


**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  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	10,84
		in <sup>3</sup>	661
Firing order			1-5-3-6-2-4
Bore		mm	123
		in	4,84
Stroke		mm	152
		in	5,98
Compression ratio			17,0:1
Wet weight	Engine only (Estimated) (excl after treatment comp.)	kg	1072
		lb	2363
	Power pac	kg	1351
		lb	2978

**Performance**

				rpm	1200	1500	1700	2000
IFN Power	285 kW	without fan		kW	239	272	285	271
				hp	325	370	388	369
		with fan 890 mm		kW	235	259	273	254
				hp	319	352	371	346
Torque at:		IFN Power		Nm	1900	1730	1600	1295
				lbf ft	1401	1276	1180	955
Max torque at engine speed	IFN Power	rpm	1260 rpm	Nm	1938			
				lbf ft	1429			
Power tolerance				%	±2			
Mean piston speed				m/s	6,1	7,6	8,6	10,1
				ft/sec	19,9	24,9	28,3	33,2
Effective mean pressure at:		IFN Power		MPa	2,20	2,01	1,86	1,50
				psi	320	291	269	218
Max combustion pressure at:		IFN Power		MPa	15,9	15,6	15,8	13,0
				psi	2298	2265	2284	1889
Total mass moment of inertia, J (mR <sup>2</sup> ) (not including flywheel)				kgm <sup>2</sup>	1,034			
				lbft <sup>2</sup>	24,5			
Friction Power				kW	20	30	38	52
				hp	27	41	52	71

**Derating see Technical Diagrams**

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

		rpm	1200	1500	1700	2000
Brake power:	without fan	kW hp	N/A	N/A	N/A	N/A
Brake torque:	without fan	Nm lbf ft	N/A	N/A	N/A	N/A
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	-15
		°F	5
	with manifold heater 3.5 kW	°C	-25
		°F	-13
	with manifold heater 3.5 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	1,2	12
			Cooling water temp engine block
			-1°C 30°F

\* See also general section in the sales guide

**Lubrication system**

Lubricating oil consumption (average)		l/hr	0,02
Oil system capacity including filters		liter US gal	37 9,77
Oil pan capacity: (both variants)	Max	liter	32
		US gal	8,45
	Min	liter	27
		US gal	7,13
Oil change intervals/specifications	VDS3	h	500*
	VDS4	h	500*
Engine angularity limits:	front up	°	30
	front down	°	30
	side tilt	°	30
Oil pressure at rated speed	kPa	350 - 600	
	psi	51 - 87	

\* Oil change intervals vary, depending on oil grade, sulfur content of the fuel and running conditions. Oil sample analysis is recommended to determine application specific oil change interval.




**Lubrication system**

Lubrication oil temperature in sump:	max	°C	127
		°F	261
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	108
		US gal/h	28,5
Fuel supply line max. restriction (measured at fuel inlet connection)		kPa	10
		psi	1,5
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection)		kPa	16,5
		psi	2,4
Fuel supply line min. pressure, during engine stand still (measured at fuel inlet connection)		kPa	-12,5
		psi	-1,8
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		
Specific UREA consumption in Nonroad Transient Cycle (NRTC)	Vol%	N/A	
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	1700	2000
Charge air consumption at: (+25°C and 100kPa)	IFN Power	m³/min cfm	14,1 498	17,2 607	19,1 675	20,4 720
 <b>See front page for important information</b>						
Max allowable air intake restriction including piping		kPa psi		5 0,7		
Heat rejection to exhaust at:	IFN Power	kW BTU/min	158 8978	190 10782	207 11755	227 12889
Exhaust gas temperature after turbine at:	IFN Power	°C °F	521 969	516 961	510 949	524 975
 <b>See front page for important information</b>						
Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm		kPa psi	-	-	-	15 2,2
 <b>See front page for important information</b>						
Max allowable temperature drop between turbine and SCR muffler inlet.		Δ°C Δ°F	N/A	N/A	N/A	N/A
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)		kPa psi	N/A	N/A	N/A	N/A
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power	m³/min cfm	38,1 1346	44,6 1575	47,8 1688	50,9 1798

**Cooling system**

		rpm	1200	1500	1700	2000
Heat rejection radiation from engine at:	IFN Power	kW	10,5	10,4	10,3	10,8
		BTU/min	597	589	588	611
Heat rejection to coolant at:	IFN Power	kW	127	141	146	158
		BTU/min	7228	8030	8292	9008
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>	0,8			
		foot <sup>2</sup>	8,61			
Fan diameter	890 mm	mm	890			
		in	35,04			
Fan power consumption	890 mm	kW	4,3	13,4	12,4	16,6
		hp	6	18	17	23
Fan drive ratio	fan Ø890		0,9:1 ccw			
Coolant capacity:	engine	liter	17			
		US gal	4,5			
	std. 0,8m <sup>2</sup> radiator with hoses	liter	21			
		US gal	5,5			
Coolant pump		drive/ratio	belt/1,41:1 cw			
Coolant flow with standard system		l/s	4,8	6,0	6,8	8
		US gal/s	1,3	1,6	1,8	2,1
Minimum coolant flow		l/s	1,9	2,2	2,5	2,8
		US gal/s	0,5	0,6	0,7	0,7
Maximum outer circuit restriction incl. piping		kPa	55,0			
		psi	8,0			
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	1700	2000
Heat rejection to charge air cooler	IFN Power	kW BTU/min	38,0 2158	44,3 2517	49,7 2828	49,0 2784
Charge air mass flow	IFN Power	kg/s	0,27	0,33	0,36	0,39
Charge air inlet temp. (Charge air temp after turbo compressor)	IFN Power	°C °F	184 362	181 357	185 365	175 346
 <b>See front page for important information</b> Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C °F	45 113	50 122	50 122	50 122
 <b>See front page for important information</b> Maximum pressure drop over charge air cooler incl. piping		kPa psi		12 1,74		
Charge air pressure (Relative, after charge air cooler)		kPa psi	203 29,40	209 30,28	216 31,30	195 28,31
Standard charge air cooler core area		m <sup>2</sup> foot <sup>2</sup>		0,8 8,61		

**Cooling performance: 0.8 m<sup>2</sup> radiator and pull 890 fixed fan standard drive ratio 0.9**

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	
				kg/s	lb/s	Pa	psi
1700 (fix 0.9)	285	63,3	146	6,98	15,40	0	
	388	59,5	139	6,21	13,69	150	0,022
		53,7	129	5,28	11,65	300	0,044
		45,6	114	4,33	9,54	450	0,065

**Cooling performance: 0.8 m<sup>2</sup> radiator and push 890 fixed fan standard drive ratio 0.9**

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	
				kg/s	lb/s	Pa	psi
1700 (fix 0.9)	285	70,2	158	9,46	20,85	0	
	388	68,9	156	8,93	19,69	150	0,022
		67,3	153	8,37	18,46	300	0,044
		65,3	150	7,73	17,05	450	0,065

**Cooling performance: 0.8 m<sup>2</sup> radiator and pull 890 Visco fan standard drive ratio 0.9**

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	
				kg/s	lb/s	Pa	psi
1700	285	60,1	140	6,81	15,00	0	
	388	54,6	130	6,03	13,29	150	0,022
		46,2	115	5,08	11,19	300	0,044
		30,4	87	4,09	9,03	450	0,065

**Cooling performance: 0,8 m<sup>2</sup> radiator and push 890 Visco fan standard drive ratio 0.9**

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
1700	285 388	63,4	146	7,65	16,86	0	
		59,8	140	6,91	15,23	150	0,022
		54,9	131	6,09	13,44	300	0,044
		48,6	119	5,26	11,60	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		Warning Level (Yellow Lamp)		Engine protection (Red Lamp)		
Parameter	Unit	Setting range	Default setting	Level	Action. Default/Alternative	
Oil temp	°C	125-130	125	130	Soft derate	
Oil pressure	Low idle	kPa	N/A	50	25	Shut down, ON/OFF
	Rated speed	kPa	N/A	300	275	Shut down, ON/OFF
Oil level						
Piston cooling pressure >1000 rpm	kPa					
Coolant temp	°C	105-107	105	107	Soft derate	
Coolant level		See cooling system	On			
Fuel feed pressure	1200rpm	kPa		100		
Water in fuel		Alarm When Closed				
Crank case pressure	kPa	N/A	Rapid Pres	Rapid pres incr	Shut down, ON/OFF	
Air filter pressure drop			5			
Altitude, above sea	m				Automatic derating, see section derating	
Charge air temp	°C	N/A	80	85	Soft derate	
Charge air pressure	kPa	N/A	Demand value + 35kPa	Demand value + 40kPa	Soft derate VE/Shutdown Powerpack	
Engine speed	rpm	x % of rated speed	135% of rated speed	Alarm level	Alarm only	

Parameter	Warning Yellow Lamp	Alarm Red Lamp	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	130°C	130°C	132°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			90P55 / (105P70 ISS för start/stop)		
	output	kW hp		5.5 / (7.0)		
Number of teeth on:	flywheel			153		
	starter motor			11		
Inlet manifold heater (at 20 V)		kW		3.5		
Power relay for the manifold heater		A		1		
<b>Conditions:</b>		<b>Temperature</b>		<b>°C</b>		
(4 mΩ main circuit resistance@ 20°C)		<b>Battery</b>		<b>Ah / CCA</b>		<b>°C</b>
				<b>25</b>	<b>0</b>	<b>-15</b>
				<b>140 / 800</b>	<b>140 / 800</b>	<b>145 / 1050</b>
Crank speed		rpm		165	150	100
Crank current		A		240	310	370
Starter input power during crank		kW		5	6,1	6,3
Battery power during crank		kW		5,3	6,5	6,8
Min battery @ 0°C		Ah / CCA		140/800		

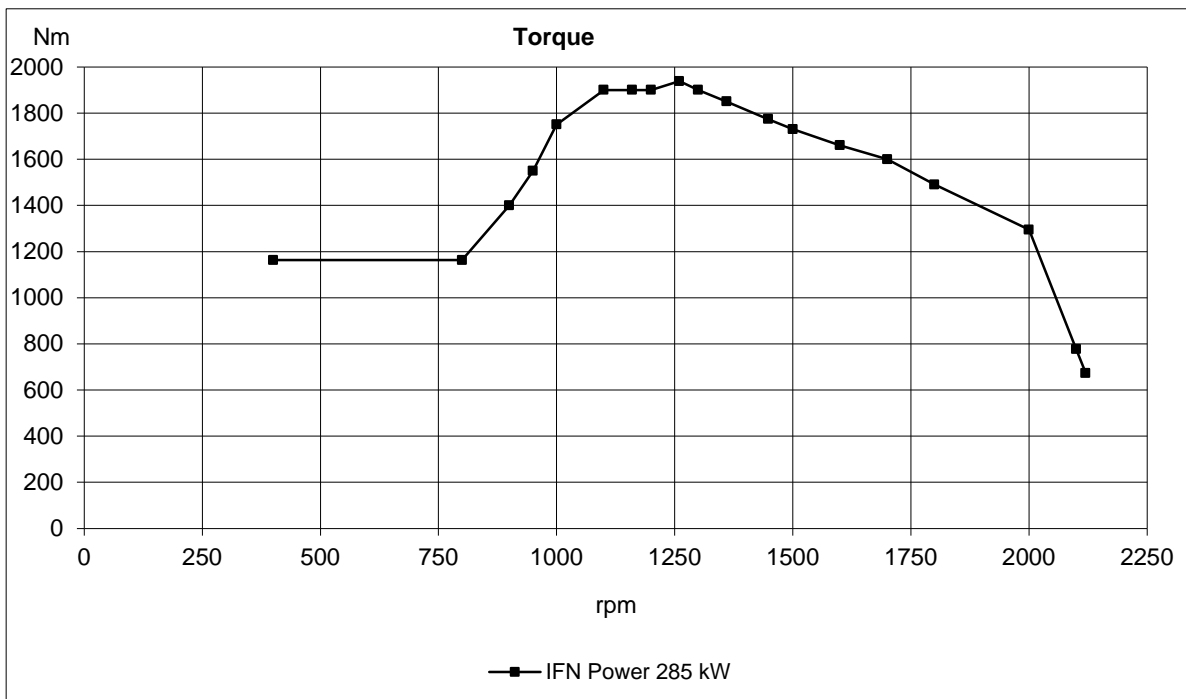
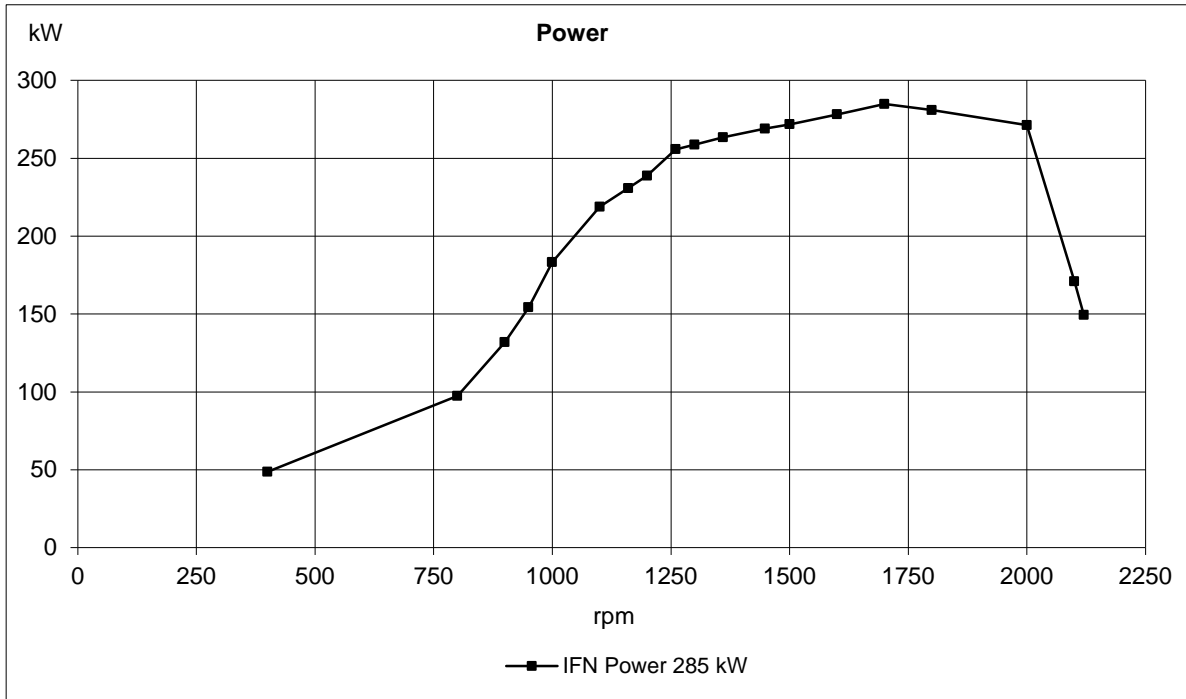
**Power take off**

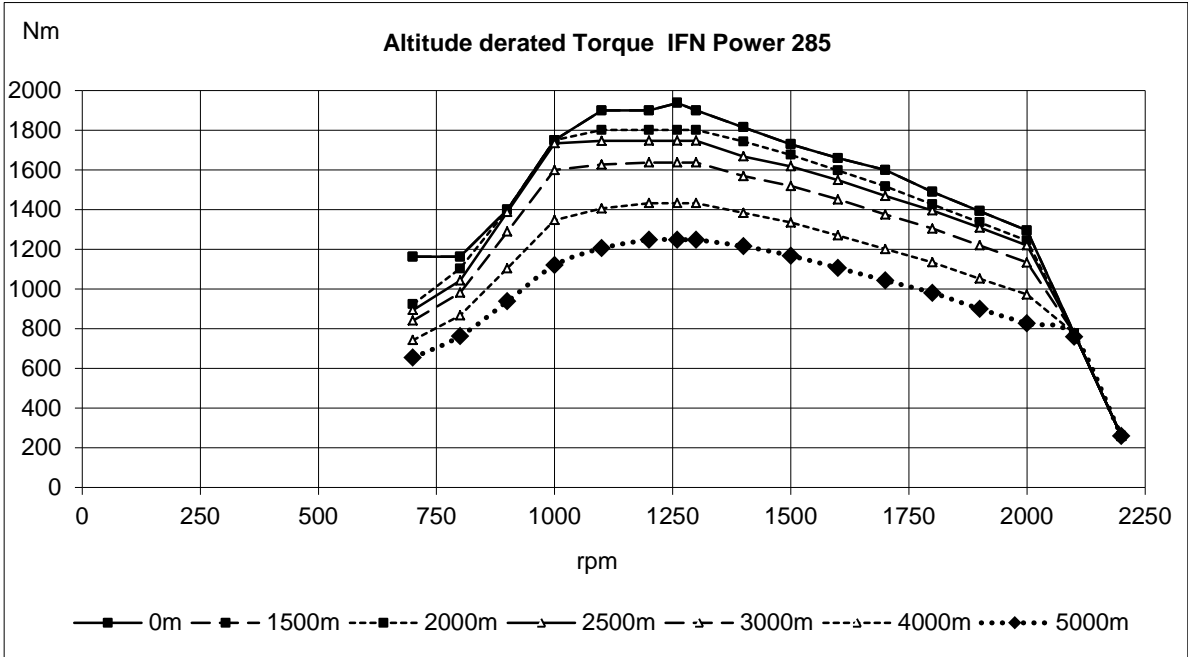
		rpm	1200	1500	1700	2000
Front end in line with crank shaft max:*		Nm lbf ft	Very restricted use, each application needs to be evaluated			
(with a total added mass moment of inertia, J (mR2) ≤ 0,05 kgm²)						
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW hp	n/a	n/a	n/a	n/a
	max down	kW hp	n/a	n/a	n/a	n/a
	max right	kW hp	n/a	n/a	n/a	n/a
Timing gear at servo pump PTO max:*		Nm lbf ft	100 74			
Speed ratio direction of rotation viewed from flywheel side			1,08:1/ccw			
Maximum torque on timing gear at rear PTO : *		Nm lbf ft	650 479			
Speed ratio direction of rotation viewed from flywheel side			1,08:1/ccw			
Timing gear at compressor PTO max:*		Nm lbf ft	310 229			
Speed ratio direction of rotation viewed from flywheel side			1,29:1/ccw			
Max allowed bending moment in flywheel housing		Nm lbf ft	7000 5163			
Max. rear main bearing load		N lbf	3000 674,4			

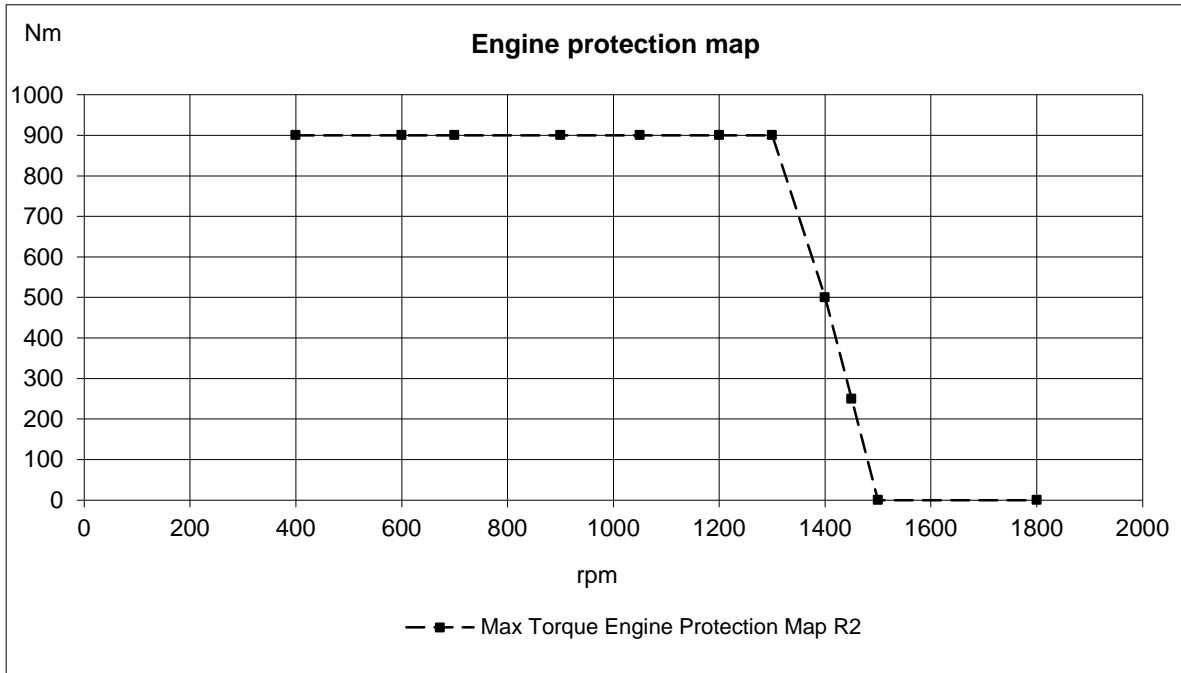
\* **Maximum allowed torque at individual PTO's.**

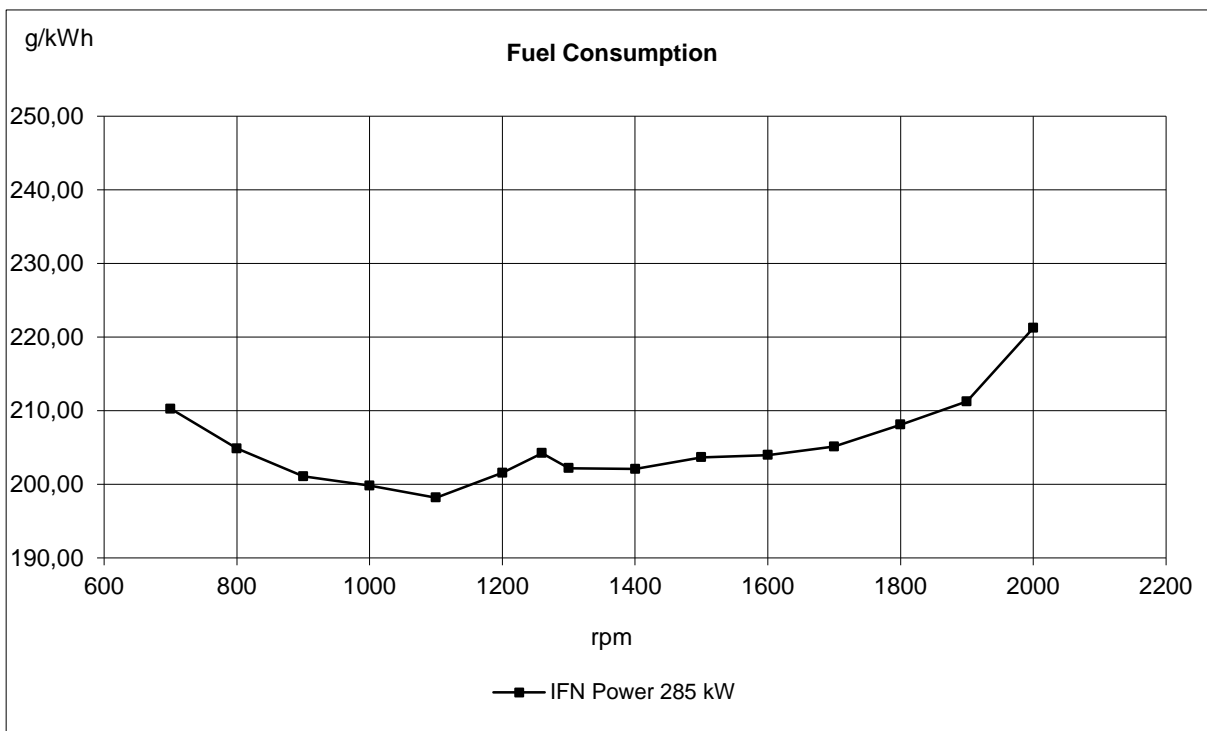
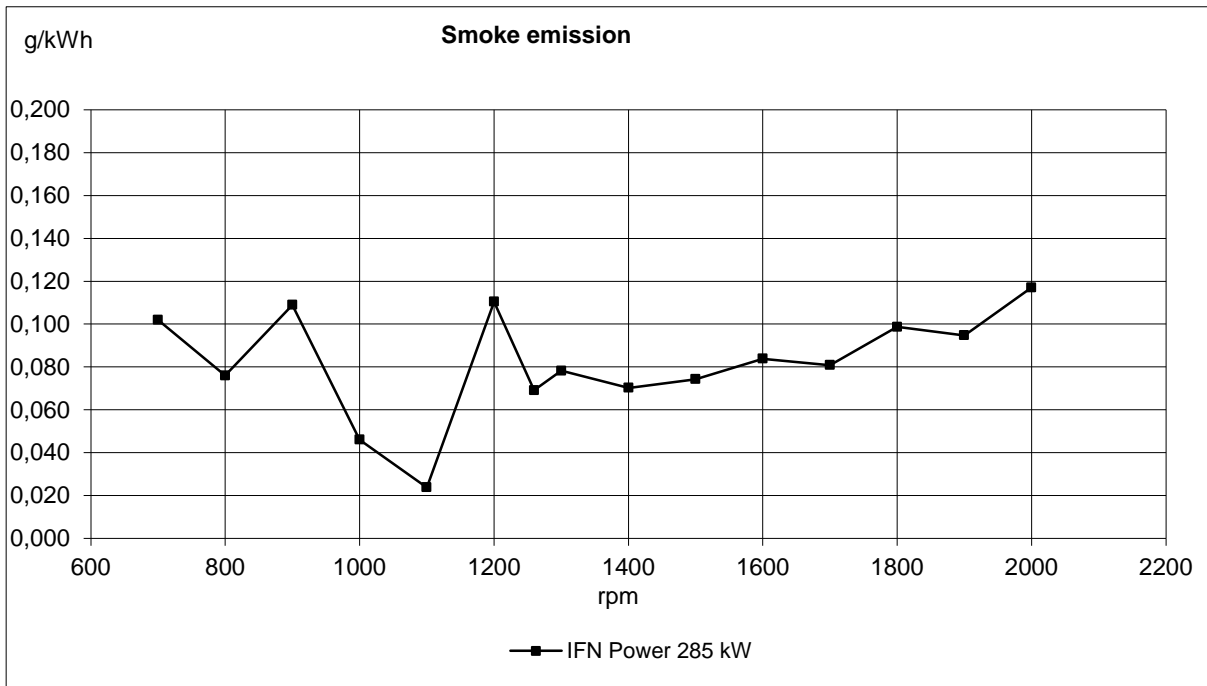
**If more than one PTO output is used simultaneously, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.**

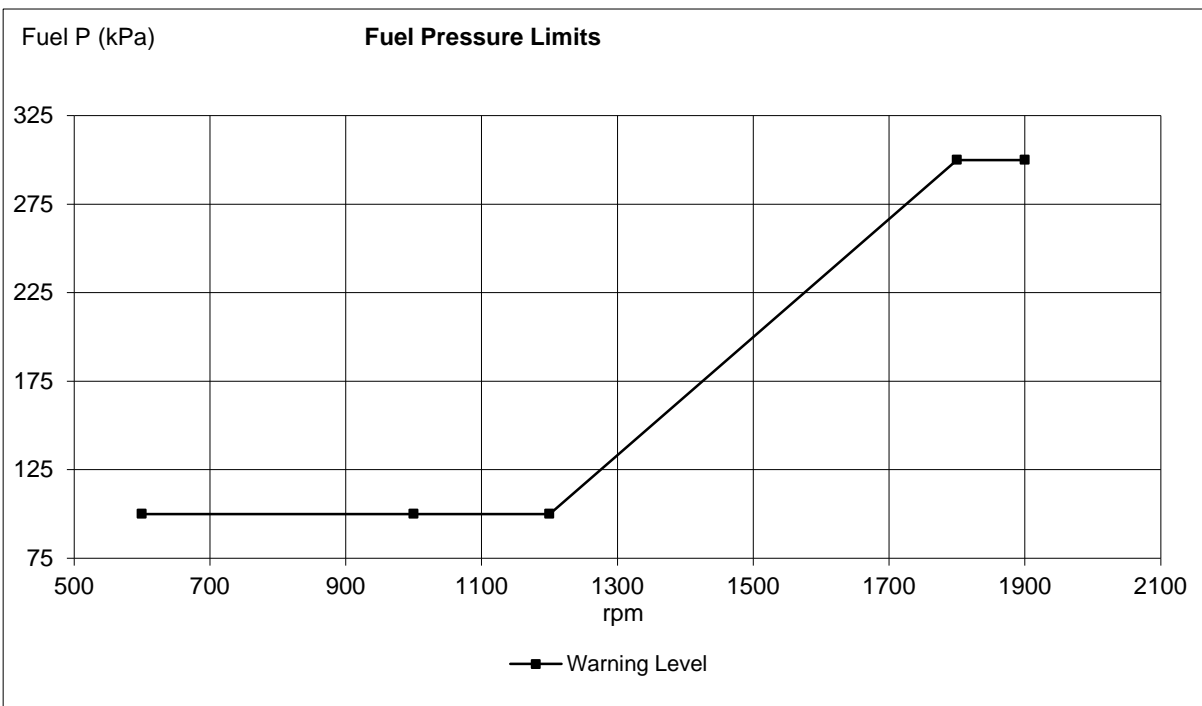
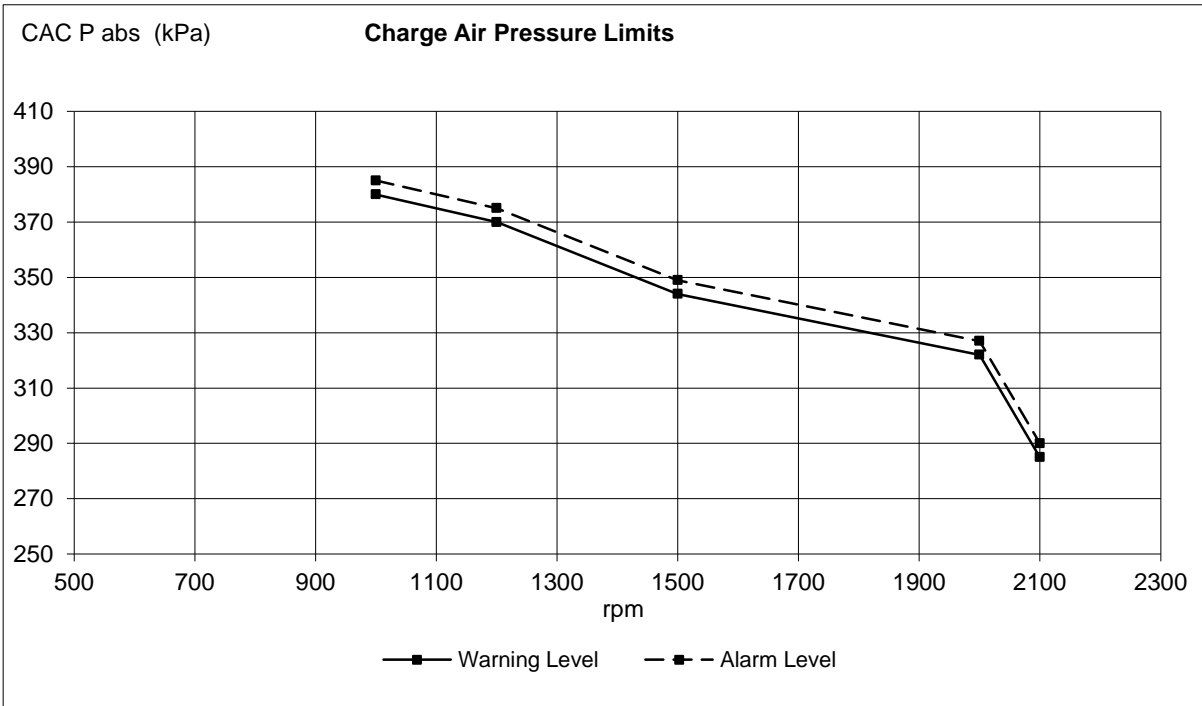


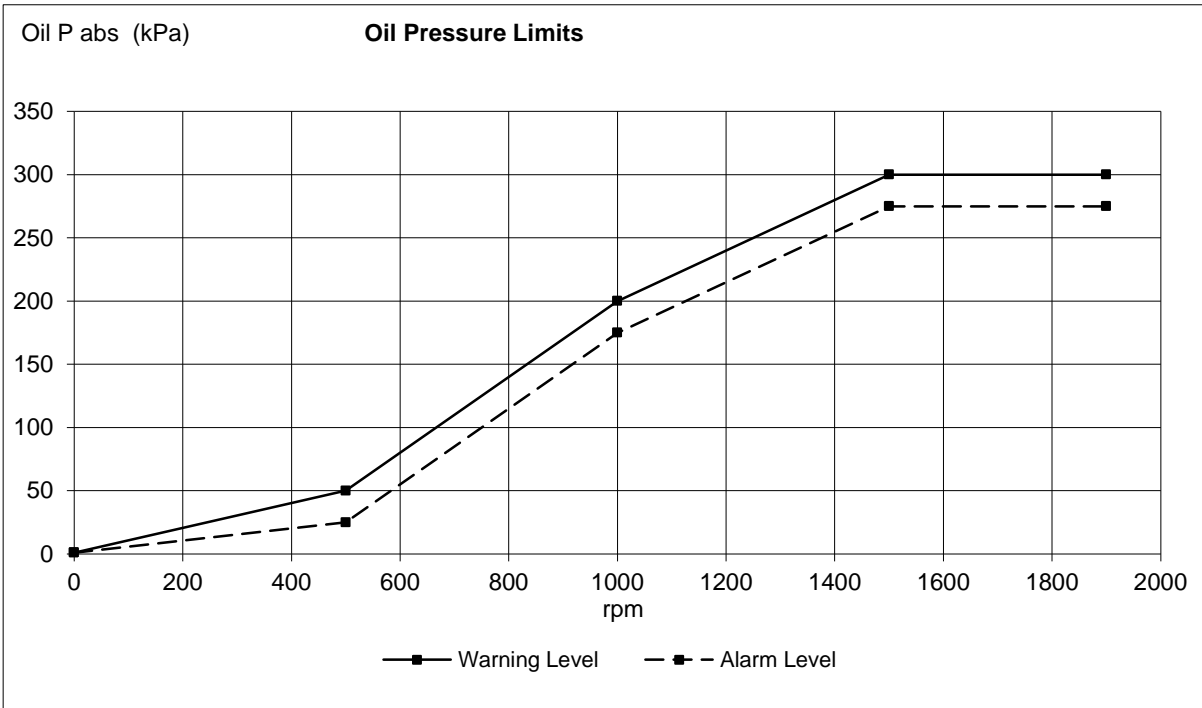


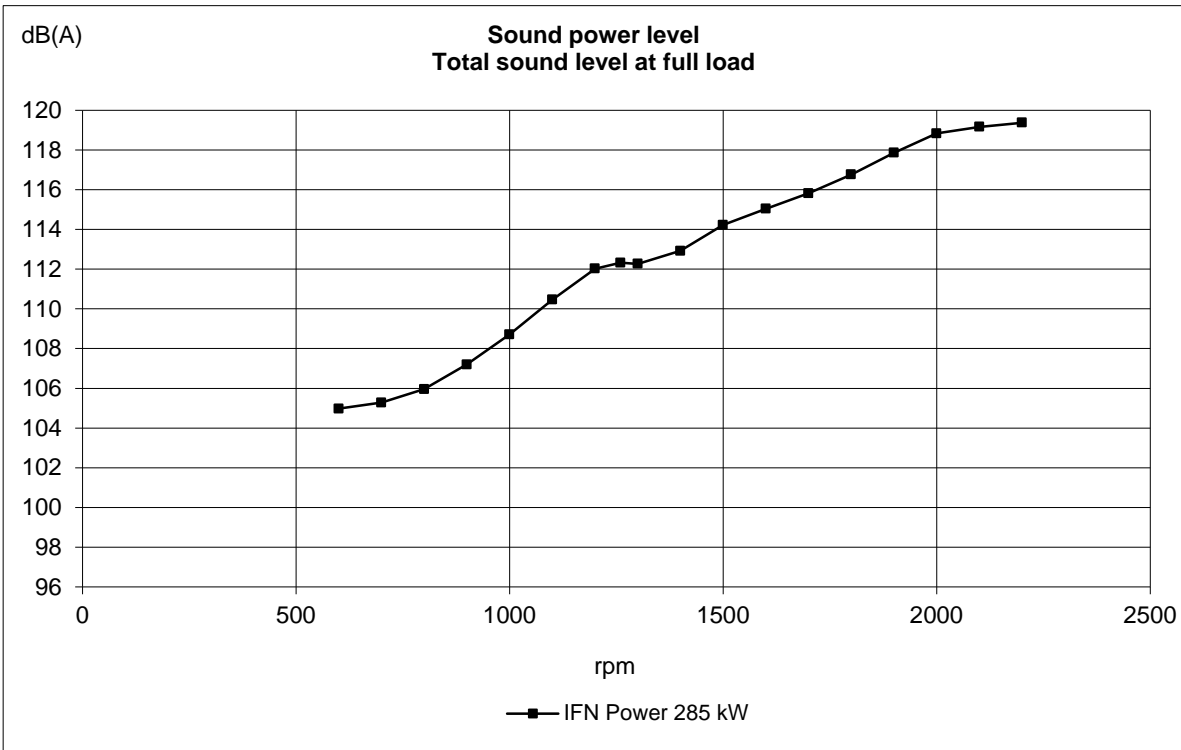
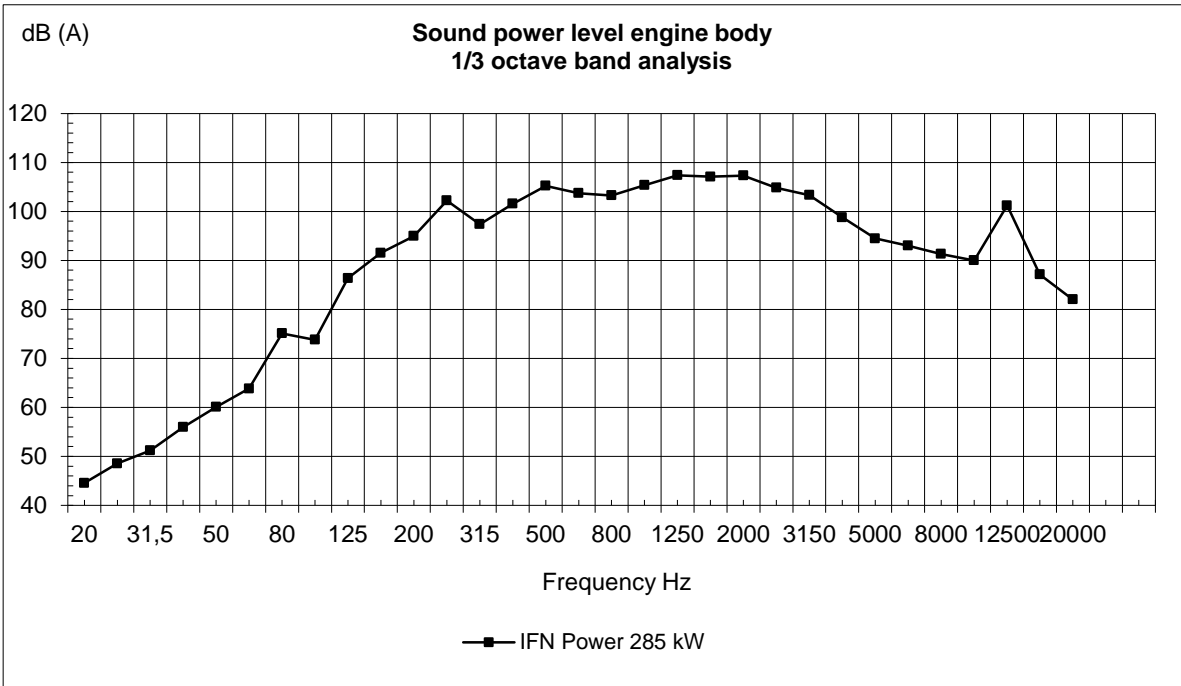


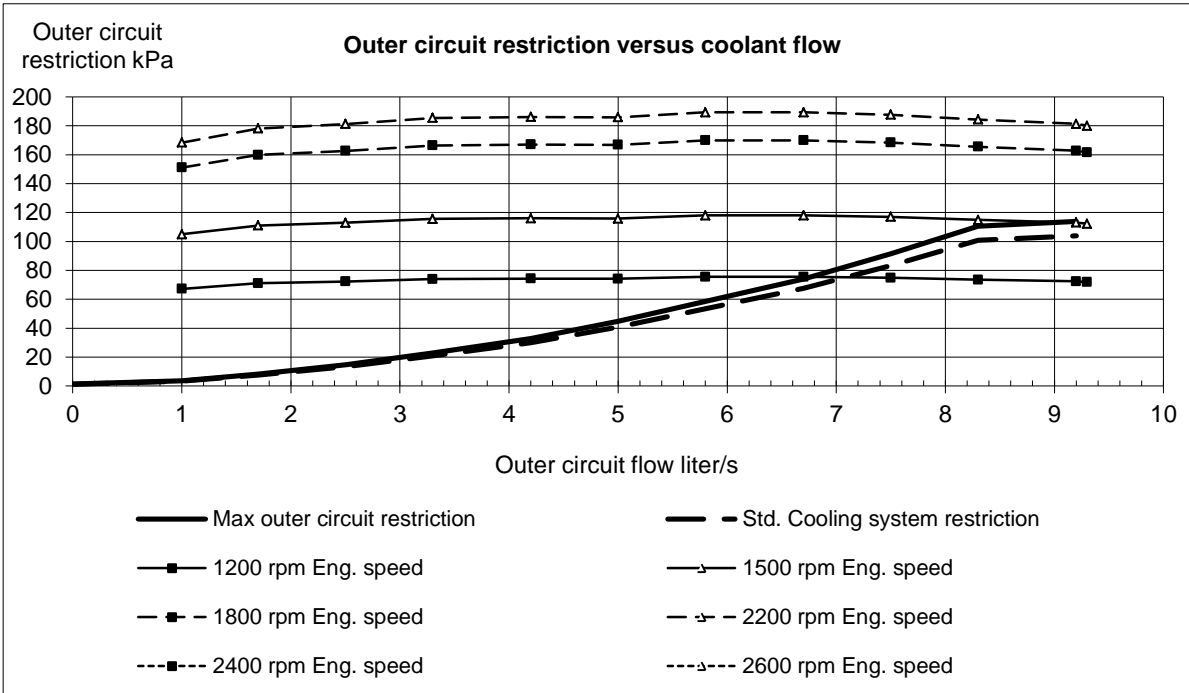




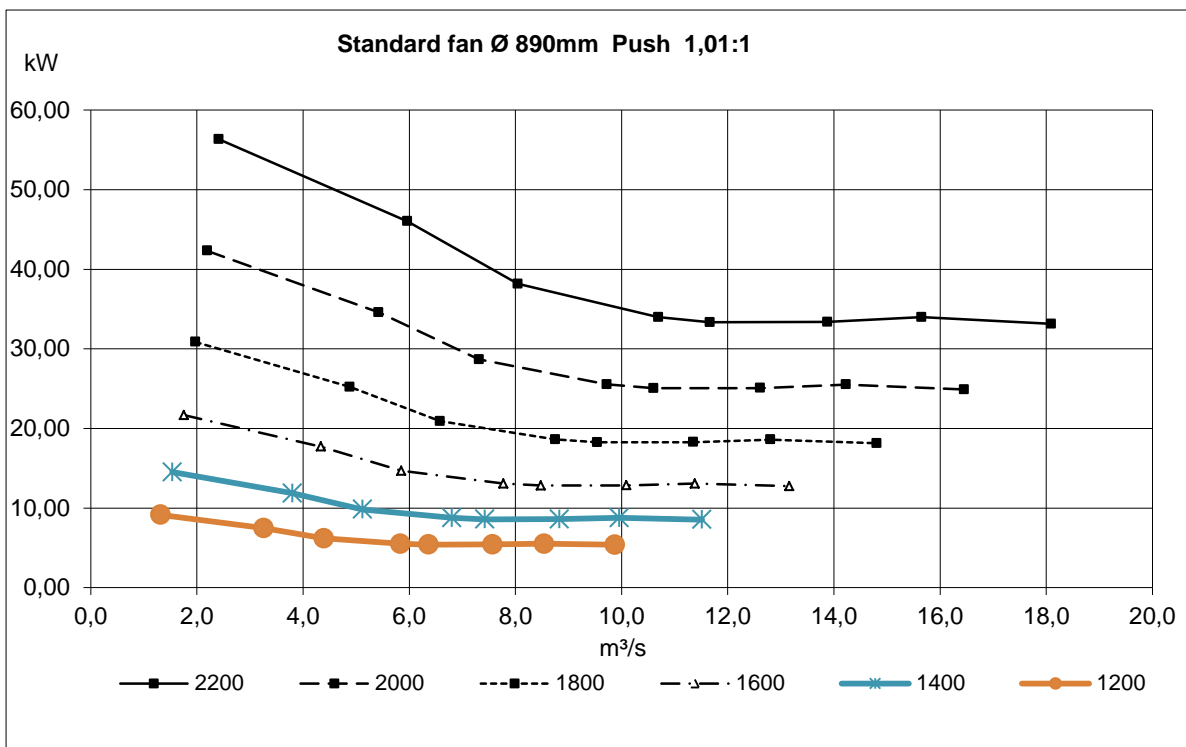
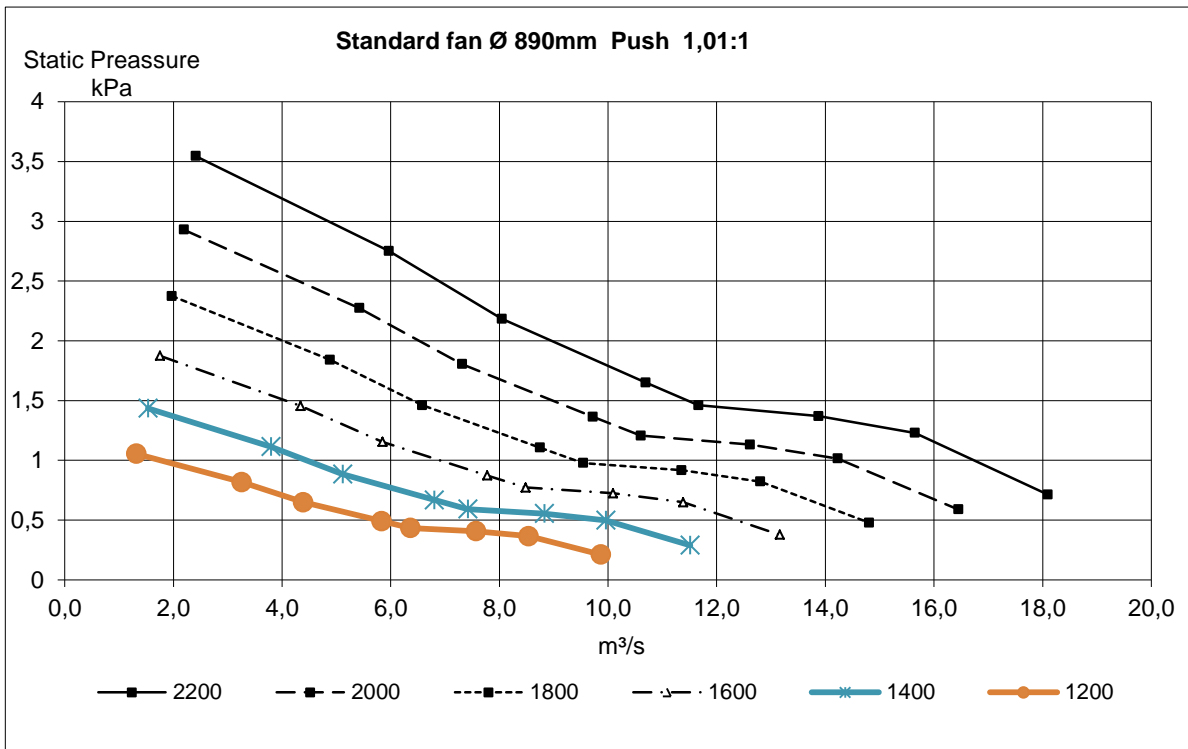




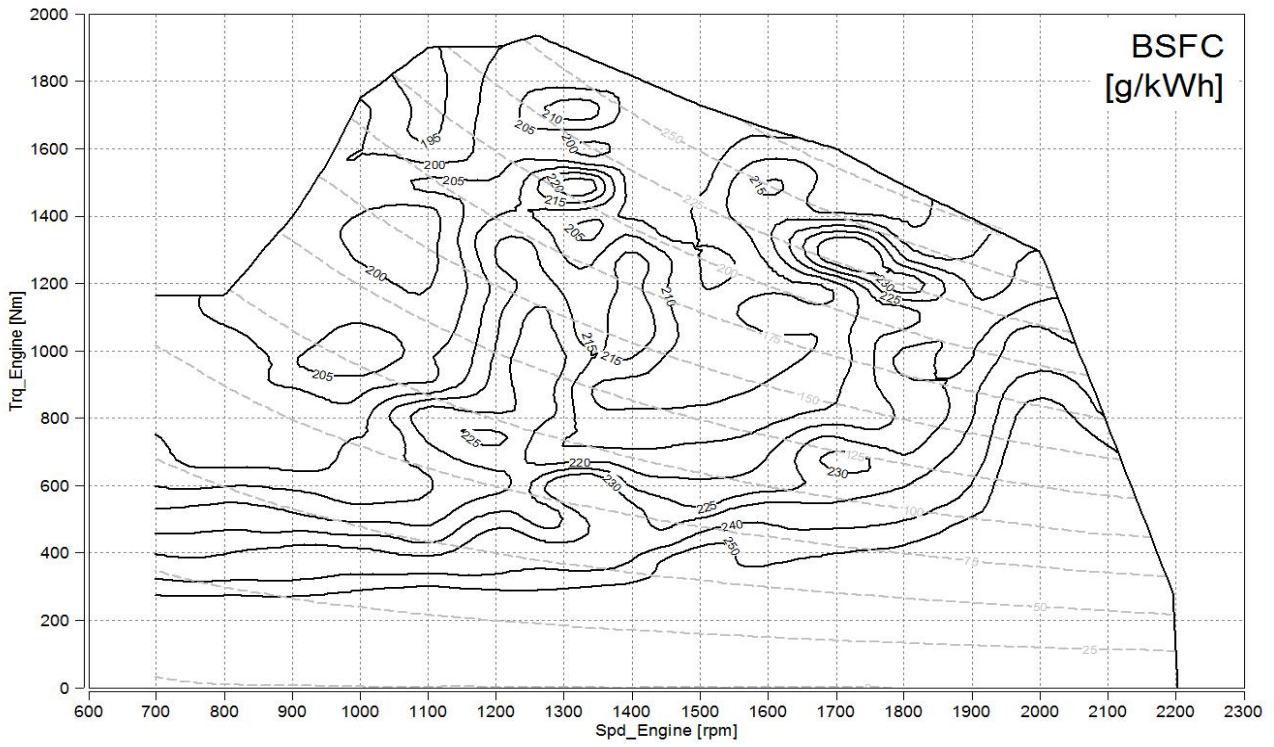








BSFC [g/kWh]



Fuel consumption [l/h]

