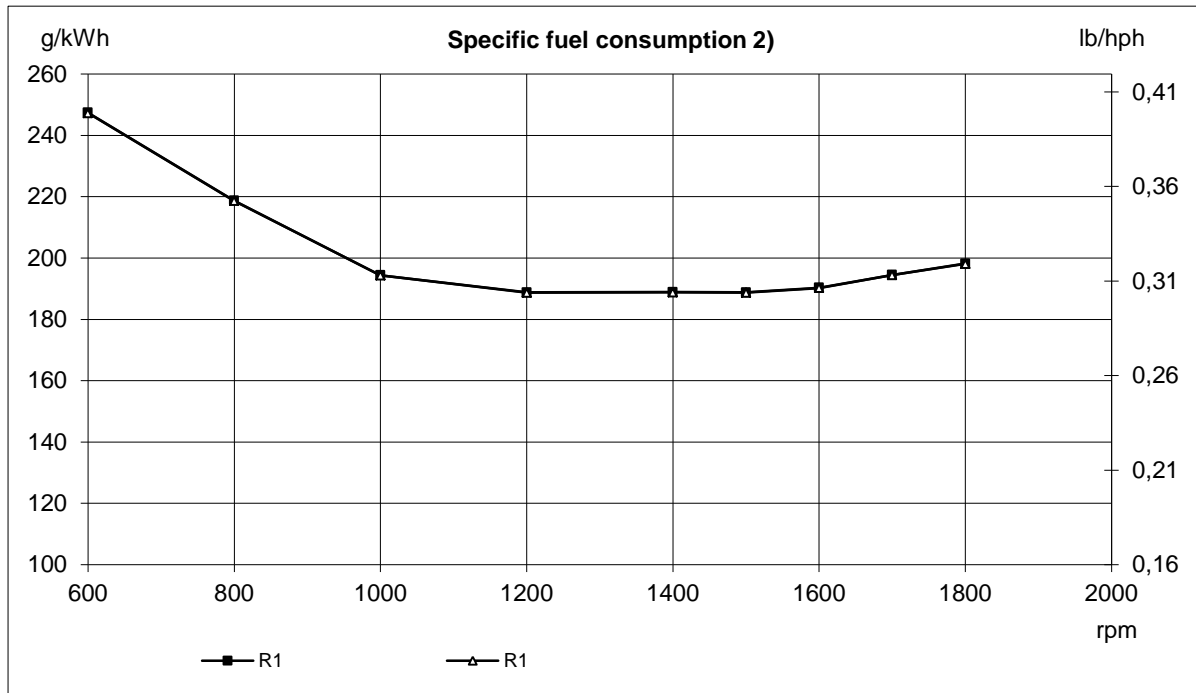
ACM	Aftertreatment Control Module
AUS	Aqueous Urea Solution
EATS	Exhaust Aftertreatment System
SCR	Selective Catalytic Reduction
UDS	Urea Dosing System
UQS	Urea Quality Sensor

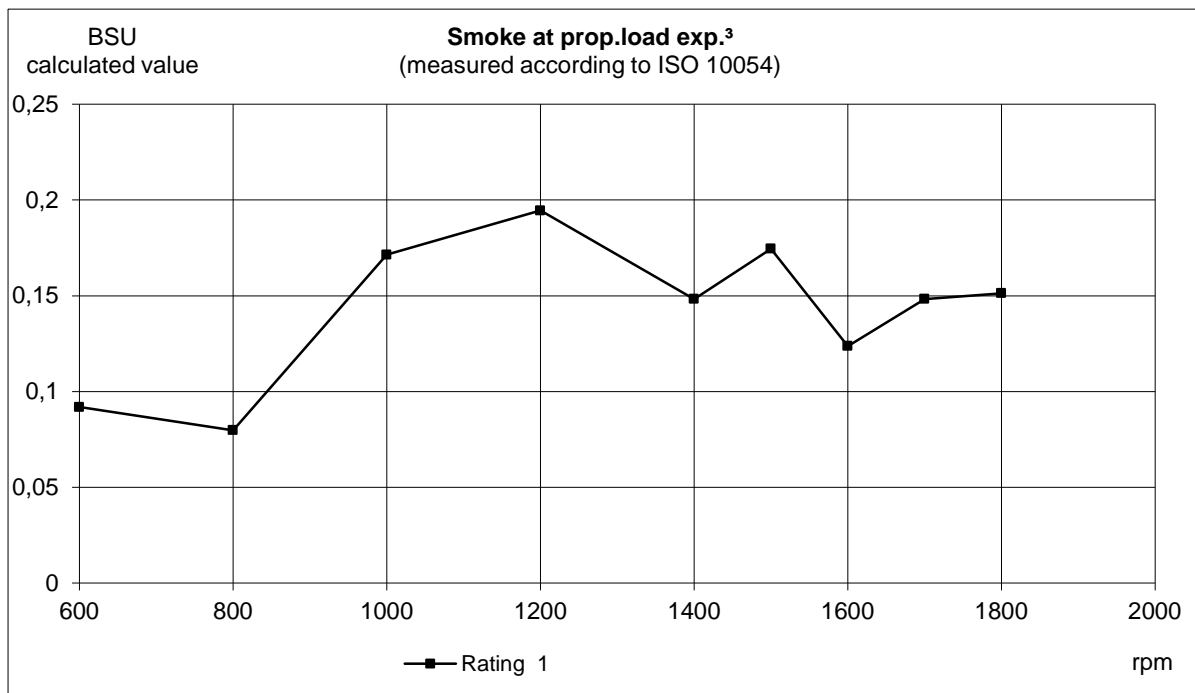
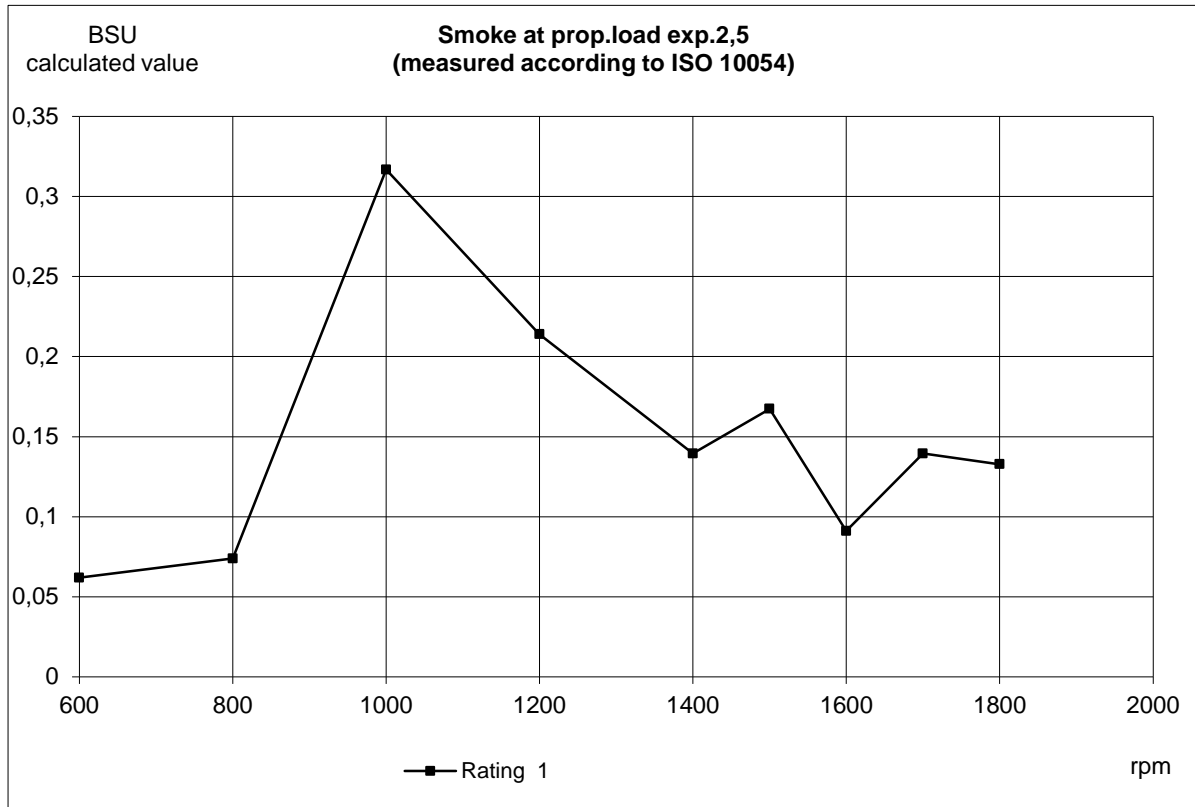


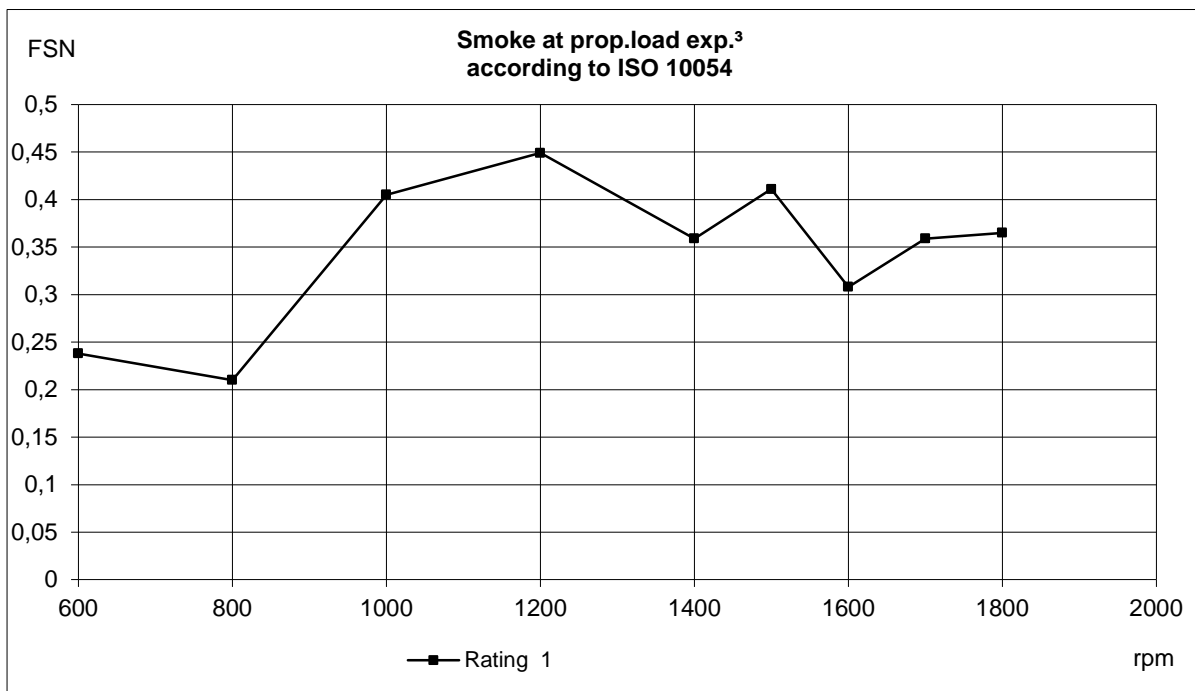
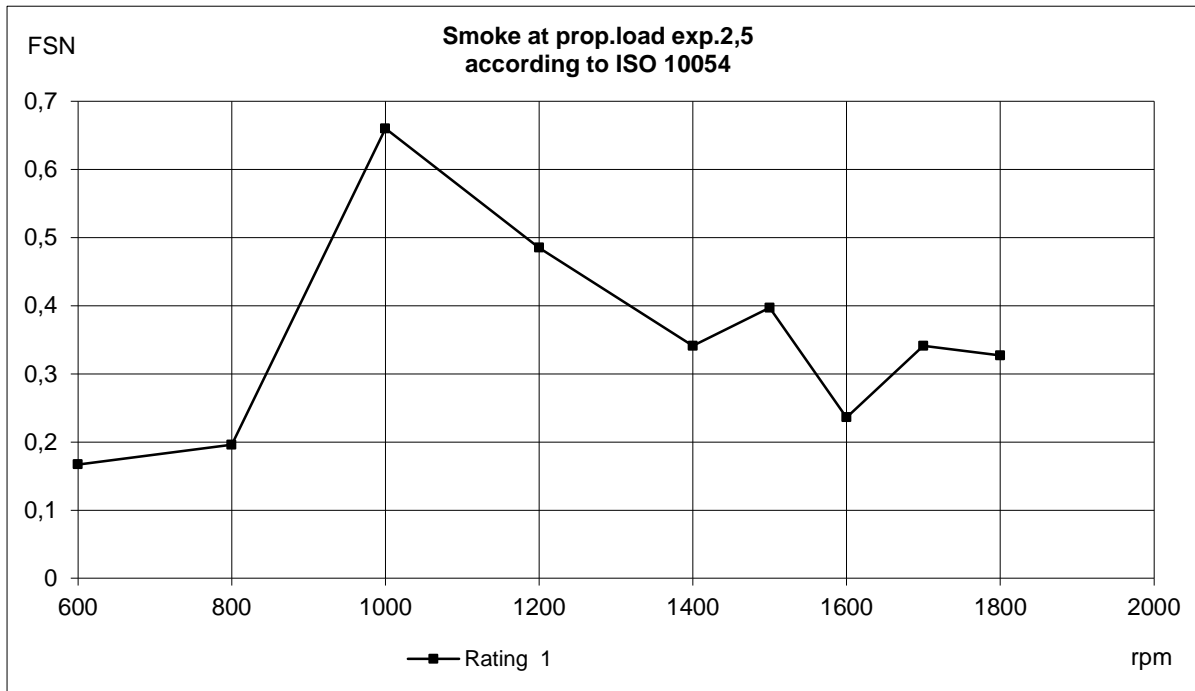


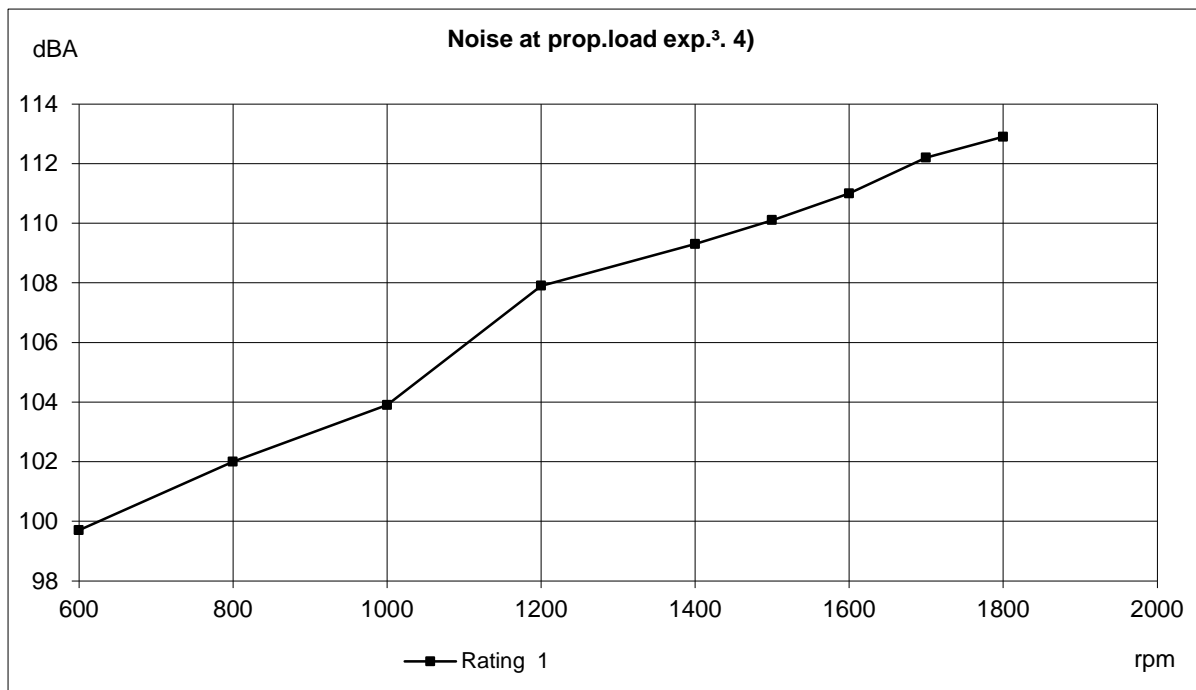
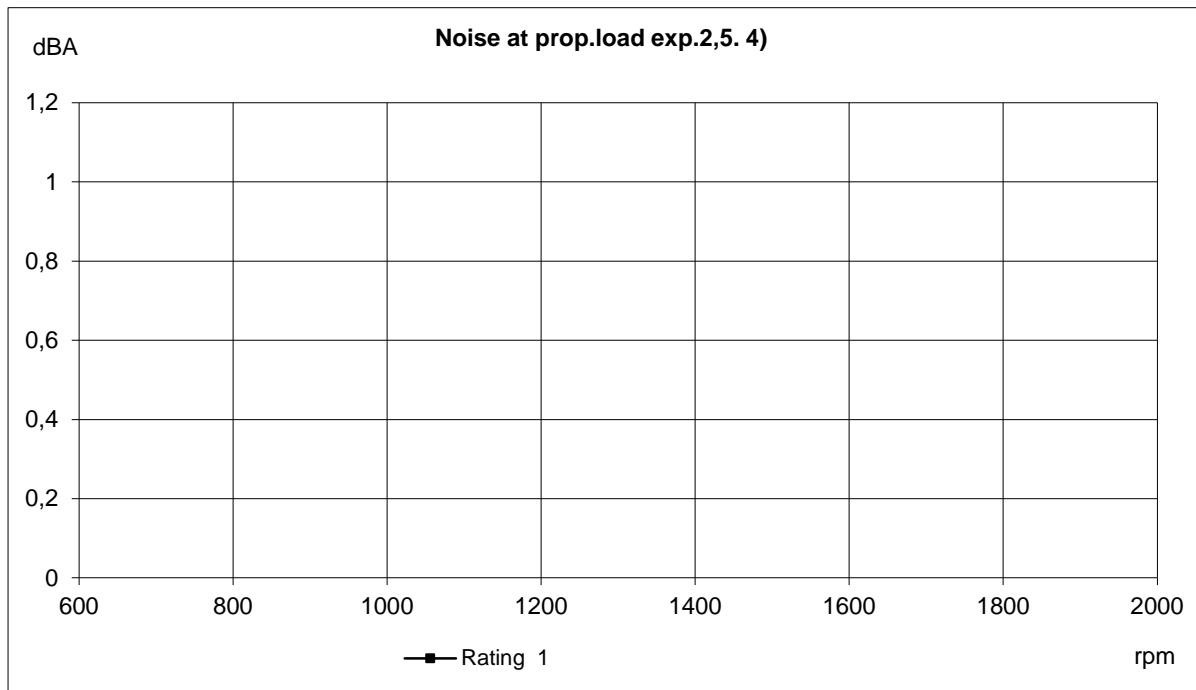






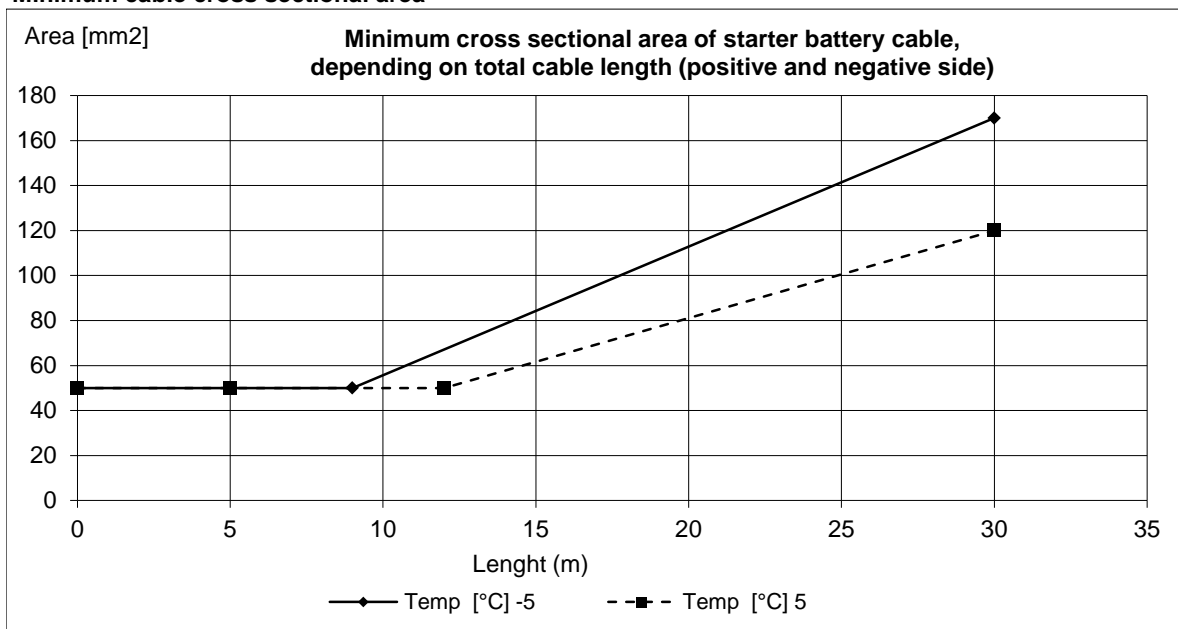






Battery capacity

Temp [°C]	Min battery size [Ah]	CCA EN (Cold cranking Amps) [A]	Max line resistance @ 20°C [mΩ]	Recommended max cable resistance @ 20°C [mΩ]	Min cross sectional area (due to heat increase) [mm ²]
5					
-5					

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

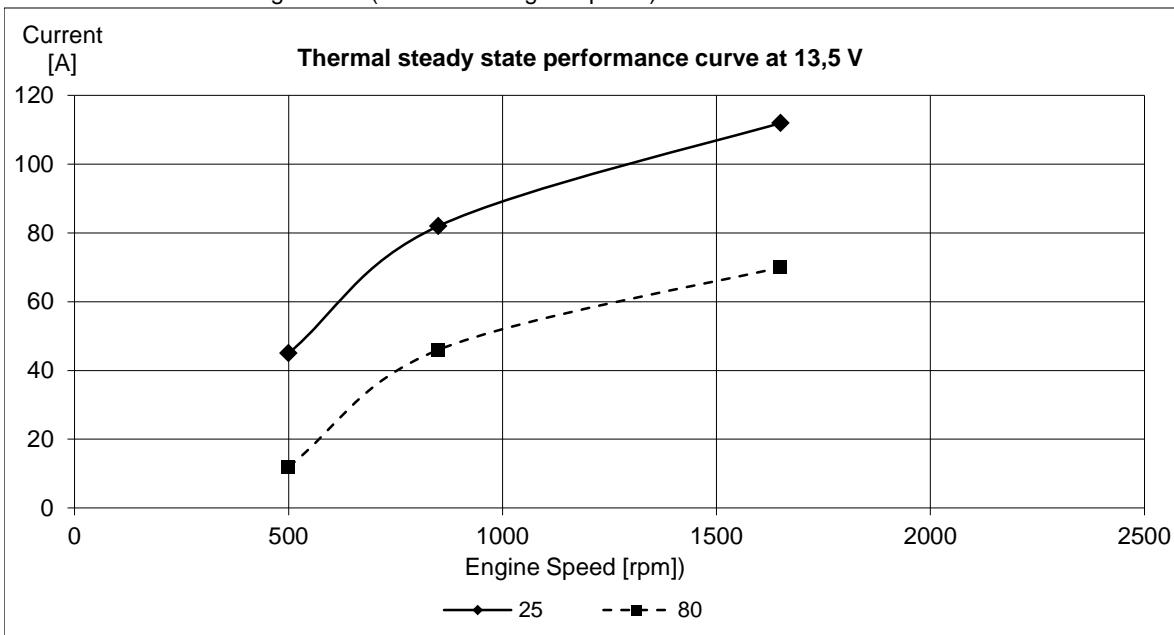
	[A]
Engine:	
Control system:	

Max current consumption during normal operation:

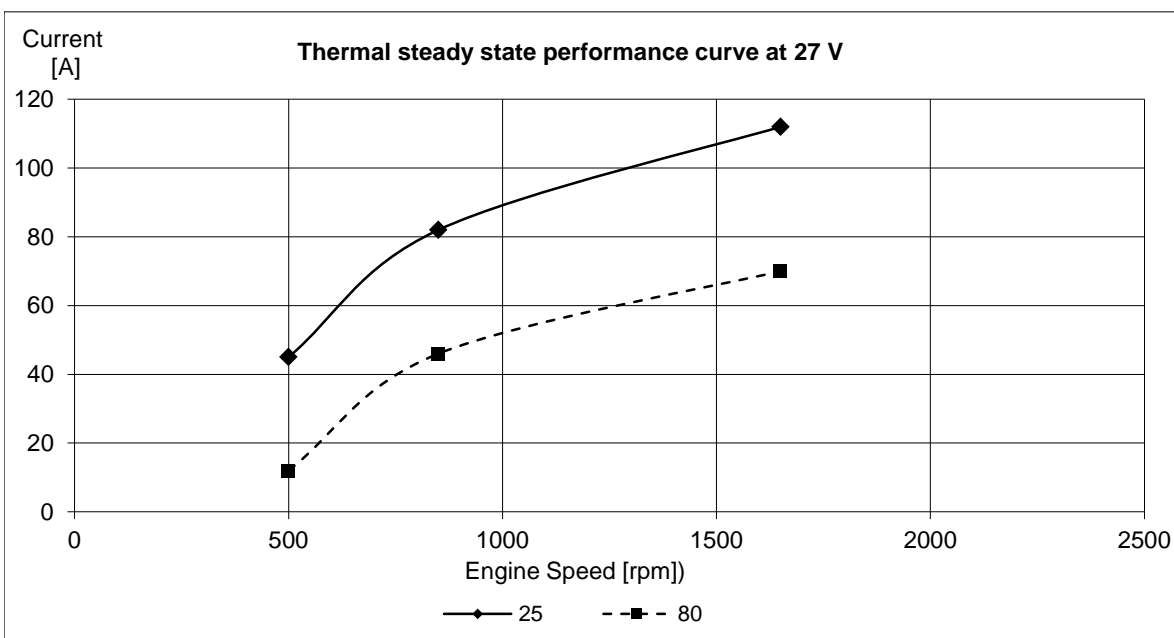
	[A]
Engine :	

Alternator data:

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



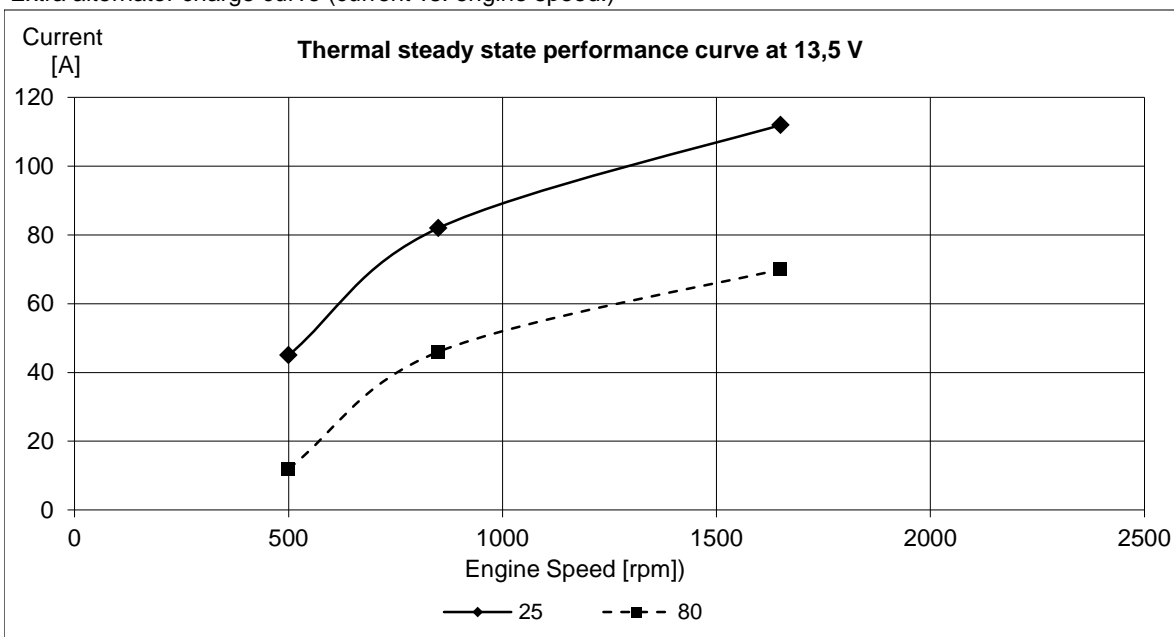
Constant charge voltage: [V]	14,3	+/- 0,3
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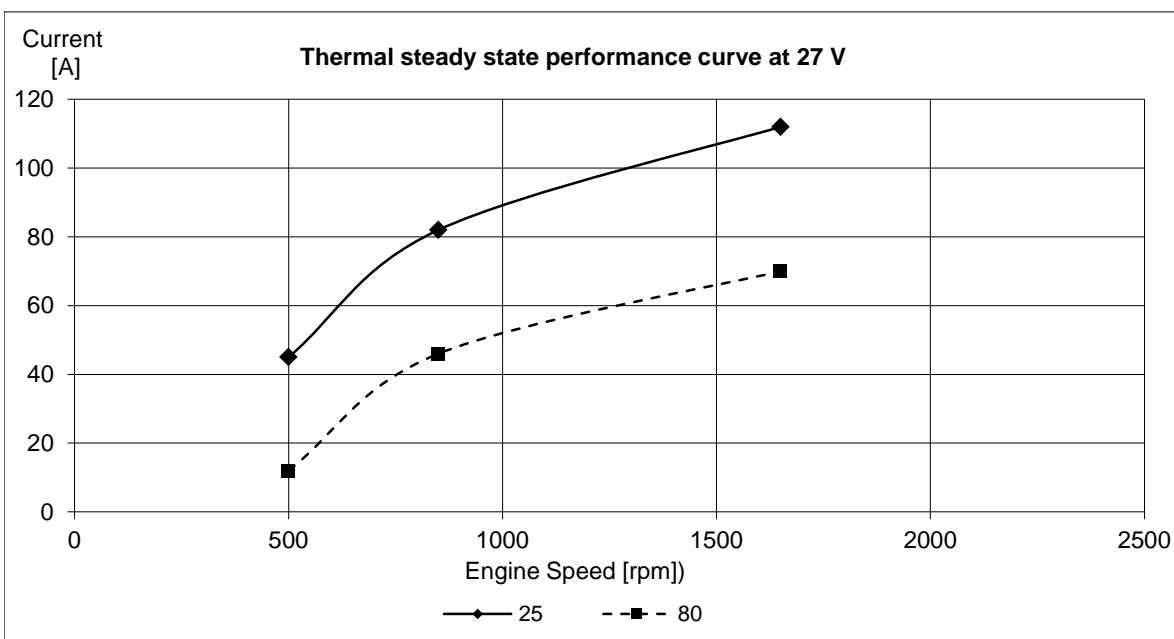
Constant charge voltage: [V]	28,3	+/- 0,3
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Alternator data:

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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