

<b>VOLVO PENTA</b>	Document No	Issue Index
	<b>21340724</b>	<b>02</b>

TAD1340VE

**General**

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

Number of cylinders			6
Displacement, total		liters in <sup>3</sup>	12.78 780
Firing order			1-5-3-6-2-4
Bore		mm in	131 5.16
Stroke		mm in	158 6.22
Compression ratio			18.1:1
Wet weight	Engine only	kg lb	
	Power pac	kg lb	

**Performance**

			rpm	1500	1800	2000	2100
ICFN Power	256 kW	without fan	kW	256	256	256	256
			hp	348	348	348	348
		with fan 890 mm	kW	250	246	242	240
			hp	340	335	329	326
Torque at:		ICFN Power 256 kW	Nm	1630	1358	1222	1164
			lbf ft	1202	1002	901	859
Max torque at engine speed		1260 rpm	Nm	1770			
			lbf ft	1305			
Mean piston speed			m/s	7.9	9.5	10.5	11.1
			ft/sec	25.9	31.1	34.6	36.3

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<b>Performance</b>		<b>rpm</b>	<b>1500</b>	<b>1800</b>	<b>2000</b>	<b>2100</b>
Effective mean pressure at:	ICFN Power 256 kW	MPa	1.60	1.34	1.20	1.14
		psi	232	194	174	166
Max combustion pressure at:	ICFN Power 256 kW	MPa	14.3	14.3	14.1	13.7
		psi	2074	2074	2045	1987
Total mass moment of inertia, J (mR <sup>2</sup> )		kgm <sup>2</sup>	3.43			
		lbft <sup>2</sup>	81.4			
Friction Power		kW	30	43	54	60
		hp	41	58	73	82

**Derating see Technical Diagrams**

### Cold start performance

*Cold start ambient temperature limit and time from start to no load speed	without starting aid	°C / sec.	20	3s
		°F / sec.	68	
	with manifold heater 4 kW	°C / sec.	-5	4s
		°F / sec.	23	
	with manifold heater 4 kW and block heater	°C / sec.	-15	4.5s
		°F / sec.	5	
*Specify oil and fuel quality	Mk1 fuel, VDS2 oil. 15w40 above -15°C, 10w30 below -15°C			
Usage of manifold heater:	<b>Time preheating, minutes</b>	<b>Time post heating, minutes</b>		
<b>Block heater type</b>	<b>Make</b>	<b>Power kW</b>	<b>Engaged hours</b>	<b>Cooling water temp engine block</b>
	Volvo	2	12	10°C 50°F

\* See also general section in the Sales Support Tool

### Lubrication system

Lubricating oil consumption at max rpm at:	ICFN Power 256 kW	liter/h	0.02
		US gal/h	0.005
	ICFN Power 256 kW	liter/h	0.02
		US gal/h	0.005
Oil system capacity including filters		liter	36
		US gal	9.51
Oil sump capacity:	Max	liter	30
		US gal	7.93
	Min	liter	19
		US gal	5.02
Oil change intervals/specifications	VDS 3	h	600
	VDS 2	h	400
		h	
Engine angularity limits:	front up	°	11
	front down	°	11
	side tilt	°	11
Oil pressure at rated speed		kPa	300 - 650
		psi	44 - 94
Oil pressure shut down switch setting		kPa	N/A
		psi	

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**Lubrication system**

Lubrication oil temperature in sump:	max	°C	130
		°F	266
Oil filter micron size		μ	40

**Fuel system**

		rpm	1500	1800	2000	2100
<b>ICFN Power 256 kW</b> Specific fuel consumption at:	25%	g/kWh	235	272	296	314
		lb/hph	0.381	0.441	0.480	0.509
	50%	g/kWh	204	220	234	244
		lb/hph	0.331	0.357	0.379	0.396
	75%	g/kWh	195	206	217	224
		lb/hph	0.316	0.334	0.352	0.363
	100%	g/kWh	191	202	211	217
		lb/hph	0.310	0.327	0.342	0.352
Fuel to conform to			ASTM-D975-No1 and 2D JIS KK 2204, EN 590			

**Fuel system**

System supply flow at max. speed	liter/h	100
	US gal/h	26.4
Fuel supply line max. restriction (Measured at fuel inlet connection)	kPa	10
	psi	1.5
Fuel supply line max. pressure, engine stopped	kPa	0
	psi	
System return flow at max. speed	liter/h	18.0
	US gal/h	4.8
Fuel return line max. restriction (Measured at fuel return connection)	kPa	20
	psi	2.9
Max. allowable inlet fuel temp (Measured at fuel inlet connection)	°C	60
	°F	140
Prefilter / Water separator micron size	μ	10
Fuel filter micron size	μ	5
Governor type/make, standard		Volvo / EMS 2.2
Injection pump type/make		Delphi E3

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Intake and exhaust system		Inlet air temp	rpm	1500	1800	2000	2100
Air consumption at: (+25°C and 100kPa)	ICFN Power 256 kW	25°C 77°F	m <sup>3</sup> /min cfm	21 742	25 883	27 954	27 954
Max allowable air intake restriction including piping			kPa psi	3 0.4			
Heat rejection to exhaust at:	ICFN Power 256 kW		kW BTU/min	170 9668	181 10293	192 10919	200 11374
Exhaust gas temperature after turbine at:	ICFN Power 256 kW		°C °F	380 716	350 662	347 657	359 678
Max allowable back pressure in exhaust line			kPa psi	10 1.5	12 1.7	14 2.0	15 2.2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	ICFN Power 256 kW		m <sup>3</sup> /min cfm	46 1624	50 1766	52 1836	54 1907
			m <sup>3</sup> /min cfm				
Exhaust gas smoke	ICFN Power 256 kW		*Bosch	0.1	0.2	0.2	0.3
Heat rejection radiation from engine at:	ICFN Power 256 kW		kW BTU/min	13 728	13 728	12.8 728	12.8 728
Heat rejection to coolant at:	ICFN Power 256 kW		kW BTU/min	99 5630	106 6028	117 6654	122 6938
Coolant			Volvo Penta coolant "ready mix" or Volvo Penta coolant mixed with clean fresh water 40 / 60				
Radiator cooling system type			Closed circuit				
Standard radiator core area			m <sup>2</sup> foot <sup>2</sup>	0.8 8.61			
Fan diameter	890 mm		mm in	890 35.04			

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Cooling system		rpm	1500	1800	2000	2100
Fan power consumption	890 mm	kW	6.0	10.0	14.0	16.0
		hp	8	14	19	22
Fan drive ratio	fan Ø890		0,84 : 1			
Coolant capacity:	engine	liter	20			
		US gal	5.3			
	std. 0,8m <sup>2</sup> radiator with hoses	liter	24			
		US gal	6.3			
Coolant pump		drive/ratio	Belt / 1.43:1			
Coolant flow with standard system		l/s				
		US gal/s				
Minimum coolant flow		l/s	4.7	5.7	6.0	6.2
		US gal/s	1.2	1.5	1.6	1.6
Maximum outer circuit restriction incl. piping		kPa	65.0			
		psi	9.4			
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			
Standard pressure cap setting		kPa	70			
		psi	10.2			
Maximum top tank temperature		°C	107			
		°F	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 are functioning	with std. 0,8 m <sup>2</sup> radiator	liter	1.8			
		US gal	0.5			
		liter				
		US gal				

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Charge air cooler system		rpm	1500	1800	2000	2100
Heat rejection to charge air cooler	ICFN Power 256 kW	kW	48	56	63	68
		BTU/min	2730	3185	3583	3867
Charge air mass flow	ICFN Power 256 kW	kg/s	0.42	0.49	0.53	0.54
		kg/s	0.42	0.49		
Charge air inlet temp. (Charge air temp after turbo compressor)	ICFN Power 256 kW	°C	157	163	170	170
		°F	315	325	338	338
Charge air outlet temp. (Charge air temp after charge air cooler)	ICFN Power 256 kW	°C	40	43	45	45
		°F	104	109	113	113
Maximum pressure drop over charge air cooler incl. piping		kPa	8			
		psi	1.16			
Charge air pressure (After charge air cooler)		kPa	177			
		psi	25.67			
Standard charge air cooler core area		m <sup>2</sup>	0.8			
		foot <sup>2</sup>	8.61			

**Cooling performance: 0.8 m<sup>2</sup> radiator and 890 mm fan**

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 103°C TTT and 40% coolant. Valid at 1 atm.

Engine speed	Engine power	ICFN Power 256 kW					
		Air on temp		Air flow		External restriction	
		°C	°F	m <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
2100 (0,84)	256	65	149	6.4	226.0	532	0.077
	348	68	154	7.2	254.3	289	0.042
		71	160	7.9	279.0	0	
1800 (0,84)	256	65	149	5.4	190.7	385	0.056
	348	68	154	6.1	215.4	180	0.026
		71	160	6.7	236.6	0	

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**Engine management system**

Functionality	Alternatives	Default setting
Governor mode	Isochronous / Droop	
Governor droop	0-8 %	
Governor response	Adjustable PID-constants (VODIA)	Standard
Idle speed	600-1200	
Stop function	Energized to Run / Stop	
Preheating function	On / Off	
Lamp test	On / Off	

Engine sensors and switch settings		Alarm level		Engine protection		
Parameter	Unit	Setting range	Default setting	Level	Action. Default/Alternative	
Oil temp	°C	120 - 130	125	Setting +5	Shut down. ON/OFF*	
Oil pressure	Low idle	kPa	-	150	-20	Shut down. ON/OFF*
	Rated speed	kPa	-	250	-20	Shut down. ON/OFF*
Oil level		-	Min level	-	-	
Piston cooling pressure >1000 rpm	kPa	-	150	150	Shut down. ON/OFF*	
Coolant temp	°C	95 - 102	102	Setting +5	Shut down. ON/OFF*	
Coolant level		See cooling system	On	Low level	Shut down. ON/OFF*	
Fuel feed pressure	Low idle	kPa	-	100	-	-
	>1300 rpm		-	300	-	-
Water in fuel		-	High level	-	-	
Crank case pressure	kPa	-	-	Rapid pres inc	Shut down. ON/OFF*	
Air filter pressure drop	kPa	-	5	-	-	
Altitude, above sea	m	-	-	-	Automatic derating, see section derating	
Charge air temp	°C	-	80	85	Shut down. ON/OFF*	
Charge air pressure**	kPa	-	310	+10	Shut down. ON/OFF*	
Engine speed	rpm	100 - 120% of rated speed	120% of rated speed	Alarm level		

\* Off means no shut down, alarm only

\*\* Pabs, 2100 rpm at sea level.

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**Electrical system**

Voltage and type		24V / insulated from earth	
Alternator:	make	Bosch	
	output	A	80
	tacho output	Hz/alternator rev.	6
	drive ratio	5,3:1	
Starter motor:	make	Melco	
	type	105P70	
	output	kW	7
		hp	9.5
Number of teeth on:	flywheel	153	
	starter motor	12	
Max wiring resistance main circuit		mΩ	2
Cranking current at +20°C		A	180
Crank engine speed at 20°C		rpm	155
Starter motor battery capacity	max	Ah/A	2x225
	min at +5°C	Ah/A	-
Inlet manifold heater (at 20 V)		kW	4
Power relay for the manifold heater		A	1

**Power take off**

Timing gear at compressor PTO max:	Nm	160
	lbf ft	118
Speed ratio direction of rotation viewed from flywheel side	0,91:1/clockwise	
Timing gear at servo pump PTO max:	Nm	100
	lbf ft	74
Speed ratio direction of rotation viewed from flywheel side	1,58:1/clockwise	
Max allowed bending moment in flywheel housing	Nm	15000
	lbf ft	11063
Max. rear main bearing load	N	4000
	lbf	899.2