

General

4-stroke direct injected, turbocharged and aftercooled diesel engine

Number of cylinders		6
No of valves		24
Displacement, total	litres	12,78
	in ³	779,7
Firing order		1-5-3-6-2-4
Rotational direction, viewed from the front		Clockwise
Bore	mm	131
	in	5,16
Stroke	mm	158
	in	6,22
Compression ratio		18,5
Compression pressure at 240 rpm	MPa	3,5
	psi	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 R2	rpm	1900
Propeller selection range R2	rpm	1870 - 1970
Dry weight engine BT	kg	HE=1520, KC=1480
	lb	HE=3351, KC=3263

Performance	Rating	rpm	600	800	1000	1200	1400	1500	1600	1800	1900
Crankshaft power 1), 5)	2	kW	81	164	245	294	346	369	393	405	405
		hp	110	223	333	399	471	502	534	550	550
Propeller shaft power 1) (At full load) With drive Twin Disc 5114	2	kW	77	157	235	282	333	354	377	388	388
		hp	105	214	320	383	452	482	513	528	528
Propellershaft power at prop. load x ³ With drive Twin Disc 5114	2	kW	12	29	57	98	155	191	232	330	388
		hp	17	39	77	133	211	260	315	449	528
Torque at crankshaft 2)	2	Nm	1283	1958	2341	2337	2363	2348	2343	2146	2033
		lbf ft	946	1444	1726	1724	1743	1732	1728	1583	1499
Mean piston speed		m/s	3,2	4,2	5,3	6,3	7,4	7,9	8,4	9,5	10,0
		ft/s	10,4	13,8	17,3	20,7	24,2	25,9	27,6	31,1	32,8
Effective mean pressure 2)	2	MPa	1,26	1,93	2,30	2,30	2,32	2,31	2,30	2,11	2,00
		psi	183,0	279,2	333,9	333,4	337,0	334,9	334,2	306,1	290,0
Max combustion pressure 2)	2	MPa	11,7	15,4	16,0	16,3	17,6	17,8	17,9	16,7	15,7
		psi	1697	2234	2321	2364	2553	2582	2596	2422	2277

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	1800	1900
Specific fuel consumption at full load US EPA Tier 3	2	g/kWh lb/hph	233,4	215,3	197,8	195,2	197,1	199,1	202,5	211	213,2
			0,378	0,349	0,32	0,316	0,319	0,323	0,328	0,342	0,345
Specific fuel consumption at full load IMO Tier II	2	g/kWh lb/hph	241	218,8	196,1	189,8	190,6	192,6	195,6	200	204
			0,39	0,354	0,318	0,307	0,309	0,312	0,317	0,324	0,33
Fuel consumption at prop. load x ³ US EPA Tier 3	2	l/h US gal/h	4	9	15	26	40	49	59	86	103
			1,1	2,4	4,0	6,9	10,6	12,9	15,6	22,7	27,2
Fuel consumption at prop. load x ³ IMO Tier II	2	l/h US gal/h	4	9	15	25	38	46	56	82	98
			1,1	2,4	4,0	6,6	10,0	12,2	14,8	21,7	25,9
Fuel consumption at full load US EPA Tier 3	2	l/h US gal/h	23	42	58	69	82	88	95	102	103
			6,0	11,2	15,3	18,1	21,6	23,2	25,1	27,0	27,3
Fuel consumption at full load IMO Tier II	2	l/h US gal/h	23	43	58	67	79	85	92	97	99
			6,1	11,4	15,2	17,6	20,9	22,5	24,3	25,6	26,1

Intake and exhaust system	Rating	rpm	600	800	1000	1200	1400	1500	1600	1800	1900	
Specific exhaust heating effect in percent of crankshaft power	2	%	72	69	63	61	61	62	64	69	73	
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	2	°C	569	576	496	423	403	408	424	447	464	
		°F	1056	1069	925	793	757	766	795	837	867	
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)		kPa psi							Max	12 1,7		
		kPa psi							Min	0 0,0		
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPa and relative humidity 30%.	2	m³/min	4,7	9,0	14,6	20,5	25,7	27,4	28,9	29,6	29,8	
		cu.ft./min	165,4	319	515	725,1	907,6	968,8	1022	1046	1052	
Charge air pressure Inlet manifold	2	kPa psi	39,0	103,0	165,0	216,0	249,0	256,0	259,0	236,0	224,0	
			5,7	14,9	23,9	31,3	36,1	37,1	37,6	34,2	32,5	
Exhaust gas flow	2	m³/min	14,5	28	39,63	48,92	57,85	61,55	65,87	69,38	71,1	
		cu.ft./min	512,1	988,8	1400	1727	2043	2174	2326	2450	2511	

Cooling system	Rating	rpm	600	800	1000	1200	1400	1500	1600	1800	1900
Radiated heat in kW (per engine)	2	kW	3,8	4,3	4,4	4,7	5,2	5,2	5,5	5,7	5,7
Heat rejection to charge air cooler in percent of crankshaft power.	2	%	1,4	5	11,3	19,6	22,6	23,9	23,1	22,4	22
Coolant heat rejection to HE, incl. engine oil cooler and excl. charge air cooler, in percent of crankshaft power.	2	%	82,9	67,2	56,3	49	48,5	48,2	50	53,2	55
Coolant flow with fully open thermostat and std cooling system		l/min	120	192	246	306	360	384	408	450	480
		cu.ft./min	4,2	6,8	8,7	10,8	12,7	13,6	14,4	15,9	17,0
Coolant volume engine, including heat exchanger and charge air cooler		litres	51								
		US gal.	13,47								
Max. additional coolant for cabin heater etc. with std. Expansion tank		litres	16								
		US gal.	4,23								
Maximum coolant flow to cabin heater etc.		l/min	42								
		cu.ft./min	1,48								
Thermostat, start open at		°C	82								
		°F	180								
Thermostat, fully open at		°C	92								
		°F	198								

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2) At power according to 1).

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4) Acc. to ISO 3744

5) At installed back pressure

Raw water circuit	rpm	600	800	1000	1200	1400	1500	1600	1800	1900
Nominal raw water design flow	l/min	161	216	273	320	368	392	414	456	468
	cu.ft./min	5,7	7,6	9,6	11,3	13,0	13,8	14,6	16,1	16,5
Nominal raw water pump pressure head at design flow. (measured before and after pump)	kPa	19	30	49	66	84	95	107	131	136
	psi	2,8	4,4	7,1	9,6	12,2	13,8	15,5	19,0	19,7
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	1800	1900
Maximum temperature to charge air cooler from external LT-cooling system circuit	2	°C									43
		°F									109,4
Coolant flow through keel cooler, LT-cooling system circuit	2	l/min	33	45	58	70	81	85	90	96	98
		cu.ft./min	1,2	1,6	2,0	2,5	2,9	3,0	3,2	3,4	3,5
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	1800	1900
Design point for keel cooler, engine outlet temperature	2	°C									88
		°F									190
Maximum temperature to engine from external HT-cooling system circuit	2	°C									70
		°F									158
Coolant flow through keel cooler, HT-cooling system circuit at design point	2	l/min									187
		cu.ft./min									6,6
Maximum coolant flow through keel cooler, HT-cooling system circuit	2	l/min									295
		cu.ft./min									10,4
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								

Cooling performance (Radiator cooled)

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

Engine speed rpm	Air on temp °C	404 kW	
		Air flow m ³ /s	External restriction Pa
1500	56	6,6	0
	54,3	6,2	100
	52,5	5,9	200
	50,3	5,5	300
	47,9	5,2	400
	45,2	4,9	500
1800	54,6	8,0	0
	53,2	7,7	100
	51,8	7,4	200
	50,4	7,1	300
	48,8	6,8	400
	47	6,5	500

Note! Calculated values >0 Pa

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5) At installed back pressure

VOLVO PENTA

D13B MH (R2-550)

Document No

21720665

Issue Index

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Fan power consumption	rpm	1500	1800
	kW	11	19
	hp	15	26
Fan drive ratio	0,99		

Emissions	Rating	rpm	600	800	1000	1200	1400	1500	1600	1800	1900
Smoke at prop. load x ³	2	*BSU	0,04	0,16	0,14	0,29	0,17	0,16	0,13	0,16	0,29
Noise at prop. load x ³ . 4)	2	dBA	100,4	103,8	107,4	109,5	111,5	#N/A	112,7	113,7	113,5

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

1) ISO 3046, fuel temp 40°C.

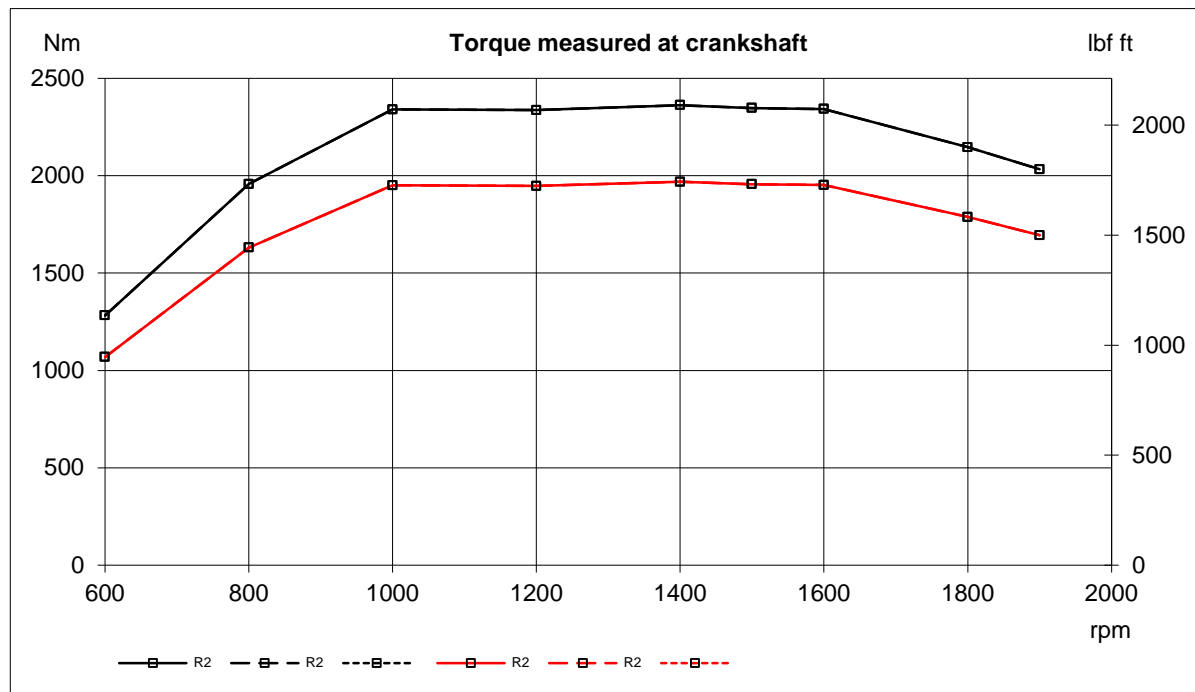
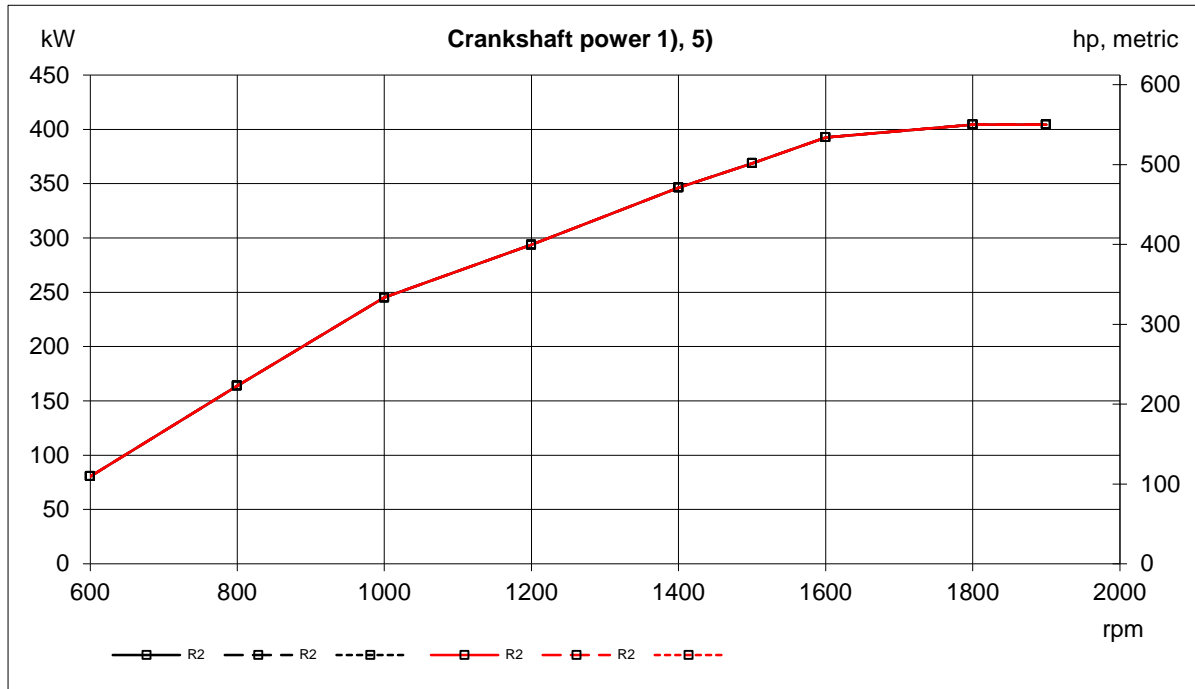
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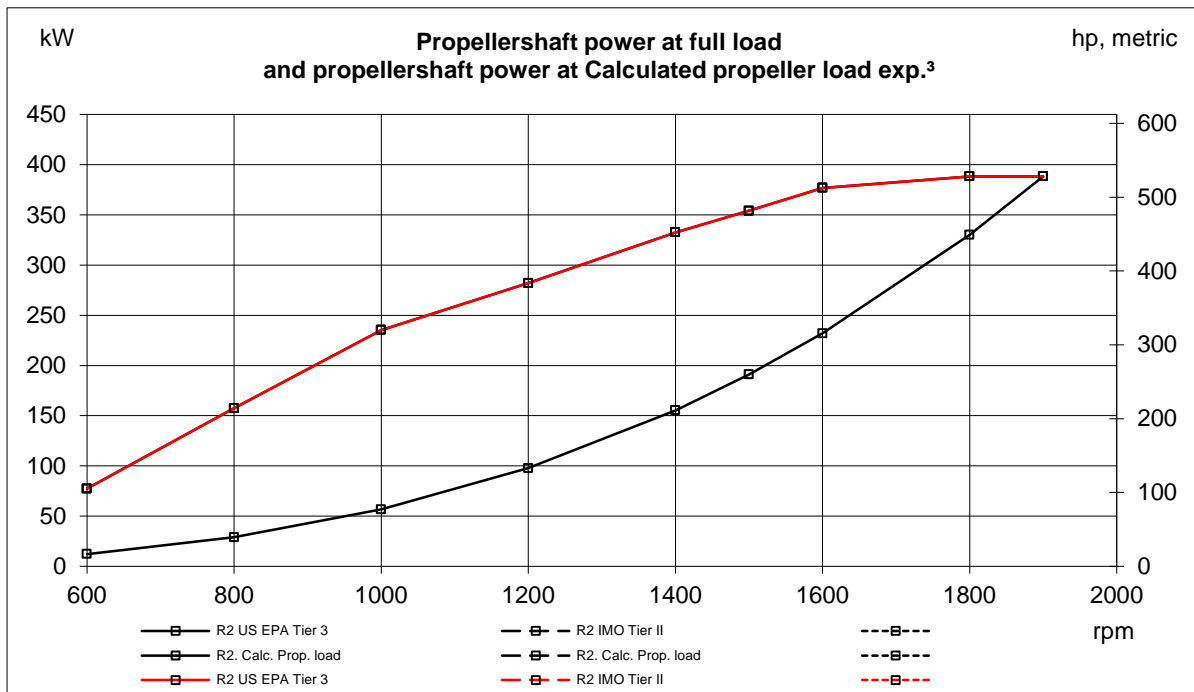
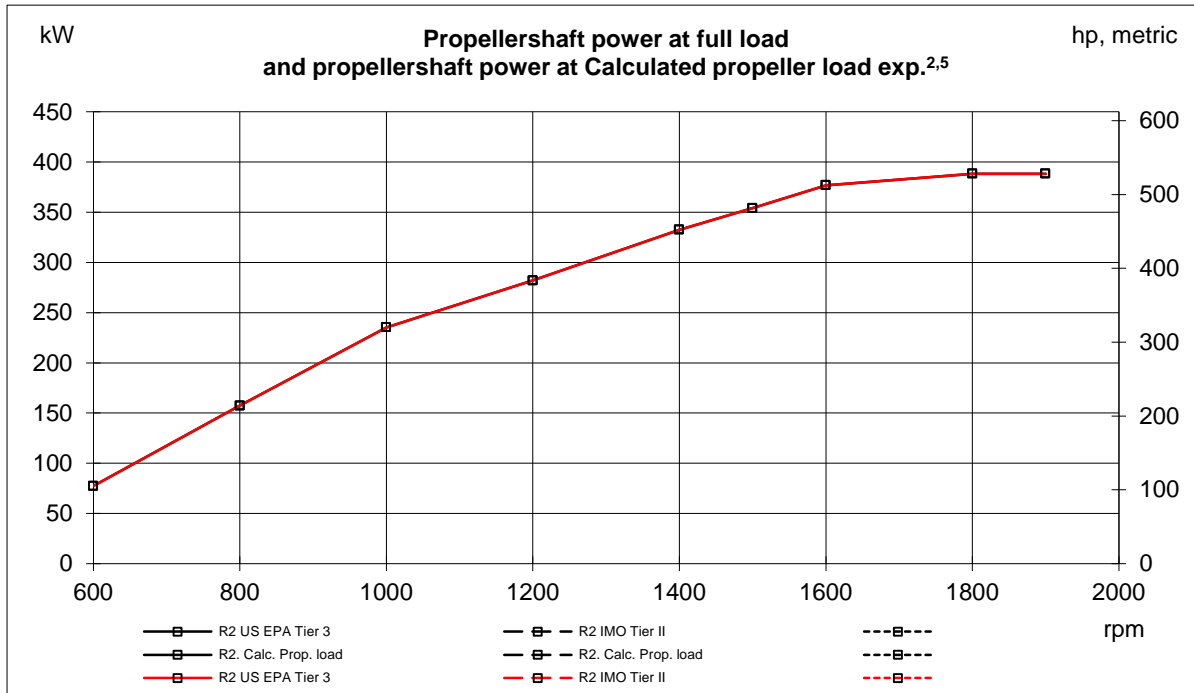
2) At power according to 1).

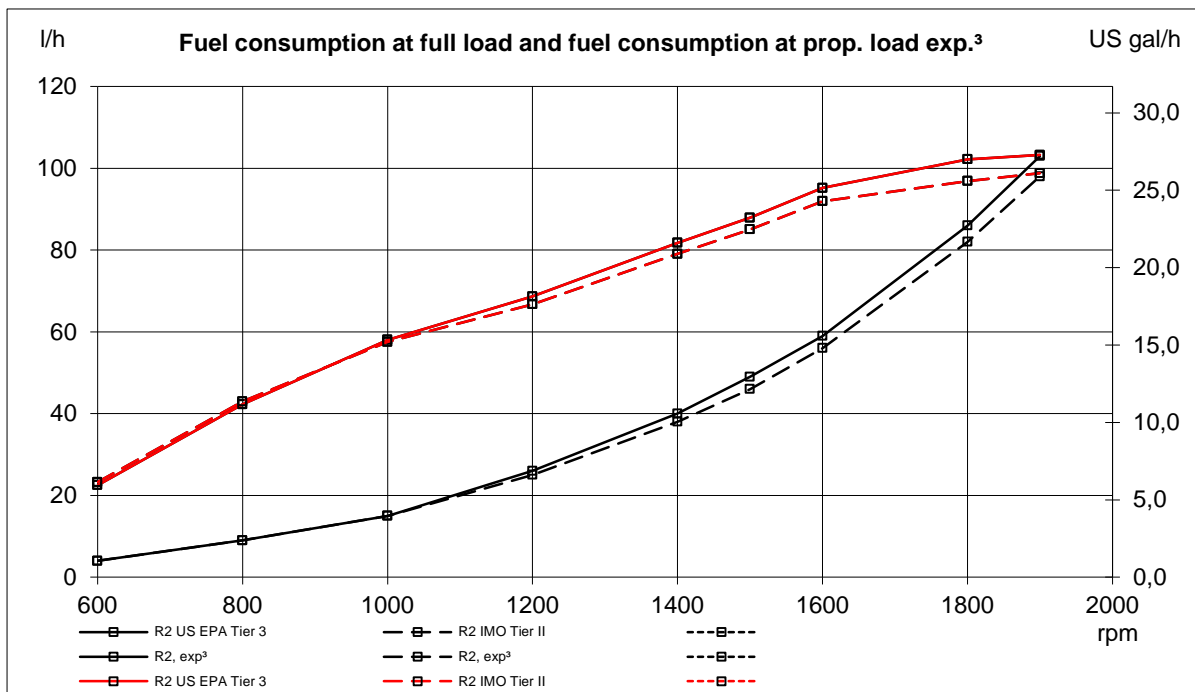
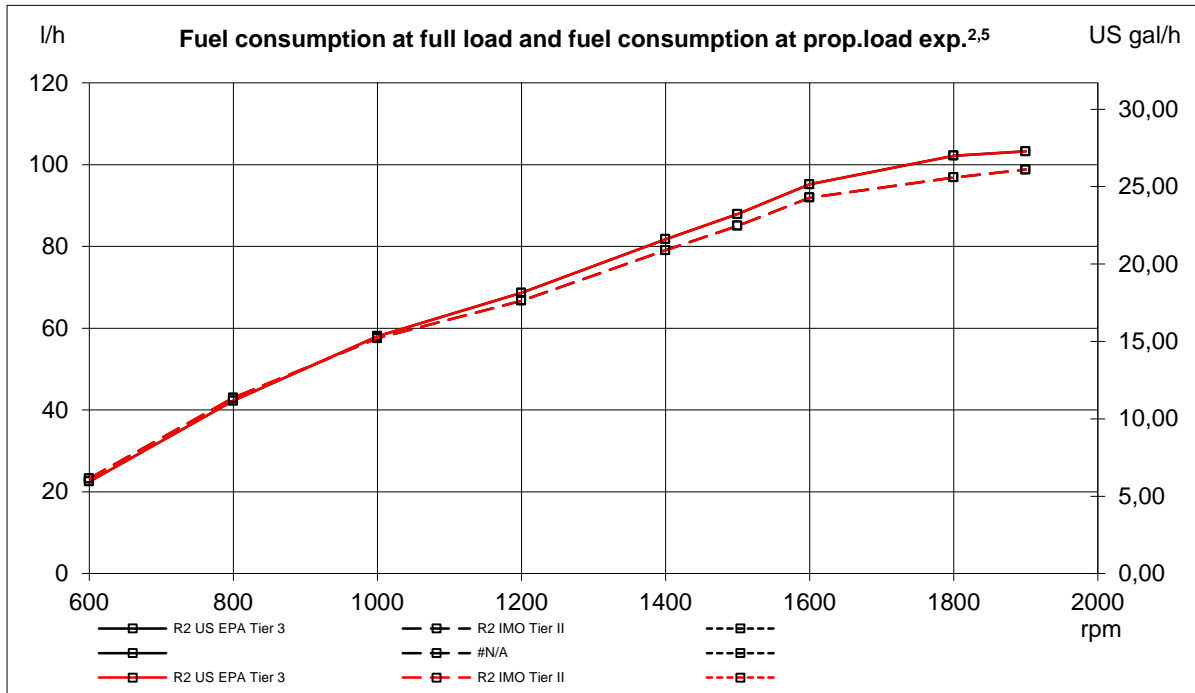
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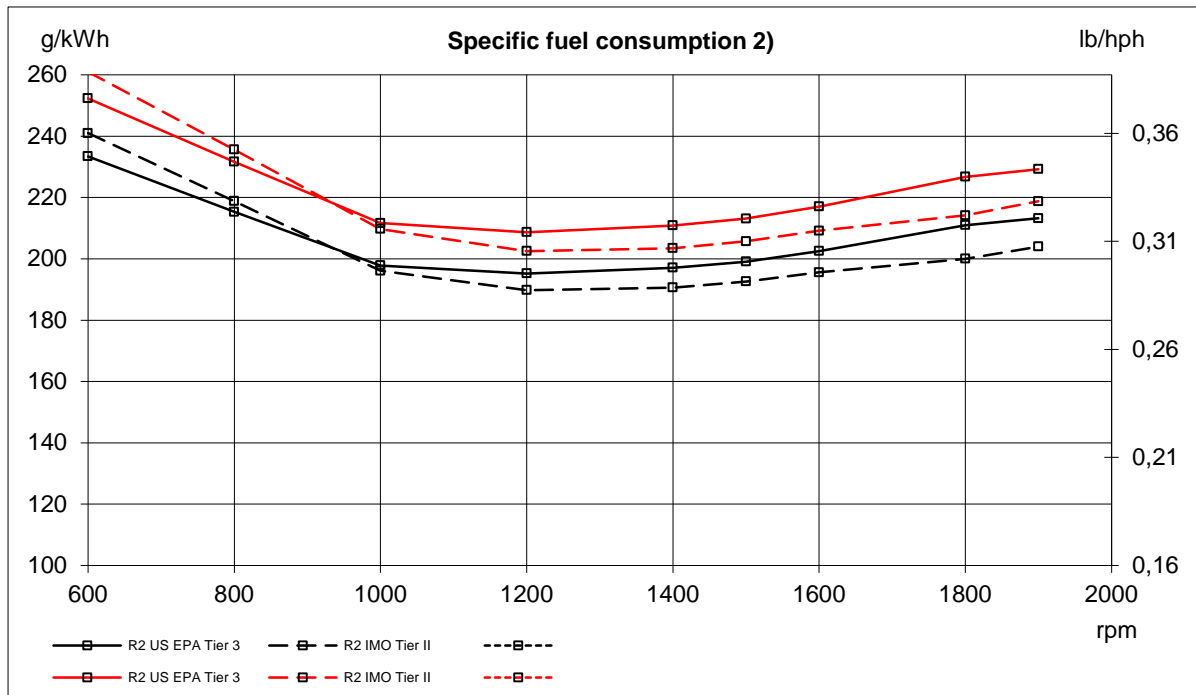
4) Acc. to ISO 3744

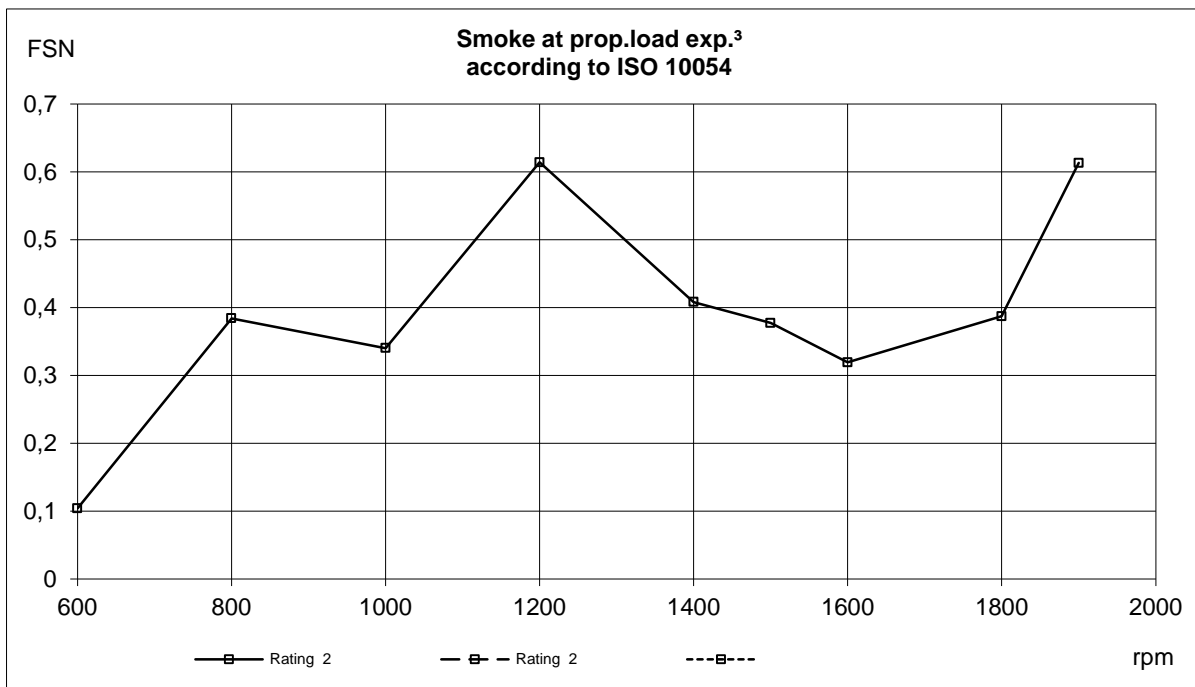
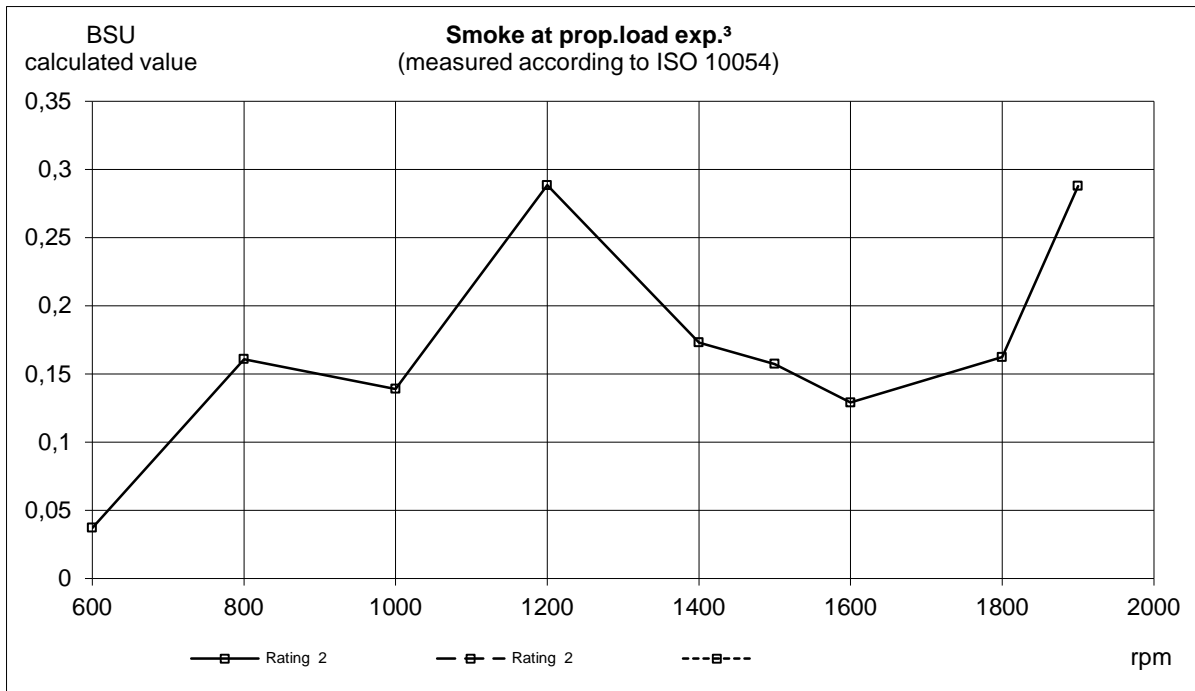
5) At installed back pressure

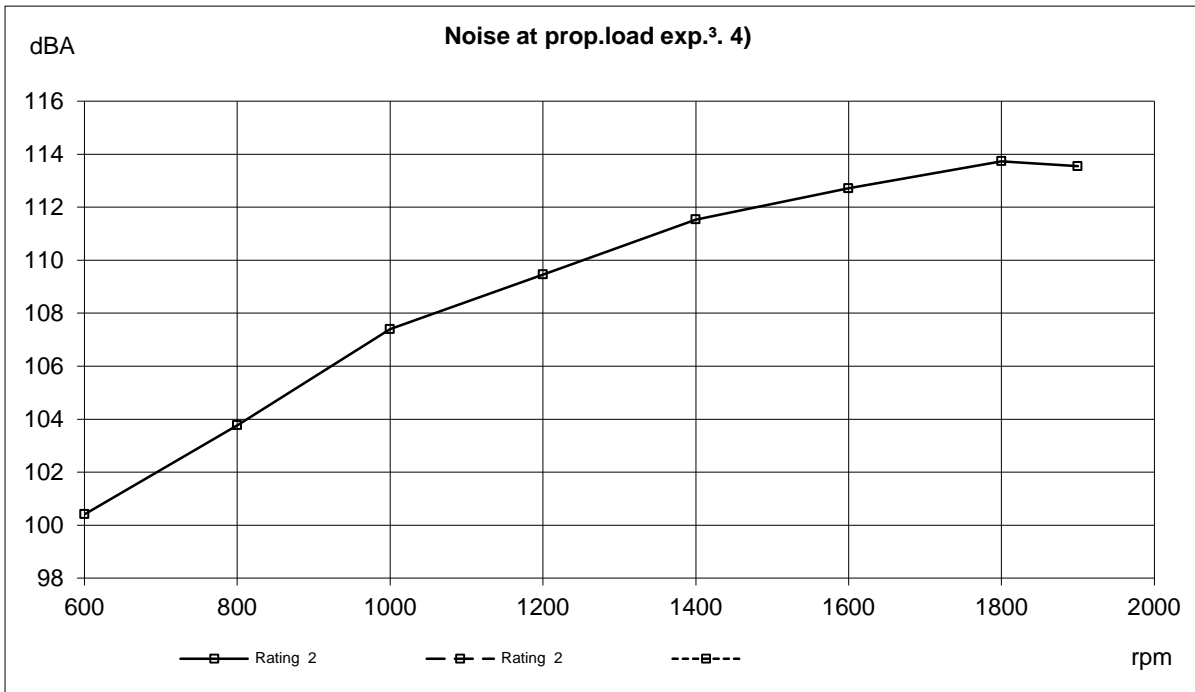












Rating	Power (Hk)	Rpm
R2	550	1900
R2	405	1900

Sensors Control and Monitoring System							Switches Engine Shutdown System	
Sensors	Signal	Unit	Range	Initial Delay / Warning Delay	Warning Level	Derating Level	Shutdown Initial Delay / Shutdown Delay	Shutdown Level (Tolerance)
Coolant level switch	Digital		ON/OFF	30 sec from start / 75 sec	Low(OFF / Open contact)	NA	NA	NA
Coolant temperature	50-0 kΩ	°C	- 40 - 140 ±1.5°C	30 sec from start / 3 sec	98	101 (Rem 1)	NA	NA
Coolant temperature (SDU)	Digital	°C	ON/OFF	NA	NA	NA	1 sec. from start / 1 sec	105 (±2°C) SDU Ch. S1
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 1900 rpm+15%	Frequency	rpm / Hz	153 puls./rev.	Instant	Lost signal	NA	Instant	2185 rpm / 5572 Hz (-1 to 0%)
Exhaust gas temperature	PT200	°C	- 40 - 750 ± 2.5%	30 sec from start / 22 sec	575	600 (Rem 2)	NA	NA
Crankcase pressure	0,5-4,5 V	kPa	0-15 kPa	20 sec from start / Instant	Rapid Pressure Increase	0-75% @ >1200 rpm	NA	NA
Oil temperature	50-0 kΩ	°C	-40 - 140 °C	30 sec from start / 22 sec	130	135 (Rem 3)	NA	NA
Gear oil temperature (EVC)	50-0 kΩ	°C	-40 - 140 ± 2.5%	NA	NA	NA	NA	NA
Gear oil pressure (EVC)	0,5-4,5V	kPa	0 - 3000 ±3%	60 sec from start / 7 sec	700	NA	NA	NA
Gear oil pressure (SDU)	Digital	kPa	ON/OFF	NA	NA	NA	11 s ±20% from start/ 1 s	400±20 <u>Shutdown Unit Activated</u> S2,S3: 510 rpm ±2% 1300 Hz ±2% 153 pulses / revolution

NA = Not applicable

Sensors Alarm	Signal	Unit	Range	Initial Delay / Delay	Warning Level / Derating Level / Shutdown Level rpm Map (relative pressure)					Derating / Notes
					600 rpm	1000 rpm	1500 rpm	1700 rpm	1900 rpm	
Charge air pressure	0,5-4,5 V	kPa	50 - 600 ± 4 kPa		600 rpm	1000 rpm	1500 rpm	1700 rpm	1900 rpm	
Warning Level (Relative / Absolute pressure)		kPa		30 sec from start / 2 sec	310 / 410	310 / 410	299 / 399	282 / 382	256 / 356	
Derating Level (Relative / Absolute pressure)		kPa		Instant	320 / 420	320 / 420	309 / 409	292 / 392	266 / 366	0-50% @ 1200-1900rpm
Shutdown Level	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Charge air Temperature	50 - 0 kΩ	°C	-40 - 130°C ±4%		600 rpm	1000 rpm	1500 rpm	1700 rpm	1900 rpm	
Warning Level		°C		90 sec from start / 22 sec	80	80	80	78	75	
Derating Level		°C		Instant	85	85	85	83	80	Rem 4
Shutdown Level	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Coolant pressure	0,5-4,5 V	kPa	0-300 kPa ±3%		600 rpm	1000 rpm	1500 rpm	1700 rpm	1900 rpm	
Warning Level		kPa		30 sec from start / 4 sec	5	30	55	72	90	
Derating Level		kPa		Instant	-5	20	45	62	80	0-50% @ 1200-1900rpm /
Shutdown Level	NA	NA	NA	NA	NA	NA	NA	NA	NA	Run detection S4=S2,S3
Seawater pressure	0,5-4,5 V	kPa	0-300 kPa ±3%		600 rpm	1000 rpm	1500 rpm	1700 rpm	1900 rpm	Only HE
Warning Level		kPa		30 sec from start / 7.5 sec	5	15	25	40	40	
Derating Level		kPa		Instant	-5	5	15	30	30	0-35% @ 1200-1900rpm
Shutdown Level	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Fuel pressure	0,5-4,5 V	kPa	0-700 kPa ±1,5%		600 rpm	1000 rpm	1500 rpm	1700 rpm	1900 rpm	
Warning Level		kPa		30 sec from start / Instant	180	240	270	270	270	
Derating Level		kPa		NA	NA	NA	NA	NA	NA	
Shutdown Level	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Oil pressure	0,5-4,5 V	kPa	0-700 kPa ±1,5%		600 rpm	1000 rpm	1500 rpm	1700 rpm	1900 rpm	
Warning Level		kPa		30 sec from start / 3 sec	136	200	265	265	265	
Derating Level		kPa		Instant	106	170	235	235	235	0-70% @ 1200-1900rpm
Shutdown Level (Shutdown Unit Channel S3)	Digital	kPa	ON/OFF	11 s ±20% from start / 1 s	120 ±20	120 ±20	120 ±20	120 ±20	120 ±20	Shutdown Unit Activated S2,S3: 510 rpm ±2% 1300 Hz ±2% 153 pulses / revolution

D13B MH (R2-550)

Remarks

1) Soft derate Coolant temp	Speed / °C	101°C	103°C	106°C
Remaining torque in %	1200 rpm	100%*	100%*	100%*
	1500 rpm	100%*	77%	54%
	1900 rpm	100%*	75%	50%

2) Soft derate Exhaust temp	Speed / °C	600°C	605°C	610°C	615°C
Remaining torque in %	1200 rpm	100%*	100%*	100%*	100%*
	1500 rpm	100%*	72%	63%	54%
	1900 rpm	100%*	70%	60%	50%

3) Soft derate Oil temp	Speed / °C	135°C	137°C	139°C
Remaining torque in %	1200 rpm	100%*	100%*	100%*
	1500 rpm	100%*	54%	35%
	1900 rpm	100%*	50%	30%

4) Soft derate Charge air Temp	Speed / °C	80°C	85°C	90°C
Remaining torque in %	1200 rpm	100%*	100%*	100%*
	1500 rpm	100%*	100%	54%
	1900 rpm	100%*	50%	30%

* Derate alarm indication but no actual torque decrease