


VOLVO PENTA TAD1365VE	Document No	Issue Index
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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, anti-clockwise viewed towards flywheel

Number of cylinders			6
Displacement, total	liters		12,78
	in ³		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	kg	1325
		lb	2921
	Power pac	kg	1790
		lb	3946

Performance

			rpm	1200	1500	1800	1900
IFN Power	405 kW	without fan	kW	333	405	405	405
			hp	453	551	551	551
		with fan	kW	329	399	395	393
		890 mm	hp	447	543	537	534
Torque at:		IFN Power 405 kW	Nm	2650	2578	2149	2036
			lbf ft	1954	1902	1585	1501
Max torque at engine speed	IFN Power	1200 rpm	Nm	2650			
			lbf ft	1954			
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 405 kW	MPa	2,61	2,54	2,11	2,00
			psi	378	368	306	290
Max combustion pressure at:		IFN Power 405 kW	MPa	18,6	20	18,9	18
			psi	2697	2900	2741	2610
Total mass moment of inertia, J (mR ²) (not including flywheel)			kgm ²	3,43			
			lbf ²	81,4			
Friction Power			kW	21	31	45	51
			hp	29	42	61	69
Derating see Technical Diagrams							

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Cold start performance

*Cold start limit temperature	without starting aid	°C	-15	
		°F	5	
	with manifold heater 4 kW	°C	-25	
		°F	-13	
	with manifold heater 4 kW and block heater	°C	-30	
		°F	-22	
*Specify oil and fuel quality	Oil: VDS3 10W30, Fuel: MK1			
Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
Self circulating	Volvo 3828643	2	12	-1°C 30°F

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption at max rpm at:	IFN Power 405 kW	liter/h	0,02
		US gal/h	0,005
Oil system capacity including filters		liter	Std sump 36 / Aluminium sump 52
		US gal	Std sump 9,51 / Aluminium sump 13,74
Plastic Oil sump capacity (Std):	Max	liter	30
		US gal	7,93
	Min	liter	19
		US gal	5,02
Aluminium Oil sump capacity:	Max	liter	46
		US gal	12,15
	Min	liter	36
		US gal	9,51
Oil change intervals/specifications	VDS3	h	600
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	300-650
		psi	44-94
Oil pressure shut down switch setting		kPa	N/A
		psi	

Lubrication system

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




Fuel system

	rpm	1200	1500	1800	1900
Fuel to conform to		EN590 ASTM D 975 No 1D and 2D (Max 20 ppm sulphur and 7% FAME)			

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	30
	psi	4,4
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection)	kPa	16,5
	psi	2,4
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/EMS2.2	
Injection pump type/make	Delphi E3	

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Intake and exhaust system		Inlet air temp	rpm	1200	1500	1800	1900
Air consumption at: (+25°C and 100kPa)	IFN Power 405 kW	25°C 77°F	m³/min cfm	22,3 788	27,4 968	28,7 1014	29,1 1028
 See front page for important information Max allowable air intake restriction including piping			kPa psi	5 0,7			
Heat rejection to exhaust at:	IFN Power 405 kW		kW BTU/min	219 12454	277 15753	315 17914	334 18994
Exhaust gas temperature after turbine at:	IFN Power 405 kW		°C °F	460 860	475 887	490 914	510 950
 See front page for important information Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm			kPa psi	21 3,0	29 4,2	32 4,6	34 4,9
 See front page for important information Max allowable temperature drop between turbine and SCR muffler inlet. SCR muffler pressure drop			°C °F	10 18			
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power 405 kW		m³/min cfm	49,0 1730	58,3 2059	61,3 2165	61,4 2168
Exhaust gas smoke	IFN Power 405 kW		*Bosch Units	0,017	0,023	0,039	0,045

Cooling system		rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	IFN Power 405 kW	kW BTU/min	8 461	9 506	9,8 557	10,5 597
Heat rejection to coolant at:	IFN Power 405 kW	kW BTU/min	112 6369	124 7052	156 8872	180 10236
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	4,0 5	6,0 8	10,0 14	12,0 16
Fan drive ratio	fan Ø890		0,84			
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/1.43:1			
Coolant flow with standard system		l/s US gal/s	3,7 1,0	4,7 1,2	5,7 1,5	6 1,6
Minimum coolant flow		l/s US gal/s	3,2 0,8	4,2 1,1	5,2 1,4	5,5 1,5
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	75 10,9			
Maximum top tank temperature		°C °F	107 225			
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 US gal	2 0,5			

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Charge air cooler system		rpm	1200	1500	1800	1900
Heat rejection to charge air cooler	IFN Power 405 kW	kW	63	77	79	80
		BTU/min	3583	4379	4493	4550
Charge air mass flow	IFN Power 405 kW	kg/s	0,44	0,54	0,56	0,57
Charge air inlet temp.	IFN Power 405 kW	°C	188	190	183	185
(Charge air temp after turbo compressor)		°F	370	374	361	365
						
See front page for important information						
Max allowable Charge air outlet temp.		°C	42	47	48	50
(Charge air temp after charge air cooler)		°F	108	117	118	122
						
See front page for important information						
Maximum pressure drop over charge air cooler incl. Piping (throttle not included)		kPa		12		
		psi		1,74		
Charge air pressure at rated power (After charge air cooler)		kPa		182		
		psi		26,40		
Standard charge air cooler core area		m ²		0,8		
		foot ²		8,61		

Cooling performance: 0,8 m² radiator and Pull 890 fan
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	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1900	405	48	118	5,8	204,8	330	0,048
0,84	551	50	122	6,1	215,4	230	0,033
		54	129	6,9	243,7	0	

Cooling performance: 0,8 m² radiator and Push 890 fan
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	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1900	405	57	135	7,5	264,9	280	0,041
0,99	551	58	136	7,8	275,5	180	0,026
		60	140	8,3	293,1	0	

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Cooling performance: 0,73 m² radiator and 750 fan fan drive ratio 0.99:1
Radiator module 136232624 and kit 22113648 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 rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1900 (0,99)	405 551	66	150	7,9	279,0	0	
		66	151	7,5	266,5	100	0,015
		65	149	7,2	252,7	200	0,029
		60	140	6,6	233,6	300	0,044
		59	138	6,2	218,4	400	0,058
1800 (0,99)	405 551	71	160	7,6	268,2	0	
		70	158	7,0	247,3	100	0,015
		65	150	6,5	230,2	200	0,029
		65	149	6,1	215,5	300	0,044
		63	146	5,7	200,6	400	0,058

Cooling performance: 0,73 m² radiator and 750 fan fan drive ratio 0.99:1
Radiator module 136232625 and kit 22113649 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 rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1900 (0,99)	405 551	62	143	7,4	262,4	0	
		63	145	7,1	249,1	100	0,015
		58	136	6,6	232,7	200	0,029
		56	132	6,2	219,5	300	0,044
		56	133	5,8	206,5	400	0,058
1800 (0,99)	405 551	68	154	6,9	244,1	0	
		64	146	6,5	229,9	100	0,015
		61	143	6,1	216,9	200	0,029
		62	144	5,8	203,6	300	0,044
		57	135	5,4	189,9	400	0,058

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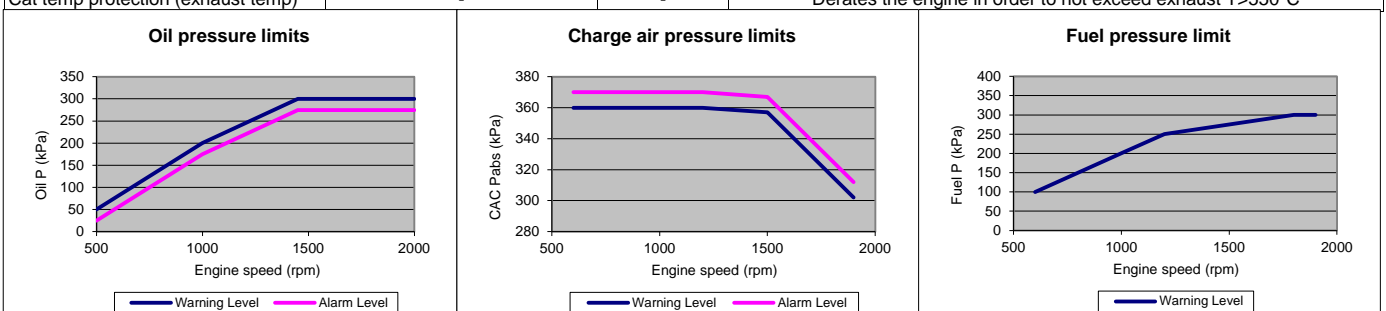
Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronous	
Governor droop	0%	
Governor response	Adjustable PI-constants	1
Idle speed	600-900	700
Stop function	Energized to run/Stop	
Preheating function	On/Off	
Lamp test	On/Off	

Parameter	Warning level	Alarm level	Engine protection		
Parameter for Power Pack	Default setting	Level	Action.	Default/Alternative	
Oil temp	125°C	Setting +5°C	Shut down.	ON/OFF*	
Oil pressure	Low idle	50 kPa	25 kPa	Shut down.	ON/OFF*
	Rated speed	300 kPa	275 kPa	Shut down.	ON/OFF*
Oil level	Min level	-	-	-	
Coolant temp	105°C	107°C	Shut down.	ON/OFF*	
Coolant level	Low level	-	-	-	
Fuel feed pressure	Low idle	-	100 kPa	-	
	1200	-	250 kPa	-	
Water in fuel	High level	-	-	-	
Crank case pressure	Press inc	-	Shut down.	ON/OFF*	
Air filter pressure drop	5 kPa	-	-	-	
Altitude, above sea	Automatic derating, see section derating				
Charge air temp	80°C	85°C	Shut down.	ON/OFF*	
Charge air pressure	Warning map value + 5kPa	Alarm map value + 5kPa	Shut down.	ON/OFF*	
Engine speed	120%	-	Shut down.	ON/OFF*	
Cat temp protection (exhaust temp)	-	-	Derates the engine in order to not exceed exhaust T>550°C		

* Off: disables the function, i e no shut down.

Parameter	Warning level	Alarm level	Engine protection			
Parameter for Mobile	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after sec	Forced shut down after 2 sec
Oil temp	125°C	127°C	127°C	130°C	N/A	N/A
Oil pressure	Warning map value	Alarm map value	N/A	N/A	N/A	Alarm map value
Oil level	Min level	N/A	N/A	N/A	N/A	N/A
Coolant temp	105°C	107°C	107°C	108°C	N/A	N/A
Coolant level	Low level	N/A	N/A	N/A	N/A	N/A
Fuel feed pressure	Warning map value	N/A	N/A	N/A	N/A	N/A
Water in fuel	High level	N/A	N/A	N/A	N/A	N/A
Crank case pressure	N/A	Press incr 5kPa	N/A	N/A	N/A	Press incr 5kPa
Air filter pressure drop	-	5 kPa	N/A	N/A	N/A	N/A
Altitude, above sea	Automatic derating, see section derating					
Charge air temp	80°C	85°C	85°C	86°C	N/A	N/A
Charge air pressure	Warning map value	Alarm map value	Alarm map value	Alarm map value	N/A	N/A
Engine speed	120%	N/A	N/A	N/A	N/A	N/A
Cat temp protection (exhaust temp)	-	-	Derates the engine in order to not exceed exhaust T>550°C			



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Electrical system

Voltage and type				24 V		
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 hp		7 9,5		
Number of teeth on:	flywheel			153		
	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

		rpm	1200	1500	1800	1900
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
Continuous torque. Timing gear at compressor PTO max: * PTO SAE B	Nm	300				
	lbf ft	221				
Speed ratio direction of rotation viewed from flywheel side	1.31:1 / ccw					
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					
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 maximum available torque depending on application inertia.

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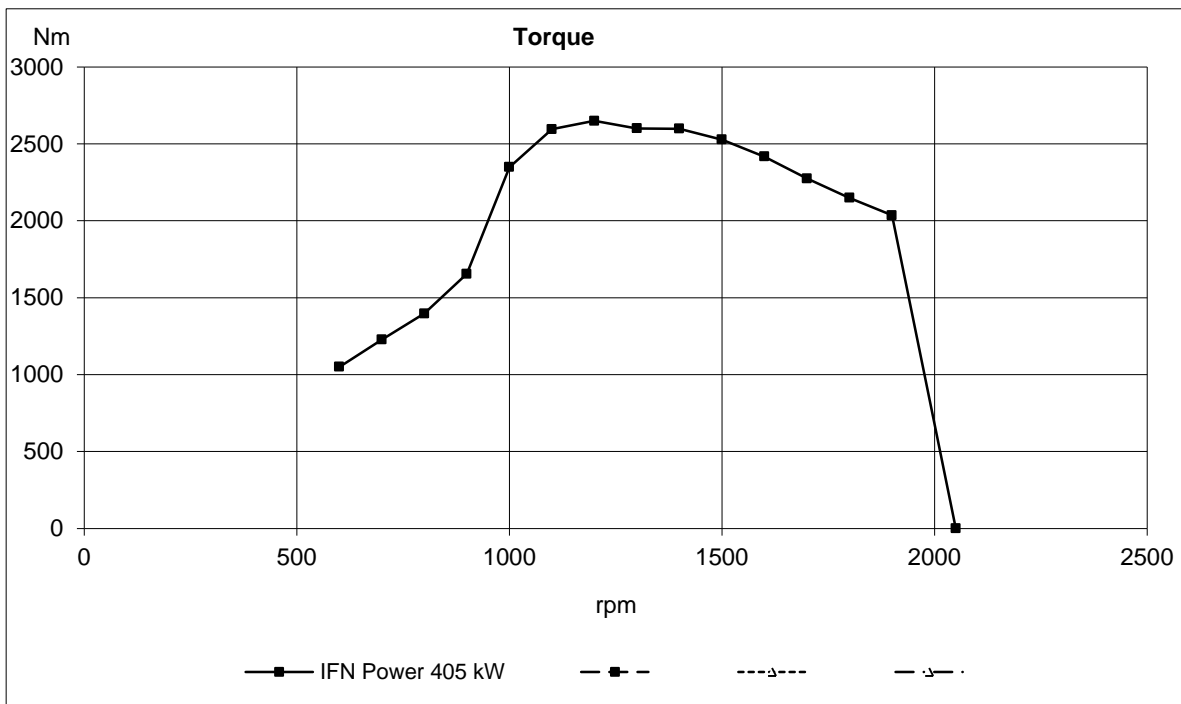
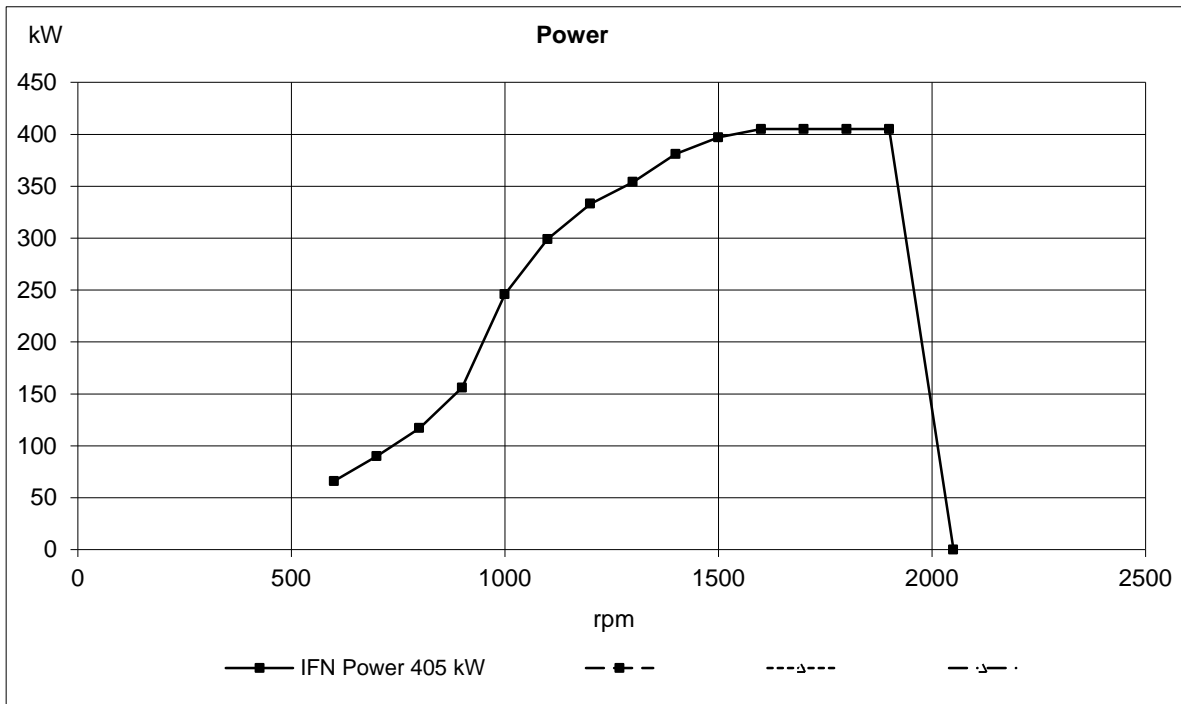
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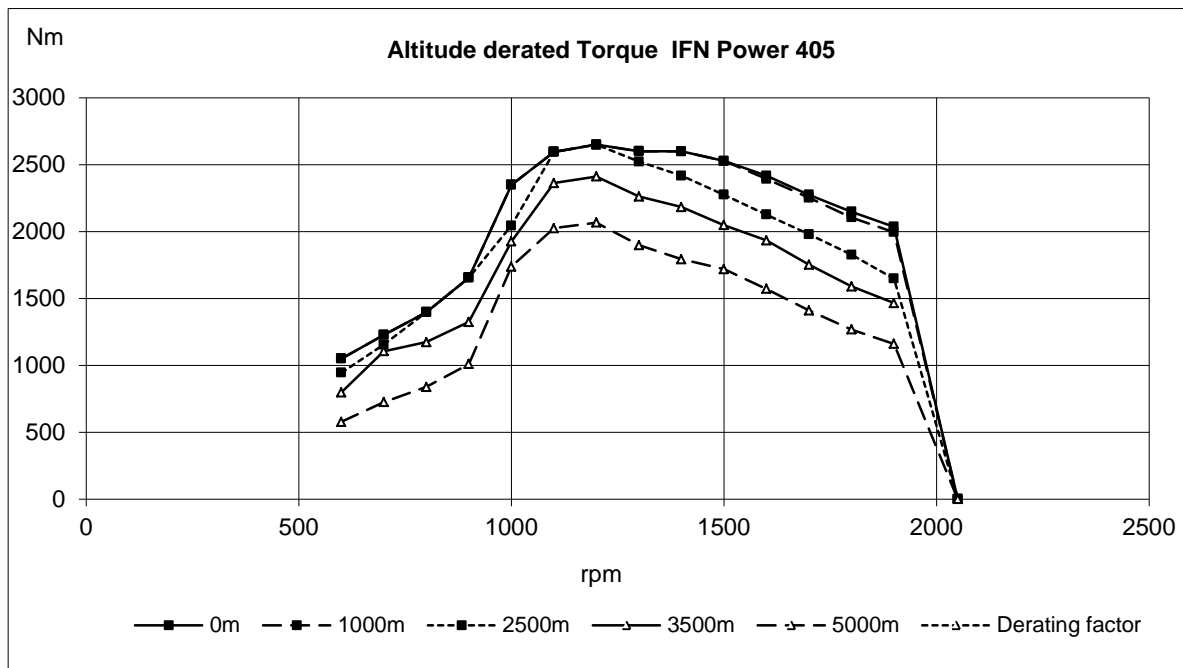
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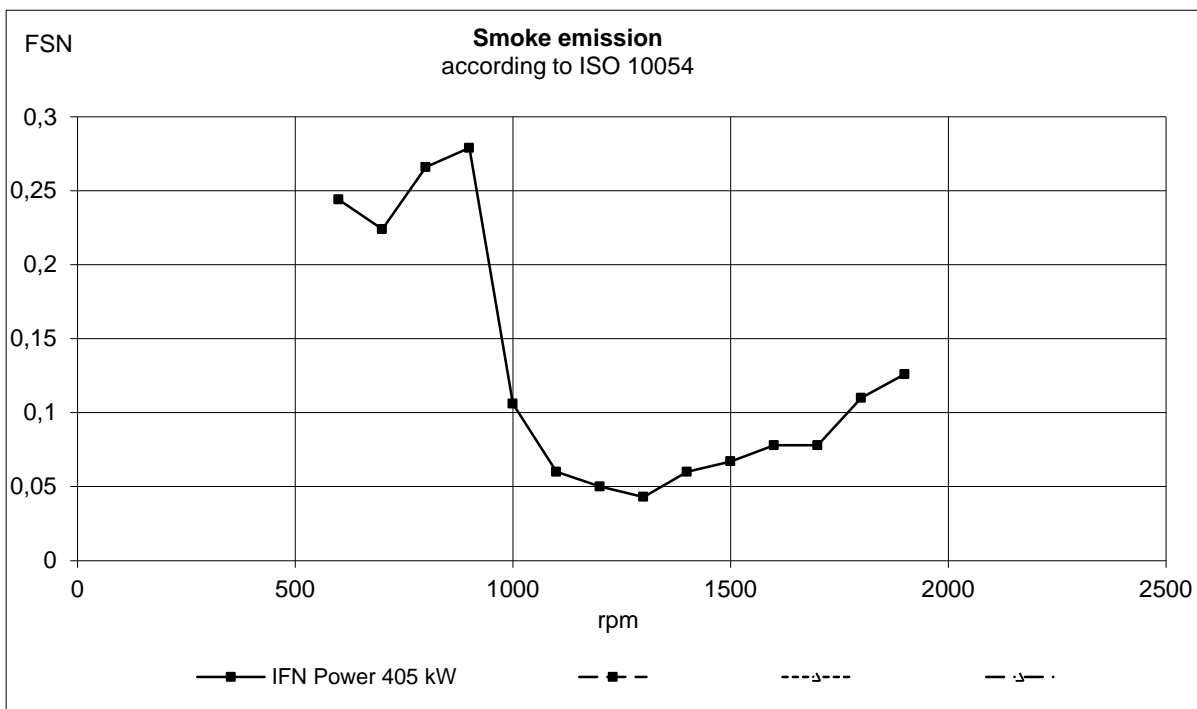
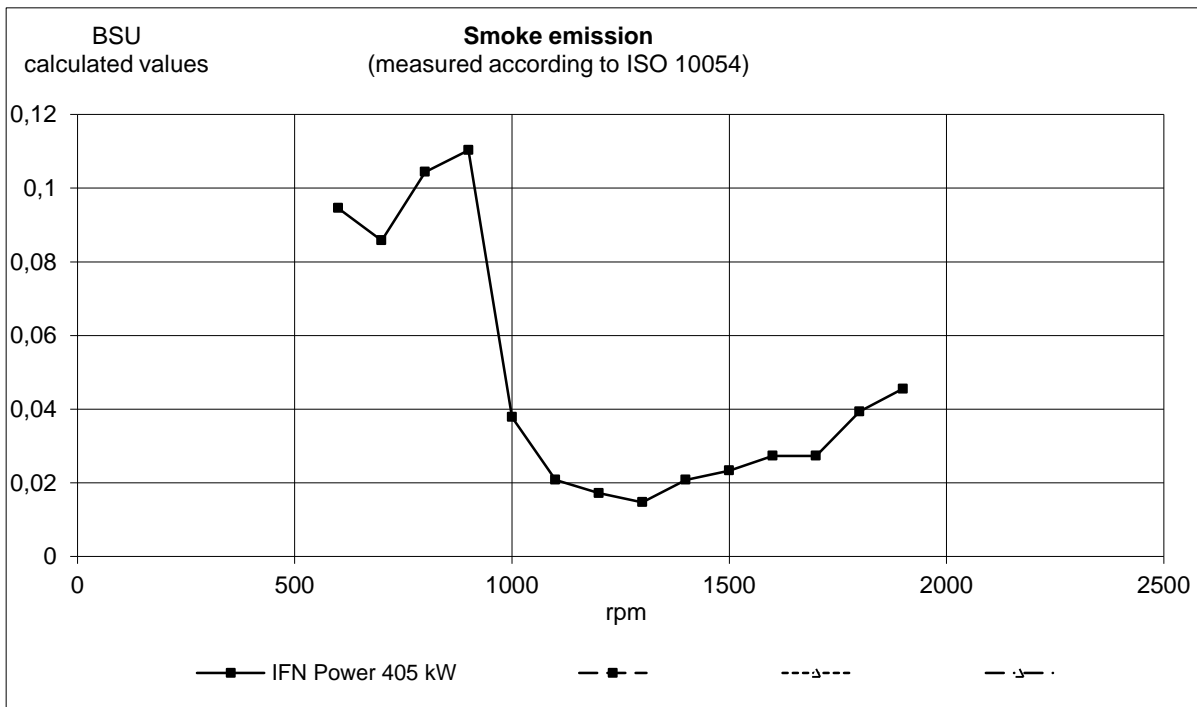
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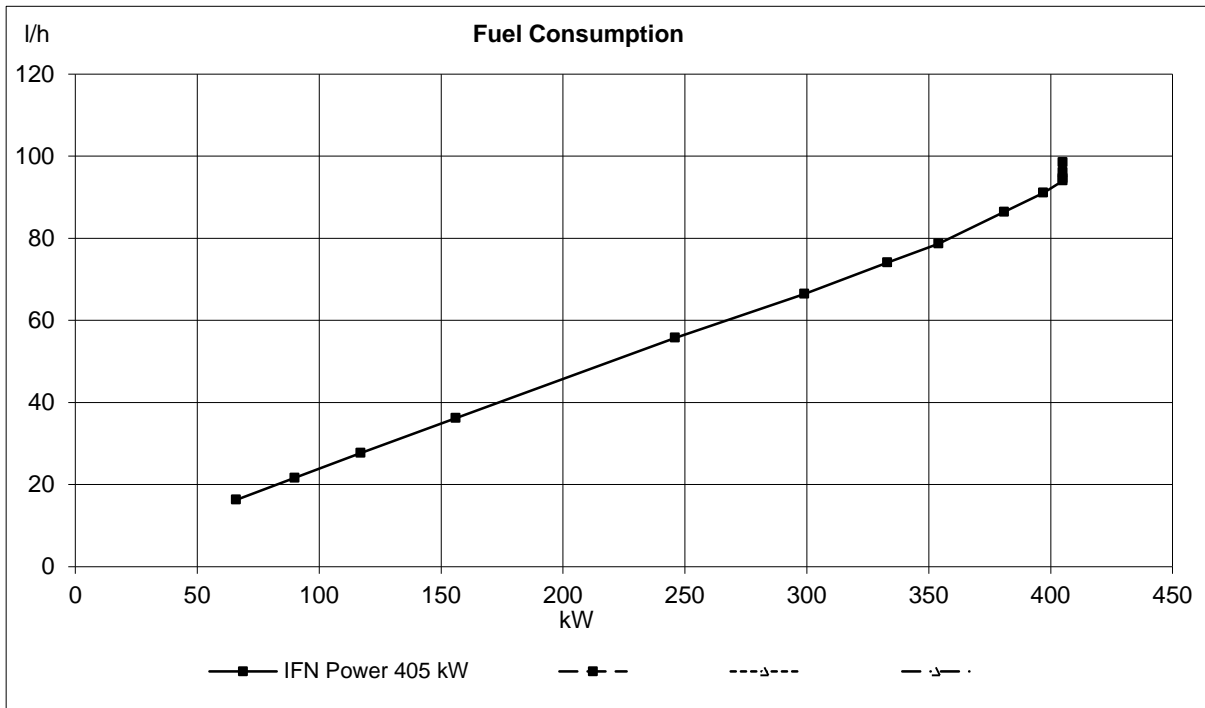
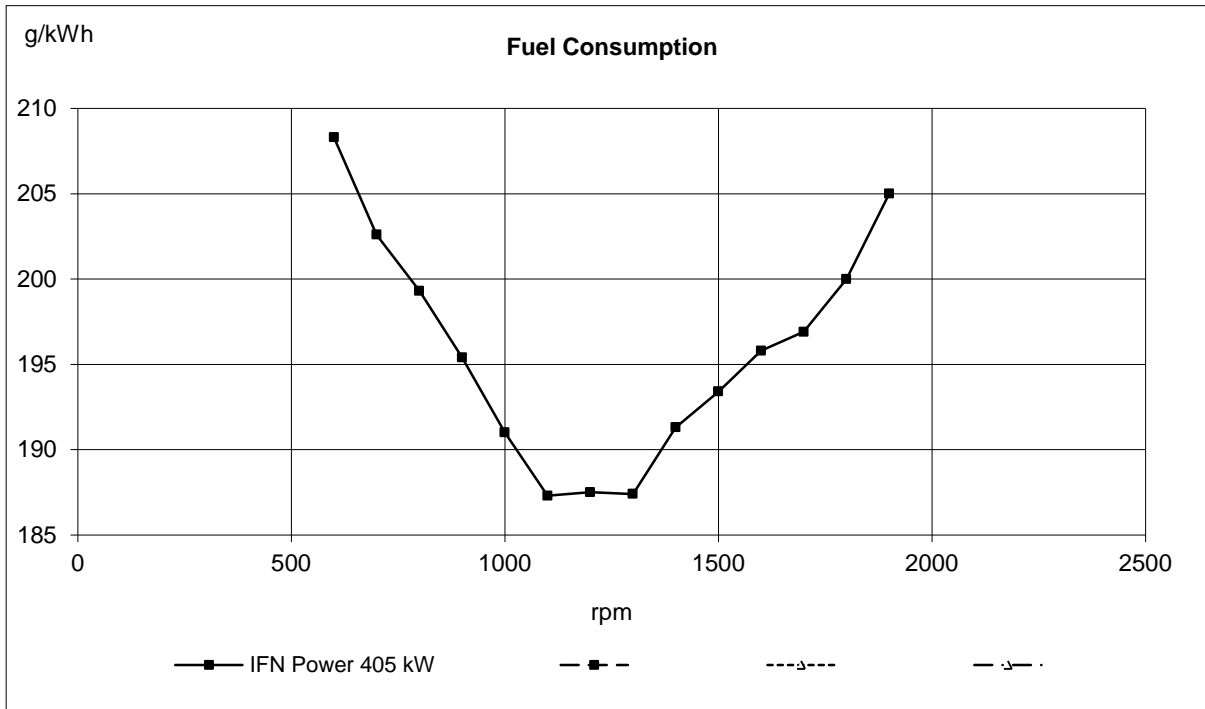
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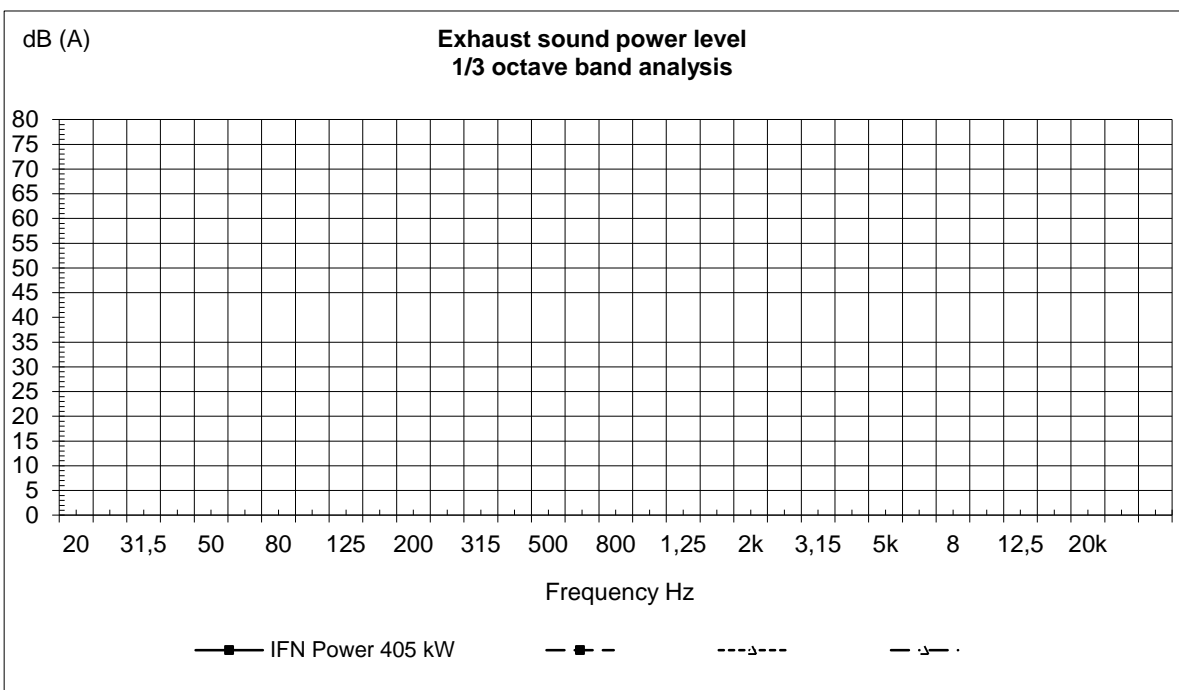
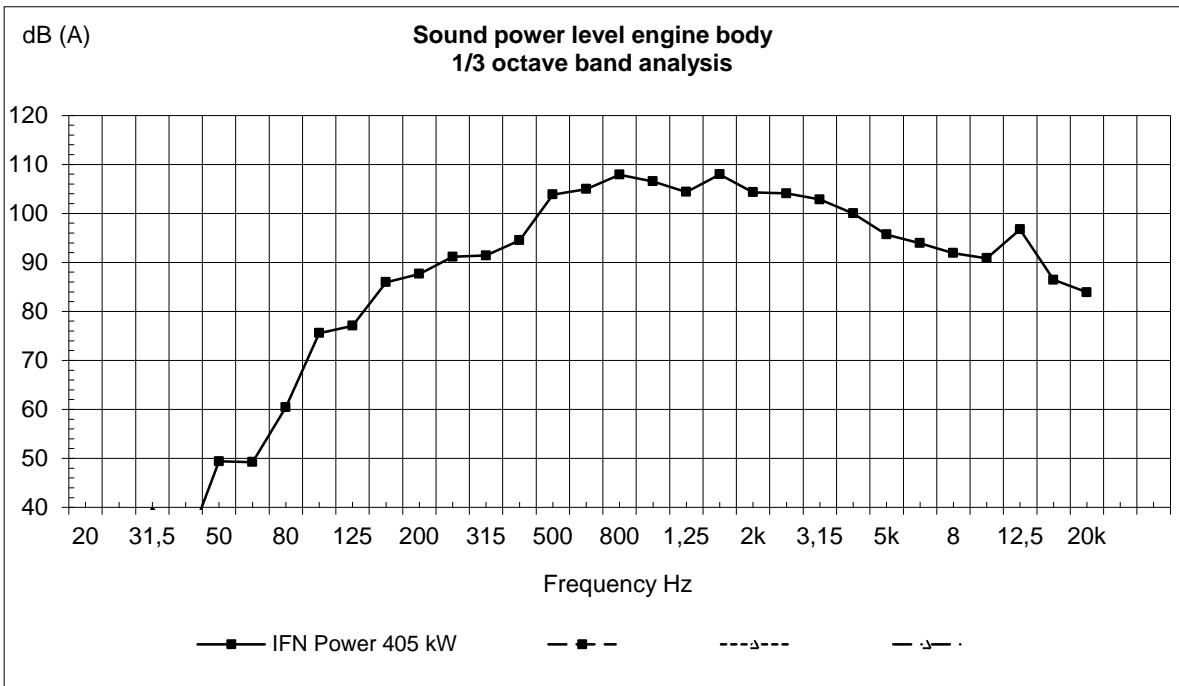
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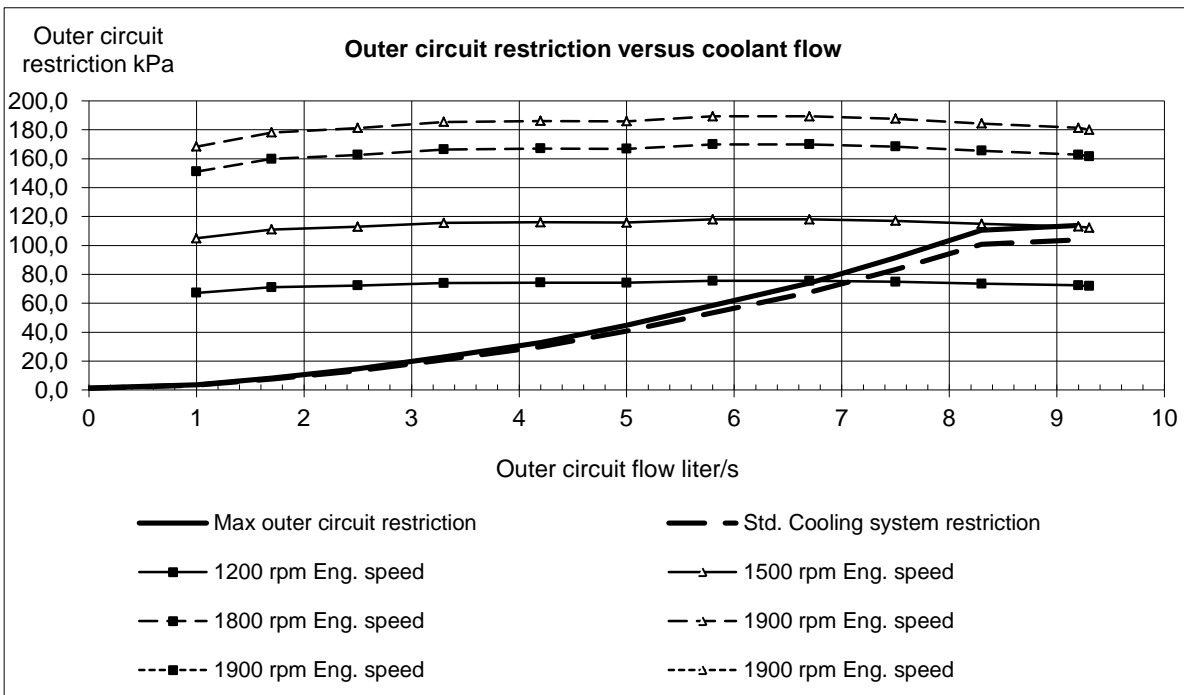
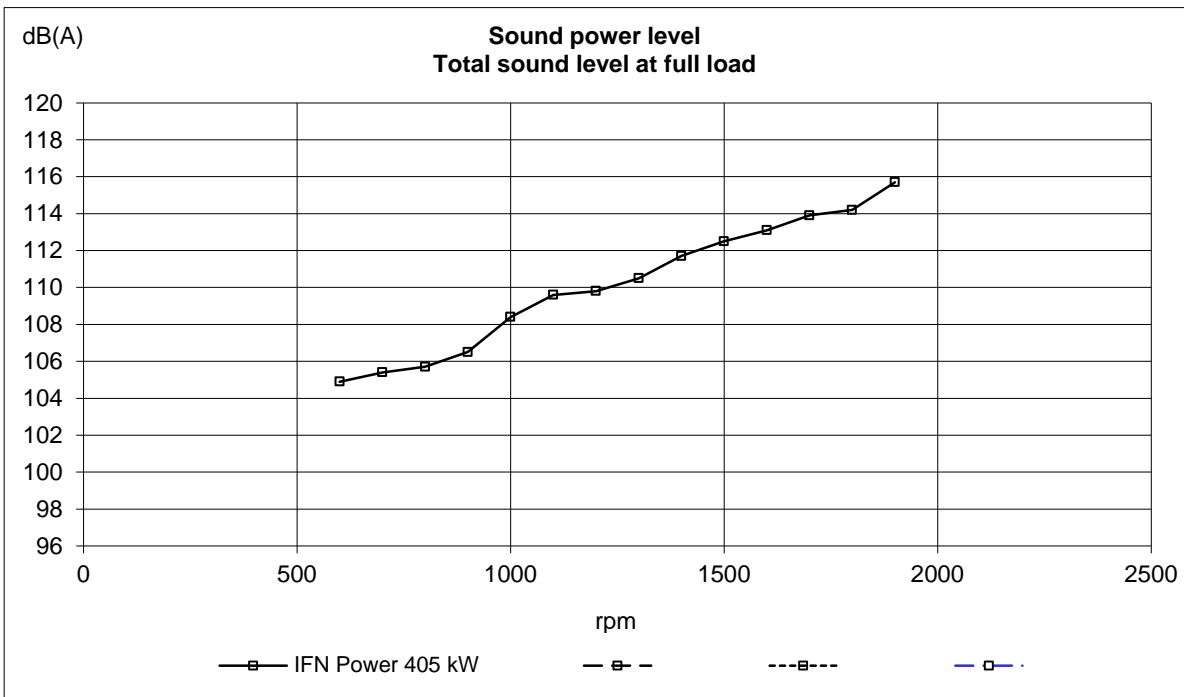
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