


Important

This Technical Data Sheet and the corresponding Installation Instructions provide important information to ensure the installed engine will operate according to the design specification in the Volvo Penta application for certification.

Requirements marked with  are considered as critical for exhaust emissions compliance according to the design specification in the Volvo Penta application for certification.

Failing to follow and meet these instructions and requirements when installing a certified engine in a piece of nonroad equipment for use in the United States violates U.S. federal law (40 CFR 1068.105(b)), subject to fines or other penalties as described in the Clean Air Act.

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	7,70
		in ³	469,7
Firing order			1-4-2-6-3-5
Bore		mm	110
		in	4,33
Stroke		mm	135
		in	5,31
Compression ratio			17,5:1
Wet weight (Not including after treatment system)	Engine only	kg	707
		lb	1559
	Engine incl. cooling system and air filtration system	kg	917
		lb	2022
	Engine incl. cooling system, air filtration system, and frame	kg	917
		lb	2022

Performance

			rpm	1500	1800
Prime Power	without fan	kW		227	236
		hp		309	321
	with fan	kW		220	225
		hp		299	306
Standby Power	without fan	kW		249	259
		hp		339	352
	with fan	kW		242	248
		hp		329	337
Torque at:	Prime Power	Nm		1445	1252
		lbft		1066	923
	Standby Power	Nm		1585	1374
		lbft		1169	1013
Power tolerance		%	+X / -Y		
Mean piston speed		m/s		6,8	8,1
		ft/sec		22,2	26,6
Effective mean pressure at:	Prime Power	MPa		2,4	2,0
		psi		342	296
Effective mean pressure at:	Standby Power	MPa		2,6	2,2
		psi		375	325
Max combustion pressure at:	Prime Power	MPa		15,6	15,2
		psi		2263	2205
Max combustion pressure at:	Standby Power	MPa		17	17,2
		psi		2466	2495
Total mass moment of inertia, J (mR ²)		kgm ²		0,42	
		lbft ²		10,0	
Friction Power		kW		18	25
		hp		24,48	34
Derating due to altitude - see Technical Diagrams					

Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power

 Tolerance ± 0.75 dB(A)

			rpm	1500	1800
Measured sound power Lw	No load	dB(A)			
	Prime Power	dB(A)			
	Standby Power	dB(A)			
Calculated sound pressure Lp at 1 m	No load	dB(A)			
	Prime Power	dB(A)			
	Standby Power	dB(A)			

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m

			rpm	1500	1800
Prime Power		dB(A)			
Standby Power		dB(A)			

Test conditions for load acceptance data

Warm engine.	Generator	Model	Type of AVR
	Leroy Somer	LSA 46.2L6 C 6/4	AS440
AVR Settings	UFRO (Hz):	47/57	DIP (%)*: std
	Stability (%)*:	std	Voltage (V): 400
			DWELL (%)*: std
			Load factor: 1.0

Applies to Stamford nomenclature,

(%)* : % of max potentiometer setting range

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

Abbreviation:	Full name:	Descriptions
AVR	Automatic Voltage Regulator	Generator performance and safty control unit
UFRO	Under Frequency Roll Off	Overheating protection at under frequency
DIP		Controls the slope of voltage drop when the UFRO is active
DWELL		Controls the slope of voltage recovery when the UFRO is active.

Single step load performance at 1500 rpm - PRIME (Resistiv load)

Load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)	Remaining load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)
0-20	2,3	0,9	0,9	0,0	20-100	17,1	2,3	15,6	1,5
0-40	4,5	1,1	1,8	0,4	40-100	8,5	1,7	2,5	0,6
0-60	8,2	1,7	2,1	0,8	60-100	4,3	1,1	1,5	0,1
0-55	7 (G3)	1,2	1,4	0,2	55-100	4,7	1,1	1,6	0,1
0-59	10 (G2)	1,9	5,1	1,2	59-100	4,3	1,1	1,5	0,1
0-80*	18,9	2,7	19,4	1,7	80-100	2,2	0,7	0,5	0,0
0-100*	33,3	2,7	37,3	2,1					
100-0	18,6	1,3	9,1	0,4					

Single step load performance at 1500 rpm - STAND BY (Resistiv load)

Load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)	Remaining load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)
0-20	2,3	0,9	0,9	0,0	20-100	22,2	2,5	22,7	1,6
0-40	5,1	1,1	1,8	0,4	40-100	11,1	2,2	6,6	1,0
0-60	11,6	2,3	8,0	1,2	60-100	4,3	1,1	1,6	0,1
0-50	7 (G3)	1,3	2,0	0,1	50-100	6,0	1,5	2,1	0,2
0-59	10 (G2)	2,1	6,6	1,2	59-100	4,9	1,2	2,0	0,2
0-80*	25,5	2,5	28,5	1,9	80-100	2,6	0,8	0,6	0,0
0-100*	43,9	3,4	46,7	2,7					
100-0	21,7	1,5	12,3	0,7					

Single step load performance at 1800 rpm - PRIME (Resistiv load)

Load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)	Remaining load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)
0-20	1,4	0,4	0,7	0,0	20-100	7,6	1,9	3,8	0,8
0-40	3,0	1,1	1,2	0,3	40-100	3,9	1,1	1,6	0,3
0-60	4,1	1,0	1,8	0,3	60-100	3,1	0,9	1,1	0,1
0-75	7 (G3)	1,6	3,0	0,8	75-100	1,9	0,7	0,6	0,0
0-87	10 (G2)	2,2	7,1	1,0	87-100	1,2	0,1	0,1	0,0
0-80*	8,4	2,1	5,0	1,0	80-100	1,5	0,5	0,3	0,0
0-100*	14,4	2,3	14,3	1,4					
100-0	13,5	0,7	4,8	0,6					

Single step load performance at 1800 rpm - STAND BY (Resistiv load)

Load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)	Remaining load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)
0-20	1,8	0,6	1,2	0,0	20-100	8,0	1,9	4,8	9,4
0-40	3,0	1,1	1,7	0,4	40-100	5,2	1,4	1,9	0,4
0-60	4,7	1,1	1,9	0,5	60-100	3,0	0,9	1,3	0,1
0-68	7 (G3)	1,6	3,0	0,8	68-100	2,8	0,9	0,9	0,0
0-79	10 (G2)	2,2	7,1	1,0	79-100	1,9	0,6	0,6	0,0
0-80*	10,2	2,0	8,1	1,2	80-100	1,6	0,5	0,4	0,0
0-100*	17,3	2,3	18,7	1,6					
100-0	12,9	1,0	6,2	0,7					

Cold start performance

		rpm	1500	1800	
Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	20	s	4,4	4,3
		5	s	4,8	4,5
		-15 *	s	6,7	7,0
		-30 **	s	4,5	5,8
		Min start temp*	°C	-34,0	

* With manifold heater 4 kW engaged, lubrication oil 5W/30.

** With manifold heater 4 kW engaged, lubrication oil 5W/30 and block heater, Fuel MK-1.

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
Part No: 23383705	Calix	1,5	15h, ambient temp -32°C	18°C

Lubrication system




		rpm	1500	1800
Lubricating oil consumption	Prime Power	litre/h	0,02	0,02
		US gal/h	0,005	0,005
	Standby Power	litre/h	0,02	0,02
		US gal/h	0,005	0,006
Oil system capacity including filters		litre	27	
		US gal	7,1	
Oil sump capacity:	max	litre	24	
		US gal	6,3	
	min	litre	19	
		US gal	5,0	
Oil change intervals/specifications:	VDS 3 , VDS 4.5		h	500
	With oil analysis VDS 3 , VDS 4.5		h	1000
			h	
Engine angularity limits:	front up	°	35	
	front down	°	35	
	side tilt	°	35	
Oil pressure at rated speed		kPa	385	
		psi	56	
Lubrication oil temperature in oil sump:	max	°C		
		°F		
Oil filter micron size		μ	5	

* See also general section in the sales guide

Fuel system		rpm	1500	1800
Prime Power				
Specific fuel consumption at:	25%	g/kWh lb/hph	227 0,368	244 0,396
	50%	g/kWh lb/hph	202 0,327	211 0,342
	75%	g/kWh lb/hph	201 0,326	208 0,337
	100%	g/kWh lb/hph	200 0,324	207 0,336
% adBlue consumption at: (Compare to Fuel consumption by Volyme)	25%	%	N/A	
	50%	%	N/A	
	75%	%	N/A	
	100%	%	N/A	
Standby Power				
Specific fuel consumption at:	25%	g/kWh lb/hph	223 0,361	236 0,383
	50%	g/kWh lb/hph	201 0,326	208 0,337
	75%	g/kWh lb/hph	200 0,324	208 0,337
	100%	g/kWh lb/hph	203 0,329	205 0,332
% adBlue consumption at: (Compare to Fuel consumption by Volyme)	25%	%	N/A	
	50%	%	N/A	
	75%	%	N/A	
	100%	%	N/A	

Fuel system		rpm	1500	1800
Fuel to conform to	EU EN590US D975, 1-D and 2-D (Max 300ppm sulphur and 7% FAME) For further information, see service bulletin 18-8-8			
System supply flow at:	litre/h US gal/h			
Fuel supply line max restriction (Measured at fuel inlet connection)	kPa psi	10,0 1,5	10,0 1,5	
Fuel supply line max pressure, engine stopped	kPa psi	20,0 2,9	20,0 2,9	
System return flow	litre/h US gal/h			
Fuel return line max restriction (Measured at fuel return connection)	kPa psi	15,0 2,2	15,0 2,2	
Maximum allowable inlet fuel temp (Measured at fuel inlet connection)	°C °F	80 176	80 176	
Prefilter / Water separator micron size	μ	30		
Fuel filter micron size	μ	5		
Governor type/make, standard	Volvo / EMS 2.3			
Injection pump type/make	Denso HP4			



Intake and exhaust system

			rpm	1500	1800
Air consumption at: (+25°C and 100kPa)	Prime Power		m ³ /min cfm	15 530	17 600
	Standby Power		m ³ /min cfm	0,31 11	0,34 12
 See front page for important information Max allowable air intake restriction including piping			kPa psi	5 0,7	5 0,7
			kPa psi	3,0 0,4	3,0 0,4
Air filter restriction clean Volvo Penta filter			kPa psi	3,0 0,4	3,0 0,4
Heat rejection to exhaust at:	Prime Power		kW BTU/min	150 8530	174 9895
	Standby Power		kW BTU/min	173 9838	192 10919
Exhaust gas temperature after turbine at:	Prime Power		°C °F	488 910	501 934
	Standby Power		°C °F	536 997	539 1002
 See front page for important information Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 127 mm			kPa psi	8 1,2	8 1,2
			kPa psi	10 1,5	10 1,5
 See front page for important information Max allowable temperature drop between turbine and SCR muffler inlet.			Δ°C Δ°F		
			Δ°C Δ°F		
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)	Prime Power		kPa psi		
	Standby Power		kPa psi		
Pre-catalyst pressure drop	Prime Power		kPa psi		
	Standby Power		kPa psi		
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	Prime Power		m ³ /min cfm		
	Standby Power		m ³ /min cfm		

Cooling system


			rpm	1500	1800
Heat rejection radiation from engine at:	Prime Power	kW			
		BTU/min			
	Standby Power	kW			
		BTU/min			
Heat rejection to coolant at:	Prime Power	kW	104	109	
		BTU/min	5914	6199	
	Standby Power	kW	120	120	
		BTU/min	6824	6824	
Radiator cooling system type		Closed circuit			
Standard radiator core area		m ²	0,6		
		foot ²	6,46		
Fan diameter		mm	650		
		in	25,59		
Fan power consumption		kW	7	11	
		hp	10	15	
Fan drive ratio			1.4:1		
Coolant capacity,	engine	litre	17		
		US gal	4,49		
	engine with std radiator and hoses	litre	51		
		US gal	13,47		
Coolant pump		drive/ratio	belt 1.4:1		
Coolant flow with standard system		l/s	5,4	6,5	
		US gal/s	1,43	1,72	
Minimum coolant flow		l/s			
		US gal/s			
Maximum outer circuit restriction, including piping		kPa	40	40	
		psi	5,8	5,8	
Thermostat	start to open	°C	85		
		°F	185		
	fully open	°C	95		
		°F	203		
Maximum static pressure head (expansion tank height + pressure cap setting)		kPa	110		
		psi	16,0		
Minimum static pressure head (expansion tank height + pressure cap setting)		kPa	85		
		psi	12,3		
Standard pressure cap setting		kPa	100		
		psi	14,5		
Maximum top tank temperature		°C	107		
		°F	225		
Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still is functioning		litre	2		
		US gal	0,53		

Charge air cooler system

		rpm	1500	1800
Heat rejection to charge air cooler	Prime Power	kW	39	41
		BTU/min	2218	2332
	Standby Power	kW	42	43
		BTU/min	2388	2445
Charge air mass flow	Prime Power	kg/s	0,29	0,33
	Standby Power	kg/s	0,31	0,34
Charge air inlet temp. (Charge air temp after turbo compressor)	Prime Power	°C	175	168
		°F	347	334
	Standby Power	°C	181	172
		°F	358	342
 See front page for important information				
Max allowable Charge air outlet temp. (Charge air temp after intercooler)	Prime Power	°C	47	47
		°F	117	117
	Standby Power	°C	47	47
		°F	117	117
 See front page for important information				
Maximum pressure drop over charge air cooler incl. piping		kPa psi		
Charge air pressure (After charge air cooler)	kPa	216	193	
	psi	31,33	27,99	
Standard charge air cooler core area	m ²	0,5		
	foot ²	5,38		

Cooling system

rpm 1500 1800

Heat rejection radiation from engine at:	#REF!	kW		
	#REF!	BTU/min		
Radiator cooling system type	#REF!	kW		
	#REF!	BTU/min		
Standard radiator core area		Closed circuit		
Fan diameter		m ²		
Fan power consumption		foot ²		
Fan drive ratio		mm		
Coolant capacity,	engine only	in		
	charge air coolers	kW		
	coolant radiators incl piping	hp		
	expansion tank	litre		
Coolant pump		US gal		
Thermostat	start to open	drive/ratio		
	fully open	°C		
Maximum static pressure head (expansion tank height + pressure cap setting)		°F		
Minimum static pressure head (expansion tank height + pressure cap setting)		°C		
Standard pressure cap setting		°F		
Maximum top tank temperature		kPa		
Charge air pressure (after charge air coolers)		psi		
				
See front page for important information				
Max allowable Charge air outlet temp. (Charge air temp after intercooler)	Prime Power	°C		
	Standby Power	°F		
		°C		
		°F		

OEM cooling system design:
- move of standard radiators

		rpm	1500	1800
Maximum additional coolant with standard expansion tank	litre			
	US gal			
Maximum distans in vertikal direction with standard pressure cap (75 kPa)	m			
	ft			
Maximum additional presssure drop due to move	KPa			
	psi			

- replacement of standard radiators

Heat rejection to coolant engine radiator at:	Prime Power	kW		
		BTU/min		
	Standby Power	kW		
		BTU/min		
Heat rejection to coolant CAC radiator at:	Prime Power	kW		
		BTU/min		
	Standby Power	kW		
		BTU/min		
Minimum coolant flow engine radiator (at fully open thermostat)	litre/s			
	US gal/s			
Minimum coolant flow CAC radiator (at fully open thermostat)	litre/s			
	US gal/s			
Maximum coolant pressure drop over engine radiator incl. Piping (at coolant flow above)	kPa			
	psi			
Maximum coolant pressure drop over CAC radiator incl. Piping (at coolant flow above)	kPa			
	psi			
Maximum coolant pressure drop over complete cooling system	kPa			
	psi			
Nominal coolant pressure	kPa			
	psi			

OEM cooling system design: 2-circuit system
- engine coolant circuit

		rpm	1500	1800
Heat rejection to coolant engine coolant circuit:	Prime Power	kW		
		BTU/min		
	Standby Power	kW		
		BTU/min		
Min coolant flow engine coolant circuit (at fully open thermostat)	litre/s			
	US gal/s			
Maximum coolant temperature entering engine	°C			
	F			
Maximum external engine coolant circuit restriction, including piping	kPa			
	psi			
Nominal coolant pressure	kPa			
	psi			

- charge air cooler (CAC) coolant circuit

Heat rejection to coolant CAC coolant circuit:	Prime Power	kW		
		BTU/min		
	Standby Power	kW		
		BTU/min		
Minimum coolant flow CAC coolant circuit:	litre/s			
	US gal/s			
Maximum coolant temperature entering CAC (at air inlet temperature 25°C)	°C			
	F			
Coolant pressure drop over charge air coolers (at Minimum coolant flow CAC coolant circuit above)	kPa			
	psi			
Nominal CAC coolant pressure	kPa			
	psi			

Cooling performance

Standard fan: Fan ratio: 1 : 0,99 Fan type: FIX

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% antifreeze. Valid at 1 atm. (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow m ³ /s	External restriction Pa	Air flow m ³ /s	External restriction Pa
1500	40				
	50				
	55				
	x x		0		
1800	40				
	50				
	x				
	x		0		

Note! External restrictions are calculated for values >0 Pa

Optional fan: Fan ratio: 1 : 0,83 Fan type: FIX

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% antifreeze. Valid at 1 atm. (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow m ³ /s	External restriction Pa	Air flow m ³ /s	External restriction Pa
1500	40				
	50				
	55				
	x x		0		
1800	40				
	50				
	x				
	x		0		

Note! External restrictions are calculated for values >0 Pa

Optional fan: Fan ratio: 1 : 1,4 Fan type: VISCO

Cooling air flow and external restriction at different radiator air temperatures based on °C TTT and % antifreeze. Valid at 1 atm. (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow m ³ /s	External restriction Pa	Air flow m ³ /s	External restriction Pa
1500	53			3,8	450
	58			4,4	300
	62			4,9	150
	64			5,4	0
	60	3,8	450		
	64	4,4	300		
	67	4,9	150		
70	5,4	0			
1800	60			4,6	450
	63			5,1	300
	66			5,5	150
	67			6,0	0
	64	4,6	450		
	67	5,1	300		
	69	5,5	150		
71	6,0	0			

Note! External restrictions are calculated for values >0 Pa

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Isochronus
Governor droop	0-8%	0,0
Governor response	Adjustable PID-constants (VODIA)	Standard
Dual speed	YES	1500 or 1800
Idle speed	600-1200	900,0
Fine speed adjustment	± 90	0,0
Stop function	Energized to Run / Stop	Energized to Run / Stop
Preheating function	On / Off	Off

Engine sensor and switch settings

Parameter	Unit	Alarm level		Engine protection		
		Setting range	Default setting	Level	Action. Default/Alternative	
Oil temp	°C	N/A	125	130,0	Shut down.	
Oil pressure	900 rpm	kPa	N/A	201	226,0	Shut down
	1500 rpm	kPa	N/A	283	308,0	Shut down
	1800 rpm	kPa	N/A	313	338,0	Shut down
Oil level			Min Level			
Piston cooling pressure >1000 rpm	kPa	N/A	N/A	N/A	N/A	
Coolant temp	°C	N/A	103	107	Shut down.	
Coolant level			Low level	N/A	N/A	
Fuel feed pressure	Low idle	kPa	N/A	N/A	N/A	
	>1400 rpm		N/A	N/A	N/A	
Water in fuel		N/A	On	N/A	N/A	
Crank case pressure	kPa	N/A	N/A	N/A	N/A	
Air filter pressure droop	kPa	N/A	5	N/A	N/A	
	0,0		Alarm level		Engine protection	
Altitude, above sea	m	N/A	N/A	1000	Automatic derating, see section derating	
Charge air temp	°C	N/A	80	85,0	Shut down	
Charge air pressure	kPa	N/A	244	254	Shut down	
Engine speed	rpm	100 - 120% of rated speed	115% of rated speed	Alarm level	Shut down.	

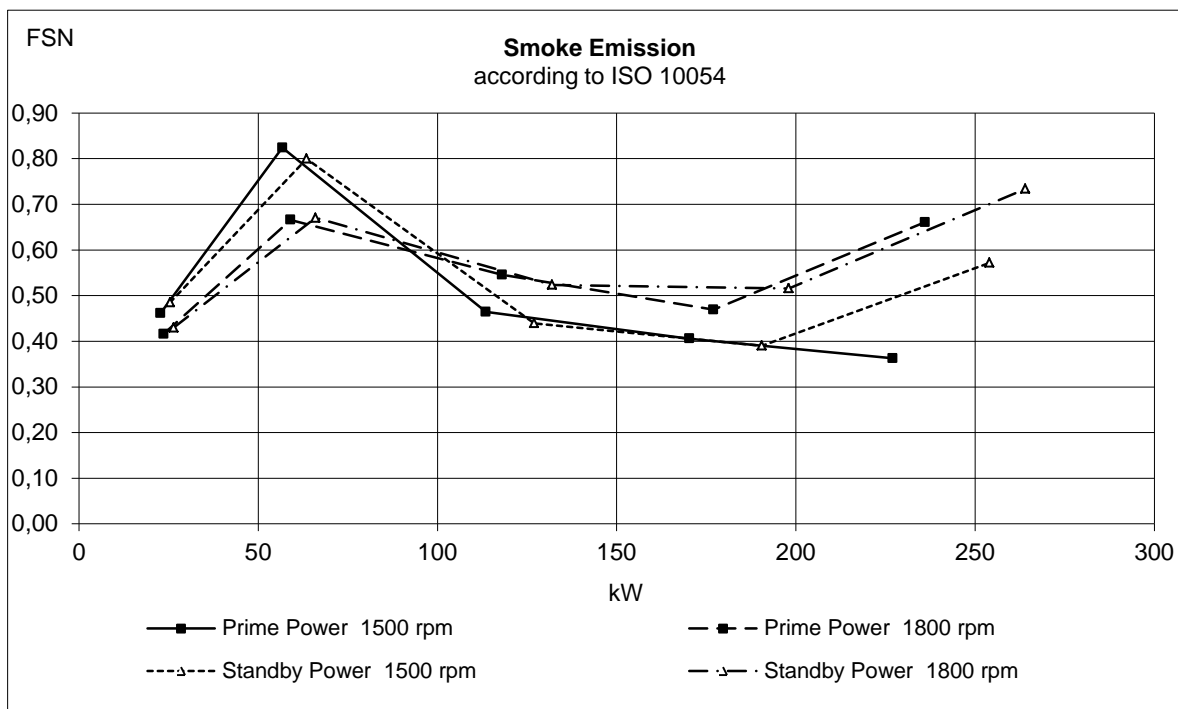
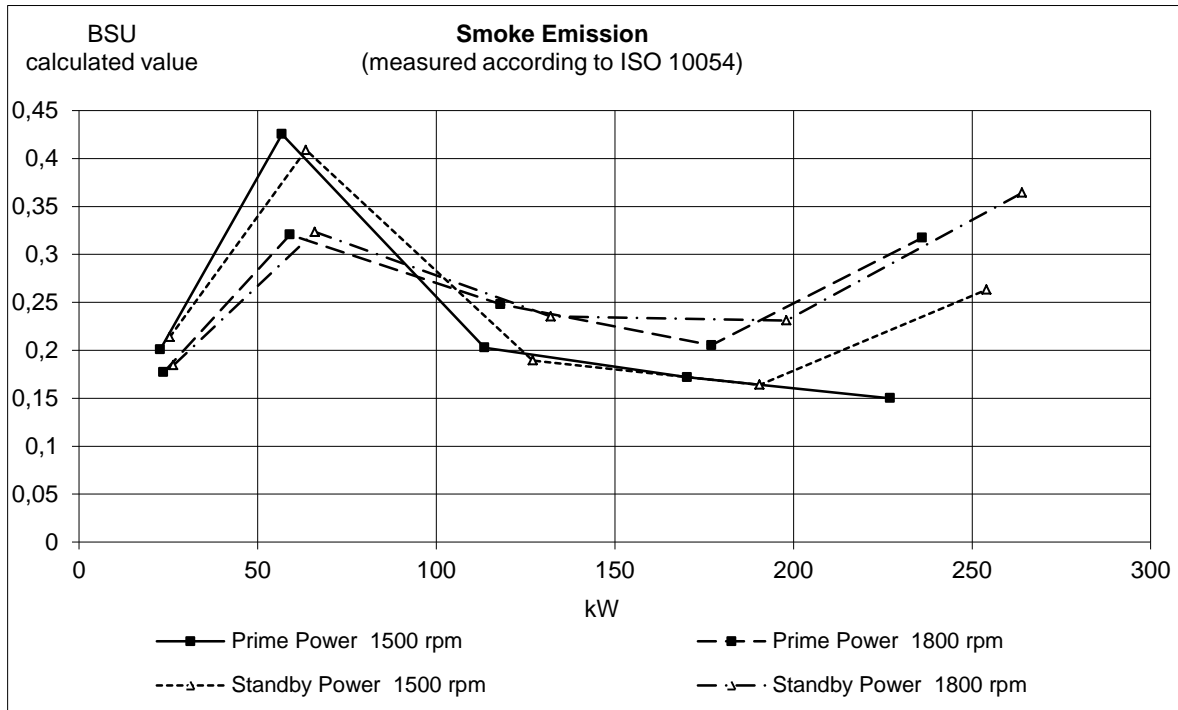
Engine protection can be disabled. For consequences please see VP International Limited Warranty Policy

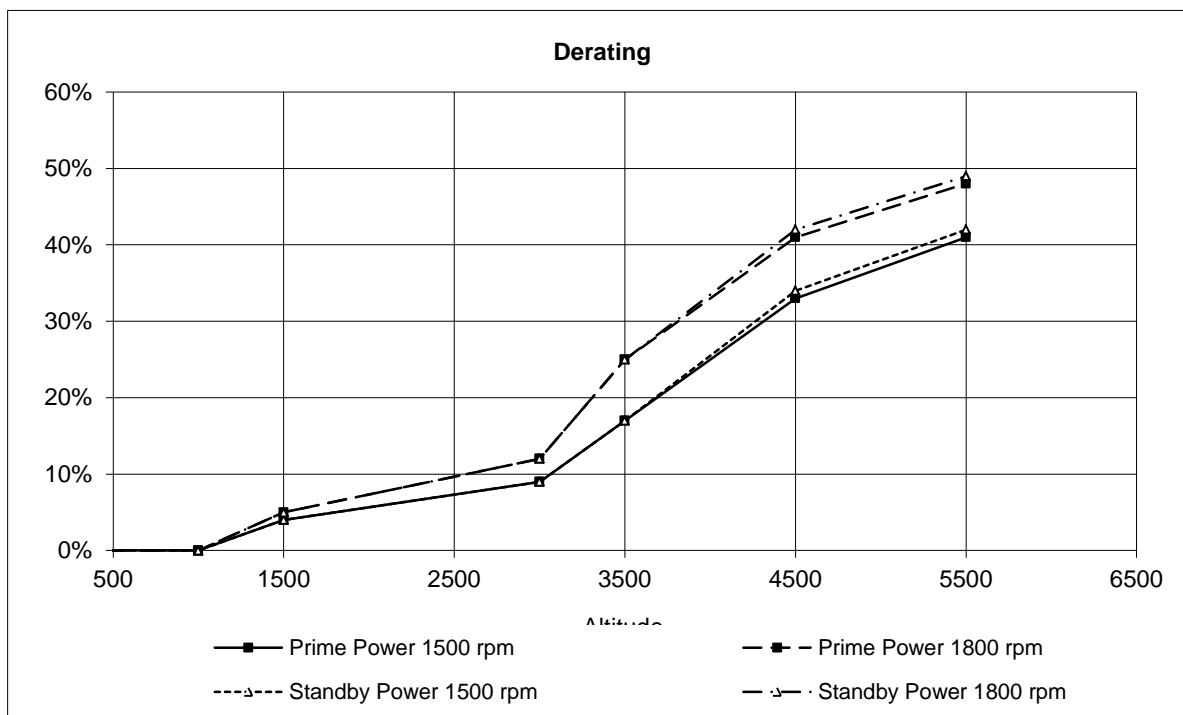
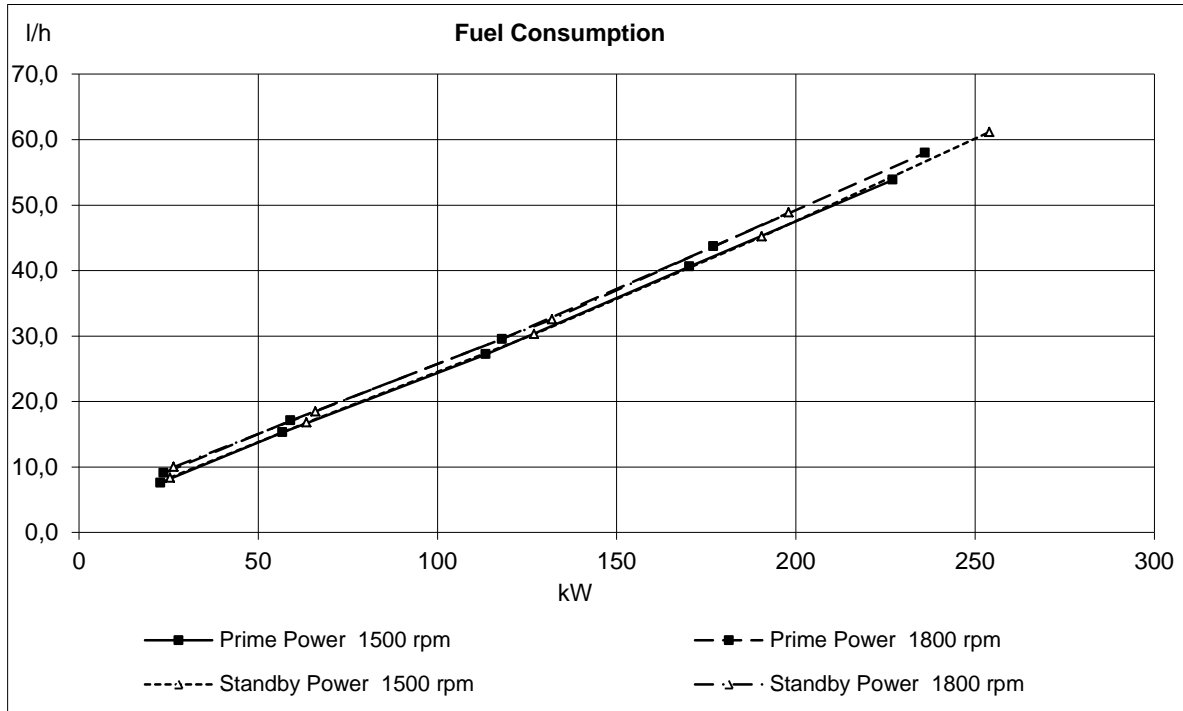
Electrical system

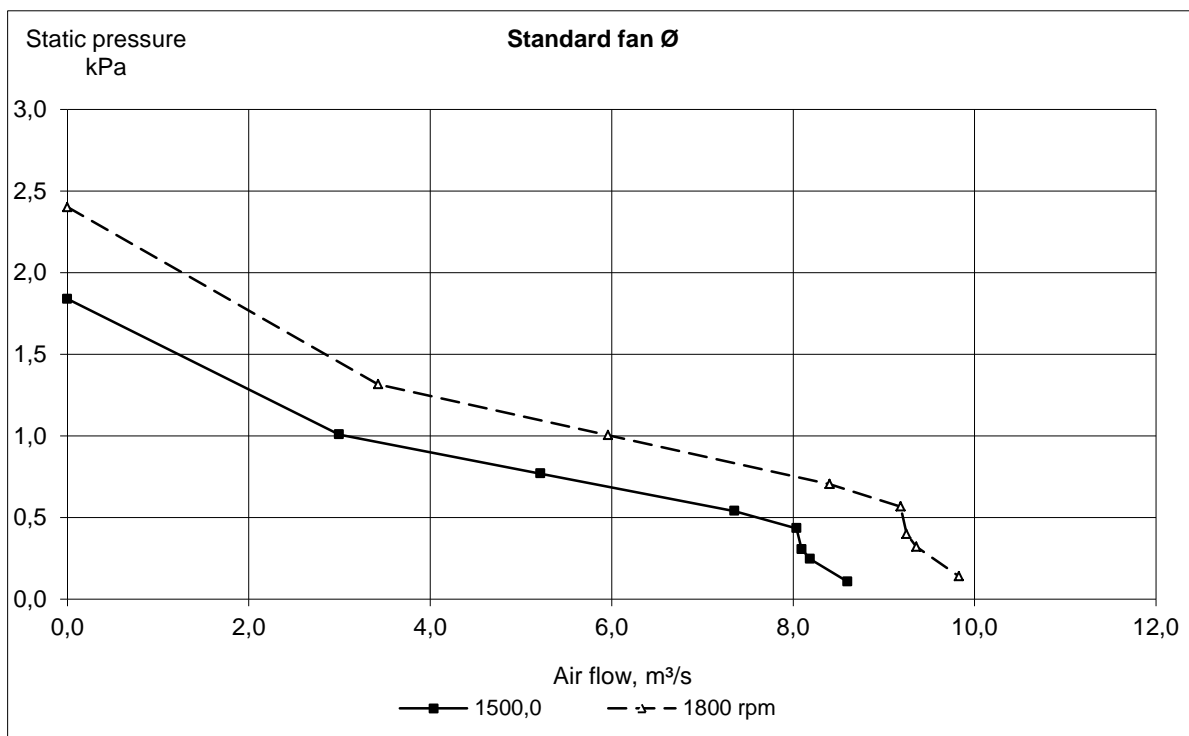
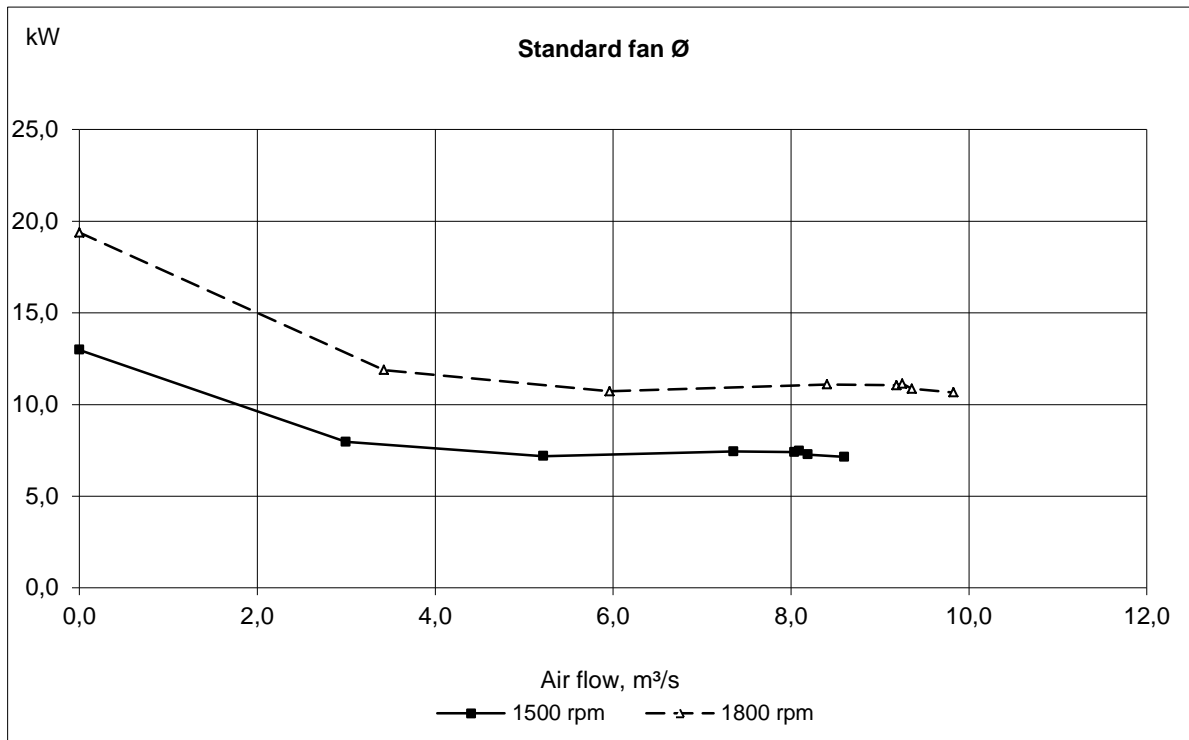
Voltage and type			
Alternator:	make/output	A	Melco / 110/130A
	tacho output	Hz/alt. Rev	
	drive ratio		
Starter motor	make	Melco	
	type	85P50 / 90P55	
	kW	5 / 5.5	
Number of teeth on:	flywheel	137	
	starter motor	10 / 12 teeth	
Max wiring resistance main circuit		mΩ	
Cranking current at +20°C		A	220
Crank engine speed at 20°C		rpm	185
Starter motor battery capacity:	max	Ah/A	-
	min at +5°C	Ah/CCA	0
Inlet manifold heater (at 20 V)		kW	4,0
Power relay for the manifold heater		A	200

Power take off

		rpm	1500	1800
Front end in line with crank shaft max:		Nm lbft		
Front end belt pulley load.	Max up (above or equal to horizontal line)	kW	13	16
		hp	17	22
	Max down (below horizontal line)	kW	27	34
		hp	36	47
Maximum power on Rear PTO on top of flywheel housing (REPTO):*		Nm lbft	75 55	
Speed ratio direction of rotation viewed from flywheel side		1:1 Counter clockwise		
Maximum torque on PTO at compressor position:*		Nm lbft		
Speed ratio direction of rotation viewed from flywheel side		1,58:1/clockwise		
Timing gear at hydraulic pump PTO max:		Nm lbft	80 59	
Speed ratio direction of rotation viewed from flywheel side		1.026:1 Counter clockwise		
Max allowed bending moment in flywheel housing		Nm lbft	4600 3393	
Max. rear main bearing load		N lbf		







VOLVO PENTA

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