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 in^3	12,78 779,7
Firing order			1-5-3-6-2-4
Bore		mm in	131 5,16
Stroke		mm in	158 6,22
Compression ratio			18,1:1
Dry weight	Engine only, excluding cooling system	kg lb	1295 2855
	GenPac	kg lb	1715 3781
Wet weight	Engine only, excluding cooling system	kg lb	1325 2921
	GenPac	kg lb	1790 3946

Performance		**r/min**	**1500**	**1800**
Standby Power	without fan	kW hp	-	281 382
	with fan	kW hp	-	269 366
Prime Power	without fan	kW hp	-	257 350
	with fan	kW hp	-	245 333
Torque at:	Standby Power	Nm lbft	- -	1491 1099
	Prime Power	Nm lbft	- -	1363 1006
Mean piston speed		m/s ft/sec	- -	9,5 31,2
Effective mean pressure at:	Standby Power	MPa psi	-	1,5 213
Effective mean pressure at:	Prime Power	MPa psi	-	1,3 194
Max combustion pressure at:	Standby Power	MPa psi	-	12 1740
Max combustion pressure at:	Prime Power	MPa psi	-	11,2 1624
Total mass moment of inertia, J (mR^2)		kgm^2 $lbft^2$	3,43 81,5	
Degree of irregularity at:	Standby Power		-	1:113
Friction Power		kW hp	-	44 59,84

Derating NB! Describe derating according to engine control system's functionality.

Engine noise emission

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

Tolerance ± 0.75 dB(A)		r/min	1500	1800
Measured sound power Lw	No load	dB(A)	-	111,4
	Standby Power	dB(A)	-	114,2
	Prime Power	dB(A)	-	114
Calculated sound pressure Lp at 1 m	No load	dB(A)	-	
	Standby Power	dB(A)	-	
	Prime Power	dB(A)	-	

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m	r/min	1500	1800
Standby Power	dB(A)	-	117
Prime Power	dB(A)	-	116

Test conditions for load acceptance data

Warm engine.	**Generator**	**Model**	**Type of AVR**
	Stamford	HCI 444 F1	SX 440

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

UFRO : Std-setting 57 Hz / 400 V

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	1,1	1,1	0,4	0,8	20-100	4,8	6,5	1	1,2
0-40	1,8	2,0	1,4	1,3	40-100	5,3	5,6	1,7	2,3
0-60	2,7	3,0	1,1	1,1	60-100	2,0	3,4	1,0	1,7
0-70	3,1	3,3	1,3	1,4	70-100	1,5	1,7	1,1	0,7
0-98		7,2		1,2	98-100		0,2		0,3
0-100	6,1	8,9	1,1	2,1	75-100				
100-0	3,3	4,1	1,0	1,1					

Cold start performance			r/min	1500	1800
Time from start to no load speed at ambient temperature:	°C	20	s	-	5,2
		5	s	-	6,0
		-15*	s	-	9,5
Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	20	s	-	6,0
		5	s	-	6,5
		-15*	s	-	12,0

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

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo Penta	2000	12	10

Lubrication system			r/min	1500	1800
Lubricating oil consumption	Standby Power		litre/h US gal/h	-	0,04 0,011
	Prime Power		litre/h US gal/h	-	0,03 0,008
Oil system capacity including filters			litre US gal	36 9,5	
Oil sump capacity:		max	litre US gal	30 7,9	
		min	litre US gal	19 5,0	
Oil change intervals/specifications:	VDS3		h	600	
	VDS2		h	400	
			h	200	
Engine angularity limits:		front up	°	11	
		front down	°	11	
		side tilt	°	11	
Oil pressure at rated speed			kPa psi	370 - 520 54 - 75	
Oil pressure shut down switch setting			kPa psi	190-300 28-44	
Lubrication oil temperature in oil sump:		max	°C °F	130 266	
Oil filter micron size			µ	40	

* See also general section in the sales guide

Fuel system		r/min	1500	1800
Standby Power Specific fuel consumption at:	25%	g/kWh lb/hph	-	269 0,436
	50%	g/kWh lb/hph	-	223 0,361
	75%	g/kWh lb/hph	-	218 0,353
	100%	g/kWh lb/hph	-	214 0,347
Prime Power Specific fuel consumption at:	25%	g/kWh lb/hph	-	283 0,459
	50%	g/kWh lb/hph	-	230 0,373
	75%	g/kWh lb/hph	-	219 0,355
	100%	g/kWh lb/hph	-	216 0,350

Fuel system	r/min	1500	1800
Fuel to conform to	ASTM-D975-No1 and 2D JIS KK 2204, EN 590		
System supply flow at:	litre/h US gal/h	-	89,0 23,5
Fuel supply line max restriction	kPa psi	-	10,0 1,5
Fuel supply line max pressure, engine stopped	kPa psi	-	0,0
System return flow	litre/h US gal/h	-	18,0 4,8
Fuel return line max restriction	kPa psi	-	20,0 2,9
Maximum allowable inlet fuel temp	°C °F	-	60 140
Prefilter / Water separator micron size	µ	10	
Fuel filter micron size	µ	5	
Governor type/make, standard	Volvo / EMS 2.2		
Injection pump type/make	Delphi E3		

Intake and exhaust system			r/min	1500	1800
Air consumption at: (+25°C and 100kPa)	Standby Power		m^3/min cfm	-	23,8 840
	Prime Power		m^3/min cfm	-	22,5 795
Max allowable air intake restriction including piping			kPa psi	-	5 0,7
Air filter type			Single stage paper cartridge		
Air filter cleaning efficiency			%	99,85	
Heat rejection to exhaust at:		Standby Power	kW BTU/min	-	216 12284
		Prime Power	kW BTU/min	-	199 11317
Exhaust gas temperature after turbine at:		Standby Power	°C °F	-	440 824
		Prime Power	°C °F	-	430 806
Max allowable back pressure in exhaust line			kPa psi	-	10 1,5
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)		Standby Power	m^3/min cfm	-	54,6 1928
		Prime Power	m^3/min cfm	-	51,5 1819

Cooling system		r/min	1500	1800
Heat rejection radiation from engine at:	Standby Power	kW BTU/min	-	8 455
	Prime Power	kW BTU/min	-	7 398
Heat rejection to coolant at:	Standby Power	kW BTU/min	-	136 7734
	Prime Power	kW BTU/min	-	126 7165
Radiator cooling system type			Closed circuit	
Standard radiator core area		m² foot²	0,8 8,61	
Fan diameter		mm in	890 35,04	
Fan power consumption		kW hp	-	12 16
Fan drive ratio			0,84 : 1	
Coolant capacity,	engine	litre US gal	20 5,28	
	std radiator with hoses	litre US gal	24 6,34	
Coolant pump		drive/ratio	Belt / 1,43:1	
Coolant flow with standard system, outer circuit.		l/s US gal/s	-	5,5 1,45
Minimum coolant flow, outer circuit.		l/s US gal/s	-	5,0 1,32
Maximum outer circuit restriction, including piping		kPa psi	-	40 5,8
Thermostat	start to open	°C °F	82 180	
	fully open	°C °F	92 198	
Maximum static pressure head (expansion tank height + pressure cap setting)		kPa psi	100 14,5	
Minimum static pressure head (expansion tank height + pressure cap setting)		kPa psi	70 10,2	
Standard pressure cap setting		kPa psi	70 10,2	
Maximum top tank temperature		°C °F	107 225	
Draw down capacity	4% of cooling system capacity			

Charge air cooler system		r/min	1500	1800
Heat rejection to charge air cooler	Standby Power	kW	-	70
		BTU/min		3981
	Prime Power	kW	-	62
		BTU/min		3526
Charge air mass flow	Standby Power	kg/s	-	0,46
	Prime Power	kg/s	-	0,44
Charge air inlet temp. (Charge air temp after turbo compressor)	Standby Power	°C	-	189
		°F		372
	Prime Power	°C	-	177
		°F		351
Charge air outlet temp. (Charge air temp after intercooler) Std cooling system 0 kPA ext restriction. Air on Temp 33 °C	Standby Power	°C	-	44
		°F		111
	Prime Power	°C	-	42
		°F		108
Maximum pressure drop over charge air cooler incl. piping		kPa	7	
		psi	1,02	
Charge air pressure (After charge air cooler)		kPa	235	
		psi	34,08	
Standard charge air cooler core area		m²	0,89	
		foot²	9,58	

Cooling performance

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% antifreeze.
Based on normal atmosperic pressure 101,6 kPA (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow m3/s	External restriction Pa	Air flow m3/s	External restriction Pa
1800	45	3,4	1050	3,8	935
	50	3,7	955	4,2	820
	55	4,1	830	4,7	650
	60	4,7	645	5,4	395
	65			6,4	0
	68	6,4	0		

Note! Calculated values >0 Pa

Engine management system

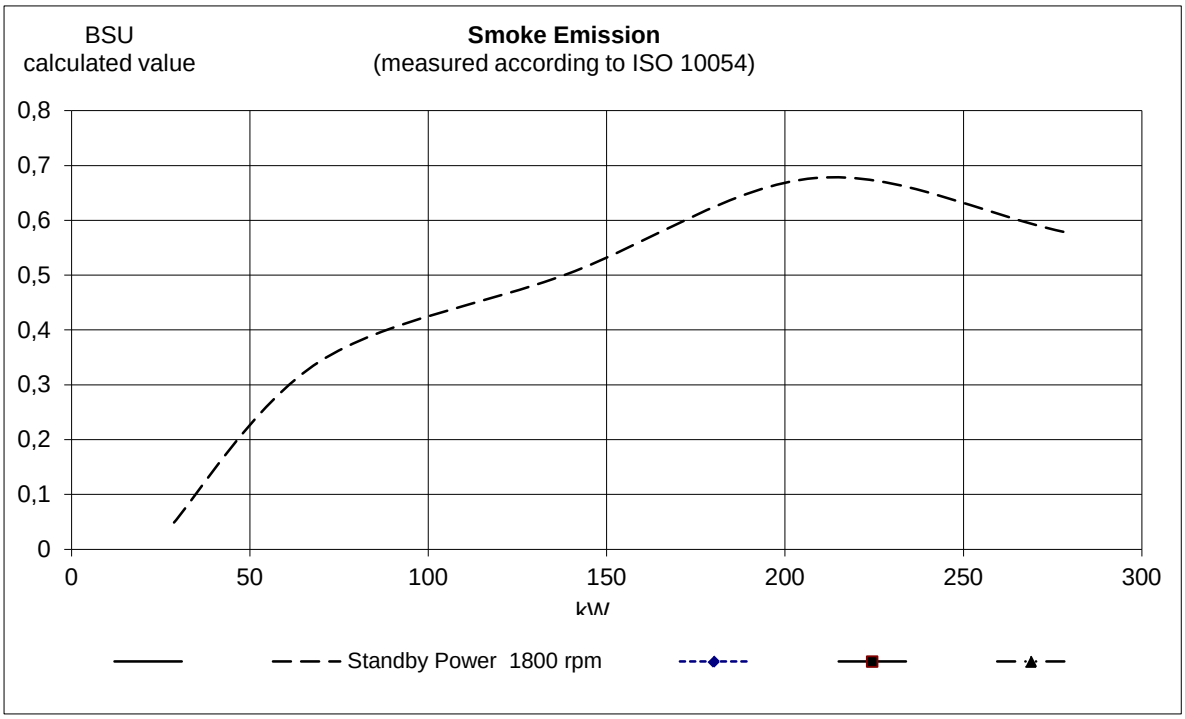
Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Isochronus
Governor droop	0-8 %	4%
Governor response	Adjustable PID-constants (VODIA)	Standard
Dual speed	NO	1800
Idle speed	600-1200	900
Fine speed adjustment	± 120	0
Stop function	Energized to Run / Stop	Energized to Stop
Preheating function	On / Off	On
Lamp test	On / Off	On

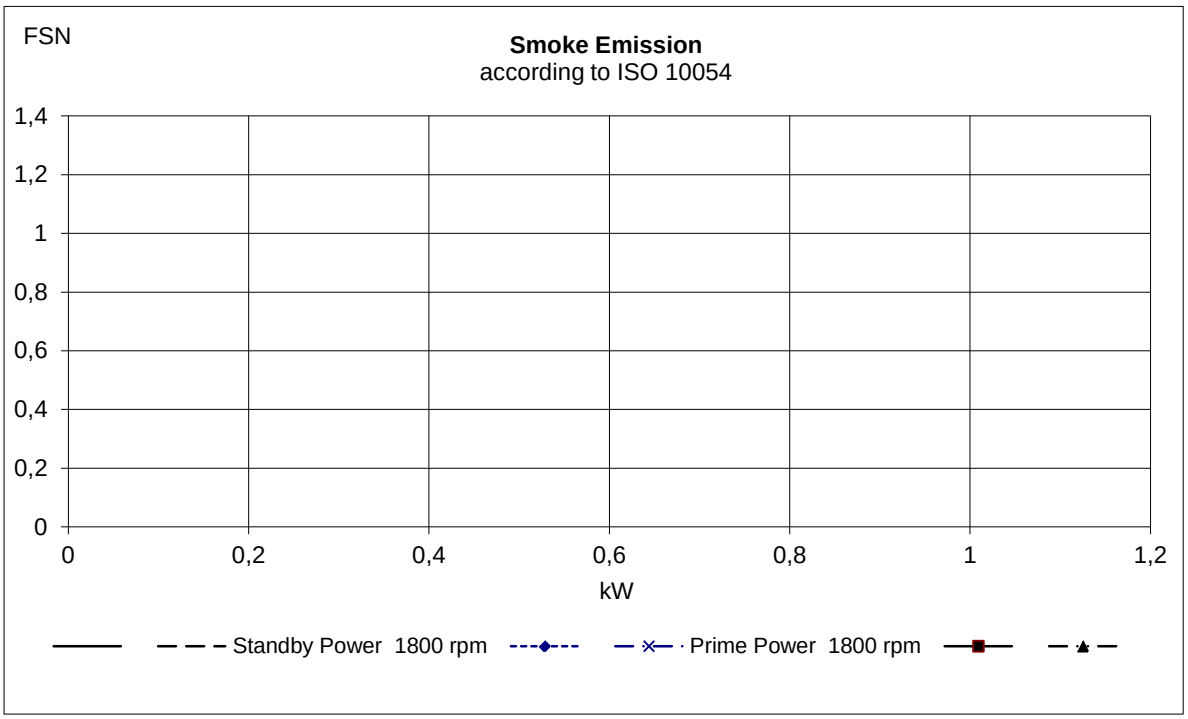
Engine protection			Alarm level		Engine protection	
Parameter		Unit	Setting range	Default setting	Level	Action. Default/Alternative
Oil temp		°C	120 - 130	125	Setting +5	Shut down. ON/OFF*
Oil pressure	Low idle	kPa	-	150	120	Shut down. ON/OFF*
	1800 rpm	kPa	-	300	270	Shut down. ON/OFF*
Oil level			-	Min level	-	-
Piston cooling pressure >1000 rpm		kPa	-	150	150	Shut down. ON/OFF*
Coolant temp		°C	95-103	102	Setting +5	Shut down. ON/OFF*
Coolant level			-	On	Low level	Shut down. ON/OFF*
Fuel feed pressure	Low idle	kPa	-	150	-	-
	>1400 rpm		-	300	-	-
Water in fuel			-	High level	-	-
Crank case pressure		kPa	-	Increased pressure	Increased pressure	Shut down. ON/OFF*
Air filter pressure droop		kPa	-	5	-	-
Altitude, above sea		m	-	-	-	Automatic derating, see section derating
Charge air temp		°C	-	80	85	Shut down. ON/OFF*
Charge air pressure		kPa	-	310	320	Shut down. ON/OFF*
Engine speed		rpm	100 - 120% of rated speed	120%	Alarm level	Shut down. ON/OFF*

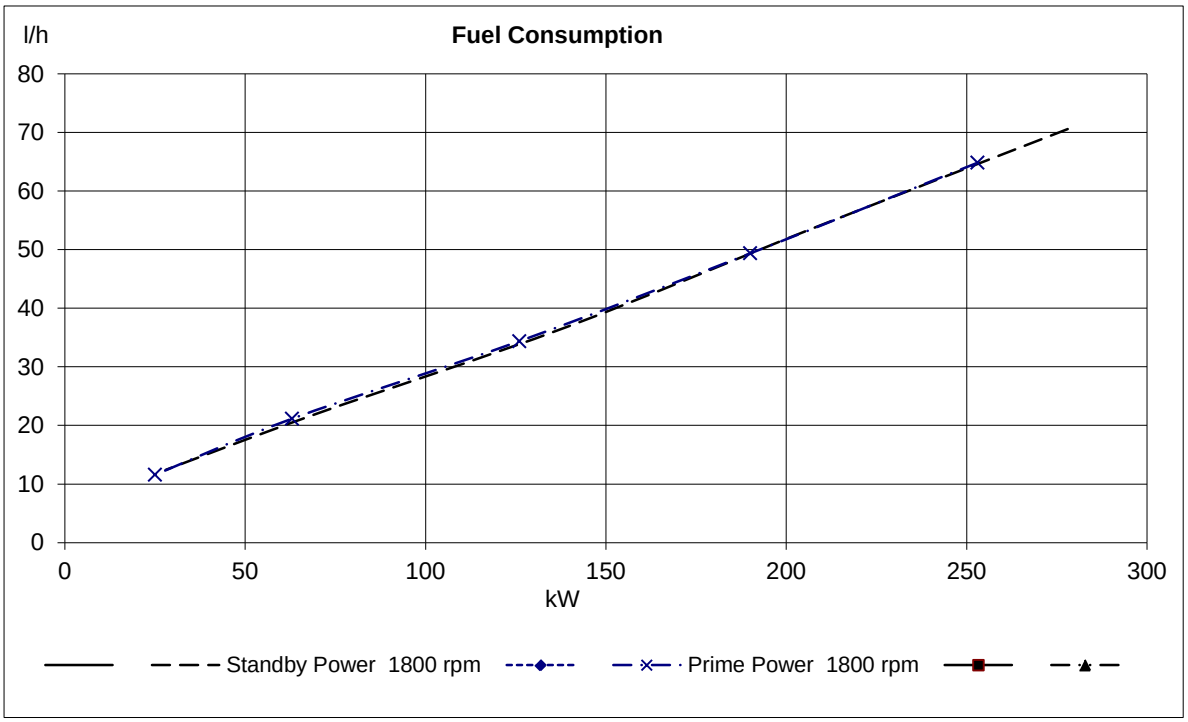
* Off means no shut down, alarm only

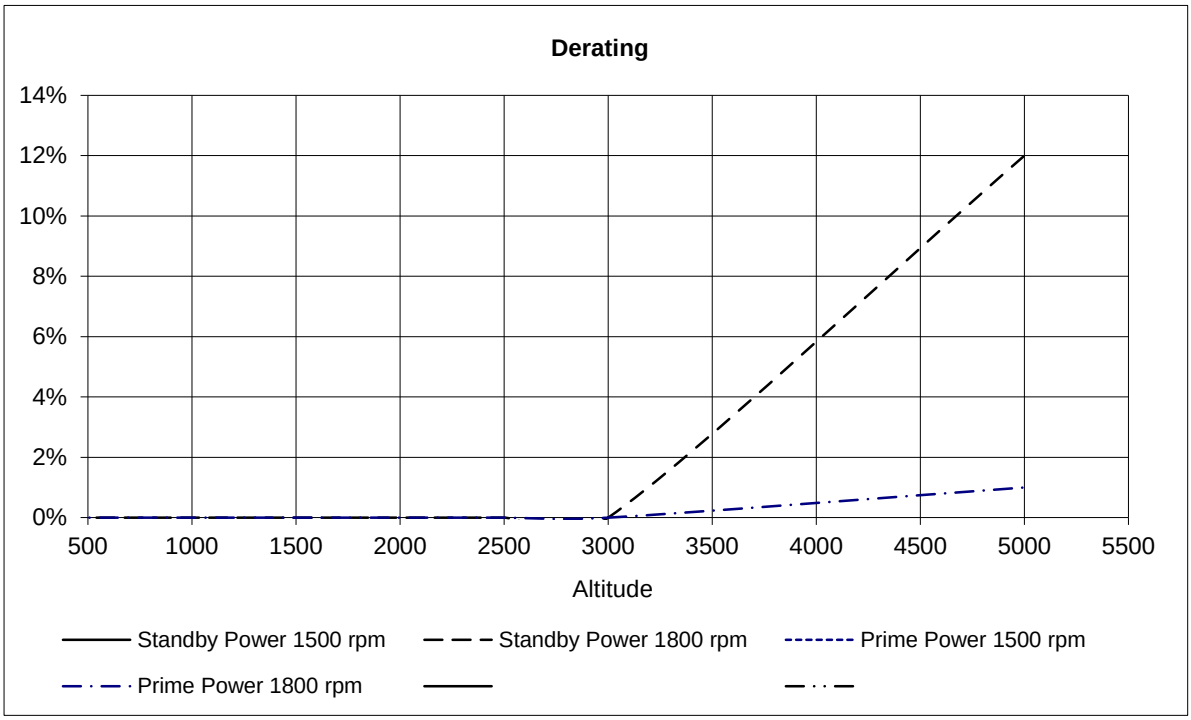
Electrical system		r/min	1500	1800
Voltage and type			24V / insulated from earth	
Alternator:	make/output	Amp	Bosch / 80	
	tacho output	Hz/alt. Rev	6	
	drive ratio		5,3 : 1	
Starter motor		make	Melco	
		type	105 P70	
		kW	7,0	
Number of teeth on:	flywheel		153	
	starter motor		12	
Max wiring resistance main circuit		mΩ	2	
Cranking current at +20°C		Amp	280	
Crank engine speed at 20°C		rpm	155	
Starter motor battery capacity:	max	Ah/A	2x225	
	min at +5°C	Ah/A	-	
Inlet manifold heater (at 20 V)		kW	4,0	
Power relay for the manifold heater		Amp	1	

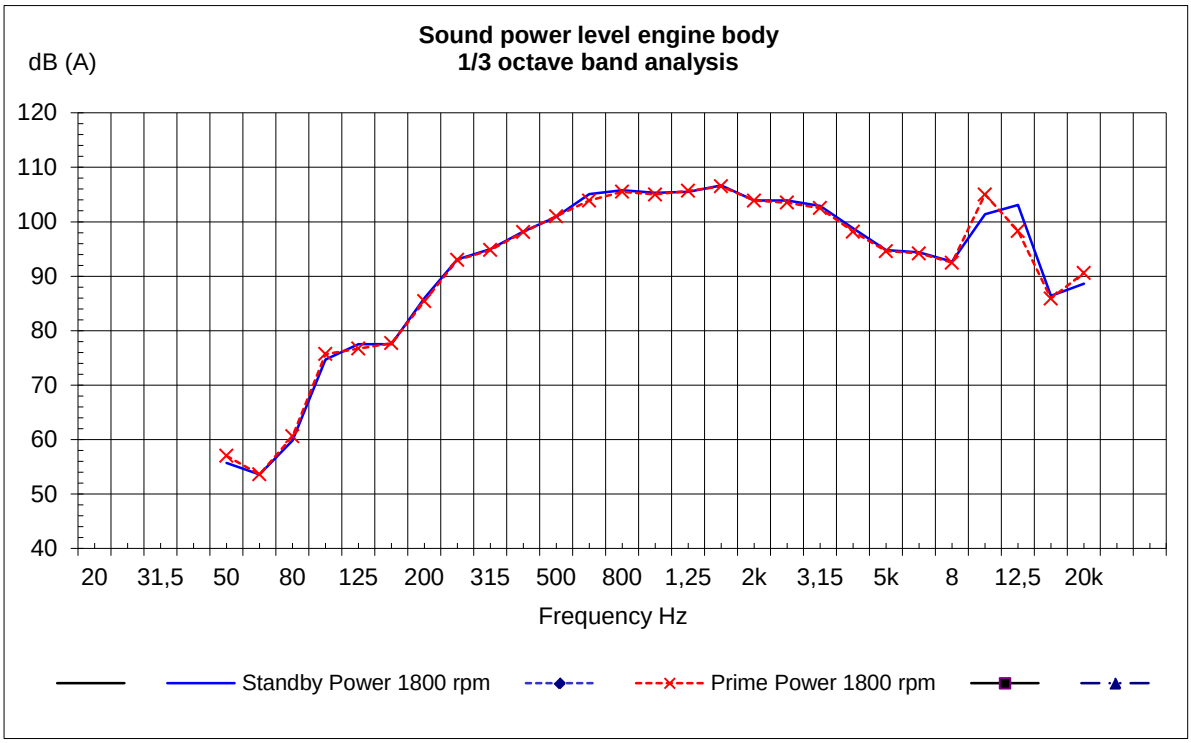
Power take off		r/min	1500	1800
Front end in line with crank shaft max:		Nm	-	
		lbft	-	
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	-	-
		hp	-	-
	max down	kW	-	-
		hp	-	-
	max right	kW	-	-
		hp	-	-
Timing gear at compressor PTO max:		Nm	160	
		lbft	118	
Speed ratio direction of rotation viewed from flywheel side			1.31:1/ccw	
Timing gear at servo pump PTO max:		Nm	100	
		lbft	74	
Speed ratio direction of rotation viewed from flywheel side			1.75:1/ccw	
Max allowed bending moment in flywheel housing		Nm	15000	
		lbft	11063	
Max. rear main bearing load		N	4000	
		lbf	899,2	

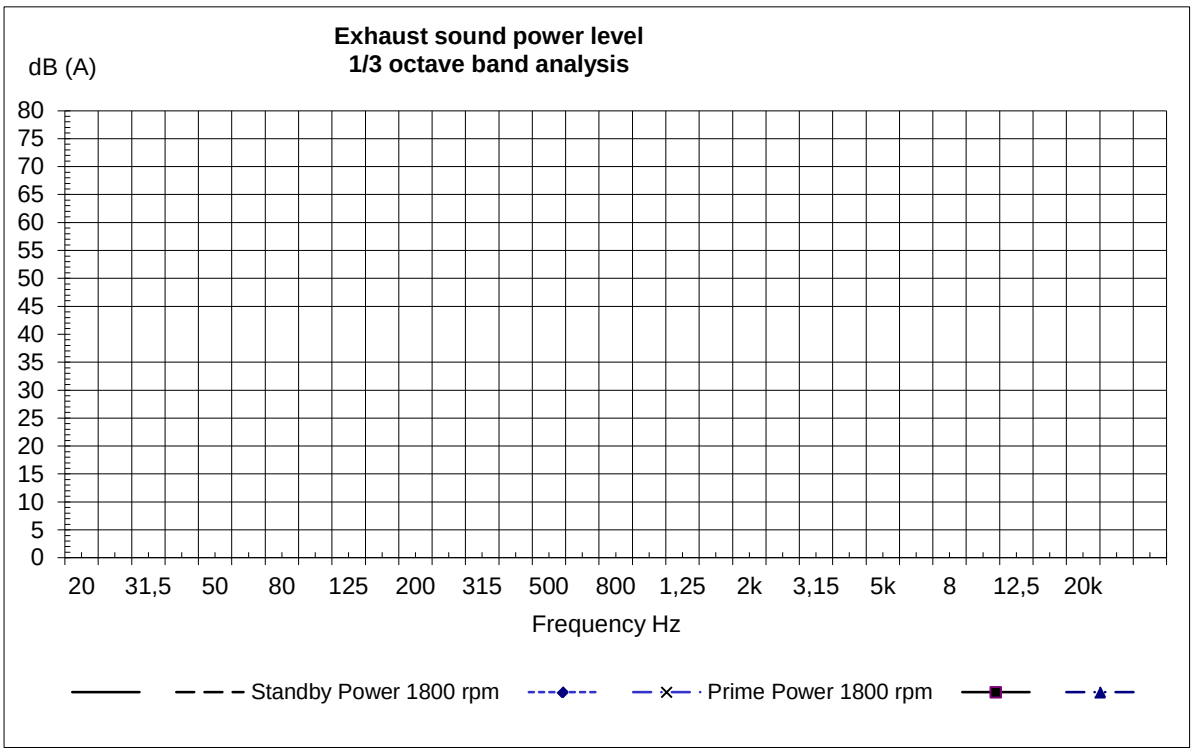

BSU
calculated value
Smoke Emission
(measured according to ISO 10054)
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
0
50
100
150
200
250
300
kW
Standby Power 1800 rpm

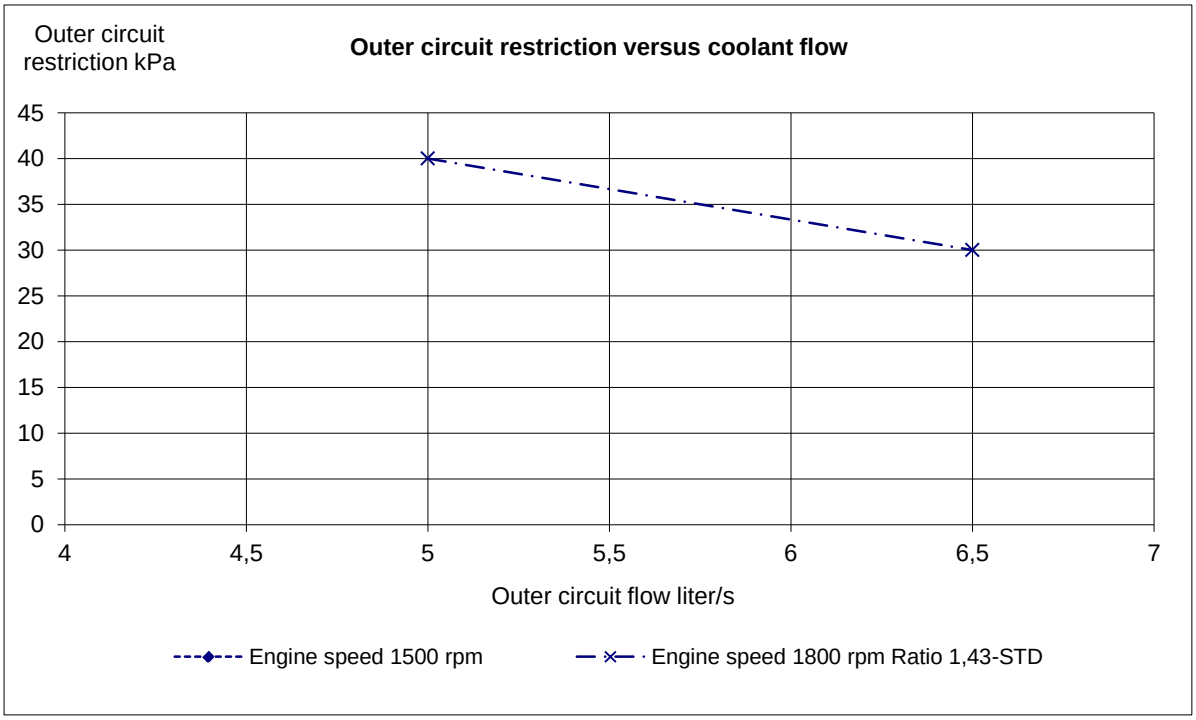

FSN
Smoke Emission
according to ISO 10054
1,4
1,2
1
0,8
0,6
0,4
0,2
0
0
0,2
0,4
0,6
0,8
1
1,2
kW
Standby Power 1800 rpm
Prime Power 1800 rpm

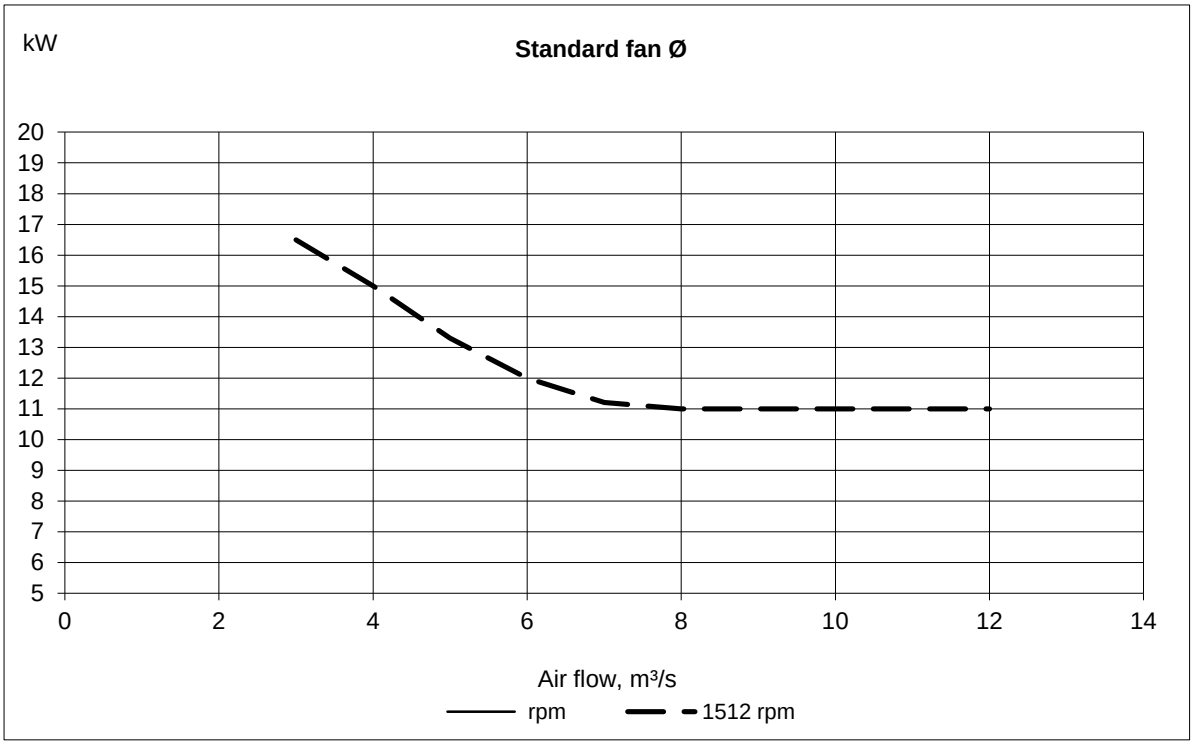

Fuel Consumption
l/h
80
70
60
50
40
30
20
10
0
0
50
100
150
200
250
300
kW
Standby Power 1800 rpm
Prime Power 1800 rpm


Derating
14%
12%
10%
8%
6%
4%
2%
0%
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
Altitude
Standby Power 1500 rpm
Standby Power 1800 rpm
Prime Power 1500 rpm
Prime Power 1800 rpm

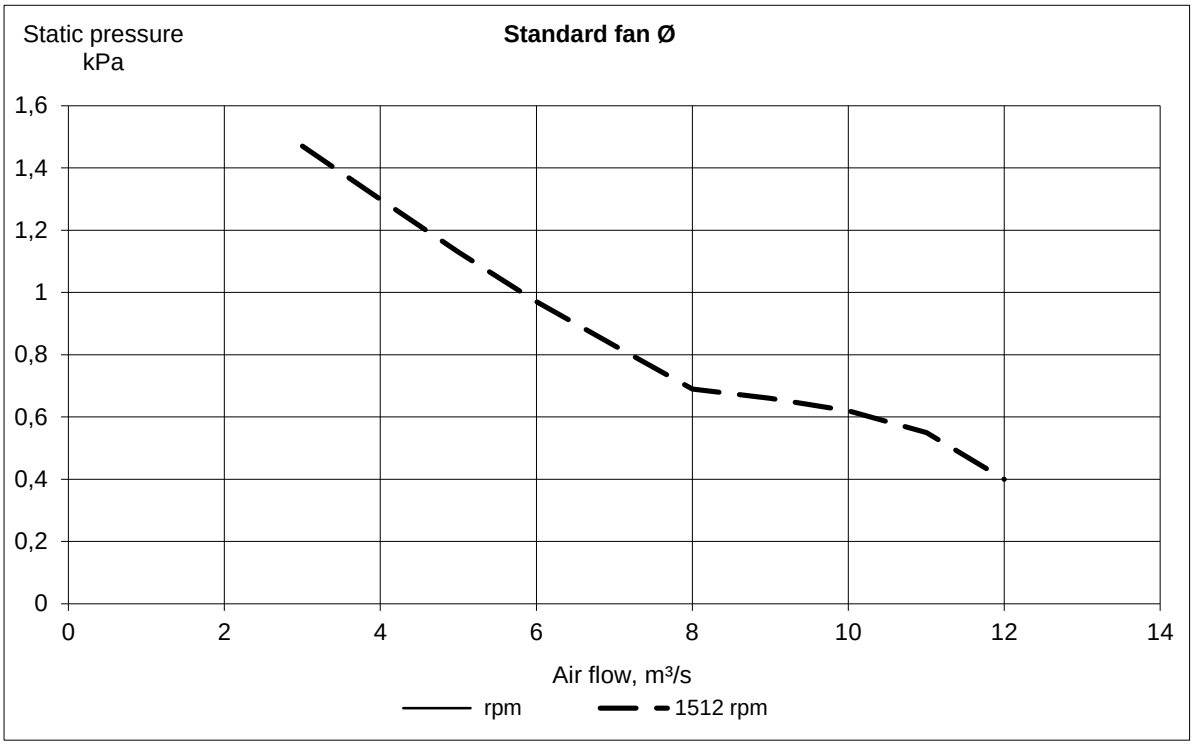

Sound power level engine body
1/3 octave band analysis
dB (A)
120
110
100
90
80
70
60
50
40
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
Standby Power 1800 rpm
Prime Power 1800 rpm


Exhaust sound power level
1/3 octave band analysis
dB (A)
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
Standby Power 1800 rpm
Prime Power 1800 rpm

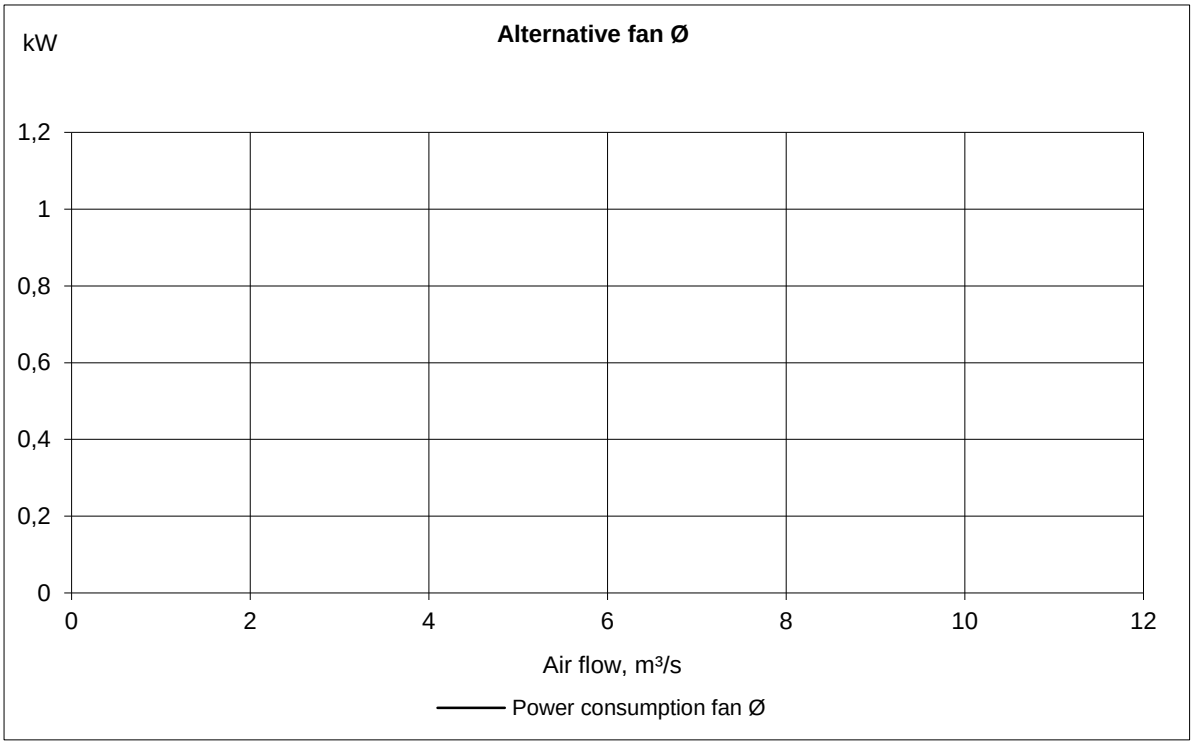

Outer circuit restriction kPa
Outer circuit restriction versus coolant flow
45
40
35
30
25
20
15
10
5
0
4
4,5
5
5,5
6
6,5
7
Outer circuit flow liter/s
Engine speed 1500 rpm
Engine speed 1800 rpm Ratio 1,43-STD

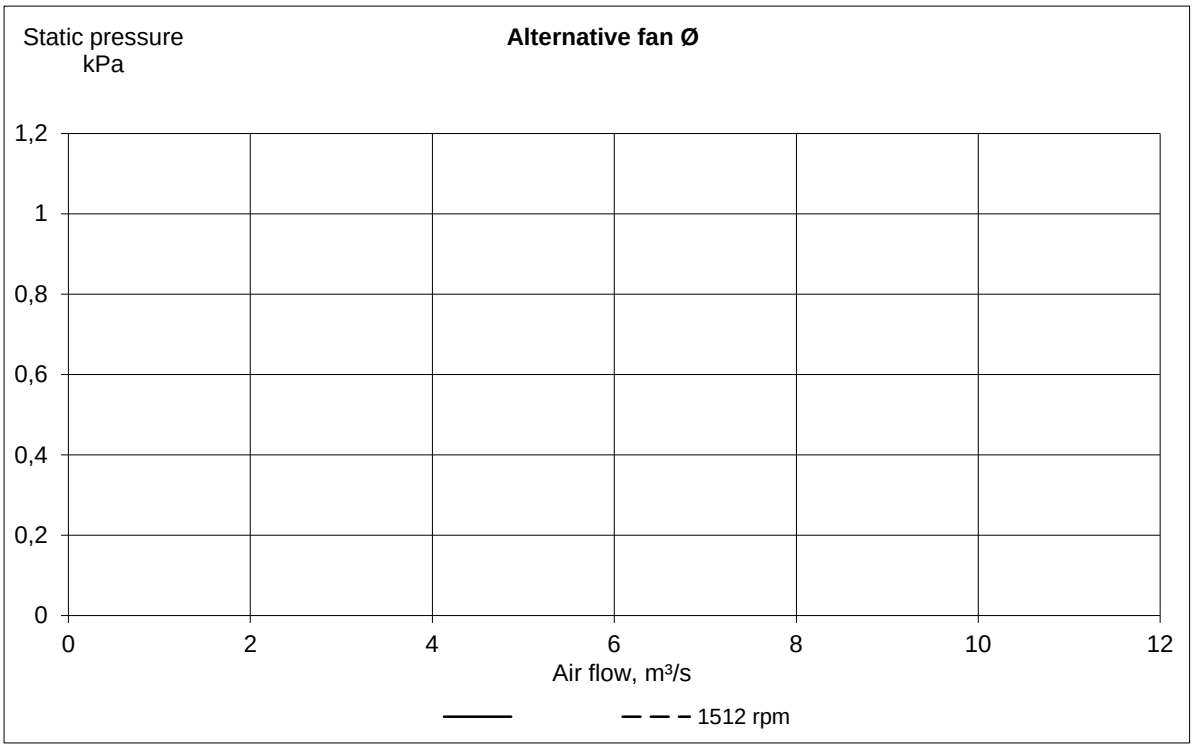


Fan characteristic according to fan supplier testrig



Fan characteristic according to fan supplier testrig


Alternative fan Ø
kW
1,2
1
0,8
0,6
0,4
0,2
0
0
2
4
6
8
10
12
Air flow, m³/s
Power consumption fan Ø


Static pressure
kPa
Alternative fan Ø
1,2
1
0,8
0,6
0,4
0,2
0
0
2
4
6
8
10
12
Air flow, m³/s
1512 rpm