

## Technical data TAD940GE – Preliminary

### General

In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel. Turbocharged

Number of cylinders			6
Displacement, total		litre	9,36
		in <sup>3</sup>	571,4
Firing order			1-5-3-6-2-4
Bore		mm	120
		in	4,72
Stroke		mm	138
		in	5,43
Compression ratio			20,2
Dry weight	Engine only, excluding cooling system	kg	1015
		lb	2238
	GenPac	kg	1354
		lb	2985
Wet weight	Engine only, excluding cooling system	kg	1065
		lb	2348
	GenPac	kg	1404
		lb	3095

Performance		r/min	1500	1800
Standby Power	without fan	kW	277	294
		hp	377	400
	with fan	kW	265	273
		hp	360	371
Prime Power	without fan	kW	253	269
		hp	344	366
	with fan	kW	241	248
		hp	328	338
Torque at:	Standby Power	Nm	1763	1560
		lbft	1301	1150
	Prime Power	Nm	1610	1428
		lbft	1187	1053
Mean piston speed		m/s	6,9	8,3
		ft/sec	22,7	27,2
Effective mean pressure at:	Standby Power	MPa	2,4	2,1
		psi	343	304

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Effective mean pressure at:	Prime Power	MPa	2,2	1,9
		psi	313	278
Max combustion pressure at:	Standby Power	MPa	18	19,8
		psi	2611	2872
Max combustion pressure at:	Prime Power	MPa		
		psi		
Total mass moment of inertia, J (mR2)		kgm <sup>2</sup>	2,60	
		lbft <sup>2</sup>	61,7	
Degree of irregularity at:	Standby Power			
Friction Power		kW	28	38
		hp	38,08	51,68

### Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power (without fan, intake and exhaust noise)

Tolerans ± 0.75 dB(A)

		r/min	1500	1800
Measured sound power L <sub>w</sub>	No load	dB(A)	108,2	109,6
	Standby Power	dB(A)	110,3	112,1
		dB(A)		
Calculated sound pressure L <sub>p</sub> at 1 m	No load	dB(A)		
	Standby Power	dB(A)		
		dB(A)		

### Unsilenced exhaust noise

Data calculated as sound pressure L<sub>p</sub>.

Assumed microphone distance 1 m

	r/min	1500	1800
Standby Power	dB(A)	113	117
Prime Power	dB(A)	113	116

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## Test conditions for load acceptance data

Warm engine.	Generator	Modell	Type of AVR

Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions.

## Single step load performance at 1500 rpm

Load (%)	Speed diff (%)		Recovery time (s)		Remaining load (%)	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby		Prime	Standby	Prime	Standby
0-20		1,5		0,8	20-100		15,7		7,4
0-40		3,1		1,5	40-100		8,1		5,9
0-55		6,8		1,9	55-100		5,5		5,1
0-60		9,1		3,1	60-100		4,3		4,9
0-x	10,0				x-100				
0-x		10,0			x-100				
100-0		3,4		1,3					

## Single step load performance at 1800 rpm

Load (%)	Speed diff %		Recovery time (s)		Remaining load (%)	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby		Prime	Standby	Prime	Standby
0-20		1,8		1,7	20-100		5,6		5,0
0-40		2,7		1,5	40-100		3,9		4,2
0-60		4,2		1,8	60-100		2,4		3,2
0-75		1,5		6,8	75-100		1,9		2,1
0-83		1,8		9,4	83-100		1,2		1,7
0-x	10,0				x-100				
0-x		10,0			x-100				
100-0									

## Cold start performance

		r/min	1500	1800	
Time from start to no load speed at ambient temperature:	°C	15	s	4,5	5,1
		0	s	6,0	6,8
		-20*	s	12,5	14,3
Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	15	s	4,5	5,1
		0	s	6,0	6,8
		-20*	s	12,5	14,3

\* With manifold heater 4 kW engaged, lubrication oil 15W/40 and block heater.

Usage of manifold heater:	Time preheating	Time postheating		
	25 sec	100 sec		
Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
Block mounted	Calix	1,5 kW		

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Lubrication system		r/min	1500	1800
Lubricating oil consumption	Standby Power	liter/h	0,03	0,04
		US gal/h	0,009	0,009
	Prime Power	liter/h	0,03	0,03
		US gal/h	0,008	0,008
Oil system capacity including filters		liter	35	
		US gal	9,2	
Oil sump capacity:	max	liter	30	
		US gal	7,9	
	min	liter	22	
		US gal	5,8	
Oil change intervals/ specifications:	VDS-2*	h	600	
	VDS, ACEA, E3*	h	400	
	ACEA E2, API CD, CF, CF-4, CG-4*	h	250	
Engine angularity limits:	front up	°	30	
	front down	°	30	
	side tilt	°	30	
Oil pressure at rated speed		kPa	350 - 600	
		psi	51 - 87	
Lubrication oil temperature in oil sump:	max	°C	125	
		°F	257	
Oil filter micron size		mm	0,040	

\* See also general section in the sales guide

Fuel system		r/min	1500	1800
<b>Standby Power</b>				
Specific fuel consumption at:	25%	g/kWh	227	239
		lb/hph	0,368	0,388
	50%	g/kWh	203	210
		lb/hph	0,329	0,341
	75%	g/kWh	197	202
		lb/hph	0,319	0,328
	100%	g/kWh	204	204
		lb/hph	0,330	0,330

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<b>Prime Power</b> Specific fuel consumption at:	25%	g/kWh	230	242
		lb/hph	0,373	0,392
	50%	g/kWh	206	214
		lb/hph	0,334	0,347
	75%	g/kWh	197	203
		lb/hph	0,319	0,329
	100%	g/kWh	201	205
		lb/hph	0,326	0,332

<b>Fuel system</b>	<b>r/min</b>	<b>1500</b>	<b>1800</b>
Fuel to conform to	ASTM-D975-No1 and 2-D JIS KK 2204, EN 590		
System return flow	liter/h	36	
	US gal/h	9,5	
System supply flow at rated speed	liter/h	108,0	
	US gal/h	28,5	
Fuel supply line max restriction	kPa	10,0	
	psi	1,5	
Fuel supply line max pressure, engine stopped	kPa	0,0	
	psi		
Fuel return line max restriction	kPa	20,0	
	psi	2,9	
Maximum allowable inlet fuel temp	°C	50	
	°F	122	
Prefilter / Water separator	mm	0,005	
Governor type/make, standard	EMS2		
Injection pump type/make	Unit injector / Delphi		
Injection timing std.	°B.T.D.C		
Injection timing	°B.T.D.C		

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Intake and exhaust system		r/min	1500	1800
Air consumption at:	Standby Power	m <sup>3</sup> /min	20,0	23,2
		cfm	705	820
	Prime Power	m <sup>3</sup> /min	18,1	21,7
		cfm	638	765
Air intake restriction, clean filter(s)		kPa	2	2
		in wc	8,0	8,0
Max allowable air intake restriction		kPa	5	5
		in wc	20,1	20,1
Air filter type		Single stage paper cartridge		
Air filter cleaning efficiency		%	99,85	
Heat rejection to exhaust at:	Standby Power	kW	216	223
		BTU/min	12284	12682
	Prime Power	kW		
		BTU/min		
Exhaust gas temperature after turbine at:	Standby Power	°C	488	429
		°F	910	804
	Prime Power	°C		
		°F		
Max allowable back pressure in exhaust line		kPa	10	10
		In wc	40,2	40,2
Exhaust gas flow at:	Standby Power	m <sup>3</sup> /min	49,6	52,7
		cfm	1750	1862
	Prime Power	m <sup>3</sup> /min		
		cfm		

Cooling system		r/min	1500	1800
Heat rejection radiation from engine at:	Standby Power	kW		
		BTU/min		
	Prime Power	kW		
		BTU/min		
Heat rejection to coolant at:	Standby Power	kW	120	124
		BTU/min	6824	7052
	Prime Power	kW	113	116
		BTU/min	6426	6597
Coolant	Volvo coolant or Volvo anticorrosion additive together with clean fresh water			
Radiator cooling system type		Closed circuit		

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Standard radiator core area		m <sup>2</sup>	0,8	
		foot <sup>2</sup>	8,61	
Standard radiator core thickness		mm	52	
		in	2,05	
Fan diameter		mm	890	
		in	35,04	
Fan power consumption		kW	12	21
		hp	16	29
Fan drive ratio			1:1,01	
Coolant capacity,	engine	liter	17	
		US gal	4,49	
	std radiator with hoses	liter	24	
		US gal	6,34	
Coolant pump		drive/ratio	belt/1,50:1	
Coolant flow with standard system		l/s	5,5	6,5
		US gal/s	1,45	1,72
Minimum coolant flow		l/s	5,3	6,2
		US gal/s	1,40	1,64
Maximum external coolant system restriction, including piping		kPa	50	55
		in wc	201	221
Thermostat	start to open	°C	82	
		°F	180	
	fully open	°C	92	
		°F	198	
Maximum static pressure head (expansion tank height + pressure cap setting)		kPa	100	
		in wc	401	
Minimum static pressure head (expansion tank height + pressure cap setting)		kPa	70	
		in wc	281	
Standard pressure cap setting		kPa	70	
		in wc	281	
Maximum top tank temperature		°C	103	
		°F	217	
Minimum temperature entering engine		°C	68	
		°F	154	
Draw down capacity		10% of total cooling system capacity		

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Intercooler system		r/min	1500	1800
Cooling power	Standby Power	kW	52	66
		BTU/min	2957	3753
	Prime Power	kW	44	58
		BTU/min	2502	3298
		kW		
		BTU/min		
Combustion air mass flow	Standby Power	kg/s	0,39	0,47
	Prime Power	kg/s	0,36	0,44
		kg/s		
Combustion air inlet temp.	Standby Power	°C	204	193
		°F	399	379
	Prime Power	°C	180	190
		°F	356	374
		°C		
		°F		
Combustion air outlet temp.	Standby Power	°C	55	58
		°F	132	136
	Prime Power	°C	54	56
		°F	128	132
		°C		
		°F		
Maximum pressure droop over intercooler, incl. piping		kPa	5	
		psi	0,73	
Boost pressure		kPa	230	
		psi	33,36	
Standard intercooler core area		m <sup>2</sup>	0,89	
		foot <sup>2</sup>	9,58	
Standard intercooler core thickness		mm	68	
		in	2,68	

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### Cooling performance Fan ratio 1:1,01

Cooling air flow and external restriction at different radiator air temperatures based on 103°C TTT and 50% antifreeze (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow kg/s	External restriction Pa	Air flow kg/s	External restriction Pa
1500	30	3,4	1280	3,6	1240
	40	3,9	1150	4,1	1090
	50	4,6	930	4,9	850
	55	5,0	760	5,4	650
	60	5,7	530	6,1	380
	65	-	-	7,0	0
	67	7,0	0		
1800	30	3,9	1930	4,3	1860
	40	4,4	1760	4,8	1680
	50	5,2	1490	5,6	1370
	55	5,7	1280	6,2	1120
	60	6,4	1010	7,0	780
	67	-	-	8,6	0
	70	8,6	0		

### Cooling performance Fan ratio 1:0,9

Cooling air flow and external restriction at different radiator air temperatures based on 103°C TTT and 50% antifreeze (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow kg/s	External restriction Pa	Air flow kg/s	External restriction Pa
1500	30	3,4	950	3,5	910
	40	3,8	830	4,0	770
	50	4,5	620	4,8	540
	55	5,0	460	5,3	350
	60	5,6	230	6,0	90
	61	-	-	6,2	0
	64	6,2	0		
1800	30	3,9	1450	4,2	1380
	40	4,4	1290	4,7	1210
	50	5,1	1030	5,5	910
	55	5,6	830	6,1	680
	60	6,3	560	6,9	350
	64	-	-	7,7	0
	67	7,7	0		

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### Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronous/droop Switchable during operation	Isochronous
Governor droop	0 - 8%	0 % (4 % when switched)
Governor response	NA	NA
Dual speed	1500 / 1800 rpm	According to customer
Idle speed	600 - 1200 rpm	900 rpm
Fine speed adjustment	NA	±120 rpm
Stop function	Energized to run / stop	Energized to stop
Preheating function	On ignition / Preheat on request	Preheat on request
Lamp test	ON/OFF	ON

Engine protection		Alarm level		Engine protection	
Parameter	Unit	Setting range	Default setting	Level	Action. Default/ Alternative
Oil temp	°C	120 - 130	125	Setting +3	Shut down. ON/OFF
Oil pressure	Low idle	kPa	NA	130	Shut down. ON/OFF
	1500 rpm	kPa	NA	220	Shut down. ON/OFF
	1800 rpm	kPa	NA	270	Shut down. ON/OFF
Oil level		NA	Low level	Low level	Shut down. ON/OFF
Piston cooling pressure >1000 rpm	kPa	NA	NA	NA	NA
Coolant temp	°C	95 - 103	98	Setting +5	Shut down. ON/OFF
Coolant level		NA	Low level	Low level	Shut down. ON/OFF
Fuel feed pressure	Low idle	kPa	NA	NA	NA
	>1400 rpm		NA	300	NA
Water in fuel		NA	Water in fuel	NA	NA
Crank case pressure	kPa	NA	Increased pressure	Increased pressure	Shut down. ON/OFF
Air filter pressure droop	kPa	NA	NA	NA	NA
Altitude, above sea	m	NA			Automatic derating, see section derating
Charge air temp	°C	NA			Shut down. ON/OFF
Charge air pressure	kPa	NA	380	380	Shut down. ON/OFF
Engine speed	rpm	100 - 120% of rated speed	120% of rated speed	Alarm level	Shut down. OFF/ON

**Derating** NB! If applicable, describe derating according to the engine control system's functionality.

### Electrical system

r/min      1500      1800

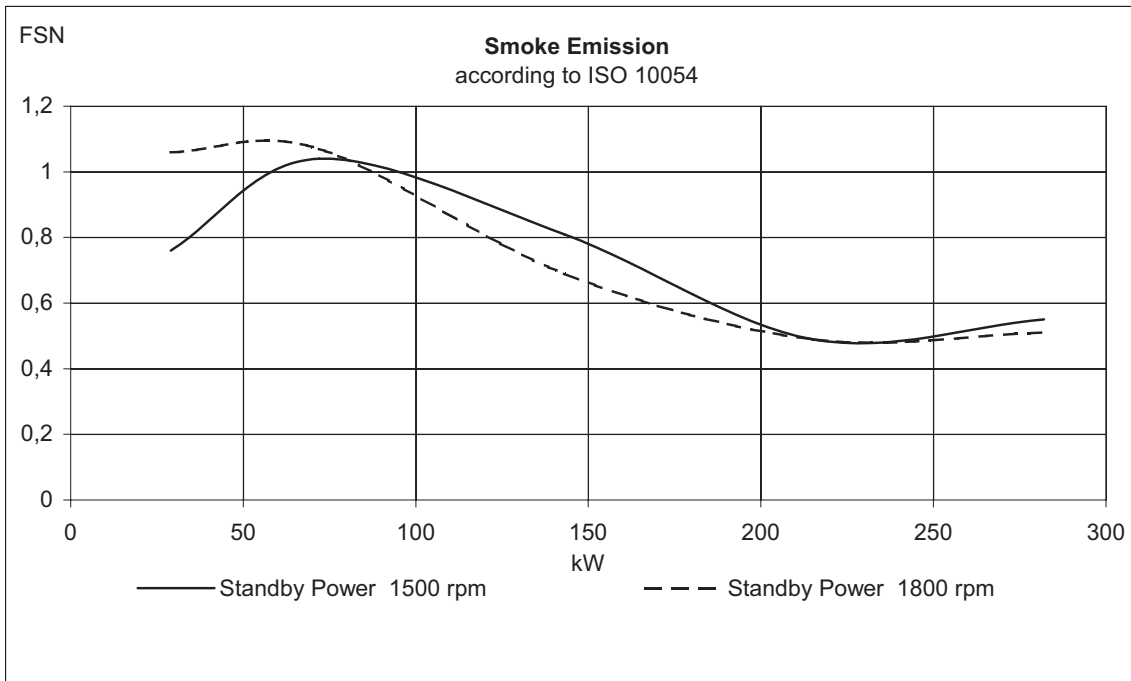
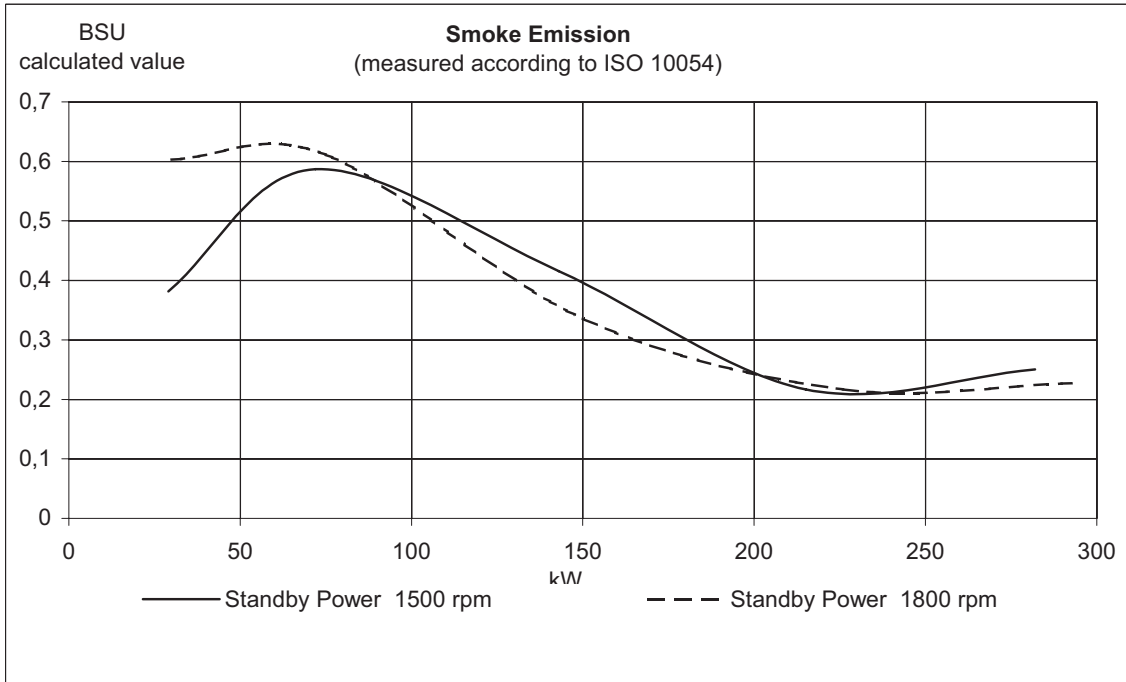
Voltage and type	24V / insulated from earth		
Alternator:	make/output	Amp	Bosch/80
	tacho output	Hz/alt. Rev	6
	drive ratio		4,5

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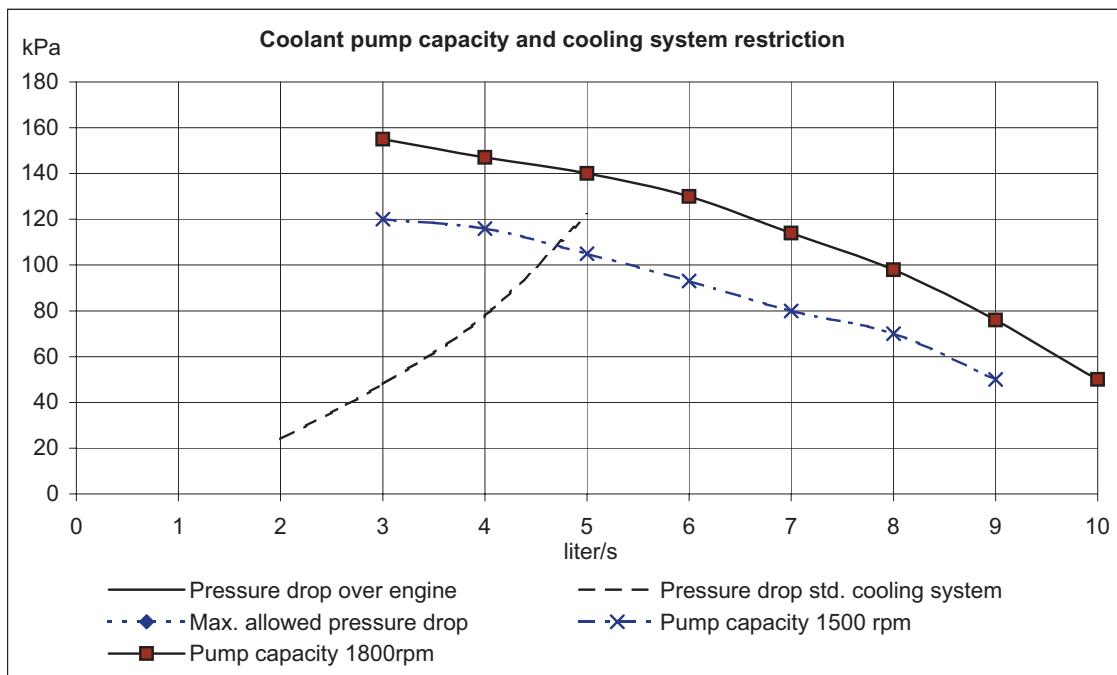
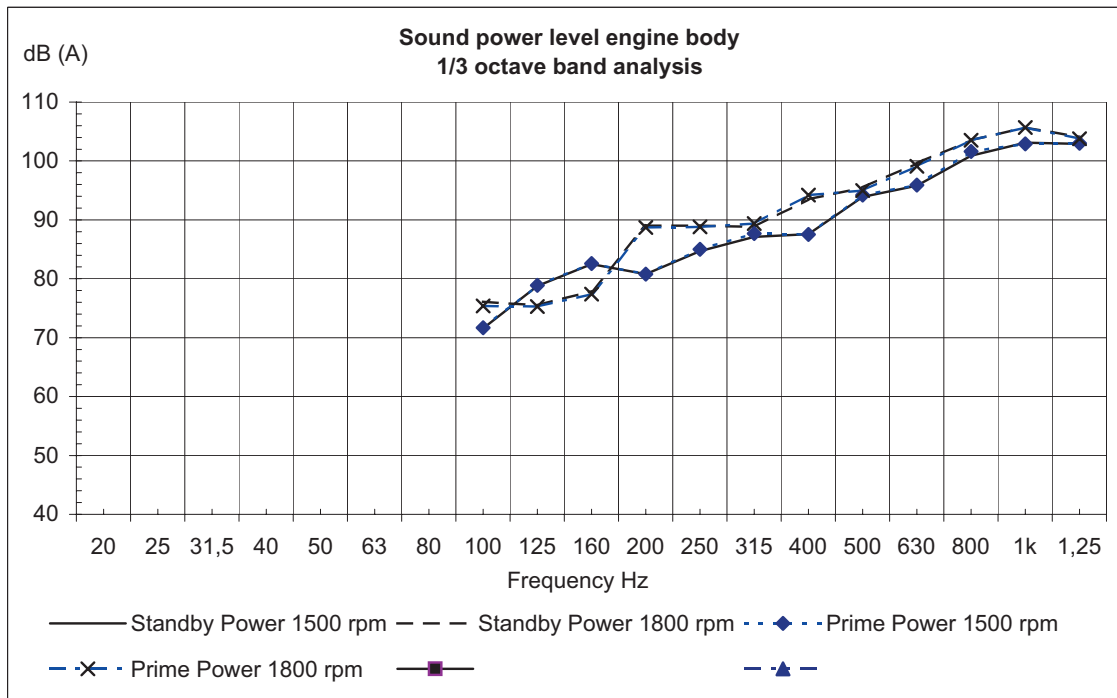
Starter motor		make	Melco
		type	90P55
		kW	5,5
Starter motor solenoid,	pull current	Amp	N/A
	hold current	Amp	2
Number of teeth on:	flywheel		153
	starter motor		11
Inrush current at +20°C		Amp	1000
Cranking current at +20°C		Amp	
Crank engine speed at 20°C		rpm	140
Starter motor battery capacity:	max	Ah	2x225 700A DIN
	min at +5°C	Ah	2x170 600A DIN
Inlet manifold heater (at 20 V)		kW	4,0
Power relay for the manifold heater		Amp	1

<b>Power take off</b>		<b>r/min</b>	<b>1500</b>	<b>1800</b>
Front end in line with crank shaft max:		Nm lbft	TVC necessary	
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	53	54
		hp	72	73
	max down	kW	248	300
		hp	337	408
	max right	kW	43	69
		hp	58	94
Timing gear at compressor PTO max:		Nm lbft	150 111	
Speed ratio direction of rotation viewed from flywheel side		1,29:1/clockwise		
Timing gear at servo pump PTO max:		Nm lbft		
Speed ratio direction of rotation viewed from flywheel side		1,58:1/clockwise		
Timing gear at hydraulic pump PTO max:		Nm lbft		
Speed ratio direction of rotation viewed from flywheel side				
Max allowed bending torque in flywheel housing		Nm lbft	7000 5163	
Max. rear main bearing load		N lbf	18460 4150,0	

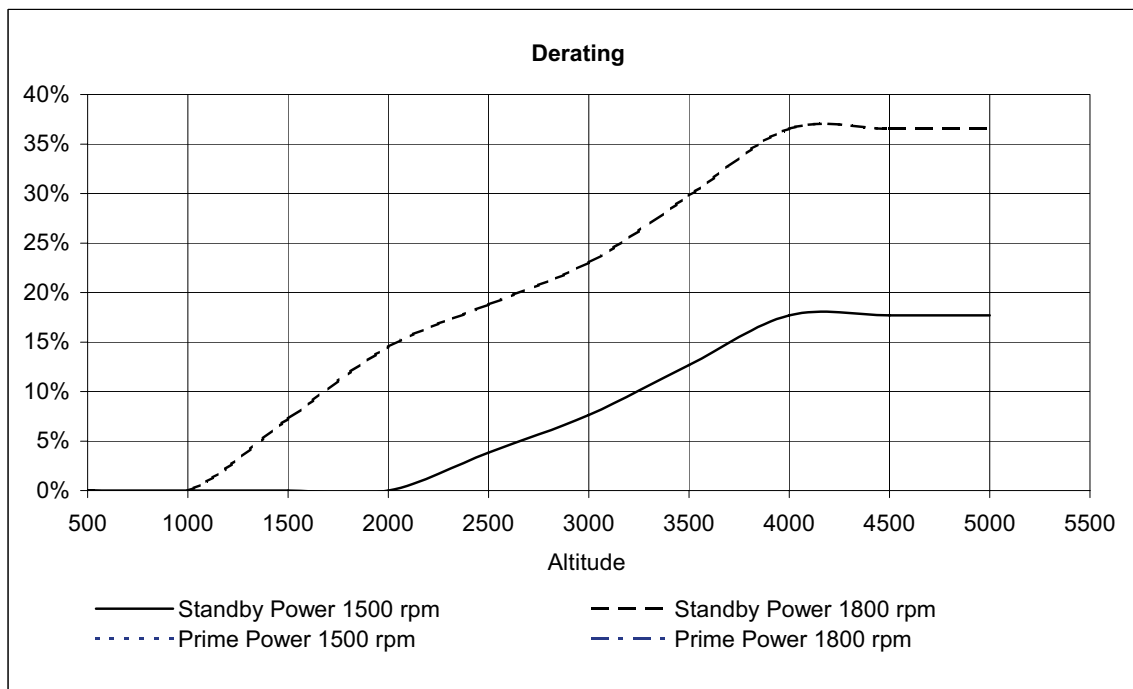
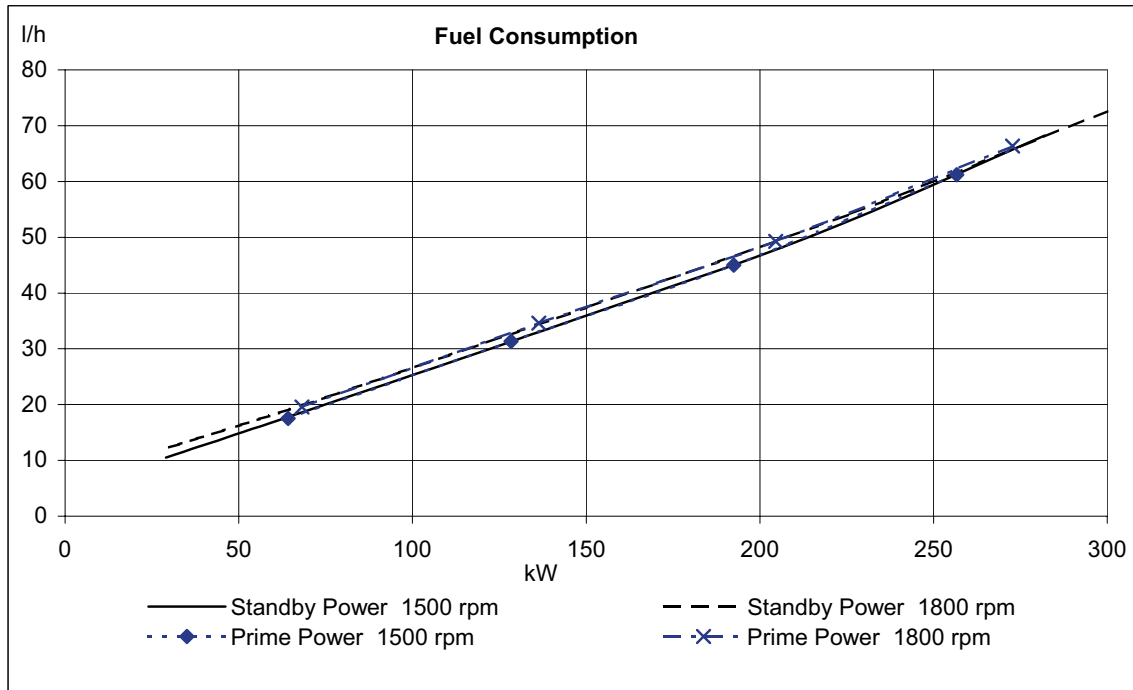
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