

<b>VOLVO PENTA</b>	Document No	Issue Index
	<b>TAD1341VE</b>	<b>21340725</b>

## 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	1325 2921
	Power pac	kg lb	1790 3946

<b>Performance</b>			<b>rpm</b>	<b>1500</b>	<b>1800</b>	<b>2000</b>	<b>2100</b>
ICFN Power	275 kW	without fan	kW	275	275	275	275
			hp	374	374	374	374
		with fan	kW	269	265	261	259
		890 mm	hp	366	360	355	352
Torque at:		ICFN Power 275 kW	Nm	1751	1459	1313	1251
			lbf ft	1291	1076	968	922
Max torque at engine speed		1260 rpm	Nm	1905			
			lbf ft	1405			
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 275 kW	MPa	1.72	1.43	1.29	1.23
		psi	250	208	187	178
Max combustion pressure at:	ICFN Power 275 kW	MPa	15.1	14.9	14.4	13.9
		psi	2190	2161	2088	2016
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 275 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	130
		psi	19

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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 275 kW</b> Specific fuel consumption at:	25%	g/kWh	230	262	286	299
		lb/hph	0.373	0.425	0.464	0.485
	50%	g/kWh	204	217	230	238
		lb/hph	0.331	0.352	0.373	0.386
	75%	g/kWh	194	205	214	221
		lb/hph	0.314	0.332	0.347	0.358
	100%	g/kWh	191	200	209	215
		lb/hph	0.310	0.324	0.339	0.349
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 275 kW	25°C 77°F	m <sup>3</sup> /min cfm	23 802	26 911	27 954	28 992
Max allowable air intake restriction including piping			kPa psi	3 0.4			
Heat rejection to exhaust at:	ICFN Power 275 kW		kW BTU/min	179 10180	192 10919	203 11544	211 11999
Exhaust gas temperature after turbine at:	ICFN Power 275 kW		°C °F	387 729	370 698	369 696	374 705
Max allowable back pressure in exhaust line			kPa psi	11 1.6	13 1.9	15 2.2	15 2.2
Exhaust gas flow at: (temp and pressure after turbine at the	ICFN Power 275 kW		m <sup>3</sup> /min cfm	49 1730	52 1836	55 1946	56 1992
Exhaust gas smoke	ICFN Power 275 kW		*Bosch	0.1	0.2	0.2	0.3
Heat rejection radiation from engine at:	ICFN Power 275 kW		kW BTU/min	14 790	14 790	13.8 785	13.8 785
Heat rejection to coolant at:	ICFN Power 275 kW		kW BTU/min	102 5801	112 6369	122 6938	128 7279
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 275 kW	kW	54	63	70	73
		BTU/min	3071	3583	3981	4151
Charge air mass flow	ICFN Power 275 kW	kg/s	0.44	0.5	0.53	0.54
Charge air inlet temp. (Charge air temp after turbo compressor)	ICFN Power 275 kW	°C	162	167	173	176
		°F	324	333	343	349
Charge air outlet temp. (Charge air temp after charge air cooler)	ICFN Power 275 kW	°C	41	44	45	45
		°F	106	111	113	113
Maximum pressure drop over charge air cooler incl. piping		kPa	8			
		psi	1.16			
Charge air pressure (After charge air cooler)		kPa	190			
		psi	27.56			
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 275 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)	275	62	144	6.3	222.5	570	0.083
	374	65	149	7.0	247.2	359	0.052
		68	154	7.9	279.0	0	
1800 (0,84)	275	62	144	5.5	194.2	358	0.052
	374	65	149	6.1	215.4	206	0.030
		68	154	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	40000
	lbf ft	29500
Max. rear main bearing load	N	4000
	lbf	899.2