VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05

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 penalities as described in the Clean Air Act.

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^3	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 (Not including after treatment system)	Engine only	kg lb	1325 2921
	Power pac	kg lb	1790 3946

Performance		**rpm**	**1500**	**1800**	**2000**	**2100**
352 kW	without fan	kW hp	348 473	352 479	352 479	352 479
	with fan 890 mm	kW hp	342 465	342 465	338 460	336 457
Torque at:	ICFN Power 352 kW	Nm lbf ft	2215 1634	1867 1377	1681 1239	1601 1180
Max torque at engine speed	1260 rpm	Nm lbf ft	2248 1658			
Power tolerance		%	±2%			
Mean piston speed		m/s ft/sec	7,9 25,9	9,5 31,1	10,5 34,6	11,1 36,3
Effective mean pressure at:	ICFN Power 352 kW	MPa psi	2,18 316	1,84 266	1,65 240	1,57 228
Max combustion pressure at:	ICFN Power 352 kW	MPa psi	17,2 2494	17,2 2494	15,7 2277	15 2175
Total mass moment of inertia, J (mR^2) (not including flywheel)		kgm^2 $lbft^2$	3,43 81,4			
Friction Power		kW hp	30 41	43 58	54 73	60 82
Derating see Technical Diagrams						

VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05

Cold start performance

*Cold start limit temperature	without starting aid	°C / sec °F / sec	20 68	3
	with manifold heater 4 kW	°C / sec °F / sec	-5 23	4
	with manifold heater 4 kW and block heater	°C / sec °F / sec	-15 5	4.5
*Specify oil and fuel quality	Mk1 fuel, VDS2 oil, 15w40 above -15°C, 10w30 below -15°C			

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo	2	12	10°C

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption at max rpm at:	ICFN Power 352 kW		liter/h US gal/h	0,02 0,005
			liter/h US gal/h	0,02 0,005
Oil system capacity including filters			liter US gal	Std sump 36 / Aluminium sump 52 Std sump 9,51 / Aluminium sump 13,74
Plastic Oil sump capacity (Std):		Max	liter US gal	30 7,93
		Min	liter US gal	19 5,02
Aluminium Oil sump capacity:		Max	liter US gal	46 12,15
		Min	liter US gal	36 9,51
Oil change intervals/specifications	VDS 3		h	600
	VDS 2		h	400
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
Oil pressure shut down switch setting			kPa psi	130 19

Lubrication system

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

VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05

Fuel system			rpm	1500	1800	2000	2100
ICFN Power 352 kW	25%	g/kWh		215	236	258,4	273,9
Specific fuel consumption at:		lb/hph		0,348	0,382	0,419	0,444
	50%	g/kWh		194	204	221,7	233,3
		lb/hph		0,314	0,331	0,359	0,378
	75%	g/kWh		189	198	209,7	218,5
		lb/hph		0,307	0,320	0,340	0,354
	100%	g/kWh		194	198	207,5	213,4
		lb/hph		0,314	0,320	0,336	0,346
Fuel to conform to				ASTM-D975-No1 and 2D JIS KK 2204, EN 590			

Fuel system

System supply flow at max. speed	liter/h	109
	US gal/h	28,8
Fuel supply line max. restriction	kPa	10
(Measured at fuel inlet connection)	psi	1,5
Fuel supply line max. pressure, during engine stand still	kPa	16,5
(meassured at fuel inlet connection)	psi	2,4
System return flow at max. speed	liter/h	18,0
	US gal/h	4,8
Fuel return line max. restriction	kPa	20
(Measured at fuel return connection)	psi	2,9
Max. allowable inlet fuel temp	°C	60
(Measured at fuel inlet connection)	°F	140
Fuel filter micron size	µ	5
Governor type/make, standard		Volvo / EMS 2,2
Injection pump type/make		Delphi E3

Intake and exhaust system		Inlet air temp	rpm	1500	1800	2000	2100
Air consumption at:	ICFN Power 352 kW		m³/min	25	27	27	28
(+25°C and 100kPa)			cfm	889	938	968	977
⚠ **See front page for important information**							
Max allowable air intake restriction including piping			kPa	3			
			psi	0,4			
Heat rejection to exhaust at:	ICFN Power 352 kW		kW	246	259	287	303
			BTU/min	13990	14729	16321	17231
Exhaust gas temperature after turbine at:	ICFN Power 352 kW		°C	456	455	484	506
			°F	853	851	903	943
⚠ **See front page for important information**							
Max allowable back pressure in exhaust line (after turbine)			kPa	11	13	14	15
Pipe dimension Ø:	mm		psi	1,6	1,9	2,0	2,2
Exhaust gas flow at:	ICFN Power 352 kW		m³/min	59	61	65	67
(temp and pressure after turbine at the			cfm	2085	2167	2304	2374
Exhaust gas smoke	ICFN Power 352 kW		*Bosch	0,1	0,13	0,2	0,6
			Units				

VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05

Cooling system			**rpm**	**1500**	**1800**	**2000**	**2100**
Heat rejection radiation from engine at:		ICFN Power 352 kW	kW BTU/min	18 995	18 1007	17,6 1001	17,6 1001
Heat rejection to coolant at:		ICFN Power 352 kW	kW BTU/min	131 7450	140 7962	155 8815	160 9099
Radiator cooling system type				Closed circuit			
Standard radiator core area			m² foot²	0,8 8,61			
Fan diameter	890 mm		mm in	890 35,04			
Fan power consumption	890 mm		kW hp	6,0 8	10,0 14	14,0 19	16,0 22
Fan drive ratio	fan Ø890			0.84 : 1			
Coolant capacity:	engine		liter US gal	20 5,3			
	std. 0,8m² radiator with hoses		liter US gal	24 6,3			
Coolant pump			drive/ratio	Belt/1,50:1			
Coolant flow with standard system			l/s US gal/s				
Minimum coolant flow			l/s US gal/s	4,7 1,2	5,7 1,5	6,0 1,6	6,2 1,6
Maximum outer circuit restriction incl. piping			kPa psi	65,0 9,4			
Thermostat:		start to open	°C °F	82 180			
		fully open	°C °F	92 198			
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	70 10,2			
Maximum top tank temperature			°C °F	107 225			

VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05

Charge air cooler system		**rpm**	**1500**	**1800**	**2000**	**2100**
Heat rejection to charge air cooler	ICFN Power 352 kW	kW	73	72	73	73
		BTU/min	4151	4095	4151	4151
Charge air mass flow	ICFN Power 352 kW	kg/s	0,5	0,53	0,54	0,55
Charge air inlet temp.	ICFN Power 352 kW	°C	188	179	178	177
(Charge air temp after turbo compressor)		°F	370	354	352	351
⚠ **See front page for important information**						
Max allowable Charge air outlet temp.		°C	43	44	45	45
(Charge air temp after charge air cooler)		°F	109	111	113	113
⚠ **See front page for important information**						
Maximum pressure drop over charge air cooler incl. piping		kPa	8			
		psi	1,16			
Charge air pressure		kPa	227			
(After charge air cooler)		psi	32,92			
Standard charge air cooler core area		m²	0,8			
		foot²	8,61			

Cooling performance: **m² radiator and** **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.

				IFN Power 352 kW			
Engine speed	Engine power	Air on temp		Air flow		External restriction	
	kW						
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
2100	352	57	135	6,8	240,1	395	0,057
(0,84)	479	59	138	7,3	257,8	260	0,038
		62	144	7,9	279,0	0	
1800	352	55	131	6	211,9	233	0,034
(0,84)	479	57	135	6,3	222,5	140	0,020
		59	138	6,7	236,6	0	

VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05

Cooling performance: 0,73 m² radiator and 750 fan fan drive ratio 0.84:1
Radiator module 136232626 and kit 22113650 pusher
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	Engine power	Air on temp		Air flow		External restriction	
	kW						
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
2100	352	70	158	7,6	268,4	0	
(0,84)	479	68	154	7,0	247,2	100	0,015
		65	149	6,4	226,0	200	0,029
		63	145	6,0	211,9	300	0,044
		61	142	5,6	197,8	400	0,058
1800	352	70	158	6,3	222,5	0	
(0,84)	479	68	154	5,9	208,4	100	0,015
		64	147	5,2	183,6	200	0,029
		61	142	4,7	166,0	300	0,044
		56	133	4,2	148,3	400	0,058

Cooling performance: 0,73 m² radiator and 750 fan fan drive ratio 0.84:1
Radiator module 136232627 and kit 22113651 suction
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	Engine power	Air on temp		Air flow		External restriction	
	kW						
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
2100	352	67	153	6,9	243,7	0	
(0,84)	479	64	147	6,4	226,0	100	0,015
		62	144	6,1	215,4	200	0,029
		60	140	5,7	201,3	300	0,044
		57	135	5,3	187,2	400	0,058
1800	352	65	149	6,0	211,9	0	
(0,84)	479	61	142	5,4	190,7	100	0,015
		58	136	4,9	173,0	200	0,029
		55	131	4,5	158,9	300	0,044
		50	122	4,0	141,3	400	0,058

VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	
Governor droop	0-8%	
Governor response	Adjustable PID-constants (VODIA)	Standard
Idle speed	550-900	
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	Derate. ON/OFF*
Oil pressure	Low idle	kPa		140,0	165	Derate. ON/OFF*
	Rated speed	kPa		300	325	Derate. ON/OFF*
Oil level					Low level	Alarm.
Piston cooling pressure >1000 rpm		kPa		150	150	Alarm. ON/OFF*
Coolant temp		°C	95 - 103	102	Setting +5	Derate. ON/OFF*
Coolant level			See cooling system	On	Low level	Alarm.
Fuel feed pressure	Low idle	kPa		0		Alarm.
	Rated speed			200		Alarm.
Water in fuel				High level		Alarm.
Crank case pressure		kPa			Rapid pres inc	Derate. ON/OFF*
Air filter pressure drop				5		Alarm.
Altitude, above sea		m				Automatic derating, see section derating
Charge air temp		°C		82	87	Derate. ON/OFF*
Charge air pressure		kPa		310**	320**	Derate. 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.

VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05

Electrical system

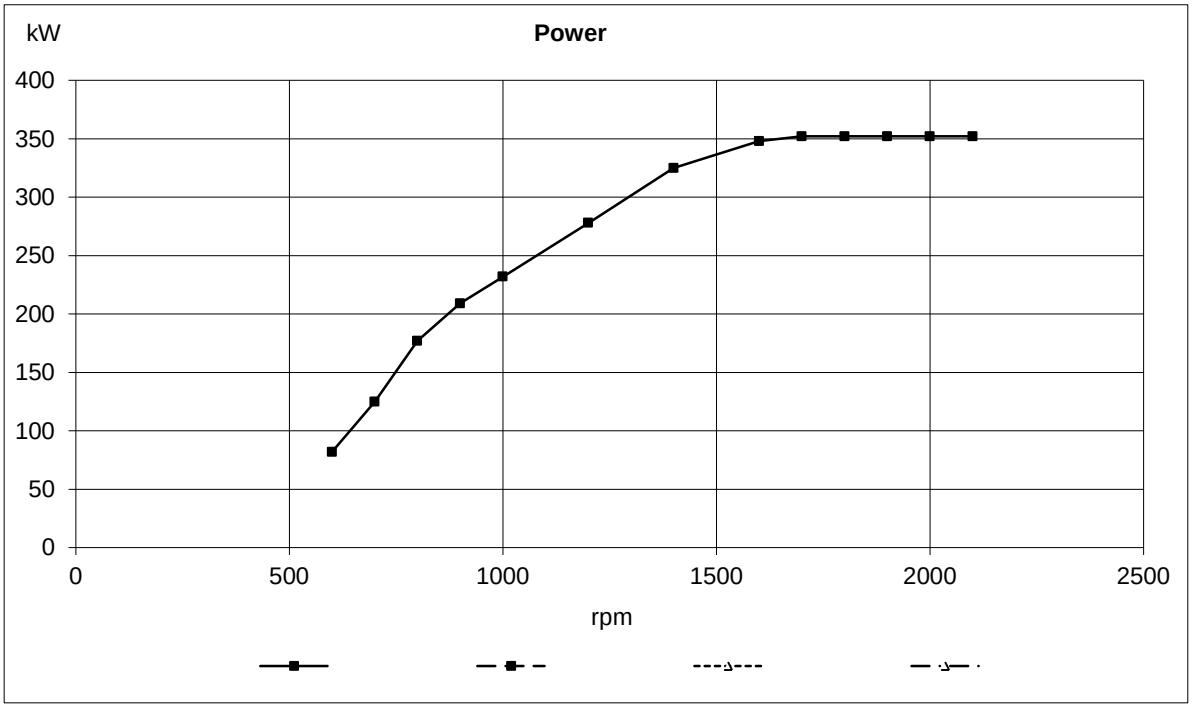
Voltage and type					24V / insulated from earth		
Alternator:	make				Bosch		
	output	A			80		
	tacho output	Hz/alternator rev.			6		
	drive ratio				5.3:1		
Starter motor:	make				Melco		
	type				105P70		
	output	kW			7		
		hp			9,5		
Number of teeth on:	flywheel				10		
	starter motor				12		
Inlet manifold heater (at 20 V)		kW			4		
Power relay for the manifold heater		A			1		
Conditions: (4 mΩ main circuit resistance@ 20°C)	**Temperature**	**°C**			**25**	**0**	**-15**
	Battery	**Ah / CCA**			**140/800**	**140/800**	**145 / 1050**
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

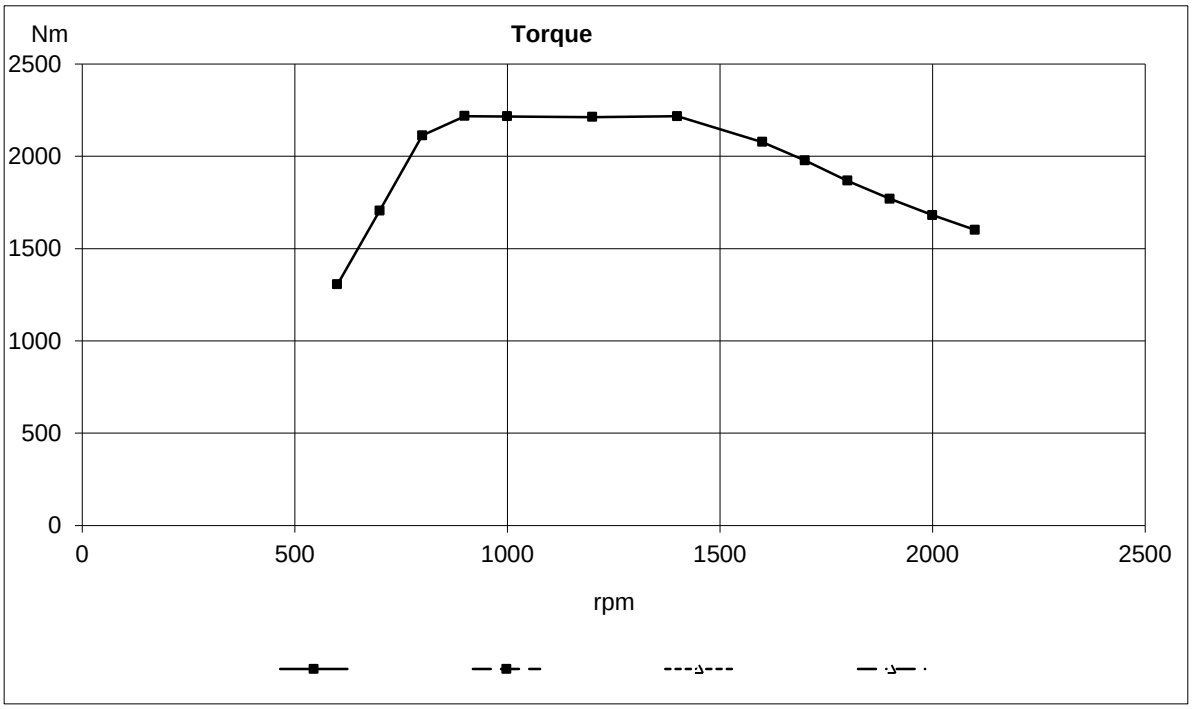
Power take off

Timing gear at compressor PTO max: * PTO SAE B	Nm lbf ft	300 221
Speed ratio direction of rotation viewed from flywheel side		1.31:1/ccw
Timing gear at servo pump PTO max: *	Nm lbf ft	100 74
Speed ratio direction of rotation viewed from flywheel side		1.75:1/ccw
Max allowed bending moment in flywheel housing	Nm lbf ft	15000 11063
Max. rear main bearing load	N lbf	4000 899,2

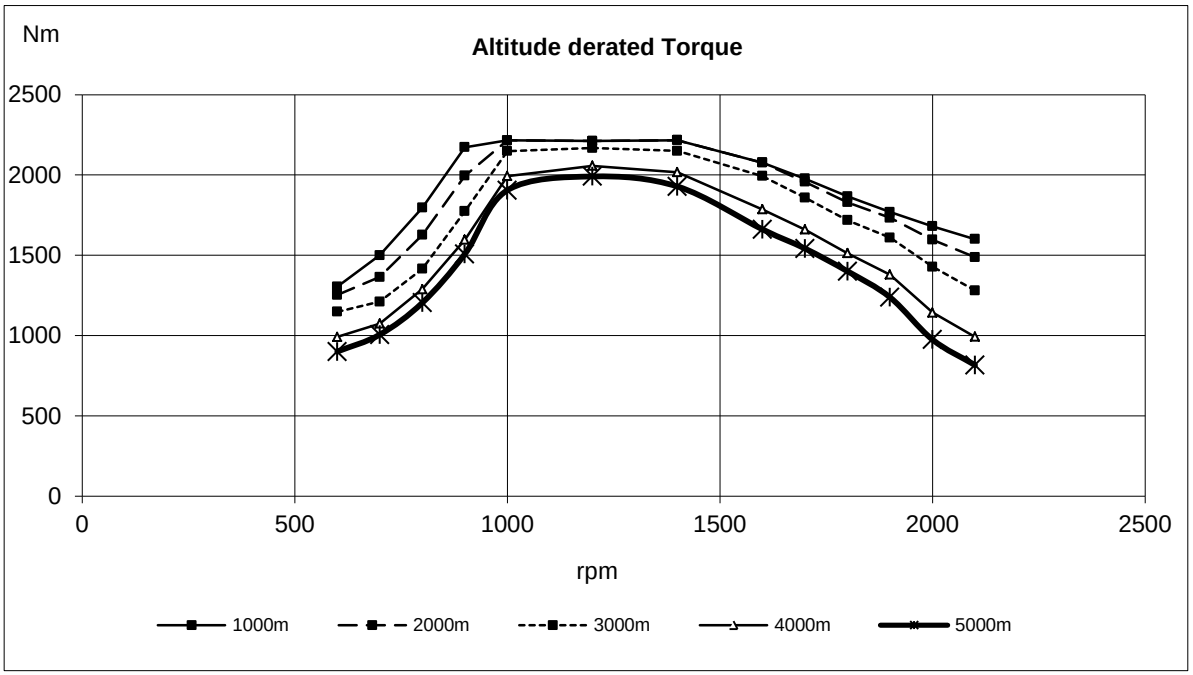
***Maximum allowed torque at individual PTO,s. If more than one PTO output is used simultaneously , calculations needs to be performed to determine maximum available torque , depending on application inertia.**

VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05





VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05



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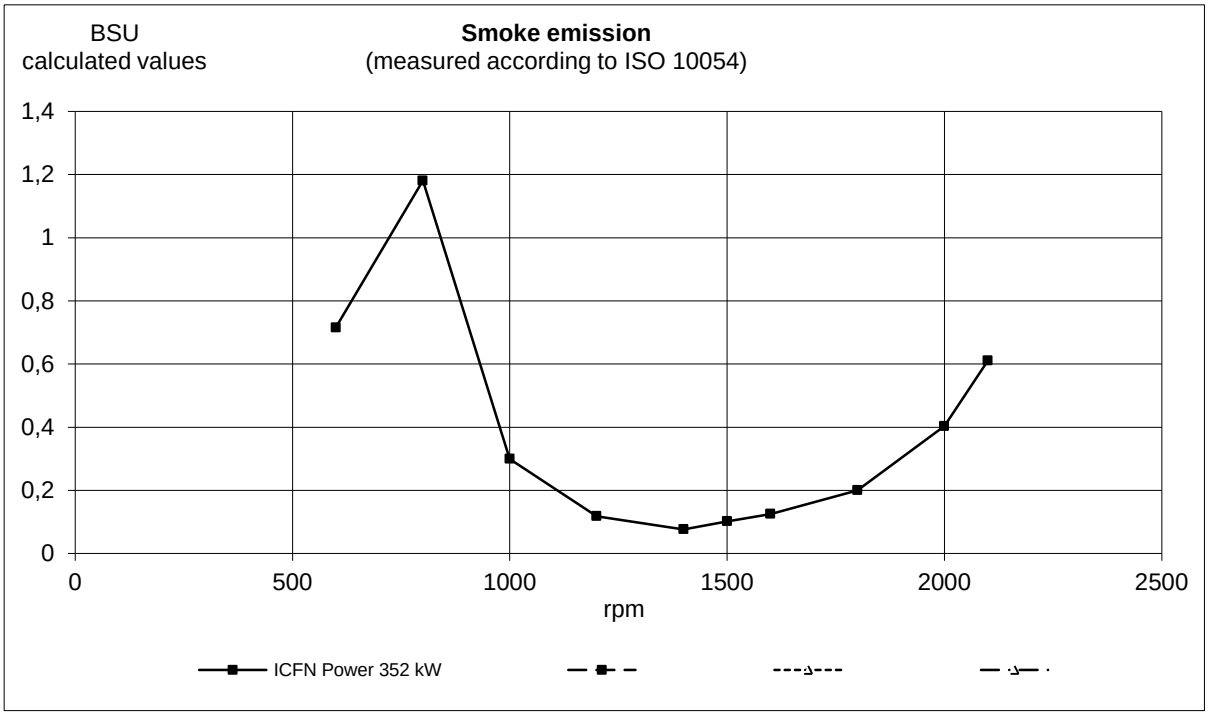

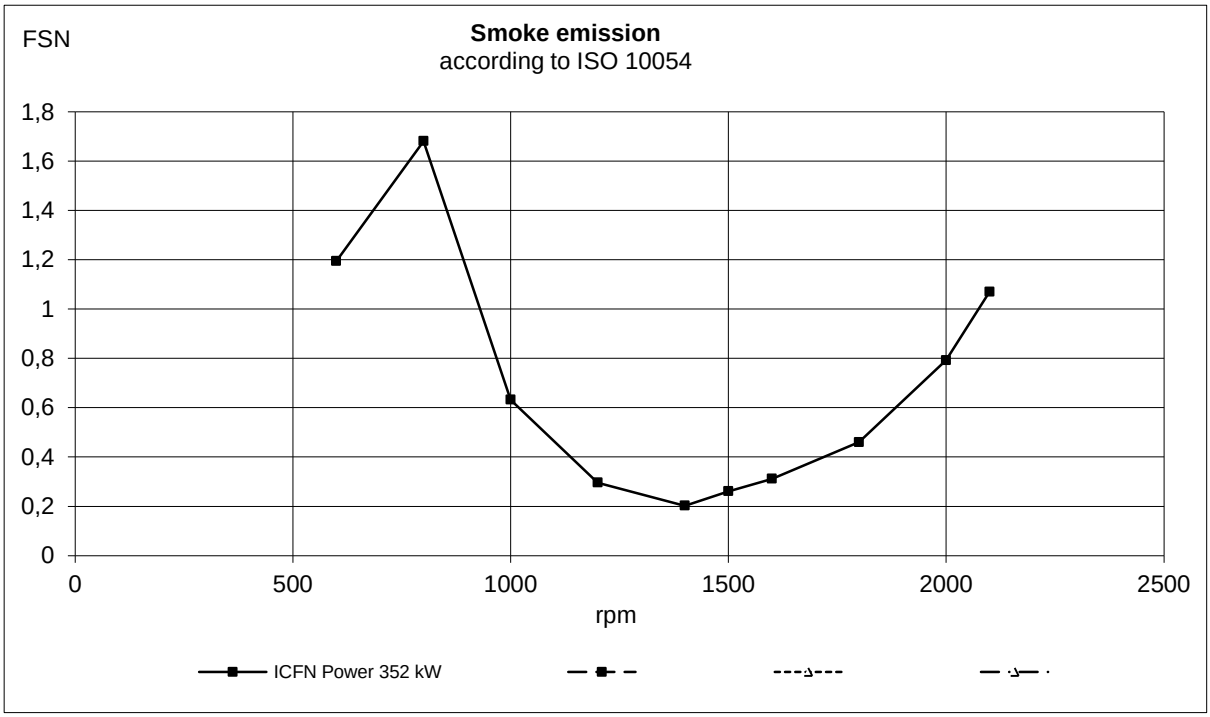

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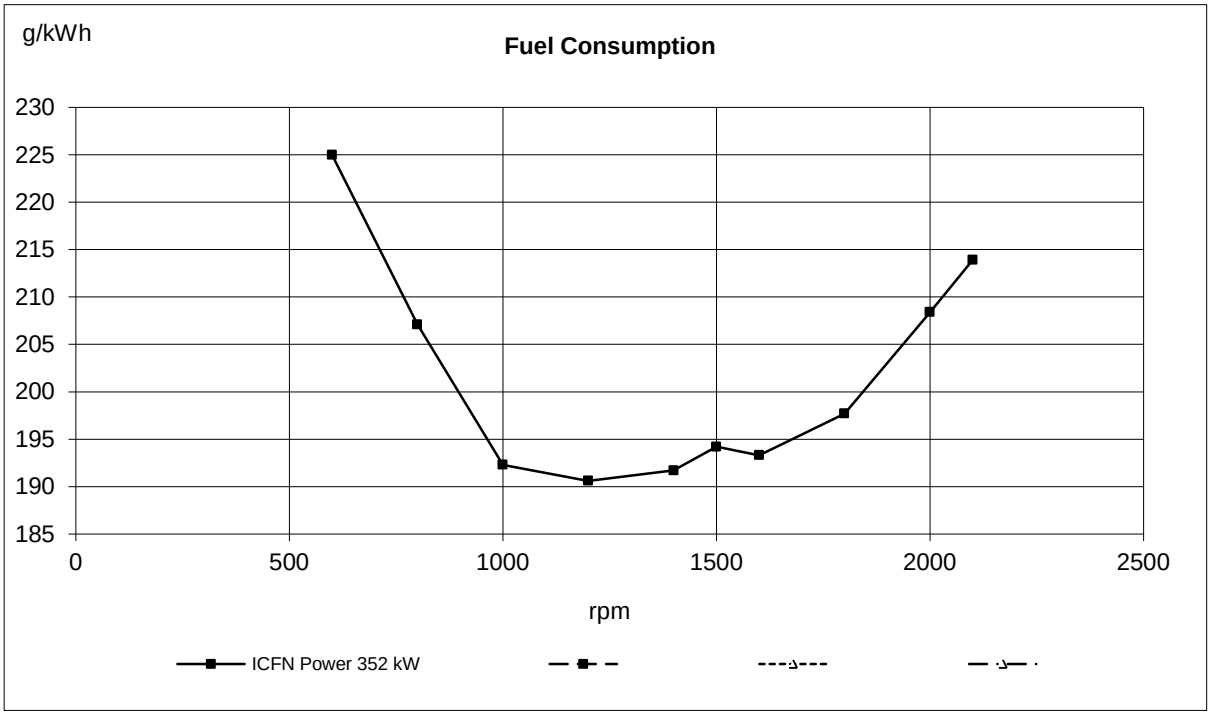
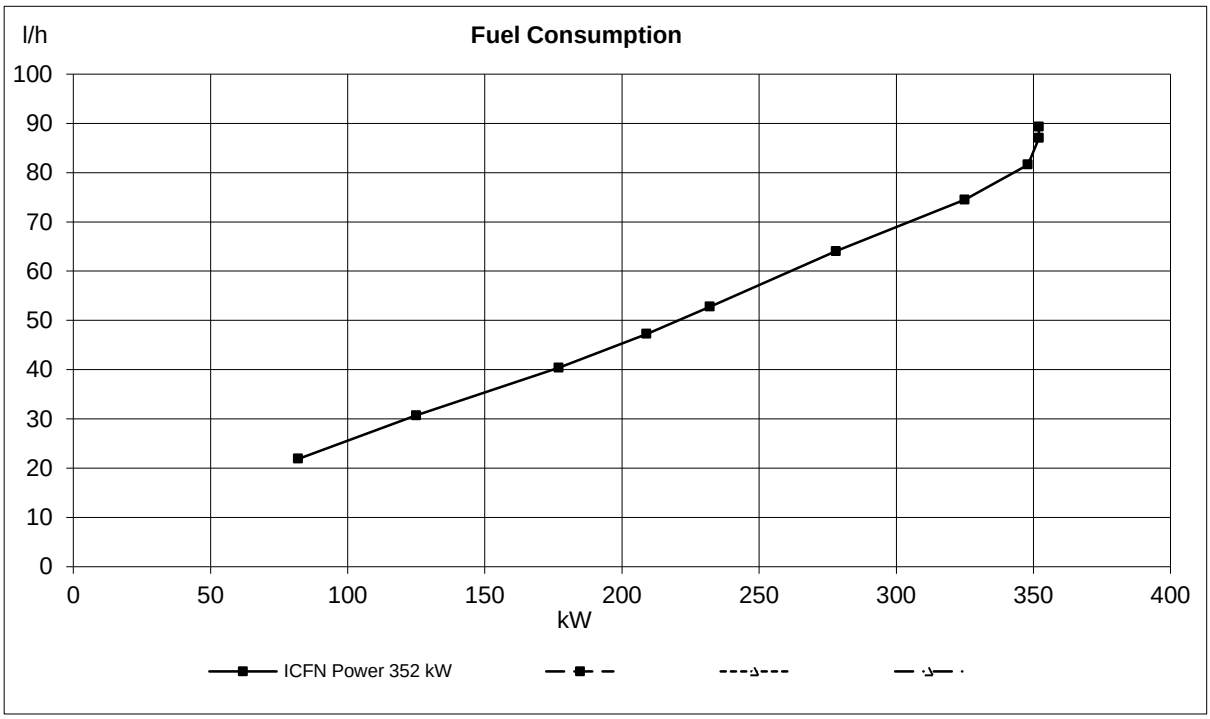
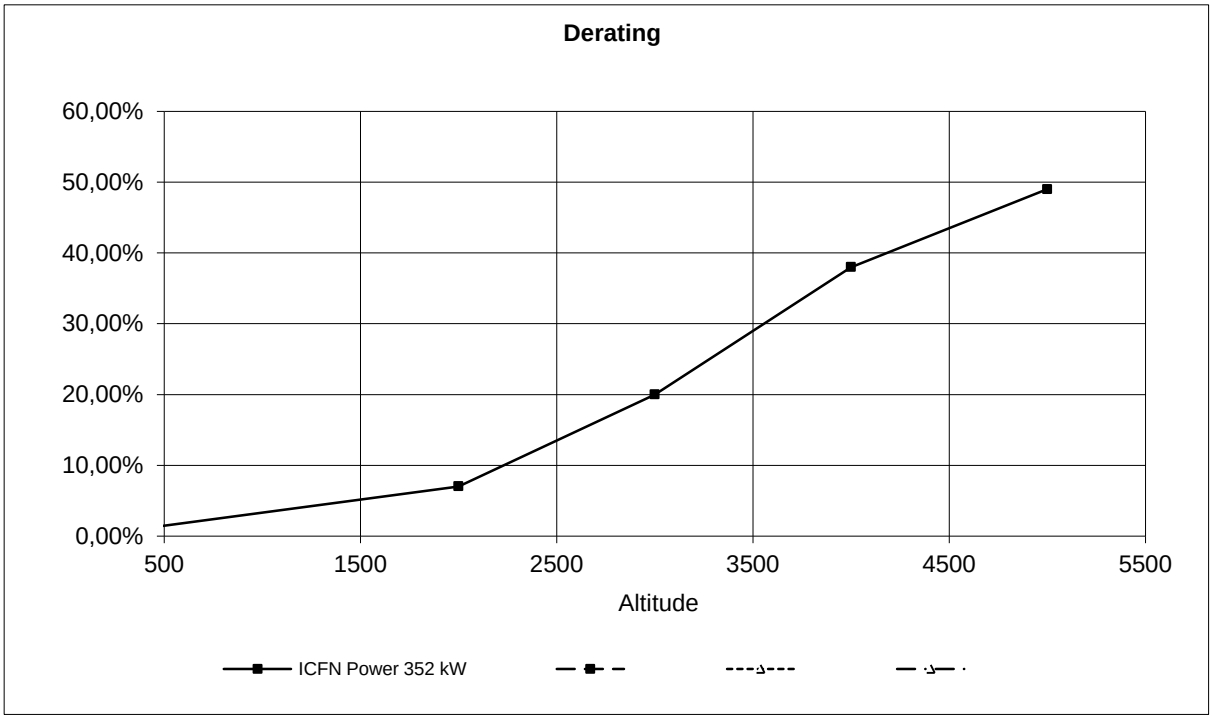
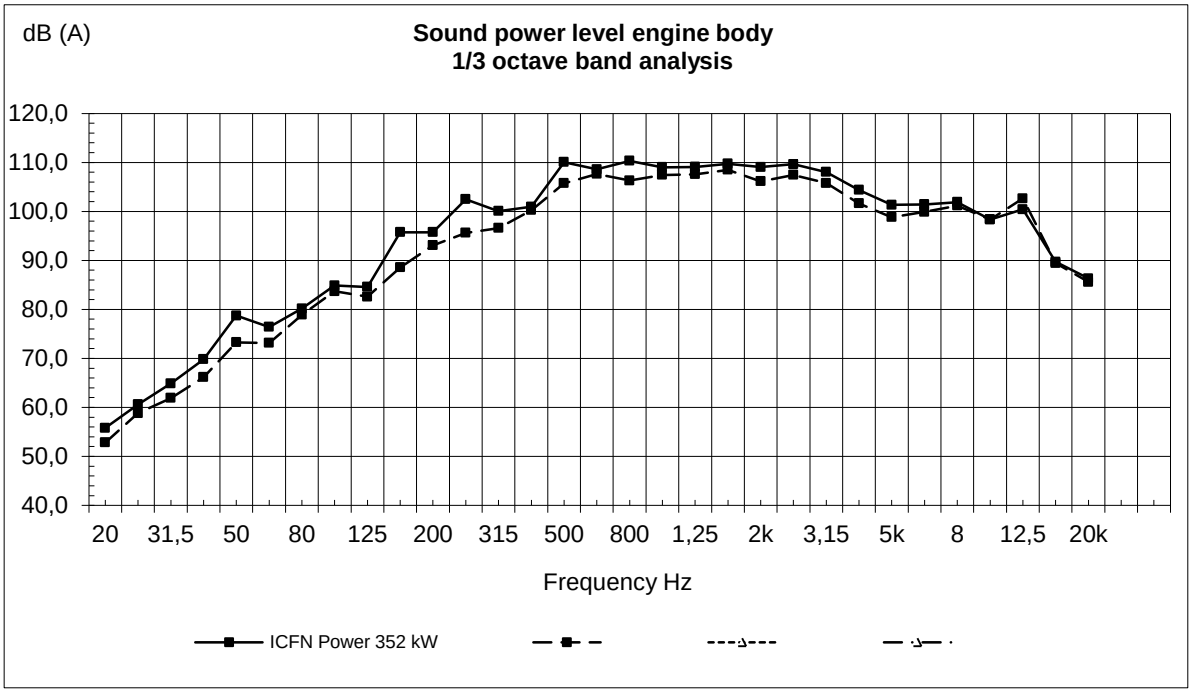
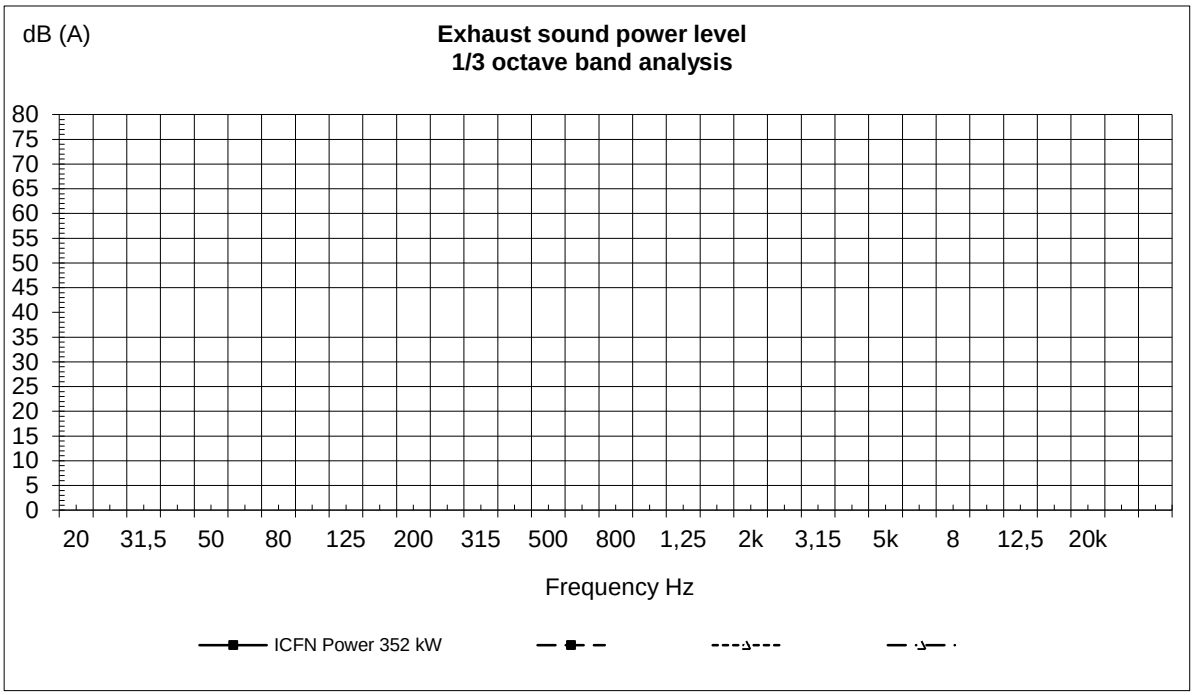


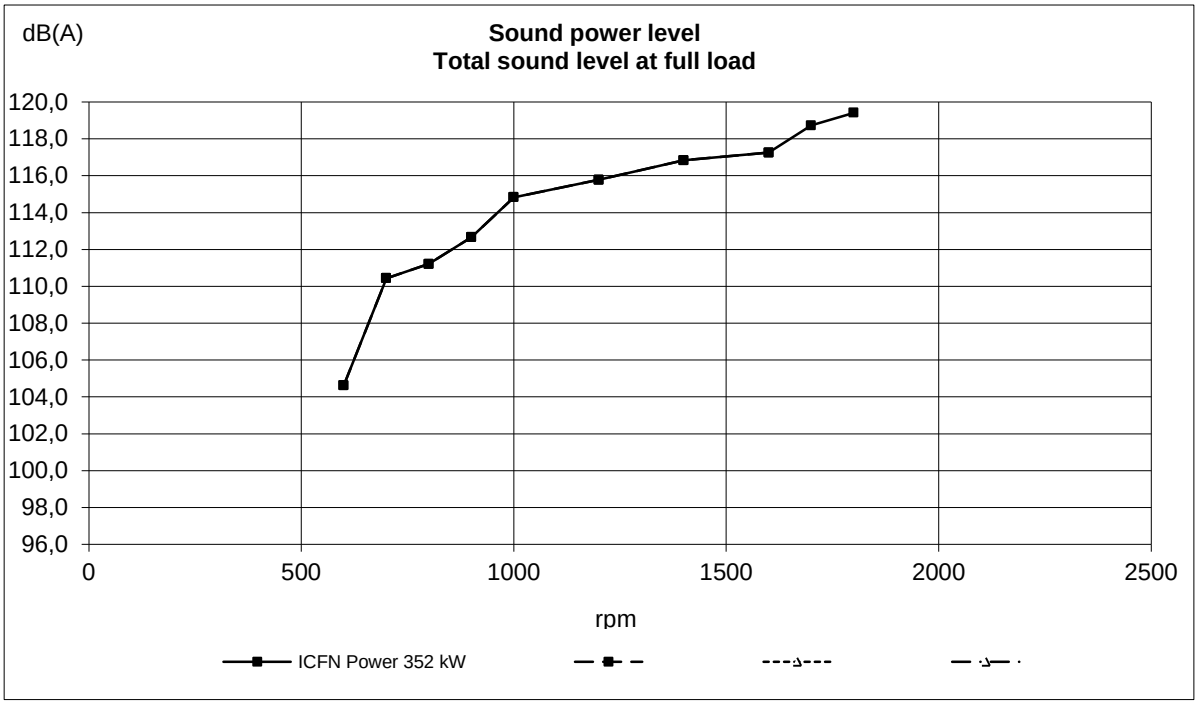


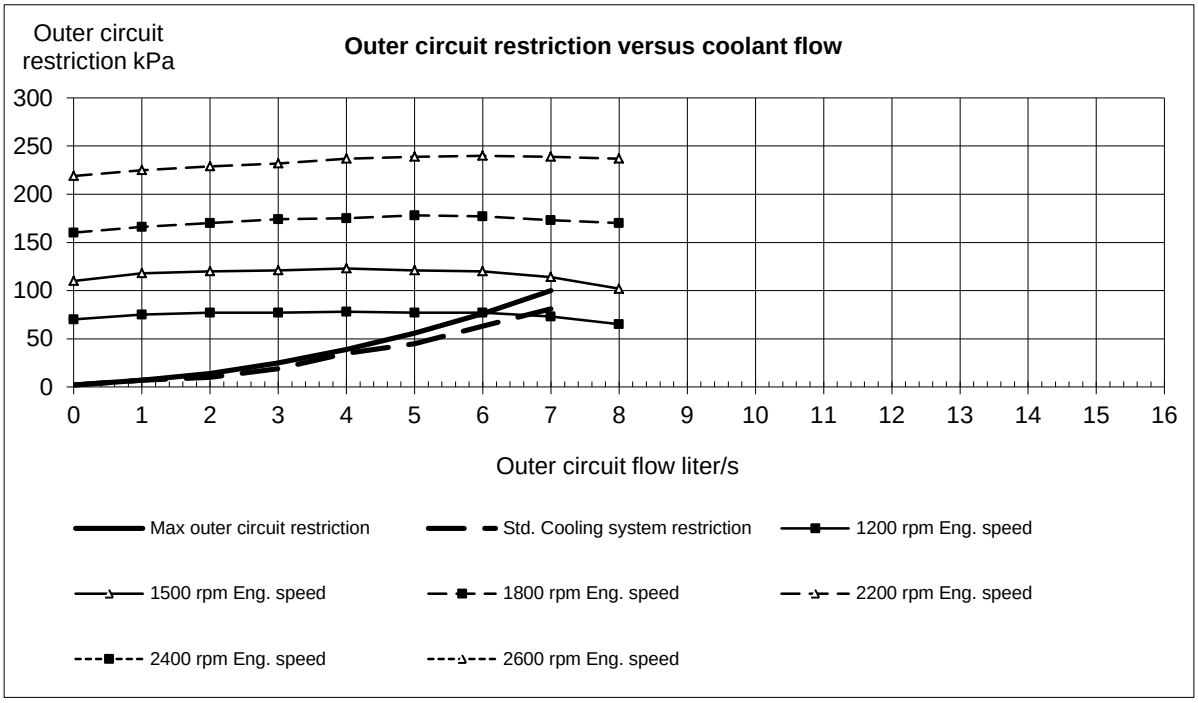
VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05




dB (A)
Sound power level engine body
1/3 octave band analysis
120,0
110,0
100,0
90,0
80,0
70,0
60,0
50,0
40,0
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
ICFN Power 352 kW


dB (A)
Exhaust sound power level
1/3 octave band analysis
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
ICFN Power 352 kW


dB(A)
Sound power level
Total sound level at full load
120,0
118,0
116,0
114,0
112,0
110,0
108,0
106,0
104,0
102,0
100,0
98,0
96,0
0
500
1000
1500
2000
2500
rpm
ICFN Power 352 kW


Outer circuit restriction kPa
Outer circuit restriction versus coolant flow
300
250
200
150
100
50
0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Outer circuit flow liter/s
Max outer circuit restriction
Std. Cooling system restriction
1200 rpm Eng. speed
1500 rpm Eng. speed
1800 rpm Eng. speed
2200 rpm Eng. speed
2400 rpm Eng. speed
2600 rpm Eng. speed

VOLVO PENTA TAD1344VE	Document No 22186976	Issue Index 05