VOLVO PENTA **TAD1375VE**	Document No **22323794**	Issue Index **09**

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, counterclockwise 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			17,8:1
Wet weight	Engine only (Estimated) (excl after treatment comp.)	kg lb	1325 2921
	Power pac	kg lb	1790 3946

Performance				**rpm**	**1200**	**1500**	**1800**	**1900**
IFN Power 405 kW		without fan		kW hp	333 453	397 540	405 551	405 551
		with fan ratio 1:1,07 890 mm		kW hp	325 442	385 524	385 524	381 518
Torque at:		IFN Power		Nm lbf ft	2650 1954	2527 1864	2149 1585	2036 1501
Max torque at engine speed	IFN Power	rpm	1200 rpm	Nm lbf ft	2650 1954			
Power tolerance				%	±2			
Mean piston speed				m/s ft/sec	6,3 20,7	7,9 25,9	9,5 31,1	10,0 32,8
Effective mean pressure at:		IFN Power		MPa psi	2,61 378	2,49 360	2,11 306	2,00 290
Max combustion pressure at:		IFN Power		MPa psi	17,7 2567	17,3 2509	18,7 2712	18,5 2683
Total mass moment of inertia, J (mR^2) (not including flywheel)				kgm^2 $lbft^2$	1,143 27,1			
Friction Power				kW hp	21 29	31 42	45 61	51 69
Derating see Technical Diagrams								

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Engine brake performance (only engines with VCB)		rpm	1200	1500	1900	2200
Brake power:	without fan	kW	70	128	240	283
		hp	95	174	326	385
Brake torque:	without fan	Nm	557	815	1206	1228
		lbf ft	411	601	890	906
Engine speed range for VCB activation:		rpm	1000-2200			
Min engine speed with VCB still active:		rpm	900			
Min oil temperature for VCB activation:		°C	55			

Cold start performance

*Cold start limit temperature	without starting aid	°C °F	-15 5	
	with manifold heater 3 kW	°C °F	-25 -13	
	with manifold heater 3 kW and block heater	°C °F	-30 -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)	Cooling water temp engine block
Self circulating	Volvo 21578298	2	12	-1°C 30°F

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption (average)			Vol%	0,02
Oil system capacity including filters			liter US gal	Plastic sump 36 / Aluminium sump 52 Plastic sump 9,51 / Aluminium sump 13,74
Plastic Oil pan capacity:		Max	liter US gal	30 7,93
		Min	liter US gal	19 5,02
Aluminium Oil pan capacity:		Max	liter US gal	46 12,15
		Min	liter US gal	36 9,51
Oil change intervals/specifications	VDS3		h	1000
	VDS4		h	1000
Engine angularity limits:	front up		°	Plastic sump 11 / Aluminium sump 35
	front down		°	Plastic sump 11 / Aluminium sump 35
	side tilt		°	Plastic 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 °F	130 266
Oil filter filtration efficiency (in accordance with ISO 4548-12)	99%	µ	38
	50%	µ	14

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Fuel system

System supply flow at max. Speed		liter/h US gal/h	130 34,3
Fuel supply line max. restriction (measured at fuel inlet connection)		kPa psi	30 4,4
Fuel supply line max. pressure, during engine stand still (meassured at fuel inlet connection)		kPa psi	16,5 2,4
Fuel supply line min. pressure, during engine stand still (meassured at fuel inlet connection)		kPa psi	-125 -18,1
System return flow at max. Speed		liter/h US gal/h	30,0 7,9
Fuel return line max. restriction (measured at fuel return connection)		kPa psi	20 2,9
Max. allowable inlet fuel temp (Measured at fuel inlet connection)		°C °F	60 140
Prefilter / Water separator micron size		µ	10
Fuel filter filtration efficiency	96%	µ	6
	75%	µ	4
Governor type/make, standard		Volvo/EMS2.3	
Specific UREA consumption in Nonroad Transient Cycle (NRTC)		Vol%	5,2
Fuel to conform to			Fuel equal to or better than EN590:2009 or ASTM D975-09 and Max sulphur 15ppm

Intake and exhaust system		**rpm**	**1200**	**1500**	**1800**	**1900**
Charge air consumption at: (+25°C and 100kPa)	IFN Power	m³/min cfm	22,0 777	27,0 954	28 989	28 989
⚠ **See front page for important information** Max allowable air intake restriction including piping		kPa psi		6 0,9		
Heat rejection to exhaust at:	IFN Power	kW BTU/min	225 12796	294 16719	329 18710	323 18369
Exhaust gas temperature after turbine at:	IFN Power	°C °F	463 865	498 928	531 988	522 972
⚠ **See front page for important information** Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm		kPa psi	15 2,2	21 3,0	22 3,2	22 3,2
⚠ **See front page for important information** Max allowable temperature drop between turbine and SCR muffler inlet.		Δ°C Δ°F	10 18	10 18	10 18	10 18
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)		kPa psi	11 1,6	14 2,0	14 2,0	14 2,0
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power	m³/min cfm	52,0 1836	62,0 2190	67 2366	67 2366

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Cooling system			**rpm**	**1200**	**1500**	**1800**	**1900**
Heat rejection radiation from engine at:		IFN Power	kW	8,3	9,7	10,6	10,3
			BTU/min	472	552	603	586
Heat rejection to coolant at:		IFN Power	kW	133	162	178	184
			BTU/min	7564	9213	10123	10464
Coolant			Yellow Volvo Coolant Solution (VCS)				
Radiator cooling system type				Closed circuit			
Standard radiator core area			m²	0,8			
			foot²	8,61			
Fan diameter	890 mm		mm	890			
			in	35,04			
Fan power consumption	890 mm		kW	4,0	6,0	10,0	12,0
			hp	5	8	14	16
Fan drive ratio	fan Ø890			1:0,84 ccw			
Coolant capacity:	engine		liter	20			
			US gal	5,3			
	std. 0,8m² 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			

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Charge air cooler system		**rpm**	**1200**	**1500**	**1800**	**1900**
Heat rejection to charge air cooler	IFN Power	kW	66	79	77	74
Charge air mass flow	IFN Power	kg/s	0,45	0,54	0,56	0,56
Charge air inlet temp. (Charge air temp after turbo compressor)	IFN Power	°C °F	190 374	196 385	186 367	181 358
⚠ **See front page for important information** Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C °F	46 115	50 122	50 122	50 122
⚠ **See front page for important information** Maximum pressure drop over charge air cooler incl. piping		kPa psi	12 1,74			
Charge air pressure (After charge air cooler)		kPa psi	239 34,66	236 34,23	196 28,43	183 26,54
Standard charge air cooler core area		m² foot²	0,8 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	
	kW						
rpm	hp	°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	
	kW						
rpm	hp	°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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Engine management system

Functionality	Alternatives			Default setting
Governor mode	Droop	Isochronous		Isochronous
Governor droop	10	127	Nm/rpm	
Governor response	Adjustable PI constants			
Idle speed	600	900	rpm	700
Preheating function	Ignition	Request	Request + temp	If preheat is available, preheat will be active at ignition on if temp low or demanded by driver.
Ignition off stops engine	Yes	No		No

Engine sensors and switch settings					Engine protection action		
Parameter		**Unit**	**Warning setting (Yellow)**		**Alarm setting (Red)**	**Default**	**Optional (Module or conversion kit)**
Oil temp		°C	125		130	Derate	Shut down.
Oil pressure	Low idle	kPa	80		55,0	Shut down	Shut down.
	Rated speed	kPa	300		275	Shut down	Shut down.
Oil level			Low level		N/A	Fault code only	Fault code only
Piston cooling pressure >1000 rpm		kPa	Not avaliable on this engine				
Coolant temp		°C	105		107	Derate	Shut down.
Coolant level			N/A		Low level	Derate	Shut down.
Fuel feed pressure	Low idle	kPa	See Fuel pressure limits		N/A	Fault code only	Fault code only
	Rated speed				N/A	Fault code only	Fault code only
Water in fuel			Alarm when closed		N/A	Fault code only	Fault code only
EGR temp		°C	N/A		N/A	N/A	N/A
Air filter pressure drop		kPa	5		N/A	Fault code only	Fault code only
Altitude, above sea		m	N/A		N/A	Automatic derating, see section derating	Automatic derating, see section derating
Crank case pressure			N/A		Alarm at	Shut down	Shut down.
Charge air temp		°C	120		125	Derate	Shut down.
Charge air pressure		kPa	See Charge air pressure limits			Derate	Shut down.
SCR temp		°C	N/A		N/A	Automatic derating	Automatic derating
Engine overspeed		rpm	2400		N/A	Fault code only	Fault code only
Derate parameters			**Derated 0% to engine protection map**	**Derated 100% to engine protection map**		**Forced idle after 5 sec**	**Forced shut down after 0 sec**
Oil temp			130°C	132°C		N/A	N/A
Coolant temp			107°C	108°C		N/A	N/A
Charge air temp			125°C	126°C		N/A	N/A
EGR temp			N/A	N/A		N/A	N/A
Low oil pressure			See Oil pressure limits			N/A	At alarm
Charge air pressure			See Charge air pressure limits			N/A	N/A

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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			7		
		hp			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		
Conditions:	**Temperature**	**°C**		**25**	**0**	**-15**	
(4 mΩ main circuit resistance@	**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 in line with crank shaft max:*		Nm	2590	2110	1420	1460
(with a total added mass moment of inertia, J (mR2)≤ 0,05 kgm²)		lbf ft	1910	1556	1047	1077
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			
Continuous torque on timing gear at rear PTO : ***, ****		Nm	650 / 1000			
DIN 5462 spline		lbf ft	479 / 739			
Continuous torque on timing gear at rear PTO : *****		Nm	600			
SAE B spline		lbf ft	442			
Speed ratio direction of rotation viewed from flywheel side, for all rear PTO,s			1,26:1/ccw			
Continuous torque. Timing gear at compressor PTO max:*****		Nm	300			
PTO SAE B		lbf ft	221			
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 then one PTO output is used simultaniusly, calculations needs to be performed to determine maximum available torque, depending on application inertia.
*****Standard 650, option 1000 Nm.***

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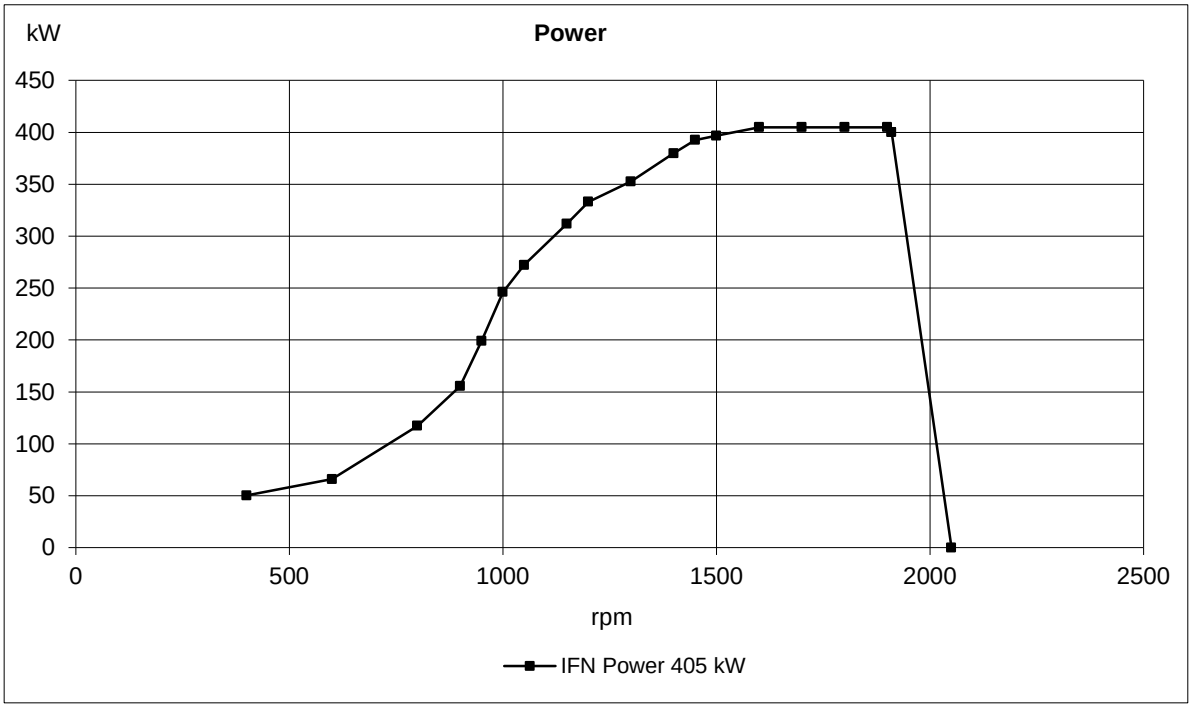

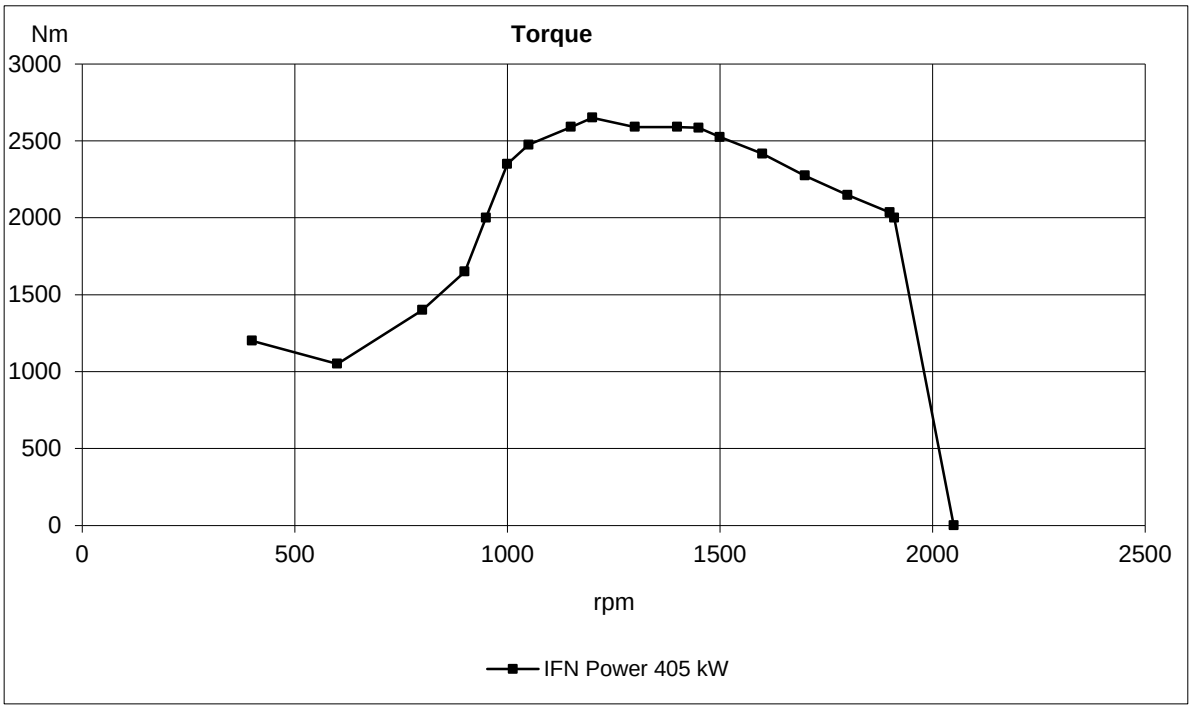

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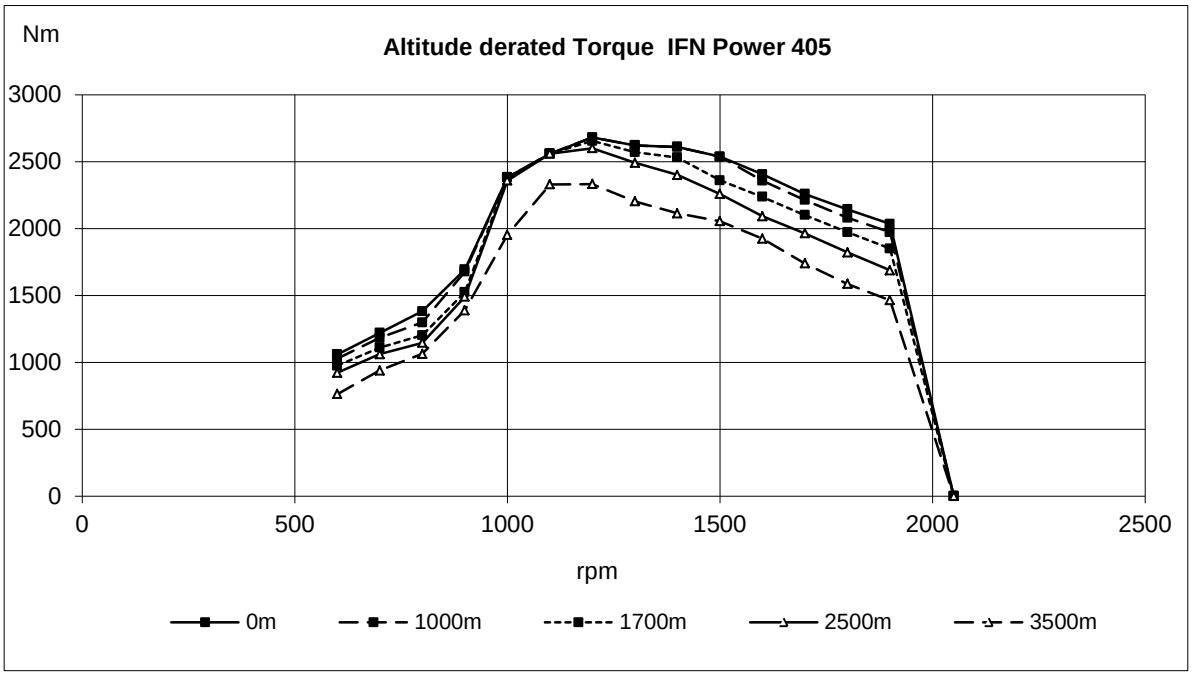

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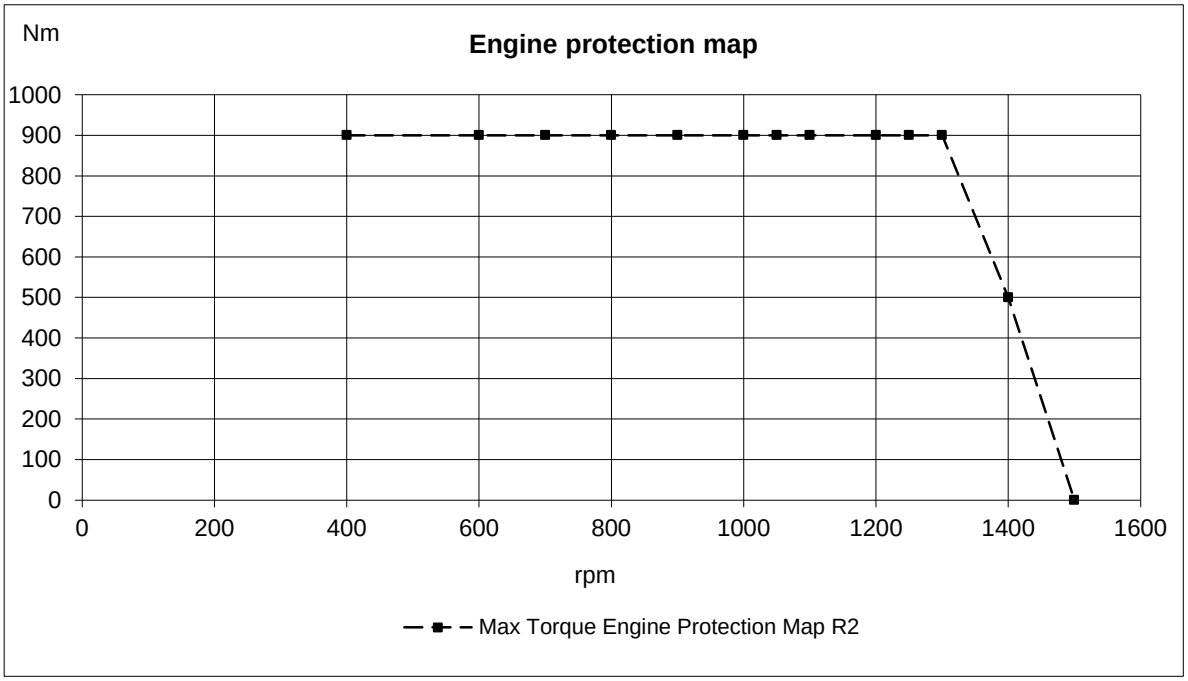

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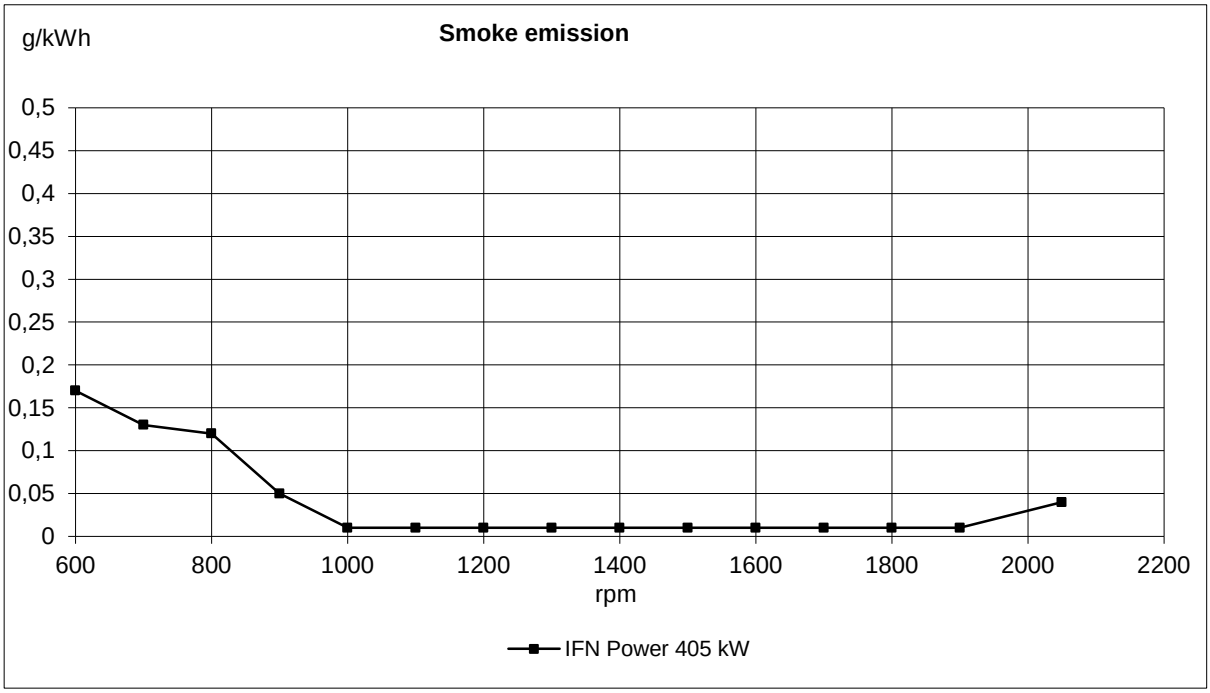

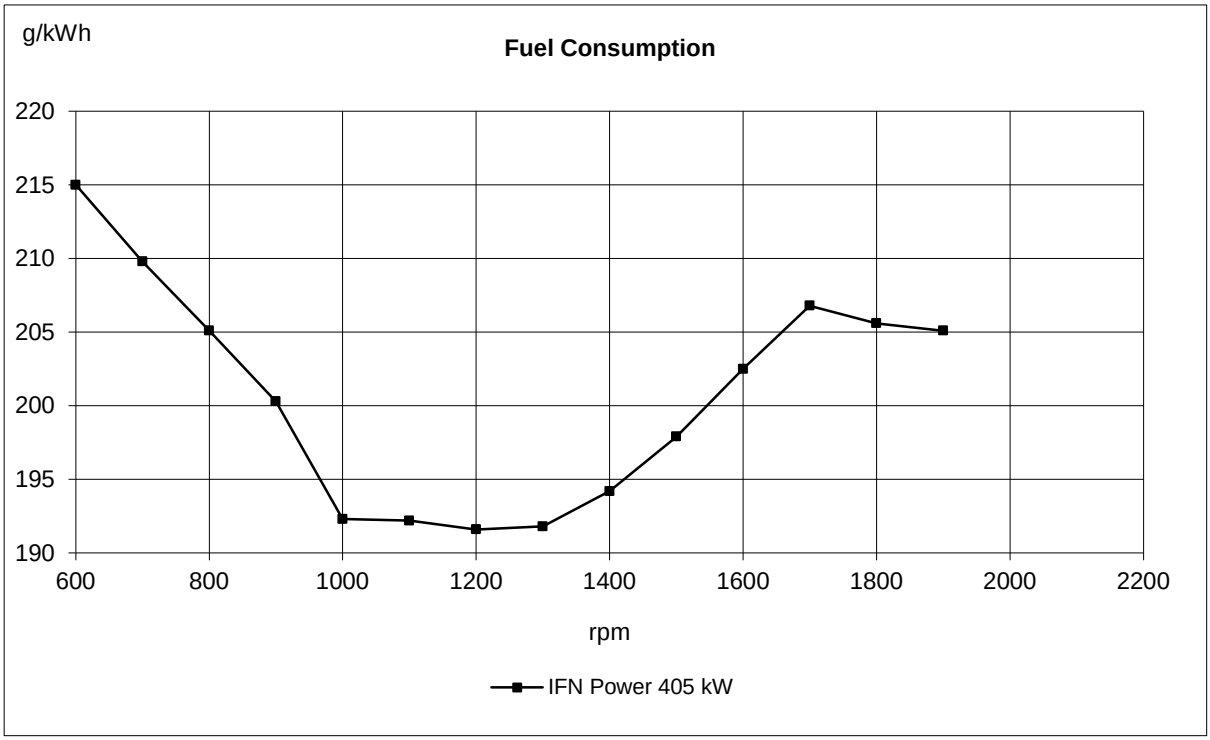

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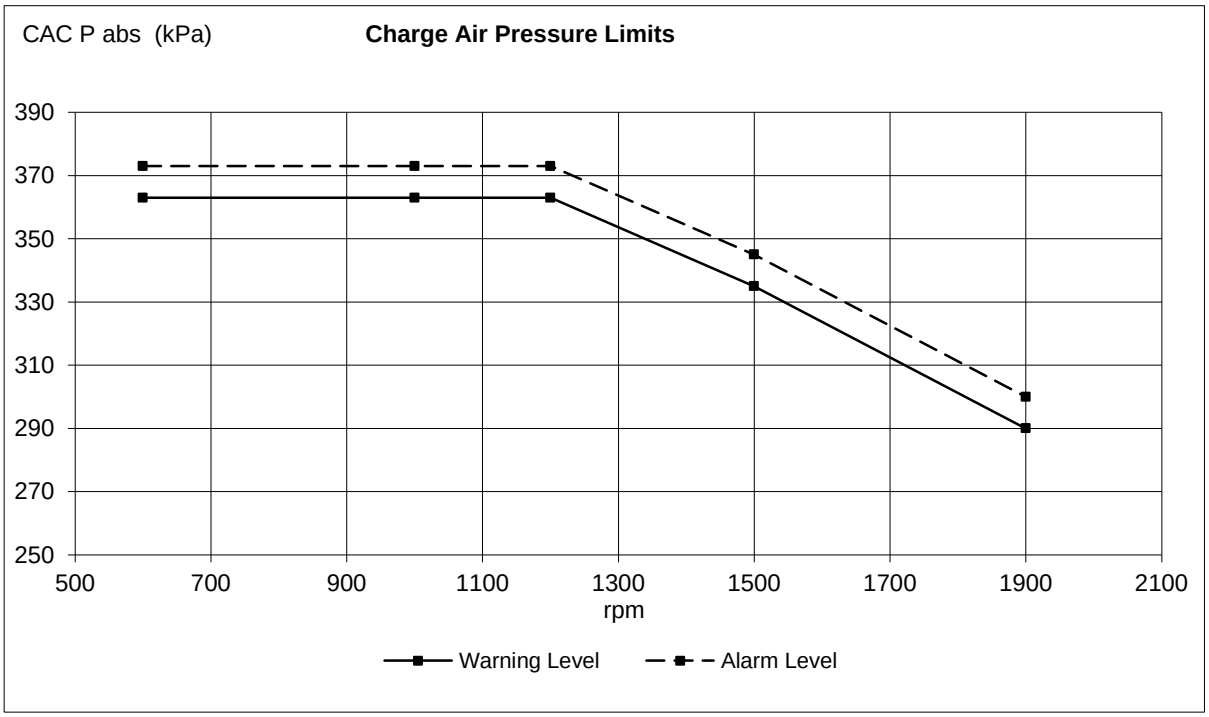

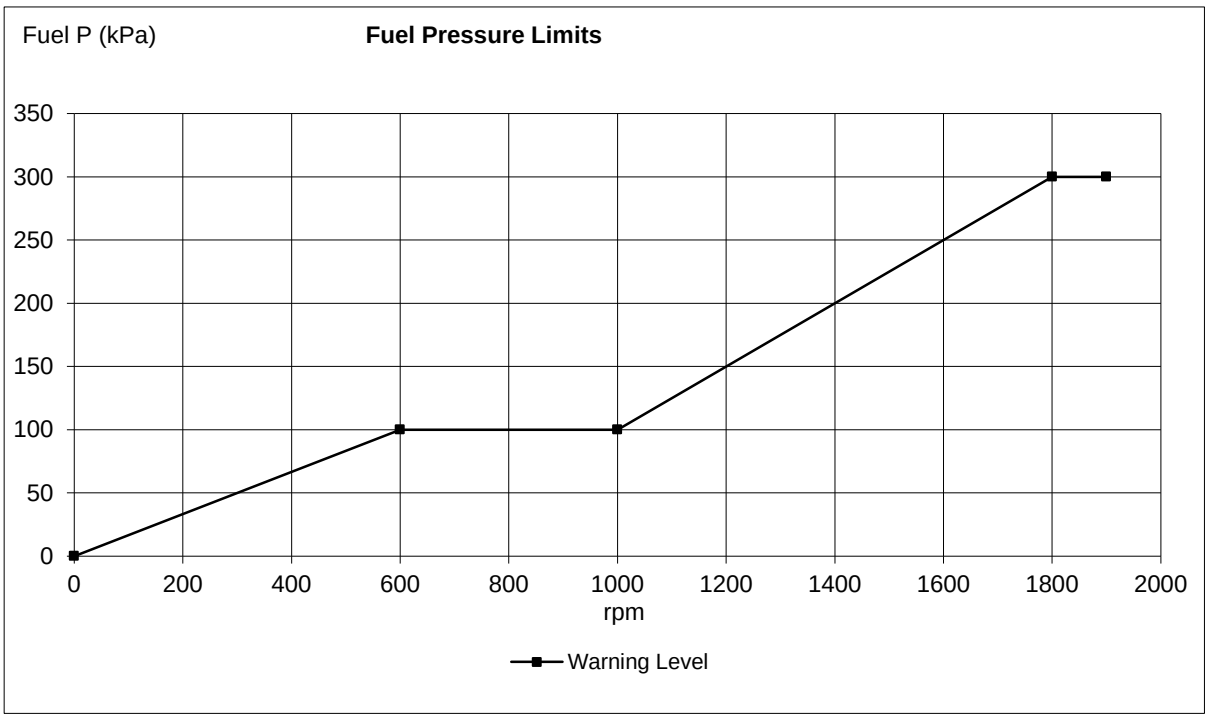

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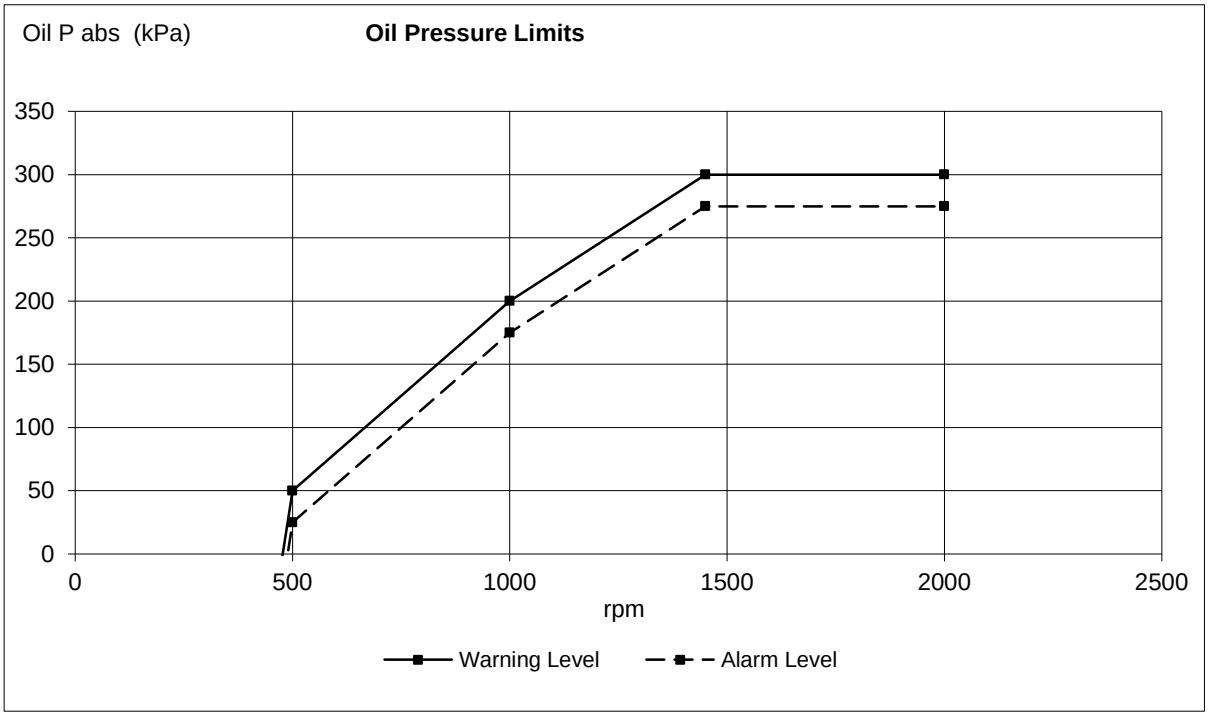

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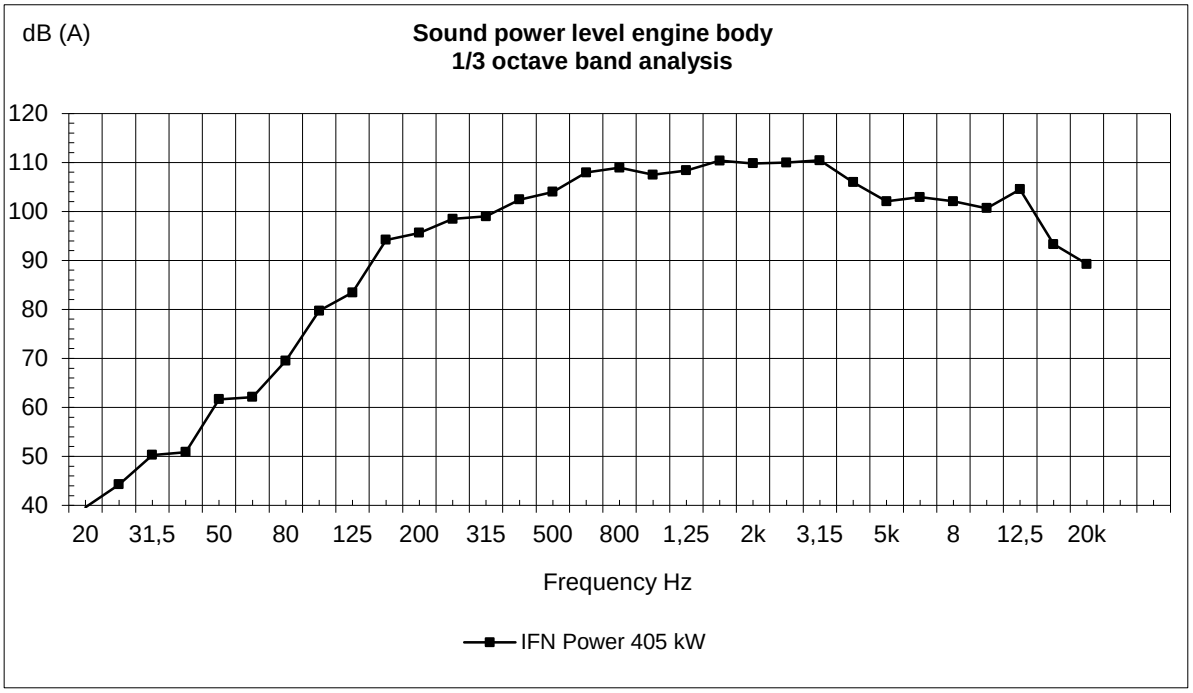
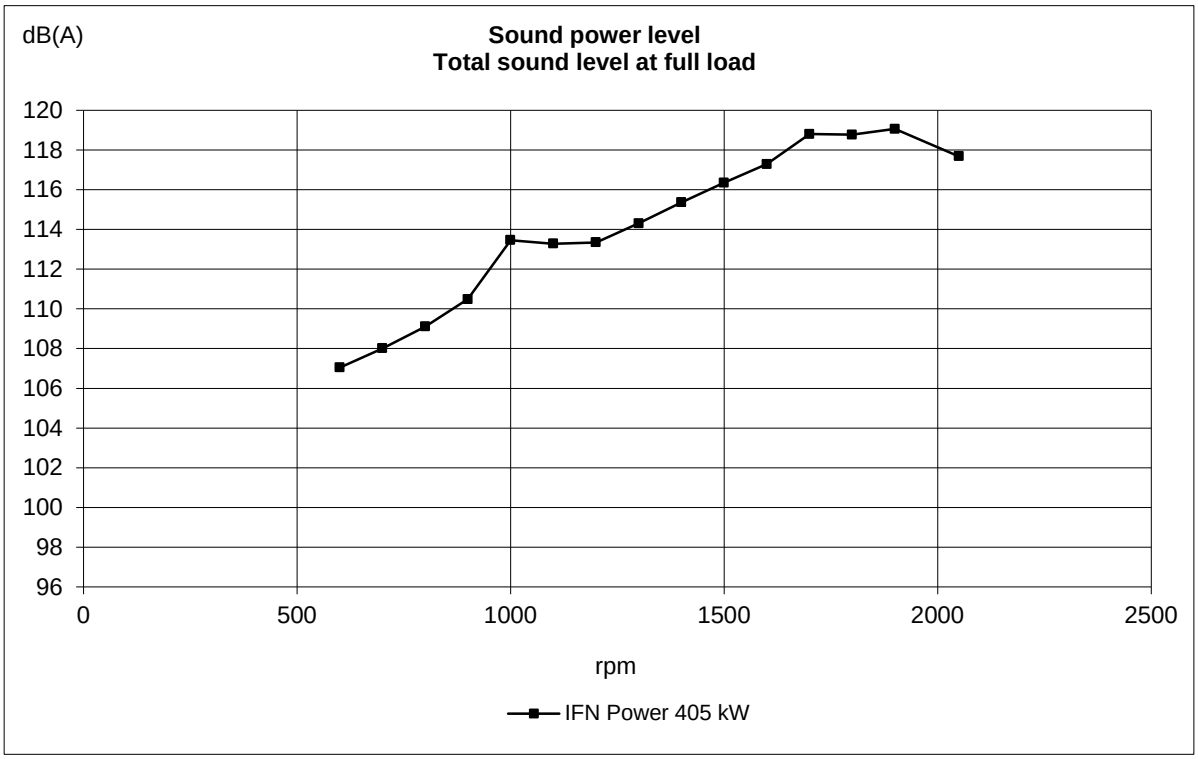
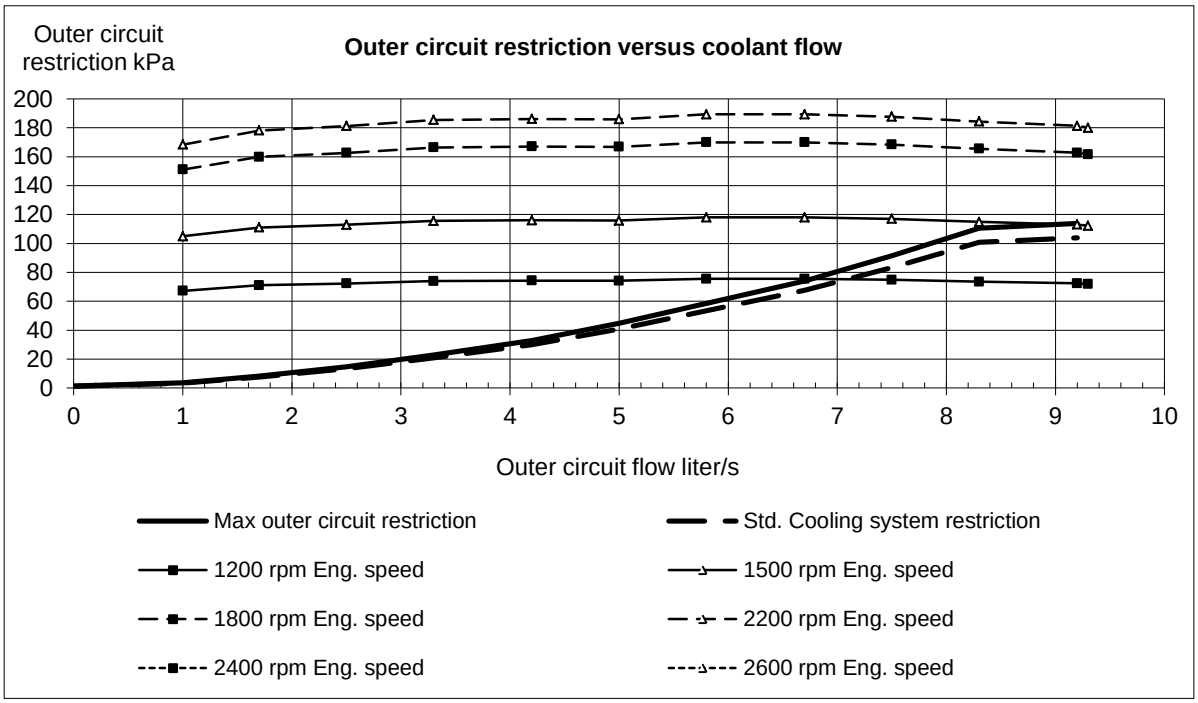
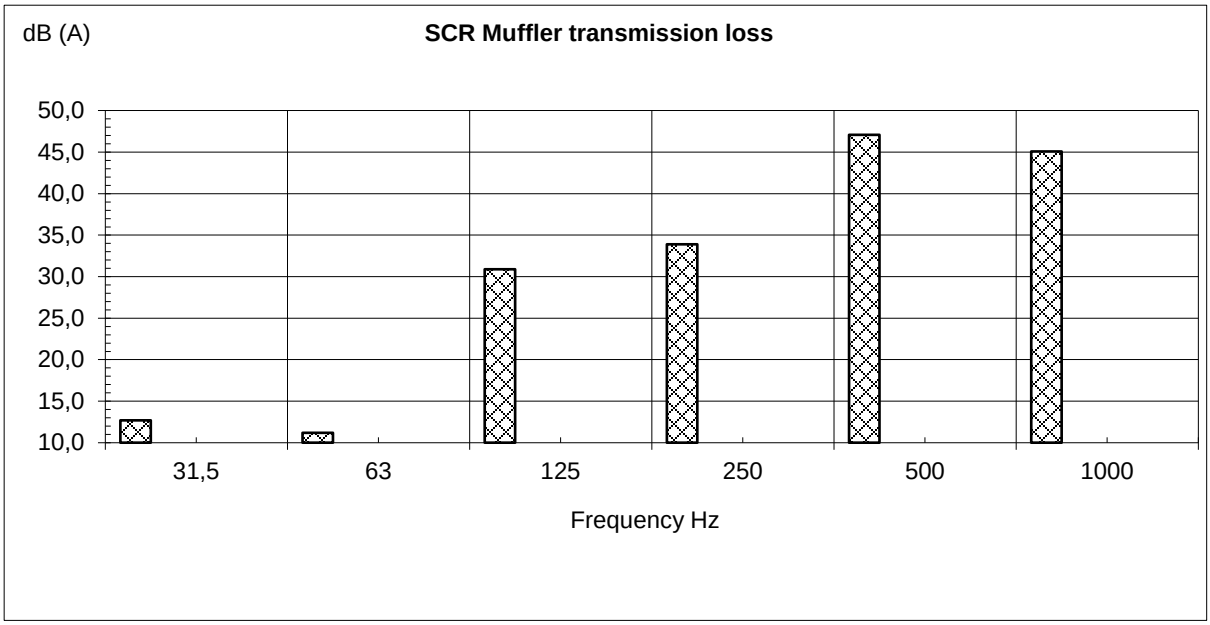





Outer circuit restriction kPa
Outer circuit restriction versus coolant flow
200
180
160
140
120
100
80
60
40
20
0
0
1
2
3
4
5
6
7
8
9
10
Outer circuit flow liter/s
Max outer circuit restriction
Std. Cooling system restriction
1200 rpm Eng. speed
1500 rpm Eng. speed
1800 rpm Eng. speed
2200 rpm Eng. speed
2400 rpm Eng. speed
2600 rpm Eng. speed


dB (A)
SCR Muffler transmission loss
50,0
45,0
40,0
35,0
30,0
25,0
20,0
15,0
10,0
31,5
63
125
250
500
1000
Frequency Hz

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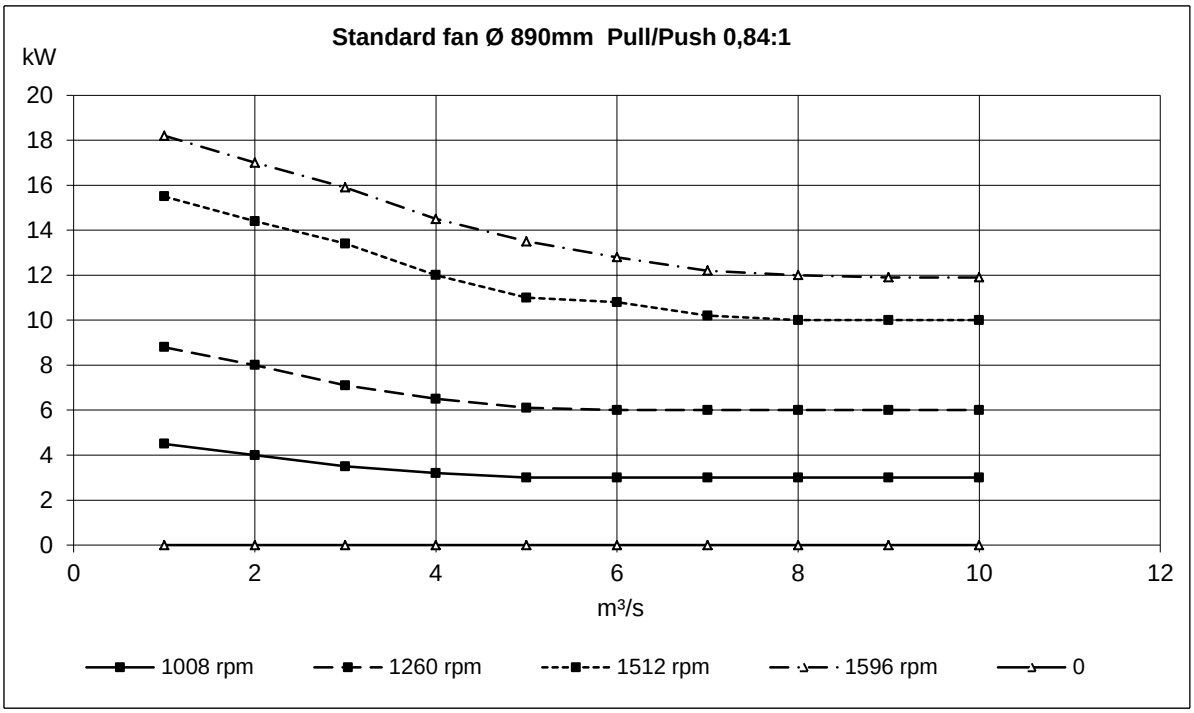

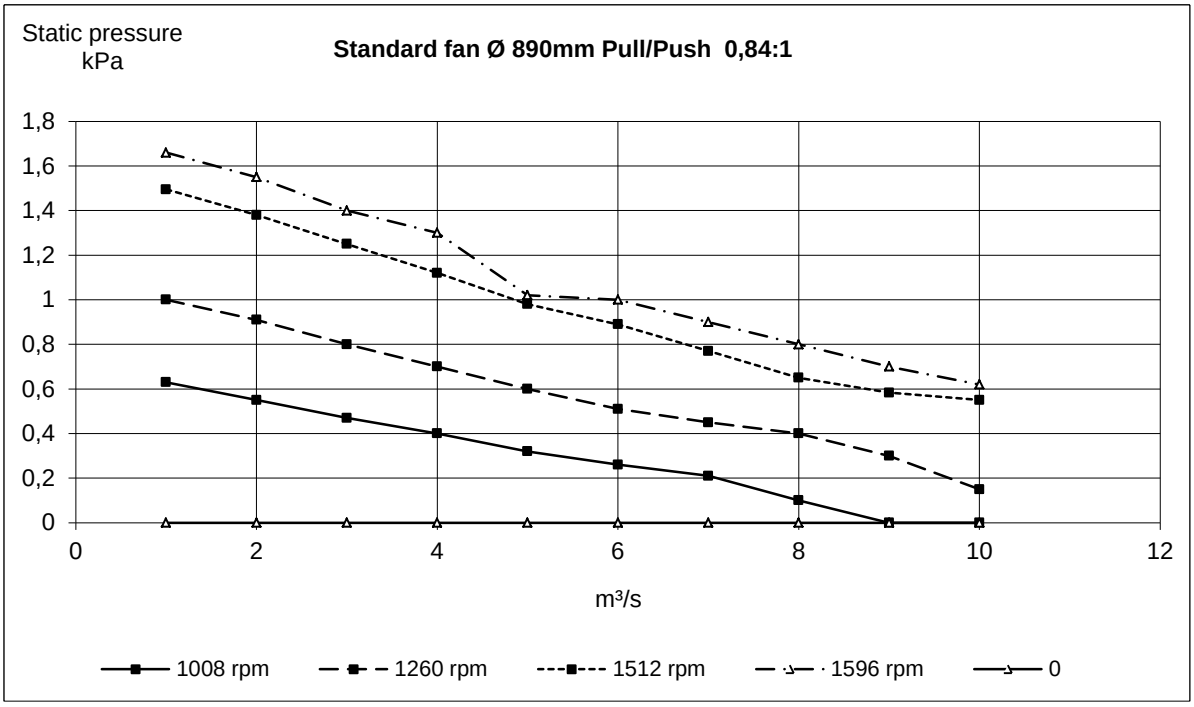

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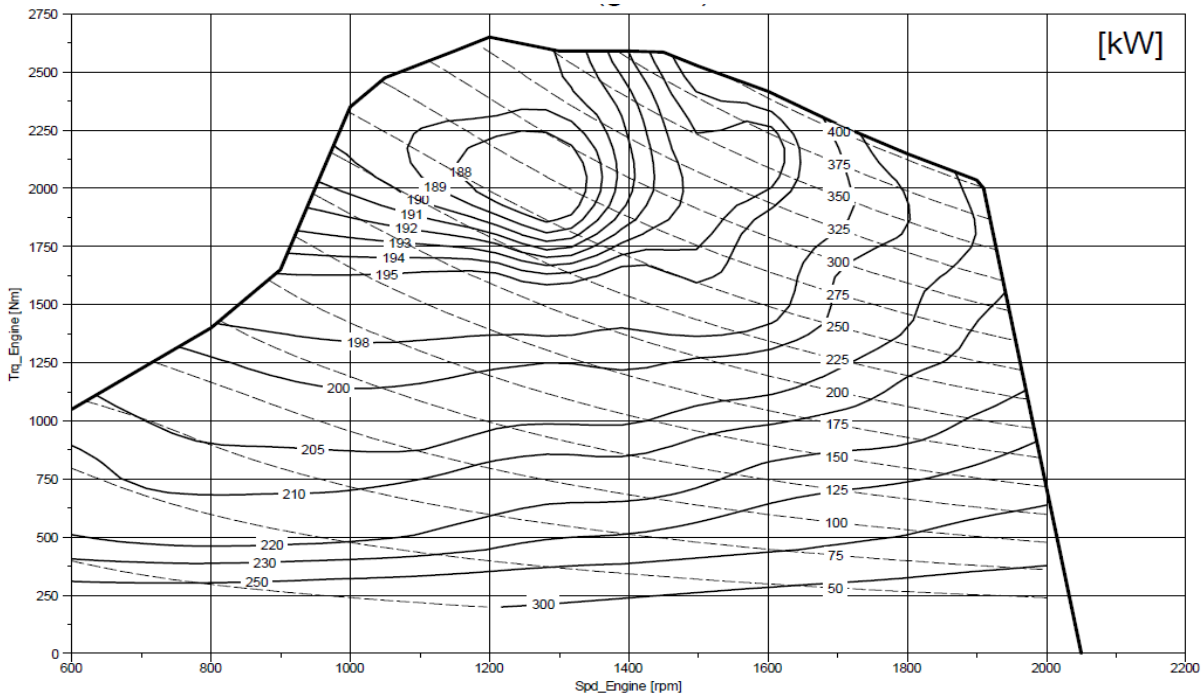
BSFC [g/kWh]



Fuel consumption [l/h]