


**Important**

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.

Requirements marked with  are considered as critical for exhaust emissions compliance according to the design specification in the Volvo Penta application for certification.

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.

**General**

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

Number of cylinders			6
Displacement, total	liters		12,78
		in <sup>3</sup>	780
Firing order			1-5-3-6-2-4
Bore	mm		131
	in		5,16
Stroke	mm		158
	in		6,22
Compression ratio			17,8:1
Wet weight	Engine only (Estimated) (excl after treatment comp.)	kg	1325
		lb	2921
	Power pac	kg	1790
		lb	3946

Performance				rpm	1200	1500	1800	1900
IFN Power	315 kW	without fan		kW	273	315	315	315
				hp	372	428	428	428
		with fan		kW	264	300	296	295
		890 mm		hp	359	408	402	401
Torque at:		IFN Power		Nm	2175	2005	1671	1583
				lbf ft	1604	1479	1232	1168
Max torque at engine speed		rpm	1200 rpm	Nm	2175			
				lbf ft	1604			
Power tolerance				%	±2			
Mean piston speed				m/s	6,3	7,9	9,5	10,0
				ft/sec	20,7	25,9	31,1	32,8
Effective mean pressure at:	IFN Power			MPa	2,14	1,97	1,64	1,56
				psi	310	286	238	226
Max combustion pressure at:	IFN Power			MPa	14,4	15,1	15,3	14,7
				psi	2088	2190	2219	2132
Total mass moment of inertia, J (mR <sup>2</sup> ) (not including flywheel)				kgm <sup>2</sup>	1,143			
				lbft <sup>2</sup>	27,1			
Friction Power				kW	23	33	47	52
				hp	31	45	64	71

**Derating see Technical Diagrams**

**Engine brake performance (only engines with VCB)**

		rpm	1200	1500	1800	1900
Brake power:	without fan	kW hp	N/A	N/A	N/A	N/A
Brake torque:	without fan	Nm lbf ft				
Engine speed range for VCB activation:		rpm	N/A			
Min engine speed with VCB still active:		rpm	N/A			
Min oil temperature for VCB activation:		°C	N/A			

**Cold start performance**

*Cold start limit temperature	without starting aid	°C	-15
		°F	5
	with manifold heater 3 kW	°C	-25
		°F	-13
	with manifold heater 3 kW and block heater	°C	-30
		°F	-22
*Specify oil and fuel quality	T>-15°C Oil VDS3 or VDS4 15W/40 T<-15°C Oil VDS3 or VDS4 5W/40		
Heater type	Make	Power kW	Engaged hours (-30°C)
Self circulating	Volvo 21578298	2	12
			Cooling water temp engine block
			-1°C 30°F

\* See also general section in the sales guide

**Lubrication system**

Lubricating oil consumption (average)		liter/h	0,02
Oil system capacity including filters		liter US gal	Std sump 36 / Aluminium sump 52 Std sump 9,51 / Aluminium sump 13,74
Plastic Oil pan capacity (Std):	Max	liter	30
		US gal	7,93
	Min	liter	19
		US gal	5,02
Aluminium Oil pan capacity:	Max	liter	46
		US gal	12,15
	Min	liter	36
		US gal	9,51
Oil change intervals/specifications	VDS3	h	500
	VDS4	h	500
Engine angularity limits:	front up	°	Std sump 11 / aluminium sump 35
	front down	°	Std sump 11 / aluminium sump 35
	side tilt	°	Std sump 11 / aluminium sump 35
Oil pressure at rated speed		kPa psi	300 - 650 44 - 94




**Lubrication system**

Lubrication oil temperature in sump:	max	°C	130
		°F	266
Oil filter filtration efficiency (in accordance with ISO 4548-12)	99%	μ	38
	50%	μ	14

**Fuel system**

System supply flow at max. Speed		liter/h	130
		US gal/h	34,3
Fuel supply line max. restriction (measured at fuel inlet connection)		kPa	30
		psi	4,4
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection)		kPa	165
		psi	23,9
Fuel supply line min. pressure, during engine stand still (measured at fuel inlet connection)		kPa	-125
		psi	-18,1
System return flow at max. Speed		liter/h	30,0
		US gal/h	7,9
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 filtration efficiency	96%	μ	6
	75%	μ	4
Governor type/make, standard	Volvo/EMS2.3		
Fuel to conform to	Fuel corresponding to EN590:1999 or ASTM D 975-No or JIS KK2204:2004		



**Intake and exhaust system**

		rpm	1200	1500	1800	1900
Charge air consumption at: (+25°C and 100kPa)	IFN Power	m³/min	19,0	23,0	26	26
		cfm	671	812	918	918
 <b>See front page for important information</b>						
Max allowable air intake restriction including piping		kPa	5			
		psi	0,7			
Heat rejection to exhaust at:	IFN Power	kW	196	233	240	257
		BTU/min	11146	13250	13649	14615
Exhaust gas temperature after turbine at:	IFN Power	°C	474	473	445	460
		°F	885	883	833	860
 <b>See front page for important information</b>						
Max allowable back pressure in exhaust line (after turbine)		kPa	8	11	13	15
Pipe dimension Ø: 125 mm		psi	1,2	1,6	1,9	2,2
 Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power	m³/min	48,0	56,0	58	61
		cfm	1695	1978	2048	2154

**Cooling system**

		rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	IFN Power	kW	8,7	8,8	7,9	9,0
		BTU/min	495	500	449	512
Heat rejection to coolant at:	IFN Power	kW	136	159	166	198
		BTU/min	7734	9042	9440	11260
Coolant		Yellow Volvo Coolant Solution (VCS)				
Radiator cooling system type		Closed circuit				
Standard radiator core area		m <sup>2</sup>	0,8			
		foot <sup>2</sup>	8,61			
Fan diameter	890 mm	mm	890			
		in	35,04			
Fan power consumption	890 mm	kW	9,5	15,0	19,5	20,5
		hp	13	20	27	28
Fan drive ratio	fan Ø890		0,99:1 ccw			
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/1,41:1 cw			
Coolant flow with standard system		l/s	3,7	4,7	5,7	6
		US gal/s	1,0	1,2	1,5	1,6
Minimum coolant flow		l/s	3,2	4,2	5,5	5,5
		US gal/s	0,8	1,1	1,5	1,5
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	75			
		psi	10,9			
Maximum top tank temperature		°C	107			
		°F	225			
Recommended 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		liter	2			
		US gal	0,5			

**Charge air cooler system**

		rpm	1200	1500	1800	1900
Heat rejection to charge air cooler	IFN Power	kW	51	61	66	67
		BTU/min	2900	3469	3753	3810
Charge air mass flow	IFN Power	kg/s	0,38	0,45	0,5	0,51
Charge air inlet temp. (Charge air temp after turbo compressor)	IFN Power	°C	175	180	179	178
		°F	347	356	354	352
 See front page for important information Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	42	46	49	50
		°F	108	115	120	122
 See front page for important information Maximum pressure drop over charge air cooler incl. piping		kPa	12			
		psi	1,74			
Charge air pressure (Relative, after charge air cooler)		kPa	210	224	217	214
		psi	30,46	32,49	31,47	31,04
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 pull 890 fixed fan standard drive ratio 0.99**

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	kg/s	lb/s	Pa	psi
1900	315 428	66	151	10,2	22,4	0	
		65	149	9,7	21,3	150	0,022
		64	146	9,1	20,1	300	0,044
		62	143	8,6	18,9	450	0,065

**Cooling performance: 0,8 m<sup>2</sup> radiator and pull 890 Visco fan standard drive ratio 0.84**

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	kg/s	lb/s	Pa	psi
1900	315 428	59	138	7,7	17,1	0	
		52	126	6,9	15,3	150	0,022
		51	124	6,0	13,3	300	0,044
		44	111	5,1	11,2	450	0,065

**Cooling performance: 0.8 m<sup>2</sup> radiator and push 890 fixed fan standard drive ratio 0.99**

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

Engine speed rpm	Engine power hp	Air on temp		Air flow		External restriction	
		°C	°F	kg/s	lb/s	Pa	psi
1900	315	67	152	10,9	24,0	0	
	428	66	150	10,4	23,0	150	0,022
		65	148	10,0	22,0	300	0,044
		63	146	9,5	21,0	450	0,065

**Cooling performance: 0,8 m<sup>2</sup> radiator and push 890 Visco fan standard drive ratio 0.84**

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	kg/s	lb/s	Pa	psi
1900	315	61	142	9,3	20,4	0	
	428	59	138	8,7	19,2	150	0,022
		56	133	8,2	18,0	300	0,044
		52	126	7,5	16,5	450	0,065

**Engine management system**

Functionality	Alternatives		Default setting
Governor mode		Isochronous	
Governor droop		0	
Governor response	Adjustable PI-constants		1
Idle speed		600-900	700
Stop function	Ignition off stop engine		
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	Setting +5	125		Shut down, ON/OFF*
Oil pressure	Low idle	kPa	50	25,0	Shut down, ON/OFF*
	Rated speed	kPa	300	275	Shut down, ON/OFF*
Oil level					
Piston cooling pressure >1000 rpm	kPa				
Coolant temp	°C	107	105		Shut down, ON/OFF*
Coolant level		See cooling system	On		
Fuel feed pressure	1200rpm	kPa	100		
Water in fuel		Alarm When Closed			
Crank case pressure	kPa	Rapid Pres inc			Shut down, ON/OFF*
Air filter pressure drop			5		
Altitude, above sea	m				Automatic derating, see section derating
Charge air temp	°C	85	80		Shut down, ON/OFF*
Charge air pressure	kPa	Alarm map value +30kPa	Warning map value +20kPa		Shut down, ON/OFF*
Engine speed	rpm	x % of rated speed	114% of rated speed	Alarm level	Shut down, ON/OFF*

\* Off means no shut down, alarm only

Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after sec	Forced shut down after 2 sec
Coolant temp	105°C	107°C	107°C	108°C	N/A	N/A
Oil temp	125°C	127°C	127°C	130°C	N/A	N/A
Low oil pressure	Warning map value	Alarm map value	N/A	N/A	N/A	Alarm map value
High charge air temp	80°C	85°C	85°C	86°C	N/A	N/A
High charge air pressure	Warning map value	Alarm map value	Alarm map value	Alarm map value	N/A	N/A

**Electrical system**

Voltage and type				24V		
Alternator:	output	A		110/150		
	tacho output	Hz/alternator rev.		6		
	drive ratio			5,25		
Starter motor:	type			105P70 / (105P70 ISS för start/stop)		
	output	kW	hp	7 9,5		
Number of teeth on:	flywheel			153		
	starter motor			12		
Inlet manifold heater (at 20 V)		kW	3			
Power relay for the manifold heater		A	1			
<b>Conditions:</b>	<b>Temperature</b>	°C		<b>25</b>	<b>0</b>	<b>-15</b>
(4 mΩ main circuit resistance@	<b>Battery</b>	<b>Ah / CCA</b>		<b>235 / 1300</b>	<b>145 / 1050</b>	<b>145 / 1050</b>
Crank speed		rpm		171	118	98
Crank current		A		290	400	480
Starter input power during crank		kW		6,2	7,5	7,7
Battery power during crank		kW		6,5	8,1	8,5
Min battery		Ah / CCA		120 / 700	140 / 800	145 / 1050

**Power take off**

	rpm	1200	1500	1800	1900	
Front end in line with crank shaft max:*	Nm	2175	2005	1560	1583	
(with a total added mass moment of inertia, J (mR2) ≤ 0,05 kgm²)	lbf ft	1604	1479	1151	1167	
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	42	53	62	68
		hp	57	72	84	92
	max down	kW	36	44	52	60
		hp	49	60	71	82
	max right	kW	42	53	62	68
		hp	57	72	84	92
Timing gear at servo pump PTO max:*	Nm	100				
	lbf ft	74				
Speed ratio direction of rotation viewed from flywheel side		1,75:1/ccw				
Maximum torque on timing gear at rear PTO : *	Nm	1000				
	lbf ft	738				
Speed ratio direction of rotation viewed from flywheel side		1,26:1/ccw				
Timing gear at compressor PTO max:*	Nm	600				
	lbf ft	443				
Speed ratio direction of rotation viewed from flywheel side		1,31:1/ccw				
Max allowed bending moment in flywheel housing	Nm	15000				
	lbf ft	11063				
Max. rear main bearing load	N	4000				
	lbf	899,2				

\* **Maximum allowed torque at individual PTO's.**

**If more than one PTO output is used simultaneously, calculations needs to be performed to determine available maximum.**

**Available torque depends on application inertia.**



