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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 penalities as described in the Clean Air Act.

General

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

Number of cylinders			6
Displacement, total		litre in^3	16,12 983,9
Firing order			1-5-3-6-2-4
Bore		mm in	144 5,67
Stroke		mm in	165 6,50
Compression ratio			16.8:1
Wet weight w/o EATS	Engine only	kg lb	1810 3990
	Engine incl. cooling system and air filtration system	kg lb	2217 4888
	Engine incl. cooling system, air filtration system, and frame	kg lb	2767 6100
Wet weight EATS only	EATS (XL Urea Tank, 165 Liters)	kg lb	255 562
	EATS (L Urea Tank, 70 Liters)	kg lb	226 498

Performance		**rpm**	**1500**	**1800**
Prime Power	without fan	kW hp	590 802	626 851
	with fan	kW hp	570 775	596 811
Standby Power	without fan	kW hp	647 880	685 932
	with fan	kW hp	627 853	655 891
COP Power	without fan	kW hp	443 602	470 639
	with fan	kW hp	428 581	447 608
Torque at:	Prime Power	Nm lbft	3756 2770	3321 2449
	Standby Power	Nm lbft	4119 3038	3634 2680
Total mass moment of inertia, J (mR^2)		kgm^2 $lbft^2$	2,50 59,3	
Derating due to altitude - see Technical Diagrams				

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Engine noise emission

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

Tolerance ± 0.75 dB(A)

		rpm	1500	1800
Measured sound power Lw	No load	dB(A)	118,2	119,3
	Prime Power	dB(A)	118,2	119,8
	Standby Power	dB(A)	117,8	119,9
Calculated sound pressure Lp at 1 m	No load	dB(A)	106,2	107,3
	Prime Power	dB(A)	106,2	107,8
	Standby Power	dB(A)	105,8	107,9

Test conditions for load acceptance data

Warm engine.	**Generator**		**Model**		**Type of AVR**	
	ABB		AMG 0355CC04 DBPM		Basler-Electric DECS-150	
AVR Settings	UFRO (Hz):	3	DIP:	1.4	DWELL:	1.4
			Voltage (V):	400	Power factor:	1.0

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.

Load Acceptance at 1500 rpm

Genset Classification

This engine fulfills G1, G2 and G3 classes, according to ISO8528-5. For other class, please, see the table below.

Load (%)	Speed diff (%)	Speed Recovery time (s)	
0-47	7 (G3)	1,8	G3 boundary conditions
0-54	10 (G2)	2,0	G2 boundary conditions

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	1,9	1,3	-	-	20-100	19,8	3,3	19,0	1,9
0-40	4,9	1,2	0,8	0,8	40-100	10,3	1,9	7,5	1,2
0-60	14,9	2,1	13,1	1,7	60-100	4,0	1,3	1,5	1,3
0-80	23,2	3,6	25,4	2,5	80-100	1,7	0,7	0,8	0,8
0-100	30,0	4,6	35,5	3,5					
0-110	31,7	5,0	38,3	3,7					
100-0	9,8	2,6	4,3	2,0					

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Load Acceptance at 1800 rpm

Genset Classification
This engine fulfills G1, G2 and G3 classes, according to ISO8528-5. For other class, please, see the table below.

Load (%)	Speed diff (%)	Speed Recovery time (s)	
0-55	7 (G3)	1,2	G3 boundary conditions
0-64	10 (G2)	1,3	G2 boundary conditions

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	1,3	0,5	-	-	20-100	11,4	1,5	12,0	1,2
0-40	2,8	0,8	-	-	40-100	6,2	0,9	3,2	0,9
0-60	7,5	1,0	5,0	1,0	60-100	3,4	0,7	1,3	0,9
0-80	13,8	1,6	15,8	1,6	80-100	1,4	0,7	1,0	0,6
0-100	19,6	2,2	25,8	2,0					
0-110	21,6	2,5	29,5	2,4					
100-0	4,0	1,2	4,3	1,8					

				RPM	
Cold start performance	**Ambient Temp. [°C]**	**Manifold Heater**	**Block heater**	**1500**	**1800**
Time to Set Speed from start	20	-	-	4,7 sec.	5,0 sec.
	5	-	-	4,8 sec.	6,3 sec.
	-15 *	Yes	-	7,0 sec.	6,8 sec.
	-30 **	Yes	Yes	6,2 sec.	6,7 sec.

Min start temp w/o Block Heater*	-30	°C

* With manifold heater 6 kW engaged, lubrication oil SAE 10W/30.
** With manifold heater 6 kW engaged, lubrication oil SAE 10W/30 and block heater, Fuel MK-1.

Block heater type	Power kW	Engaged hours	Cooling water temp engine block
Volvo partnumber: 23012775	2	15	7°C
			45°F

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Lubrication system			**rpm**	**1500**	**1800**
Lubricating oil consumption	Prime Power		litre/h	0,07	0,08
			US gal/h	0,018	0,022
	Standby Power		litre/h	0,10	0,10
			US gal/h	0,025	0,026
Oil system capacity including filters			litre	48	
			US gal	12,7	
Oil sump capacity:		max	litre	42	
			US gal	11,1	
		min	litre	32	
			US gal	8,5	
Oil change intervals/specifications:	VDS 4.5 10W/30		h	500	
Engine angularity limits:		front up	°	30	
		front down	°	30	
		side tilt	°	30	
Oil pressure at rated speed			kPa	395 - 415	
			psi	57 - 60	
Lubrication oil temperature in oil sump:		max	°C	130	
			°F	266	
Oil filter micron size			µ	40,000	

* See also general section in the sales guide

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Fuel system			**rpm**	**1500**	**1800**
Prime Power	25%	g/kWh		214	230
Specific **fuel** consumption at:		lb/hph		0,347	0,373
	50%	g/kWh		195	203
		lb/hph		0,316	0,329
	75%	g/kWh		191	196
		lb/hph		0,309	0,317
	100%	g/kWh		191	195
		lb/hph		0,309	0,315
% DEF consumption at:	25%	%		6,3	5,6
(Compare to Fuel consumption by Volyme)	50%	%		7,2	6,3
	75%	%		7,0	6,8
	100%	%		6,6	6,2

Standby Power	25%	g/kWh		211	225
Specific **fuel** consumption at:		lb/hph		0,341	0,364
	50%	g/kWh		194	201
		lb/hph		0,315	0,325
	75%	g/kWh		191	194
		lb/hph		0,310	0,315
	100%	g/kWh		193	196
		lb/hph		0,313	0,318
% DEF consumption at:	25%	%		6,6	5,7
(Compare to Fuel consumption by Volume)	50%	%		7,2	6,4
	75%	%		6,7	6,7
	100%	%		6,4	5,9

CO2 emission declaration	**rpm**	**1500**	**1800**
Carbon dioxide (CO_2) emissions determined during the EU type approval process, NRSC-D2.	g/kWh	619	647

Fuel system

Fuel to conform to	EN590:2013 ASTM D 975 1-D and 2-D EN15940:2016 (GTL/HVO) SS-155435:201 (MK1)

	rpm	**1500**	**1800**
System supply flow at:	litre/h	177,0	195,0
	US gal/h	46,8	51,5
Fuel supply line max restriction	kPa	-10,0	-10,0
(Measured at fuel inlet connection)	psi	-1,5	-1,5
Fuel supply line max pressure, engine stopped	kPa	16,5	16,5
	psi	2,4	2,4
System return flow	litre/h	25,0	25,0
	US gal/h	6,6	6,6
Fuel return line max restriction	kPa	20,0	20,0
(Measured at fuel return connection)	psi	2,9	2,9
Maximum allowable inlet fuel temp	°C	60	60
(Measured at fuel inlet connection)	°F	140	140
Prefilter / Water separator micron size	µ	30	
Fuel filter micron size	µ	5	
Governor type/make, standard	Volvo / EMS 2.4		
Injection pump type/make	Unit Injector Delphi		

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Intake and exhaust system			**rpm**	**1500**	**1800**
Air consumption at: (+25°C and 100kPa)	Prime Power		m^3/min	43	48
			cfm	1519	1695
	Standby Power		m^3/min	45	51
			cfm	1589	1801

⚠ **See front page for important information**

Max allowable air intake restriction including piping		kPa	3	3
		psi	0,4	0,4
Air filter restriction clean Volvo Penta filter		kPa	2,3	2,5
		psi	0,3	0,4
Heat rejection to exhaust at:	Prime Power	kW	393	438
		BTU/min	22350	24909
	Standby Power	kW	448	495
		BTU/min	25477	28150
Exhaust gas temperature after turbine at:	Prime Power	°C	434	432
		°F	813	810
	Standby Power	°C	464	461
		°F	867	862

⚠ **See front page for important information**

Max allowable back pressure in exhaust line (after turbine)	Prime Power	kPa	20	20
		psi	2,9	2,9
Pipe dimension Ø: 200 mm	Standby Power	kPa	20	20
		psi	2,9	2,9

⚠ **See front page for important information**

Max allowable temperature drop between turbine and SCR muffler inlet.	Prime Power	Δ°C	10	10
		Δ°F	18	18
	Standby Power	Δ°C	10	10
		Δ°F	18	18
SCR muffler pressure drop (at exhaust max Power)	Standby Power	kPa	10	10
		psi	1,5	1,5
Exhaust gas flow at: (temp and pressure after turbine at max Power)	Standby Power	m^3/min	104,0	113,0
		cfm	3673	3991

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Cooling system			**rpm**	**1500**	**1800**
Heat rejection radiation from engine at max Power:			kW BTU/min	20 1137	20 1137
Radiator cooling system type			Closed circuit		
Standard radiator core area			m² foot²	1,68 18,08	
Fan diameter			mm in	965 37,99	
Fan power consumption			kW hp	20 27	30 41
Fan drive ratio				1.04:1	
Coolant capacity,	engine only		litre US gal	33 8,72	
	charge air coolers		litre US gal	10 2,64	
	coolant radiators incl piping		litre US gal	48 12,68	
	expansion tank		litre US gal	20 5,28	
Coolant pump			drive/ratio	Belt / 1.85:1	
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	100 14,5	
Maximum top tank temperature			°C °F	107 225	
Charge air pressure (after charge air coolers)			kPa psi	350 50,8	

⚠

See front page for important information

Max allowable Charge air outlet temp. (Charge air temp after intercooler) Amb. Temp. 25°C	Prime Power	°C	50	50
		°F	122	122
	Standby Power	°C	50	50
		°F	122	122

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OEM cooling system design:

- remote position of standard radiators	**rpm**	**1500**	**1800**
Maximum additional coolant with standard expansion tank	litre	15	15
	US gal	4	4
Maximum distance in vertical direction with standard pressure cap	m	4	4
(100 kPa)	ft	13	13
Maximum additional pressure drop due to remote position	KPa	10	10
	psi	1	1

OEM cooling system design: 2-circuit system

- engine coolant circuit		**rpm**	**1500**	**1800**
Heat rejection to coolant **engine coolant circuit:**	Prime Power	kW	188	214
		BTU/min	10691	12170
	Standby Power	kW	188	218
		BTU/min	10691	12397
Min coolant flow **engine coolant circuit** (at fully open thermostat)		litre/s	6,5	7,7
		US gal/s	1,71	2,04
Maximum coolant temperature entering engine (25°C amb. Temp.)		°C	82	
		F	180	
Maximum external **engine coolant circuit** restriction, including piping		kPa	90	
(25°C amb. Temp.)		psi	13,1	
Nominal coolant pressure		kPa	100	100
		psi	14,5	14,5
- charge air cooler (CAC) coolant circuit				
Heat rejection to coolant **CAC coolant circuit:**	Prime Power	kW	139	160
		BTU/min	7905	9099
	Standby Power	kW	151	167
		BTU/min	8587	9497
Nominal coolant flow **CAC coolant circuit**:		litre/s	1,7	2,0
		US gal/s	0,45	0,53
Maximum coolant temperature entering CAC		°C	40	
(at air inlet temperature 25°C)		F	104	
Coolant pressure drop over Low Temp. Radiator		kPa	65	85
(at Nominal coolant flow CAC coolant circuit above)		psi	9,4	12,3
Nominal CAC coolant pressure		kPa	100	100
		psi	14,5	14,5

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Cooling performance

Standard fan:		Fan ratio:	1: 1,04	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	66	11,4	0		
	64	11,0	100		
	63	10,4	200		
	62	10,0	300	11,4	0
	60			11,0	100
	59			10,4	200
	58			10,0	300
1800	67	13,4	0		
	66	12,7	100		
	65	12,2	200		
	64	11,7	300	13,4	0
	62			12,7	100
	61			12,2	200
	59			11,7	300

Note! External restrictions are calculated for values >0 Pa

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Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronous	Isochronous
Governor droop		
Governor response	Adjustable PID-constants (VODIA)	
Dual speed	1500rpm 50Hz/ 1800 rpm 60Hz	1500 rpm 50 Hz
Idle speed	900-1200rpm	900rpm
Fine speed adjustment	+- 90 rpm	
Stop function		
Preheating function	On / Off	
Lamp test		

Engine sensor and switch settings

Parameter		Unit	Warning Level (Yellow)	Engine protection		
				Alarm level (Red)	Default	Optional
						N/A
Oil temp		°C	125	130,0	Shut down.	N/A
Oil pressure	Low idle	kPa	170	145,0	Shut down	N/A
	1500 rpm	kPa	300,0	275,0	Shut down	N/A
	1800 rpm	kPa	300,0	275,0	Shut down	N/A
Oil level				Low level		N/A
DEF Dosing injector failure			Min. Level		Shut down	N/A
Piston cooling pressure >1000 rpm		kPa	N/A	N/A	N/A	N/A
Coolant temp		°C	98	Setting +2	Shut down.	N/A
Coolant level			On	Low level	Shut down.	N/A
Fuel feed pressure	Low idle	kPa				N/A
	>1400 rpm					N/A
Water in fuel						N/A
Crank case pressure		kPa	N/A	N/A	N/A	N/A
Air filter pressure droop		kPa				N/A
Altitude, above sea		m			Automatic derating, see section derating	N/A
Charge air temp		°C	80	82,5	Shut down	N/A
Charge air pressure		kPa	30 above demanded	40 above demanded	Shut down	N/A
Engine speed		rpm	115% of rated speed	Alarm level	Shut down.	N/A
Exhaust Temperature (Before SCR volume)		°C	530	550,0	Shut down.	N/A
Engine protection can be disabled. For consequences please see VP International Limited Warranty Policy						

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Electrical system

Voltage and type		24 V /insulated from earth	
Alternator:	make/output	A	Bosch / 80
	tacho output	Hz/alt. Rev	6
	drive ratio		3,94 : 1
Starter motor		make	Mitsubishi electric
		type	24 V 7 kW 12/3. 17F
		kW	7,0
Number of teeth on:	flywheel		153
	starter motor		12
Max wiring resistance main circuit		mΩ	3
Cranking current at +20°C		A	400
Crank engine speed at 20°C		rpm	155
Starter motor battery capacity:	min	Ah	2 x 145
	CCA at -18°C	Ah/A	900
Inlet manifold heater (at 24 V)		kW	3,6
Power relay for the manifold heater		A	1

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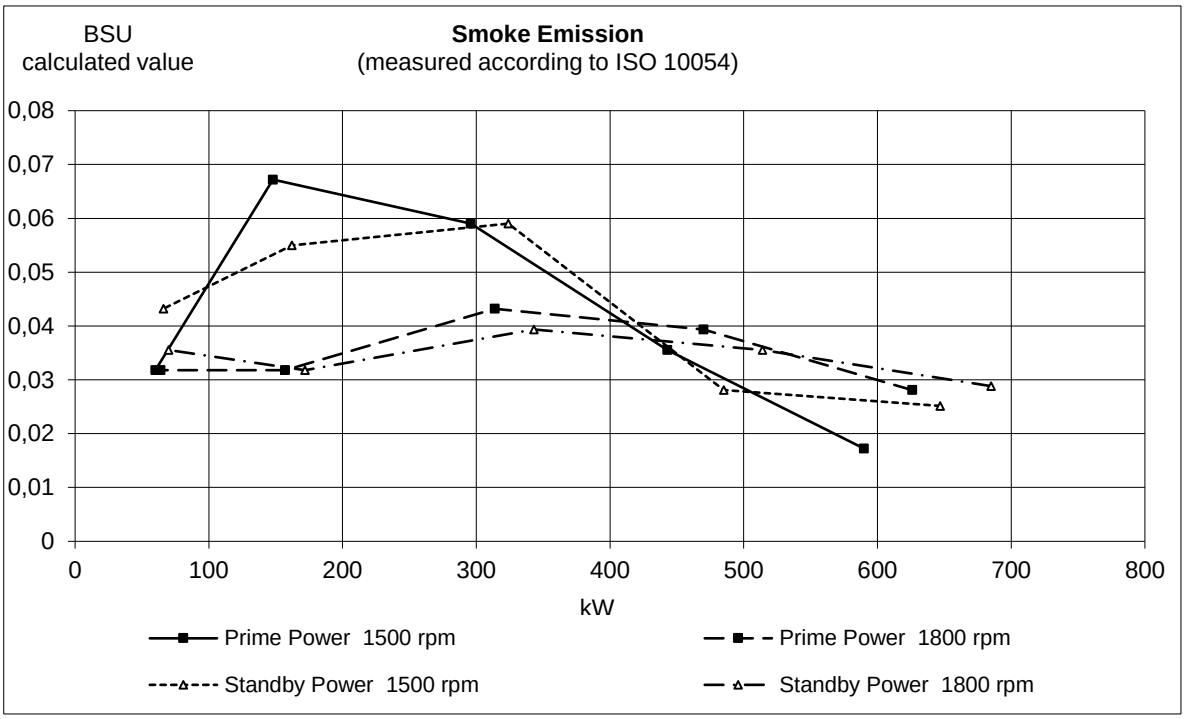

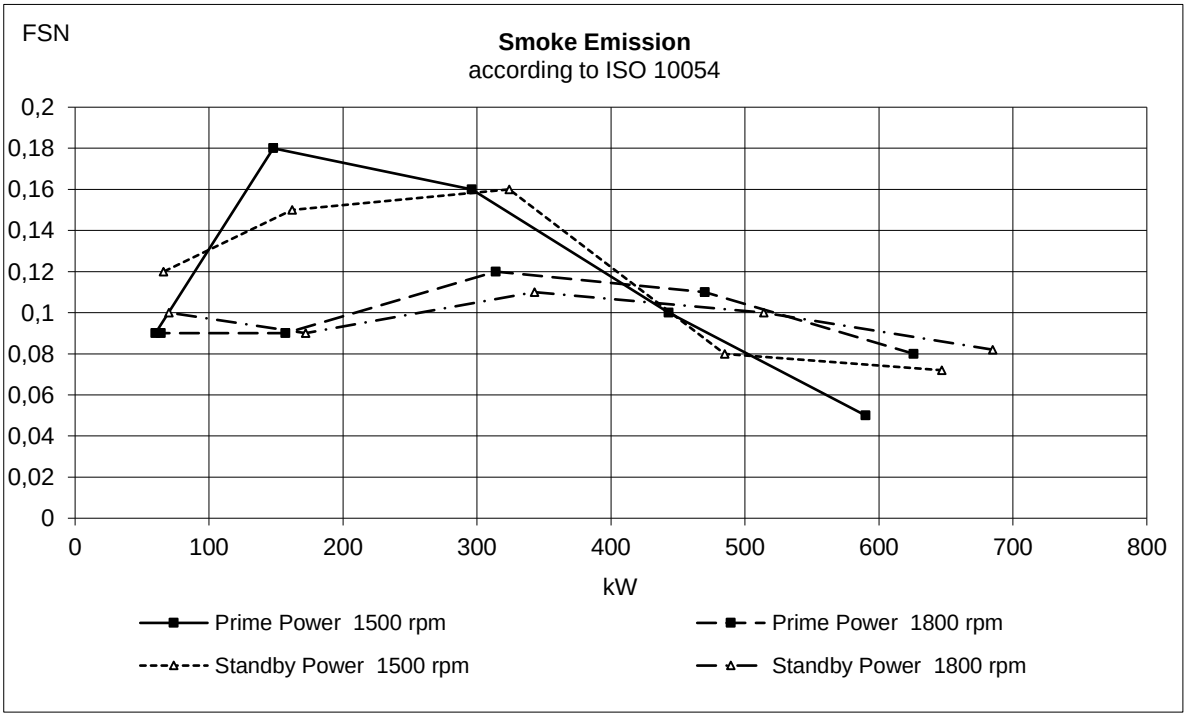

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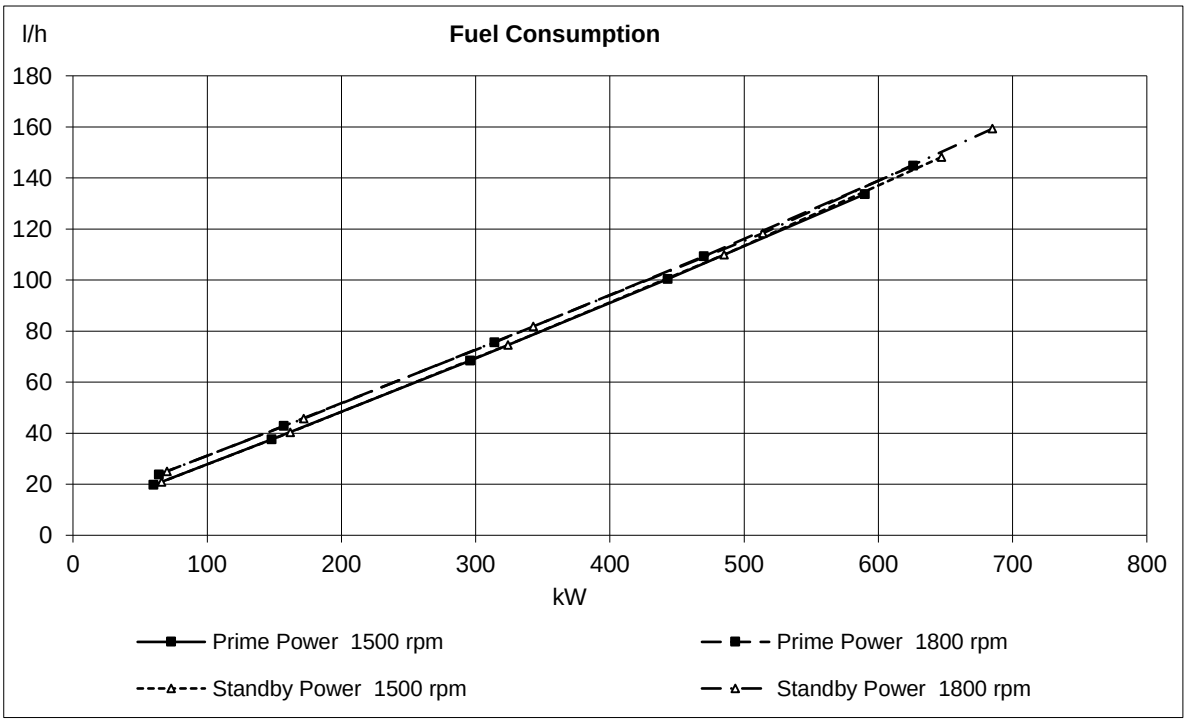

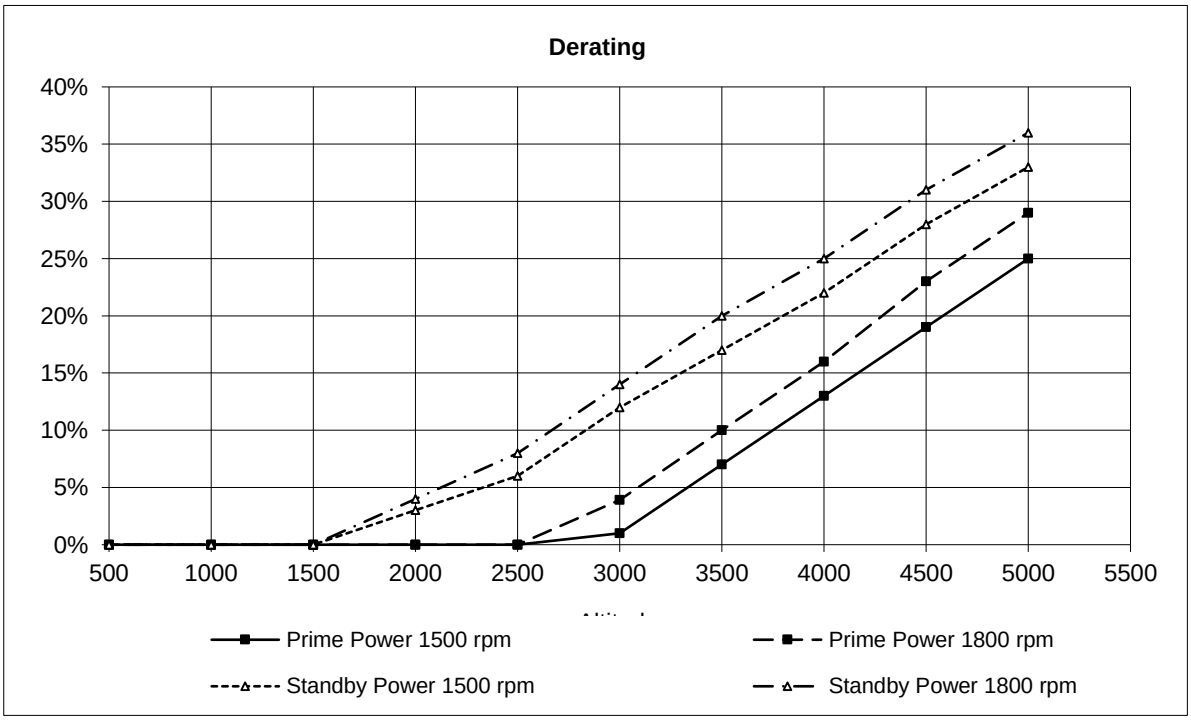

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