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TAD1641GE-B	23572226	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  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		441	504
		hp		600	685
	with fan	kW		432	489
		hp		588	665
Standby Power	without fan	kW		484	565
		hp		658	768
	with fan	kW		475	550
		hp		646	748
Torque at:	Prime Power	Nm		2807	2674
		lbft		2071	1972
	Standby Power	Nm		3081	2997
		lbft		2272	2211
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		2,2	2,1
		psi		317	302
Effective mean pressure at:	Standby Power	MPa		2,4	2,3
		psi		348	339
Max combustion pressure at:	Prime Power	MPa		16,4	17,1
		psi		2379	2480
Max combustion pressure at:	Standby Power	MPa		17,5	18,2
		psi		2538	2640
Total mass moment of inertia, J (mR ²)		kgm ²		4,20	
		lbft ²		99,7	
Friction Power		kW		36	53
		hp		48,96	72,08
Derating due to altitude - see Technical Diagrams					

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TAD1641GE-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)	116.7	118.5
	Prime Power	dB(A)	118.3	118.7
	Standby Power	dB(A)	118.2	119.1
Calculated sound pressure Lp at 1 m	No load	dB(A)	104,7	106,5
	Prime Power	dB(A)	106,3	106,7
	Standby Power	dB(A)	106,2	107,1

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%
	Stability (%)*:	std	DWELL (%)*: 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	1,6	1,0	0,3	0,0	20-100	18,1	3,0	17,9	2,1
0-40	4,2	1,4	0,8	0,0	40-100	8,2	1,7	4,1	1,1
0-50					50-100				
0-60	8,4	1,5	3,9	1,1	60-100	4,9	1,4	1,7	0,8
0-56	7 (G3)	1,4	1,9	0,9	56-100	5,5	1,5	1,7	0,8
0-65	10 (G2)	1,8	6,1	1,4	65-100	4,4	1,4	1,5	0,7
0-80	15,9	2,8	14,7	2,0	80-100	2,4	1,1	1,2	0,6
0-100	24,3	3,8	26,6	2,9					
100-0	6,1	1,2	1,7	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	1,8	1,1	0,3	0,0	20-100	2,8	7,7	21,8	2,6
0-40	5,0	1,5	0,9	0,0	40-100	9,1	4,7	5,6	1,4
0-50					50-100				
0-60	10,2	1,8	6,5	1,4	60-100	6,1	3,6	1,9	1,2
0-51	7 (G3)	1,4	1,9	0,9	x-100				
0-59	10 (G2)	1,8	6,1	1,4	x-100				
0-80	20,0	3,3	20,4	2,5	80-100	2,4	1,3	1,3	0,8
0-100	27,9	6,4	31,9	3,4					
100-0	6,2	1,5	1,8	0,9					

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TAD1641GE-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	1,4	1,0	0,7	0,0	20-100	9,9	1,8	9,3	1,4
0-40	3,3	1,3	1,1	0,2	40-100	5,8	1,5	2,5	1,5
0-50					50-100				
0-60	5,8	1,5	1,9	0,9	60-100	3,5	1,4	1,5	0,9
0-68	7 (G3)	1,4	3,8	1,1	68-100	2,9	1,3	1,3	0,8
0-78	10 (G2)	1,9	9,0	1,3	78-100	1,9	1,0	1,1	0,6
0-80	10,0	2,0	9,1	1,3	80-100	1,8	0,9	1,1	0,5
0-100	15,7	3,2	19,2	2,2					
100-0	4,3	1,9	4,4	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	1,8	1,2	0,2	0,0	20-100	11,3	3,9	11,9	1,9
0-40	3,9	1,4	1,5	0,3	40-100	7,1	2,5	4,5	1,4
0-50					50-100				
0-60	6,9	1,5	3,6	1,0	60-100	4,1	2,1	1,7	1,2
0-60	7 (G3)	1,4	3,8	1,1	x-100				
0-70	10 (G2)	1,9	9,0	1,3	x-100				
0-80	12,9	2,8	14,3	1,8	80-100	1,9	1,0	1,2	0,8
0-100	18,1	4,8	23,4	2,8					
100-0	4,5	1,3	5,1	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

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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



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Fuel system		rpm	1500	1800
Prime Power Specific fuel consumption at:	25%	g/kWh	233	249
		lb/hph	0,378	0,403
	50%	g/kWh	205	210
		lb/hph	0,332	0,341
	75%	g/kWh	201	205
		lb/hph	0,326	0,332
	100%	g/kWh	200	207
		lb/hph	0,325	0,335

Standby Power Specific fuel consumption at:	25%	g/kWh	227	232
		lb/hph	0,368	0,376
	50%	g/kWh	203	202
		lb/hph	0,328	0,327
	75%	g/kWh	200	203
		lb/hph	0,324	0,329
	100%	g/kWh	197	204
		lb/hph	0,319	0,331

Fuel system		rpm	1500	1800
Fuel to conform to	ASTM-D975-No1 and 2-D JIS KK 2204, EN 590			
System supply flow at:	litre/h		180,0	200,0
	US gal/h		47,6	52,8
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	kPa		20,0	20,0
	psi		2,9	2,9
Max system return flow	litre/h		60,0	60,0
	US gal/h		15,9	15,9
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	μ		10,000	
Fuel filter	μ		5,000	
Governor type/make, standard	Volvo / EMS 2.4			
Injection pump type/make	Delphi / E3			



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Intake and exhaust system			rpm	1500	1800
Air consumption at: (+25°C and 100kPa)	Prime Power		m ³ /min cfm	35,5 1254	44 1554
	Standby Power		m ³ /min cfm	38 1342	45,8 1617
 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	1,2 0,2	1,2 0,2
Heat rejection to exhaust at:	Prime Power		kW BTU/min	326 18539	373 21212
	Standby Power		kW BTU/min	356 20245	442 25136
Exhaust gas temperature after turbine at:	Prime Power		°C °F	443 829	436 817
		Standby Power	°C °F	455 851	469 876
 See front page for important information Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm			Prime Power	kPa psi	10 1,5
			Standby Power	kPa psi	10 1,5
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	Prime Power		m ³ /min cfm	85,0 3002	100,6 3553
	Standby Power		m ³ /min cfm	92,0 3249	110,4 3899

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**Cooling system**

		rpm	1500	1800
Heat rejection radiation from engine at:	Prime Power	kW BTU/min	18 1024	22 1251
	Standby Power	kW BTU/min	20 1137	24 1365
Heat rejection to coolant at:	Prime Power	kW BTU/min	170 9668	212 12056
	Standby Power	kW BTU/min	184 10464	231 13137
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	

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Charge air cooler system		rpm	1500	1800
Heat rejection to charge air cooler	Prime Power	kW	91	127
		BTU/min	5175	7222
	Standby Power	kW	110	147
		BTU/min	6256	8360
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	184	210
		°F	363	410
	Standby Power	°C	202	230
		°F	396	446
 See front page for important information Max allowable Charge air outlet temp. (Charge air temp after intercooler)	Prime Power	°C		
		°F		
	Standby Power	°C	45	45
		°F	113	113
 See front page for important information Maximum pressure drop over charge air cooler incl. piping		kPa	18	
		psi	2,61	
Charge air pressure (After charge air cooler)		kPa	240	252
		psi	34,81	36,55
Standard charge air cooler core area		m ²	0,765	
		foot ²	8,23	

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**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	63			7,6	450,0
	64			8,2	300,0
	66			8,7	150,0
	66			9,1	0,0
	69	7,6	450,0		
	70	8,2	300,0		
	70	8,7	150,0		
1800	71	9,1	0,0		
	60			9,9	450,0
	61			10,0	300,0
	62			10,5	150,0
	64			10,9	0,0
	65	9,9	450,0		
	66	10,0	300,0		
	67	10,5	150,0		
68	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	61			6,8	450,0
	62			7,4	300,0
	63			7,9	150,0
	64			8,6	0,0
	67	6,8	450,0		
	68	7,4	300,0		
	69	7,9	150,0		
1800	69	8,6	0,0		
	57			9,0	450,0
	58			9,3	300,0
	60			9,9	150,0
	61			10,3	0,0
	62	9,0	450,0		
	63	9,3	300,0		
	65	9,9	150,0		
66	10,3	0,0			

Note! External restrictions are calculated for values >0 Pa

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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	58			6,4	450,0
	59			6,8	300,0
	61			7,3	150,0
	61			7,5	0,0
	64	6,4	450,0		
	66	6,8	300,0		
	67	7,3	150,0		
	68	7,5	0,0		
1800	55			8,0	450,0
	56			8,4	300,0
	58			8,9	150,0
	59			9,3	0,0
	60	8,0	450,0		
	61	8,4	300,0		
	63	8,9	150,0		
	64	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 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	59				400
	63				300
	64		400		
	66		300		200
	66		300		
	69				100
	70		200		
	72		100		0
1800	75		0		
	61				400
	63				300
	64				200
	66		400		100
	68		300		0
	69		200		
	70		100		
72		0			

Note! External restrictions are calculated for values >0 Pa

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TAD1641GE-B**Engine management system**

Functionality	Alternatives	Default setting
Governor mode	Isochronous/droop	Isochronous
Governor droop	0-8%	4. %
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	-30,0	Shut down
	1500 rpm	kPa	-	250,0	-30,0	Shut down
	1800 rpm	kPa	-	300,0	-30,0	Shut down
Oil level		-	Min level	-	Shut down.	
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	(+) 5	Shut down	
Charge air pressure	kPa	-	290	300,0	Shut down	
Engine speed	rpm	100 - 120% of rated speed	120% of rated speed	Alarm level	Shut down.	
Low voltage V		-	25,5 -	-	-	

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

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TAD1641GE-B**Electrical system**

Voltage and type		24V / 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	105P70	
	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	

