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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 penalties 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	12,78
		in <sup>3</sup>	779,9
Firing order			1-5-3-6-2-4
Bore		mm	131
		in	5,16
Stroke		mm	158
		in	6,22
Compression ratio			16.8:1
Wet weight w/o EATS	Engine only	kg	1267
		lb	2793
	Engine incl. cooling system and air filtration system	kg	-
	lb		
	Engine incl. cooling system, air filtration system, and frame	kg	NA
	lb		
Wet weight EATS only	EATS (XL Urea Tank, 165 Liters)	kg	300
		lb	661
	EATS (L Urea Tank, 70 Liters)	kg	183
		lb	403
	EATS (M Urea Tank, 45 Liters)	kg	151
		lb	333
	EATS (S Urea Tank, 20 Liters)	kg	122
		lb	269

### Performance

		rpm	1500	1800
Standby Power	without fan	kW	348	368
		hp	473	500
Prime Power	without fan	kW	318	337
		hp	432	458
COP Power	without fan	kW	239	253
		hp	324	344
Torque at:	Standby Power	Nm	2215	1952
		lbft	1634	1440
	Maximum within fine speed range	Nm	2024	1788
		lbft	1493	1319
Total mass moment of inertia, J (mR <sup>2</sup> )		kgm <sup>2</sup>	3,378	
		lbft <sup>2</sup>	80,2	

**Derating due to altitude - see Technical Diagrams**

**Test conditions for load acceptance data**

Engine at working temperature, fuel that is used..... Nominal operating conditions

Generator	Brand	Model	Type of AVR
	Stamford	HCM534D1	MX341
AVR Settings	UFRO (Hz):	DIP:	DWELL:
	Stability (%)*:	Voltage (V):	415
			Power factor:

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

#### Nomenclature

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)	
G4			
0-49	7 (G3)	1,2	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	2	1	1	0,2	20-100	18	5	14	3
0-40	5	1	2	1	40-100	8	3	6	1
0-60	15	3	10	2	60-100	3	1	3	0
0-80	29	4	19	3	80-100	2	1	2	0,3
0-100	67	5	64	8					
0-110									
100-0	6	2	7	1					

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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)	
0-72	7 (G3)	2,1	G3 boundary conditions
0-83	10 (G2)	2,5	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	0,3	3	1	20-100	5	2	10	2
0-40	2	1	6	2	40-100	3	1	6	2
0-60	5	1	10	2	60-100	2	1	5	1
0-80	11	3	15	3	80-100	1	0,2	2	1
0-100	17	4	19	4					
0-110									
100-0	4	2	11	2					

Cold start performance	Ambient Temp. [°C]	Manifold Heater	Block heater	RPM	
				1500	1800
Time to Set Speed from start	-10	-	-	6,0	
	-15	-	-	13,7	
	-20*	Yes	-	7,5	
	-25*	Yes		10,4	
	-30 **	Yes	Yes	6,1	

Min start temp w/o Block Heater*	-25	°C
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#REF!
#REF!

Block heater type	Power kW	Engaged hours	Cooling water temp engine block
TYP UI 701	1,5		

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Lubrication system		rpm	1500	1800
Oil system capacity including filters		litre	36	
		US gal	9,5	
Oil sump capacity:	max	litre	30	
		US gal	7,9	
	min	litre	19	
		US gal	5,0	
Oil change intervals/specifications:	VDS 4.5 10W/30	h	1000	
Engine angularity limits:	front up	°	11	
	front down	°	11	
	side tilt	°	11	
Oil pressure at nominal set speed		kPa	275 - 475	
		psi	40 - 69	
Lubrication oil temperature in oil sump:	max	°C	128	
		°F	262	
Oil filter micron size		μ	Use Penta Original	

\* See also general section in the sales guide

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Fuel system		rpm	1500	1800
<b>Standby Power</b> Specific fuel consumption at:	25%	g/kWh lb/hph	218 0,354	250 0,406
	50%	g/kWh lb/hph	199 0,323	213 0,345
	75%	g/kWh lb/hph	196 0,318	208 0,337
	100%	g/kWh lb/hph	197 0,320	206 0,334
% DEF consumption at: (Compare to Fuel consumption by Volyme)	25%	%	7,8	4,0
	50%	%	7,7	7,2
	75%	%	7,7	7,2
	100%	%	8,2	8,4

<b>Prime Power</b> Specific fuel consumption at:	25%	g/kWh lb/hph	222 0,360	256 0,415
	50%	g/kWh lb/hph	201 0,326	214 0,348
	75%	g/kWh lb/hph	197 0,319	208 0,337
	100%	g/kWh lb/hph	197 0,319	206 0,334
% DEF consumption at: (Compare to Fuel consumption by Volume)	25%	%	7,8	3,9
	50%	%	7,5	7,2
	75%	%	7,6	7,0
	100%	%	7,8	7,3

CO2 emission declaration	rpm	1500	1800
Carbon dioxide (CO <sub>2</sub> ) emissions determined during the EU type approval process, NRSC-D2.	g/kWh	641	691

Fuel system	
Fuel to conform to	EN590 98/70/EC

	rpm	1500	1800
System supply flow at:	litre/h	82,0	91,0
	US gal/h	21,7	24,0
Fuel supply line max restriction (Measured at fuel inlet connection)	kPa	30,0	30,0
	psi	4,4	4,4
Fuel supply line max pressure, engine stopped & running	kPa	17,0	17,0
	psi	2,5	2,5
System return flow at:	litre/h	50,0	50,0
	US gal/h	13,2	13,2
Fuel return line max restriction (Measured at fuel return connection)	kPa	20,0	20,0
	psi	2,9	2,9
Maximum allowable inlet fuel temp (Measured at fuel inlet connection)	°C	60	60
	°F	140	140
Prefilter / Water separator micron size	µ	Use Penta Original	
Fuel filter micron size	µ	Use Penta Original	
Governor type/make, standard	Volvo EMS 2.4		
Injection pump type/make	Delphi F2		

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Intake and exhaust system		rpm	1500	1800
Air consumption at: (+25°C and 100kPa)	Standby Power	m <sup>3</sup> /min cfm	25,2 890	26,9 950
	Prime Power	m <sup>3</sup> /min cfm	24,3 858	26,3 929



**See front page for important information**


Max air intake restriction including piping with maintained performance		kPa psi	6 0,9	6 0,9
Max <u>allowable</u> air intake restriction including piping		kPa psi	6 0,9	6 0,9
Air filter restriction clean Volvo Penta filter		kPa psi	3,0 0,4	3,0 0,4
Heat rejection to exhaust at:	Standby Power	kW BTU/min	243 13808	284 16151
	Prime Power	kW BTU/min	218 12409	258 14649
Exhaust gas temperature after turbine at:	Standby Power	°C °F	449 840	487 909
	Prime Power	°C °F	425 797	459 858





**See front page for important information**

Max allowable back pressure in exhaust after turbine Pipe dimension Ø: 125 mm	Standby Power	kPa psi	45 6,5	45 6,5
<p><b>See front page for important information</b></p> Max allowable temperature drop between turbine and SCR muffler inlet.	Standby Power	Δ°C	10	10
		Δ°F	18	18
<p><b>See front page for important information</b></p> Max allowable temperature drop between turbine and muffler 1 inlet at exhaust temperature 480° C and exhaust gas flow 69.8 m <sup>3</sup> /min.		Δ°C	10	10
		Δ°F	18	18
DPF muffler pressure drop (at exhaust gas flow and exhaust temp specified in this table)		kPa psi	5,0 0,7	5,6 0,8
		Exhaust gas flow at max power: (temp and pressure after turbine)	m <sup>3</sup> /min cfm	48 1695
<p><b>See front page for important information</b></p> Engine speed during stand still regeneration		rpm	NA	NA

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 <b>See front page for important information</b>  Max allowed load during stand still regeneration	Nm	NA	NA
	lb ft	NA	NA

<b>Charge air cooler system</b>	<b>rpm</b>	<b>1500</b>	<b>1800</b>
Heat rejection to charge air cooler at standby power	kW	68,9	70,7
	BTU/min	3918	4021
Charge air mass flow at standby power	kg/s	0,499	0,532
Charge air inlet temp at standby power (Charge air temp after turbo compressor)	°C	50	52
	°F	122	126
 <b>See front page for important information</b>  Max allowable Charge air outlet temp at standby power (Charge air temp after intercooler)	°C	50	50
	°F	122	122
 Maximum pressure drop over charge air cooler incl. Piping	kPa	9	12
	psi	1,31	1,74
Maximum charge air pressure (After charge air cooler)	kPa	315	284
	psi	45,69	41,19

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**Cooling system**

Coolant type and mixture		Volvo Penta Coolant VCS 40% VCS + 60% tap water		
Coolant capacity,	engine only	litre	20	
		US gal	5,28	
	expansion tank	litre	5	
		US gal	1,32	
		<b>rpm</b>	<b>1500</b>	<b>1800</b>
Heat rejection radiation from engine at Standby power:		kW	7,6	8,8
		BTU/min	432	500
Heat rejection to coolant at standby power		kW	145,3	165,6
		BTU/min	8263	9418
Min coolant flow <b>engine coolant circuit</b> (at fully open thermostat)		litre/s	4,2	5,5
		US gal/s	1,11	1,45
Maximum external <b>engine coolant circuit</b> restriction, including piping (25°C amb. Temp.)		kPa	65	
		psi	9,4	
Nominal coolant pressure		kPa	46	48
		psi	6,67	6,96
Nominal coolant flow <b>with standard system</b>		litre/s	4,2	5,5
		US gal/s	1,11	1,45
Fan diameter		mm	890	
		in	35,04	
Fan drive ratio				
Coolant pump		drive/ratio	1.41:1	
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	
		psi	14,5	
Minimum static pressure head (expansion tank height + pressure cap setting)		kPa	70	
		psi	10,2	
Maximum top tank temperature		°C	107	
		°F	225	



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### Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronous/droop	Isochronous
Governor droop	0.1-6%	0,1
Governor response	Adjustable PID-constants (VODIA)	
Dual speed	1500rpm 50Hz/ 1800 rpm 60Hz	1500 rpm 50 Hz or 1800 rpm 60 Hz
Idle speed	900-1200	900,0
Fine speed adjustment	+/-90	0,0
Stop function	Igntion off stop engine true/false	Igntion off stop engine false
Preheating function	On / Off	off

### Engine protection map

Parameter	Unit	Warning Level (Yellow)	Engine protection			
			Alarm level (Red)	Default	Optional	
Oil temp	°C	125	130,0	Shutdown		
Oil pressure	Low idle	kPa	106	81,0	Shutdown	
	1500 rpm	kPa	194,0	169,0	Shutdown	
	1800 rpm	kPa	215,0	190,0	Shutdown	
Oil level		NA	NA			
DEF Dosing injector failure		0,1	0,1	Shutdown delay 10 s		
Piston cooling pressure >1000 rpm	kPa	NA	NA			
Coolant temp	°C	105	107,0	Shutdown delay 10 s		
Coolant level		NA	Low level	Shutdown delay 10 s		
Fuel feed pressure	Low idle	kPa	NA	NA		
	>1400 rpm		NA	NA		
Water in fuel		NA	NA			
Crank case pressure	kPa	NA	NA			
Air filter pressure droop	kPa	NA	NA			
Altitude, above sea	m	See Fuel & Derating	See Fuel & Derating			
Charge air temp	°C	120	125,0	Shutdown delay 10 s		
Charge air pressure	kPa	See Fuel & Derating	See Fuel & Derating			
Engine speed	rpm	NA	NA			
Exhaust Temperature (Before SCR volume)	°C	525	530,0	Shutdown		

### Electrical system

Voltage and type	24V DC	
Max wiring resistance main circuit	mΩ	5
Starter motor battery capacity:	min	Ah
	CCA at -18°C	Ah/A
Inlet manifold heater (at 24 V)	kW	4,0

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