

<b>VOLVO PENTA</b> TAD733GE	Document No	Issue Index
	<b>21369984</b>	<b>02</b>

## 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	7.15
		in <sup>3</sup>	436.0
Firing order			1-5-3-6-2-4
Bore		mm	108
		in	4.25
Stroke		mm	130
		in	5.12
Compression ratio			18:1
Dry weight	Engine only	kg	710
		lb	1565
	Engine and cooling package	kg	900
		lb	1984
Wet weight	Engine only	kg	751
		lb	1656
	Engine and cooling package	kg	968
		lb	2134

Performance		r/min	1500	1800	2000
Standby Power	without fan	kW	201	224.9	206
		hp	273	306	280
	with fan	kW	195	214	192
		hp	265	292	261
Prime Power	without fan	kW	181	202	185
		hp	246	275	252
	with fan	kW	175	192	171
		hp	238	260	232
Torque at:	Standby Power	Nm	1280	1193	984
		lbft	944	880	725
	Prime Power	Nm	1152	1072	883
		lbft	850	790	651
Mean piston speed		m/s	6.5	7.8	8.7
		ft/sec	21.4	25.7	28.5
Effective mean pressure at:	Standby Power	MPa	2.3	2.1	1.7
		psi	326	304	251
	Prime Power	MPa	2.0	1.9	1.6
		psi	294	273	225
Max combustion pressure at:	Standby Power	MPa	14.9	19.1	15.2
		psi	2161	2770	2205
	Prime Power	MPa	14	15.1	14
		psi	2031	2190	2031
Total mass moment of inertia, J (mR2)		kgm <sup>2</sup>	3.09		
		lbft <sup>2</sup>	73.3		
Degree of irregularity at:	Standby Power		1:37	1:48	
	Prime Power		1:41	1:52	
Residual speed droop at load increase from 0 to 100%		%	adjustable		
Friction Power		kW	8.5	12.3	
		hp	11.56	16.728	

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**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	2000
Measured sound power Lw	No load	dB(A)	103	104	
	Standby Power	dB(A)	106	109	
	Prime Power	dB(A)	106	108	
Calculated sound pressure Lp at 1 m	No load	dB(A)	90	91	
	Standby Power	dB(A)	93	95	
	Prime Power	dB(A)	92	95	

**Unsilenced exhaust noise**

Data calculated as sound pressure Lp.  
 Assumed microphone distance 1 m

		r/min	1500	1800	2000
Standby Power		dB(A)	117	118	
Prime Power		dB(A)	116	117	

**Load acceptance**

Test condition: Warm engine. 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
0-40	6.0	6.3	1.8	2.0	40-100	11.2	13.1	4.5	9.9
0-50	7.2	8.2	2.1	2.9	50-100	8.5	9.6	3.8	7.8
0-60	8.7	10.2	3.0	4.3	60-100	6.8	7.8	3.5	5.0
0-75	13.7	17.5	3.8	4.5	75-100	4.0	4.6	3.2	3.6
0-51	7.0		2.8		0-46		7.0		2.8
0-100									
100-0									

**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
0-40	3.8	4.1	1.2	1.4	40-100	5.4	6.7	2.1	7.0
0-50	4.5	5.1	1.6	1.7	50-100	4.8	5.8	1.9	6.8
0-60	5.6	6.2	1.8	2.2	60-100	3.6	4.4	1.8	4.1
0-75	7.3	7.5	2.1	2.5	75-100	2.4	3.5	1.7	3.6
0-73	7.0		1.9		0-66		7.0		1.9
0-100	14.3	18.3	3.5	9.1					
100-0	5.8	5.8	2.0	2.0					

**Cold start performance**

1500/1800/2000

Cold start limit temperature	°C	-15
		-30*

\* With manifold heater engaged, lubrication oil 15W/40

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### Derating

The engine may be operated up to 1000 m altitude and 40°C ambient air temperature without derating. For applications above 1000 m an ECU with automatic derating must be used. For operations with air ambient temperature over 40°C, the power should be derated according to the following factors:

Altitude derating factor < 3000 m	% / m	4 / 500
Altitude derating factor > 3000 m	% / m	6 / 500
Ambient temperature derating factor	% / °C	2 / 5°C
Humidity	%	No derating

<b>Lubrication system</b>		<b>r/min</b>	<b>1500</b>	<b>1800</b>	<b>2000</b>
Lubricating oil consumption	Standby Power	liter/h	0.09	0.11	0.10
		US gal/h	0.024	0.029	0.026
	Prime Power	liter/h	0.08	0.09	0.09
		US gal/h	0.021	0.024	0.024
Oil system capacity including filters		liter	34		
		US gal	9.0		
Oil sump capacity:	max	liter	31		
		US gal	8.2		
	min	liter	24		
		US gal	6.3		
Oil change intervals/specifications:					
Closed crankcase ventilation	ACEA: E4. API: CH-4, CI-4* full synthetic	h	500		
Open crankcase ventilation	VDS-2. ACEA: E3, E5. API: CG-4, CH-4*	h	500		
Open crankcase ventilation	VDS. ACEA: E2. API: CF, CF-4*	h	250		
Engine angularity limits:	front up	°	10		
	front down	°	10		
	side tilt	°	10		
Oil pressure at rated speed		kPa	480	520	550
		psi	70	75	80
Oil pressure shut down switch setting		kPa	200		
		psi	29		
Lubrication oil temperature:	normal	°C	110		
		°F	230		
	max	°C	125		
		°F	257		
Oil filter micron size		mm	0.012		

\* See also general section in the sales guide

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<b>Fuel system</b>		<b>r/min</b>	<b>1500</b>	<b>1800</b>	<b>2000</b>
<b>Standby Power</b> Specific fuel consumption at:	25%	g/kWh lb/hph	228 0.37	238 0.39	249 0.40
	50%	g/kWh lb/hph	216 0.35	221 0.36	223 0.36
	75%	g/kWh lb/hph	215 0.35	220 0.36	221 0.36
	100%	g/kWh lb/hph	219 0.35	228 0.37	226 0.37
<b>Prime Power</b> Specific fuel consumption at:	25%	g/kWh lb/hph	228 0.37	245 0.40	265 0.43
	50%	g/kWh lb/hph	217 0.35	222 0.36	227 0.37
	75%	g/kWh lb/hph	214 0.35	220 0.36	221 0.36
	100%	g/kWh lb/hph	216 0.35	222 0.36	223 0.36
Recommended fuel to conform to		ASTM-D975-No1 and 2-D JIS KK 2204, EN 590			
Total fuel flow		liter/h US gal/h	360 95	450 119	480 127
Max allowed inlet fuel temperature	continuous	°C °F	70 158		
	temporarily	°C °F	90 194		
Feed pump pressure		kPa psi	500 73		
Fuel supply line max. restriction (before fuel feed pump)		kPa psi	35 5.1		
Fuel supply line max. restriction (before fuel prefilter and manual feed pump)		kPa psi	15 2.2		
Fuel supply line max. pressure, (before fuel feed pump)		kPa psi	20 2.9		
Fuel filter micron size		mm	0.005		
Prefilter / Water separator		mm	0.063		
Governor type/make, standard		Heinzman / EDC4			
Injection pump type/make		PFM 1 P100 S 2005 / Bosch			
Injection timing std.		°B.T.D.C	2.5		

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<b>Intake and exhaust system</b>		<b>r/min</b>	<b>1500</b>	<b>1800</b>	<b>2000</b>	
Air consumption at:	Standby Power	27°C 81°F	m <sup>3</sup> /min cfm	12.4 439	15.8 557	14.4 509
	Prime Power	27°C 81°F	m <sup>3</sup> /min cfm	11.5 406	14.2 501	13.1 463
Air intake restriction, clean filter(s)			kPa in wc	1.5 6.0		
Max allowable air intake restriction			kPa in wc	3.5 14.1		
Air filter type			Two stage paper cartridge			
Air filter cleaning efficiency			%	99.9		
Heat rejection to exhaust at:	Standby Power		kW BTU/min	165 9383	202 11488	
	Prime Power		kW BTU/min	142 8075	168 9554	
Exhaust gas temperature after turbine at:	Standby Power	°C	530	530	501	
		°F	986	986	934	
	Prime Power	°C	510	509	479	
		°F	950	948	894	
Max allowable back pressure in exhaust line	Standby Power	kPa	3	5	5	
		In wc	12.0	20.1	20.1	
	Prime Power	kPa	5	7.5	7.5	
		In wc	20.1	30.1	30.1	
Exhaust gas flow at:	Standby Power	m <sup>3</sup> /min cfm	37.2 1314	44.4 1568	48.0 1695	
		Prime Power	m <sup>3</sup> /min cfm	31.8 1123	40.4 1427	43.0 1519
Heat rejection to CAC	Standby Power	kW BTU/min	42 2388	51 2895	43 2462	
		Prime Power	kW BTU/min	38 2150	46 2605	39 2235

<b>Intercooler system</b>		<b>r/min</b>	<b>1500</b>	<b>1800</b>	<b>2000</b>
Boost pressure	kPa	183	205	186	
	in wc	733	823	747	
Charge air temp after turbo compressor	°C	196	201	194	
	°F	385	394	381	
Max allowable comb. air temp after CAC	°C	50			
	°F	122			
Max pressure droop over intercooler, incl. Piping	kPa	15			
	In wc	60			

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<b>Cooling system</b>		<b>r/min</b>	<b>1500</b>	<b>1800</b>	<b>2000</b>
Heat rejection radiation from engine at:	Standby Power	kW	20	23	21
		BTU/min	1137	1308	1194
	Prime Power	kW	19	22	20
		BTU/min	1081	1251	1137
Heat rejection to coolant at:	Standby Power	kW	96	110	101
		BTU/min	5465	6244	5738
	Prime Power	kW	87	99	92
		BTU/min	4919	5607	5215
Recommended coolant	Volvo coolant or Volvo anticorrosion additive together with clean fresh water				
Radiator cooling system type	Closed circuit				
Radiator core area	m <sup>2</sup>	0.65			
	foot <sup>2</sup>	7.00			
Radiator core thickness	mm	55			
	in	2.17			
Intercooler core area	m <sup>2</sup>	0.41			
	foot <sup>2</sup>	4.46			
Intercooler core thickness	mm	50			
	in	1.97			
Fan diameter	mm	870			
	in	34.25			
Fan power consumption	kW	6.1	10.5	14.3	
	hp	8	14	19	
Fan drive ratio	1:0,8				
Coolant capacity,	engine	liter	9.8		
		US gal	2.59		
	radiator with hoses	liter	28.6		
		US gal	7.56		
Coolant pump	drive/ratio	1,73:1		1,36:1	
Coolant flow with standard cooling system	l/s	3.0	3.6	3.2	
	US gal/s	0.79	0.95	0.85	
Maximum external coolant system restriction	kPa	25	35	28	
	in wc	100	141	112	
Thermostat,	start to open	°C	87		
		°F	189		
	fully open	°C	102		
		°F	216		
Maximum static pressure head	kPa	100			
	in wc	402			
Pressure cap setting on standard cooling system	kPa	90			
	in wc	361			
Maximum top tank temperature	°C	105			
	°F	221			
Max. permissible cooling down of engine coolant by radiator	°C	8			
	°F	46			
Shutdown switch setting	°C	113			
	°F	235			
Recommended draw down capacity	10% of total cooling system capacity				

**Cooling performance**

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 105°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 m <sup>3</sup> /s	External restriction Pa	Air flow m <sup>3</sup> /s	External restriction Pa
1500	63	3.9	0		
	57	3.3	150		
	55	3.1	200		
	50	2.7	300		
	43	2.4	400		
	66			3.9	0
	61			3.3	150
	59			3.1	200
	54			2.7	300
	48			2.4	400
1800	65	4.9	0		
	61	4.3	150		
	60	4.1	200		
	56	3.7	300		
	53	3.4	400		
	68			4.9	0
	64			4.3	150
	63			4.1	200
	60			3.7	300
	57			3.4	400
2000	71	5.7	0		
	69	5.1	150		
	68	5.0	200		
	67	4.6	300		
	64	4.3	400		
	73			5.7	0
	72			5.1	150
	71			5.0	200
	70			4.6	300
	67			4.3	400

Electrical system		r/min	1500	1800	2000
Voltage and type		24V / 1 pole system			
Alternator:	make/output	Amp	Iskra/35		
	tacho output	Hz/alt. Rev	6		
	drive ratio		4,07:1		
Starter motor	make	Melco			
	type	M008T62471			
	kW	5.0			
Starter motor solenoid,	pull current	Amp	2		
	hold current	Amp	2		
Number of teeth on:	flywheel		129		
	cam wheel		96		
	starter motor		10		
Inrush current at +20°C		Amp	1200		
Cranking current at +20°C		Amp	400		
Crank engine speed at 20°C		rpm	200		
Starter motor battery capacity:	max	Ah	135		
	min at +5°C	Ah	110		
Inlet manifold heater (at 12V/24V)		kW	2 / 3,6		
Power relay for the manifold heater (at 12V/24V)		Amp	150 / 120		