


VOLVO PENTA	Document No	Issue Index
TAD1640GE-B	23572224	01
<p>Important</p> <p>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.</p> <p>Requirements marked with  are considered as critical for exhaust emissions compliance according to the design specification in the Volvo Penta application for certification.</p> <p>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.</p>		

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		16,12
	in ³		983,9
Firing order			1-5-3-6-2-4
Bore	mm		144
	in		5,67
Stroke	mm		165
	in		6,50
Compression ratio			17.0:1
Wet weight (Not including after treatment system)	Engine only	kg	1550
		lb	3417
	Engine incl. cooling system and air filtration system	kg	1750
		lb	3858
	Engine incl. cooling system, air filtration system, and frame	kg	2020
		lb	4453

Performance

			rpm	1500	1800
Prime Power	without fan	kW		401	445
		hp		545	605
	with fan	kW		392	430
		hp		533	585
Standby Power	without fan	kW		440	494
		hp		598	672
	with fan	kW		431	479
		hp		586	651
Torque at:	Prime Power	Nm		2553	2361
		lbft		1883	1741
	Standby Power	Nm		2801	2621
		lbft		2066	1933
Power tolerance		%	+4 / -0		
Mean piston speed		m/s		8,3	9,9
		ft/sec		27,1	32,6
Effective mean pressure at:	Prime Power	MPa		2,0	1,8
		psi		289	267
Effective mean pressure at:	Standby Power	MPa		2,2	2,0
		psi		317	296
Max combustion pressure at:	Prime Power	MPa		15	16,2
		psi		2176	2350
Max combustion pressure at:	Standby Power	MPa		16,1	17,2
		psi		2335	2495
Total mass moment of inertia, J (mR ²)		kgm ²		4,20	
		lbft ²		99,7	
Friction Power		kW		38	55
		hp		51,68	74,8

Derating due to altitude - see Technical Diagrams

VOLVO PENTA	Document No	Issue Index
	23572224	01

TAD1640GE-B**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)	116.5	118.5
	Prime Power	dB(A)	117.7	119.1
	Standby Power	dB(A)	117.5	118.7
Calculated sound pressure Lp at 1 m	No load	dB(A)	104,5	106,5
	Prime Power	dB(A)	105,7	107,1
	Standby Power	dB(A)	105,5	106,7

Test conditions for load acceptance data

Warm engine.	Generator	Model	Type of AVR
	ABB	AMG 0355CC04 DBPM	Blaster Electric, DECS-150 1NS1\
AVR Settings	UFRO (Hz):	47/57	DIP (%)*: 0% DWELL (%)*: std
	Stability (%)*:	std	Voltage (V): 400 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 safety 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	1,5	0,8	0,3	0,0	20-100	15,3	2,8	13,9	1,9
0-40	3,7	1,5	0,6	0,0	40-100	7,3	1,8	2,8	1,0
0-50					50-100				
0-60	6,9	1,5	1,7	0,9	60-100	4,6	1,4	1,5	0,8
0-62	7 (G3)	1,4	2,1	1,0	62-100	4,5	1,4	1,5	0,8
0-72	10 (G2)	1,8	6,5	1,4	72-100	3,4	1,3	1,3	0,6
0-80	13,1	2,4	10,5	1,7	80-100	2,1	1,1	1,0	0,4
0-100	21,0	3,4	21,8	2,5					
100-0	4,6	1,3	1,5	0,7					

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	1,6	1,0	0,3	0,0	20-100	17,6	7,1	17,2	2,1
0-40	4,2	1,4	0,7	0,0	40-100	8,2	4,6	4,2	1,3
0-50					50-100				
0-60	7,9	1,4	3,3	1,0	60-100	6,0	3,7	1,7	1,1
0-56	7 (G3)	1,4	2,1	1,0	x-100				
0-65	10 (G2)	1,8	6,5	1,4	x-100				
0-80	16,0	2,8	14,8	2,0	80-100	2,3	1,2	1,1	0,6
0-100	24,3	6,1	26,6	2,9					
100-0	6,3	1,4	1,7	0,8					

VOLVO PENTA	Document No	Issue Index
	23572224	01

TAD1640GE-B

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	1,3	0,7	0,6	0,0	20-100	8,2	1,8	6,2	1,2
0-40	3,1	1,3	1,6	0,3	40-100	5,4	1,5	1,6	1,0
0-50					50-100				
0-60	5,0	1,5	0,8	0,0	60-100	3,2	1,3	1,3	0,7
0-76	7 (G3)	1,4	4,2	1,1	76-100	2,1	1,1	1,0	0,4
0-88	10 (G2)	2,0	9,0	1,4	88-100	1,1	0,4	0,8	0,0
0-80	7,8	1,4	5,3	1,1	80-100	1,8	1,0	0,9	0,0
0-100	12,6	2,8	13,7	1,8					
100-0	4,4	0,9	2,8	1,1					

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	1,5	1,0	0,4	0,0	20-100	9,5	5,1	8,3	1,5
0-40	3,5	1,4	2,0	0,3	40-100	5,9	3,5	2,4	1,3
0-50					50-100				
0-60	5,7	1,5	1,7	0,8	60-100	3,8	2,4	1,4	0,9
0-68	7 (G3)	1,4	4,2	1,1	x-100				
0-80	10 (G2)	2,0	9,0	1,4	x-100				
0-80	9,6	1,8	8,5	1,3	80-100	1,8	1,1	1,0	0,3
0-100	14,9	4,6	17,7	2,3					
100-0	3,9	0,9	3,8	1,2					

Cold start performance

		rpm	1500	1800
Time from start to stay within 0.5% of no load speed at ambient temperature:	20	s	6,5	8,4
	5	s	6,7	8,7
	-15 *	s	7,3	9,8
	-25**	s	11,2	13,2
	Min start temp**	°C		-35,0

* With manifold heater 4 kW engaged, lubrication oil 10W/30.

** With manifold heater 4 kW engaged and block heater 2kW, lubrication oil 10W/30.

Ambient temp. °C	Block heater type and Make	Power kW	Engaged hours	Cooling water temp engine block
-15	GENETECH	2	12	17°C 63°F

VOLVO PENTA		Document No		Issue Index	
TAD1640GE-B		23572224		01	
Lubrication system		rpm	1500	1800	
Lubricating oil consumption	Prime Power	litre/h	0,10	0,11	
		US gal/h	0,026	0,029	
	Standby Power	litre/h	0,11	0,12	
		US gal/h	0,029	0,032	
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-3, VDS-4, VDS-4.5*	h	600		
	VDS, ACEA, E3*	h	400		
	ACEA E2, APICD,CF.CF-4,CG-4*	h	200		
Engine angularity limits:	front up	°	30		
	front down	°	30		
	side tilt	°	30		
Oil pressure at rated speed		kPa	300 - 650		
		psi	44 - 94		
Lubrication oil temperature in oil sump:	max	°C	130		
		°F	266		
Oil filter		μ	40,000		

* See also general section in the sales guide



VOLVO PENTA	Document No	Issue Index
	23572224	01

TAD1640GE-B

Fuel system		rpm	1500	1800
Prime Power Specific fuel consumption at:	25%	g/kWh lb/hph	233 0,378	233 0,378
	50%	g/kWh lb/hph	205 0,332	205 0,332
	75%	g/kWh lb/hph	201 0,326	201 0,326
	100%	g/kWh lb/hph	200 0,325	200 0,325

Standby Power Specific fuel consumption at:	25%	g/kWh lb/hph	250 0,405	259 0,419
	50%	g/kWh lb/hph	212 0,343	215 0,349
	75%	g/kWh lb/hph	205 0,332	206 0,333
	100%	g/kWh lb/hph	207 0,336	208 0,337



Fuel system		rpm	1500	1800
Fuel to conform to	ASTM-D975-No1 and 2-D JIS KK 2204, EN 590			
System supply flow at: rated speed	litre/h US gal/h		105,0 27,7	123,0 32,5
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 0,0	20,0 0,0
Max system return flow	litre/h US gal/h		60,0 15,9	60,0 15,9
Fuel return line max restriction (Measured at fuel return connection)	kPa psi		20,0 2,9	20,0 2,9
Maximum allowable inlet fuel temp (Measured at fuel inlet connection)	°C °F		60,0 140	60,0 140
Prefilter / Water separator	μ		10,000	
Fuel filter	μ		5,000	
Governor type/make, standard	Volvo / EMS 2.4			
Injection pump type/make	Delphi E3			

VOLVO PENTA			Document No		Issue Index	
TAD1640GE-B			23572224		01	
Intake and exhaust system			rpm	1500	1800	
Air consumption at: (+25°C and 100kPa)	Prime Power	25°C 77°F	m ³ /min cfm	31,7 1119	39,7 1402	
	Standby Power	25°C 77°F	m ³ /min cfm	33,1 1169	42,3 1494	
 See front page for important information Max allowable air intake restriction including piping			kPa psi	5 0,7	5 0,7	
Air filter restriction clean Volvo Penta filter			kPa psi	1,1 0,2	1,7 0,2	
Heat rejection to exhaust at:	Prime Power		kW BTU/min	307 17459	319 18141	
	Standby Power		kW BTU/min	335 19051	381 21667	
Exhaust gas temperature after turbine at:	Prime Power		°C °F	472 882	419 786	
		Standby Power	°C °F	484 903	438 820	
 See front page for important information Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm			kPa psi	8 1,2	8 1,2	
			kPa psi	10 1,5	10 1,5	
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	31,8 1123	40,3 1423	

VOLVO PENTA	Document No	Issue Index
	TAD1640GE-B	23572224

**Cooling system**

		rpm	1500	1800
Heat rejection radiation from engine at:	Prime Power	kW BTU/min	18 1024	20 1137
	Standby Power	kW BTU/min	20 1137	22 1251
Heat rejection to coolant at:	Prime Power	kW BTU/min	158 8985	176 10009
	Standby Power	kW BTU/min	166 9440	188 10691
Radiator cooling system type		Closed circuit		
Standard radiator core area		m ² foot ²	1,3 13,99	
Fan diameter		mm in	890 35,04	
Fan power consumption		kW hp	9 12	15 20
Fan drive ratio		0.97:1		
Coolant capacity,	engine	litre US gal	33 8,72	
	engine with std radiator and hoses	litre US gal	60 15,85	
Coolant pump		drive/ratio	Belt / 1.85:1	
Coolant flow with standard system		l/s US gal/s	6,4 1,69	7,7 2,03
Minimum coolant flow		l/s US gal/s	6,4 1,69	7,7 2,03
Maximum outer circuit restriction, including piping		kPa psi	50 7,3	70 10,2
Thermostat	start to open	°C	82	
		°F	180	
	fully open	°C	96	
		°F	205	
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	
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 US gal	58 15,32	

VOLVO PENTA			Document No	Issue Index	
TAD1640GE-B			23572224	01	
Charge air cooler system			rpm	1500 1800	
Heat rejection to charge air cooler	Prime Power	kW	84	112	
		BTU/min	4777	6369	
	Standby Power	kW	99	140	
		BTU/min	5630	7962	
Charge air mass flow	Prime Power	kg/s			
	Standby Power	kg/s			
Charge air inlet temp. (Charge air temp after turbo compressor)	Prime Power	°C	183	197	
		°F	361	387	
	Standby Power	°C	198	215	
		°F	388	419	
 See front page for important information Max allowable Charge air outlet temp. (Charge air temp after intercooler)		Prime Power	°C	43	43
			°F	109	109
		Standby Power	°C	45	45
			°F	113	113
 See front page for important information Maximum pressure drop over charge air cooler incl. piping		kPa	12	17	
			psi	1,74	2,47
		Charge air pressure (After charge air cooler)	kPa	232	231
			psi	33,65	33,50
Standard charge air cooler core area		m ²	0,765		
		foot ²	8,23		

VOLVO PENTA	Document No	Issue Index
	23572224	01

TAD1640GE-B**Cooling performance**

Standard fan: STD cooling Fan ratio: 1 : 1.13 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	67			7,6	450,0
	67			8,2	300,0
	69			8,7	150,0
	69			9,1	150,0
	70	7,6	450,0		
	71	8,2	300,0		
	72	8,7	150,0		
1800	72	9,1	0,0		
	67			9,9	450,0
	68			10,0	300,0
	69			10,5	150,0
	69	9,9	450,0	10,9	0,0
	70	9,9	150,0		
	71	10,0	300,0		
72	10,5	150,0			
73	10,9	0,0			

Note! External restrictions are calculated for values >0 Pa

Optional fan: STD cooling 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	64			6,8	450,0
	65			7,4	300,0
	67			7,9	150,0
	67			8,6	0,0
	69	6,8	450,0		
	69	7,4	300,0		
	70	7,9	150,0		
1800	71	8,6	0,0		
	64			9,0	450,0
	65			9,3	300,0
	67			9,9	150,0
	67			10,3	0,0
	69	9,0	450,0		
	70	9,3	300,0		
70	9,9	150,0			
71	10,3	0,0			

Note! External restrictions are calculated for values >0 Pa

VOLVO PENTA	Document No	Issue Index
	23572224	01

TAD1640GE-B

Optional fan: STD cooling Fan ratio: 1 : 0.97 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	62			6,4	450,0
	63			6,8	300,0
	65			7,3	150,0
	65			7,5	0,0
	67	6,4	450,0		
	68	6,8	300,0		
	69	7,3	150,0		
	69	7,5	0,0		
1800	62			8,0	450,0
	63			8,4	300,0
	65			8,9	150,0
	66			9,3	0,0
	67	8,0	450,0		
	68	8,4	300,0		
	69	8,9	150,0		
	70	9,3	0,0		

Note! External restrictions are calculated for values >0 Pa

Optional fan: Heavy Dust Fan ratio: 1 : 0.97 Fan type: FIX

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	62				400
	66				300
	66		400		
	68		300		
	69				200
	72				100
	72		200		
	74		100		
75				0	
77		0			
1800	69		400		400
	71		300		300
	72		200		200
	73		100		
	74				100
	75		0		
	76				0

Note! External restrictions are calculated for values >0 Pa

VOLVO PENTA	Document No	Issue Index
	23572224	01

TAD1640GE-B**Engine management system**

Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Isochronus
Governor droop	0-8%	4,0
Governor response	Adjustable PID-constants (VODIA)	Standard
Dual speed	1500 / 1800 RPM	According to customer
Idle speed	600 - 1200 rpm	900rpm
Fine speed adjustment	± 90 rpm	0,0
Stop function	Energized to Run/ Stop	Energized to Stop
Preheating function	On / Off	Off
Lamp test	On / Off	On

Engine sensor and switch settings

Parameter	Unit	Alarm level		Engine protection	
		Setting range	Default setting	Level	Action. Default/Alternative
Oil temp	°C	120 - 130	125	Setting +5	Shut down.
Oil pressure	Low idle	kPa	-	190,0	Shut down
	1500 rpm	kPa	-	250,0	Shut down
	1800 rpm	kPa	-	300,0	Shut down
Oil level		-	Min level	-	-
Piston cooling pressure >1000 rpm	kPa	-	150	150,0	Shut down
Coolant temp	°C	95 - 103	102	Setting +5	Shut down.
Coolant level		-	On	Low level	Shut down.
Fuel feed pressure	Low idle	kPa	-	150	-
	>1400 rpm		-	300	-
Water in fuel		-	High level	-	-
Crank case pressure	kPa	-	-	-	Shut down
Air filter pressure droop	kPa	-	5	-	-
	0,0	Alarm level		Engine protection	
Altitude, above sea	m	-	-	>1500	Automatic derating, see section derating
Charge air temp	°C	-	80	85,0	-
Charge air pressure	kPa	-	290	300,0	-
Engine speed	rpm	100 - 120% of rated speed	120% of rated speed	Alarm level	Shut down.
Low voltage		-	25,5 -	-	-

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

VOLVO PENTA	Document No	Issue Index
TAD1640GE-B	23572224	01

Electrical system

Voltage and type		24 V / insulated from earth	
Alternator:	make/output	A	Bosch / 80
	tacho output	Hz/alt. Rev	6
	drive ratio		3.9:1
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		A	280
Crank engine speed at 20°C		rpm	150
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		A	1

Power take off

	rpm	1500	1800
Max allowed bending moment in flywheel housing	Nm	15000	
	lbft	11063	
Max. rear main bearing load	N	5000	
	lbf	1124,0	

