


**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	1300	1800	2000	2100
IFN Power	235 kW	without fan		kW	213	235	235	235
				hp	290	320	320	320
		with fan 890 mm		kW	209	224	222	220
				hp	285	304	302	300
Torque at:	IFN Power			Nm	1568	1247	1122	1068
				lbf ft	1156	920	827	788
Max torque at engine speed	IFN Power	rpm	1260 rpm		1581			
					1166			
Power tolerance				%	±2			
Mean piston speed				m/s	6,6	9,1	10,1	10,6
				ft/sec	21,6	29,9	33,2	34,9
Effective mean pressure at:	IFN Power			MPa	1,81	1,45	1,30	1,24
				psi	263	210	189	180
Max combustion pressure at:	IFN Power			MPa	13,16	13,46	13,29	11,34
				psi	1908	1952	1927	1644
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	24	43	53	58
				hp	32	58	71	79

**Derating see Technical Diagrams**

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

		rpm	1300	1800	2000	2100
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	1300	1800	2000	2100
Charge air consumption at: (+25°C and 100kPa)	IFN Power	m³/min cfm	13,9 491	18,9 667	20,5 724	19,2 678
 <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	144 8201	174 9912	191 10862	211 11999
Exhaust gas temperature after turbine at:	IFN Power	°C °F	479 894	436 817	441 826	507 945
 <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	35,3 1247	42,5 1501	45,3 1600	46,9 1656

**Cooling system**

		rpm	1300	1800	2000	2100
Heat rejection radiation from engine at:	IFN Power	kW	8,6	7,5	7,7	9,7
		BTU/min	489	427	438	552
Heat rejection to coolant at:	IFN Power	kW	115	138	145	166
		BTU/min	6551	7865	8246	9440
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	3,6	11,2	12,6	14,6
		hp	5	15	17	20
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	5,1	7,2	8	8,4
		US gal/s	1,3	1,9	2,1	2,2
Minimum coolant flow		l/s	2,0	2,5	2,5	2,7
		US gal/s	0,5	0,7	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	1300	1800	2000	2100
Heat rejection to charge air cooler	IFN Power	kW	33,1	45,5	49,1	40,7
		BTU/min	1882	2588	2792	2315
Charge air mass flow	IFN Power	kg/s	0,27	0,37	0,4	0,38
Charge air inlet temp. (Charge air temp after turbo compressor)	IFN Power	°C	164	172	173	156
		°F	327	342	343	313
 <b>See front page for important information</b> Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	45	50	50	50
		°F	113	122	122	122
 <b>See front page for important information</b> Maximum pressure drop over charge air cooler incl. piping		kPa	12			
		psi	1,74			
Charge air pressure (Relative, after charge air cooler)		kPa	181	199	199	170
		psi	26,25	28,86	28,86	24,66
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 0.9**  
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
2100 (fix 0.9)	235	69,6	157,3	8,68	19,13	0	
	320	67,8	154,1	8,07	17,78	150	0,022
		65,3	149,5	7,33	16,16	300	0,044
		62,0	143,7	6,55	14,43	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
2100 (fix 0.9)	235	71,1	159,9	9,58	21,1	0	
	320	69,8	157,6	9,06	20,0	150	0,022
		68,2	154,8	8,51	18,8	300	0,044
		66,3	151,3	7,89	17,4	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
2100	235	68,7	155,7	8,43	18,59	0	
	320	66,6	151,8	7,76	17,10	150	0,022
		63,7	146,7	7,00	15,44	300	0,044
		60,0	140,0	6,18	13,63	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
2100	235	70,3	158,6	9,33	20,56	0	
	320	68,9	156,0	8,79	19,37	150	0,022
		67,2	153,0	8,22	18,12	300	0,044
		70,34	158,61	7,53	16,60	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	110% 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		

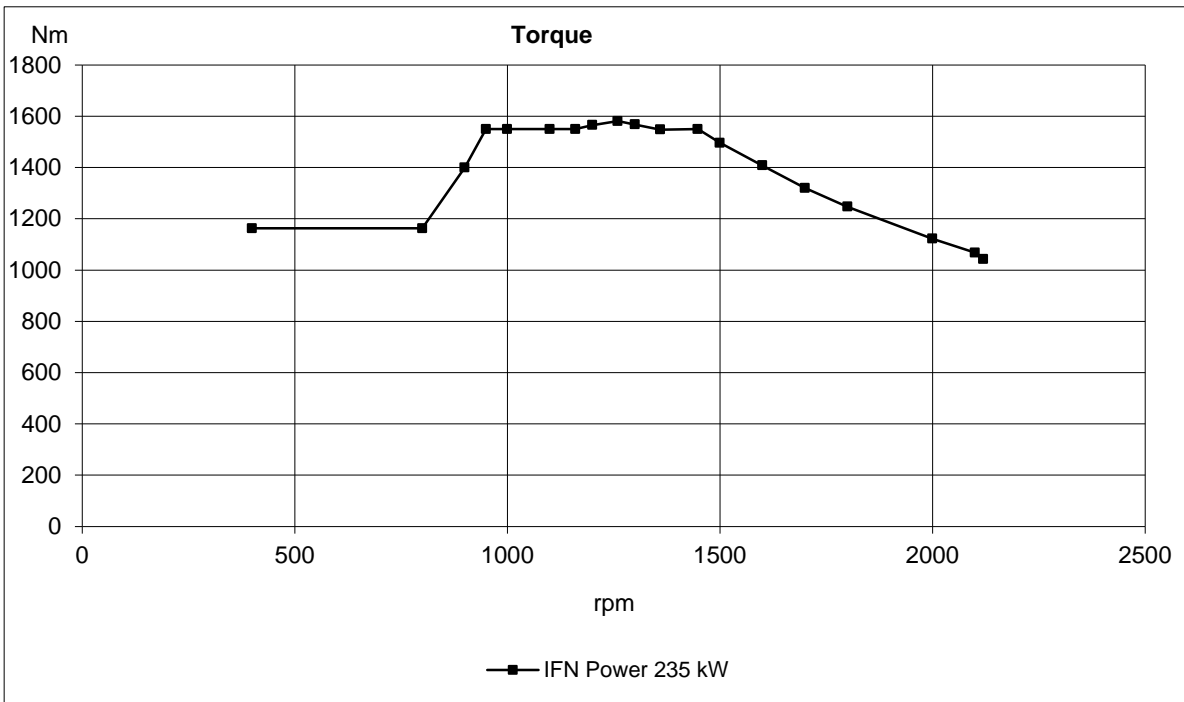
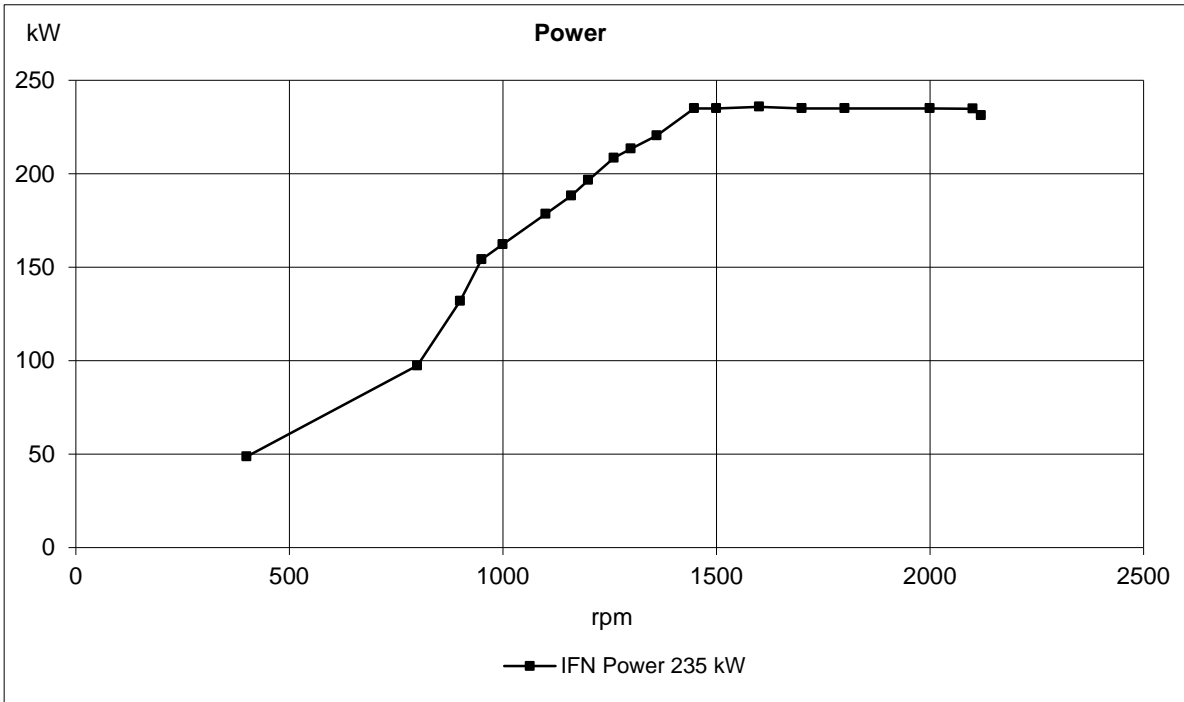
**Power take off**

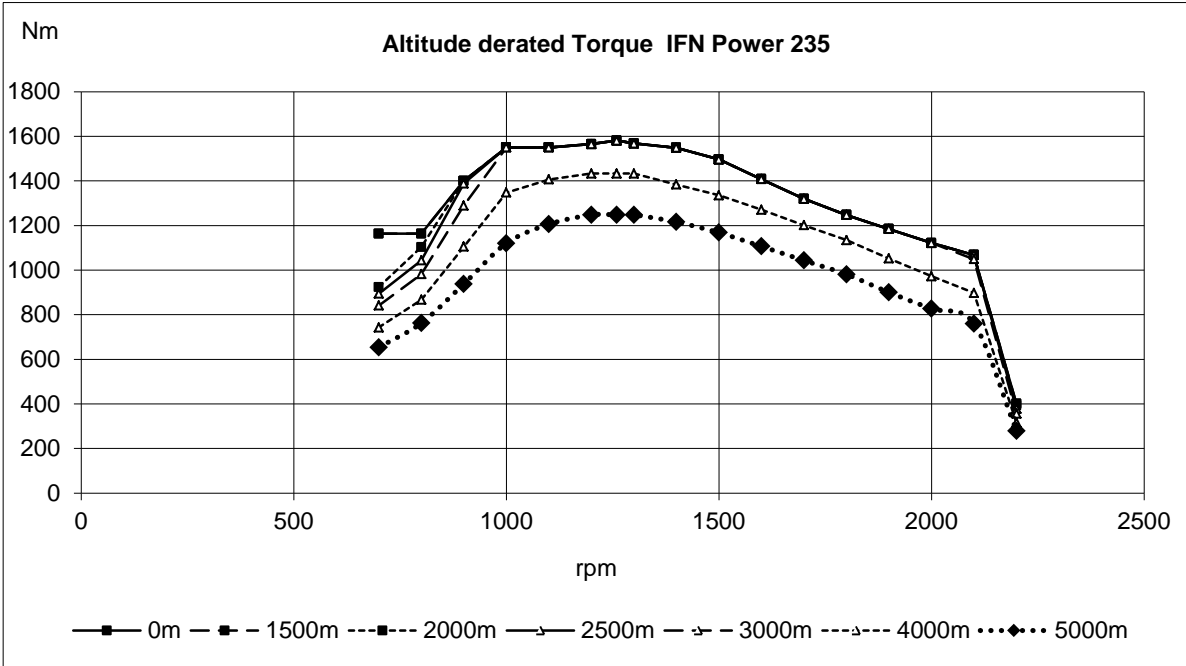
		rpm	1300	1800	2000	2100
Front end in line with crank shaft max:*		Nm	1568	1213	1119	1068
	(with a total added mass moment of inertia, J (mR2)≤ 0,05 kgm²)	lbf ft	1156	895	825	788
Front end belt pulley load. Direction of load viewed from flywheel side: (Pulley diameter 201 mm with distance 190 mm from main bearing nr 1)	max up	kW	17	23	26	27
		hp	23	31	35	37
	max side	kW	17	23	26	27
		hp	23	31	35	37
	max down	kW	34	47	52	55
		hp	46	64	71	75
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			

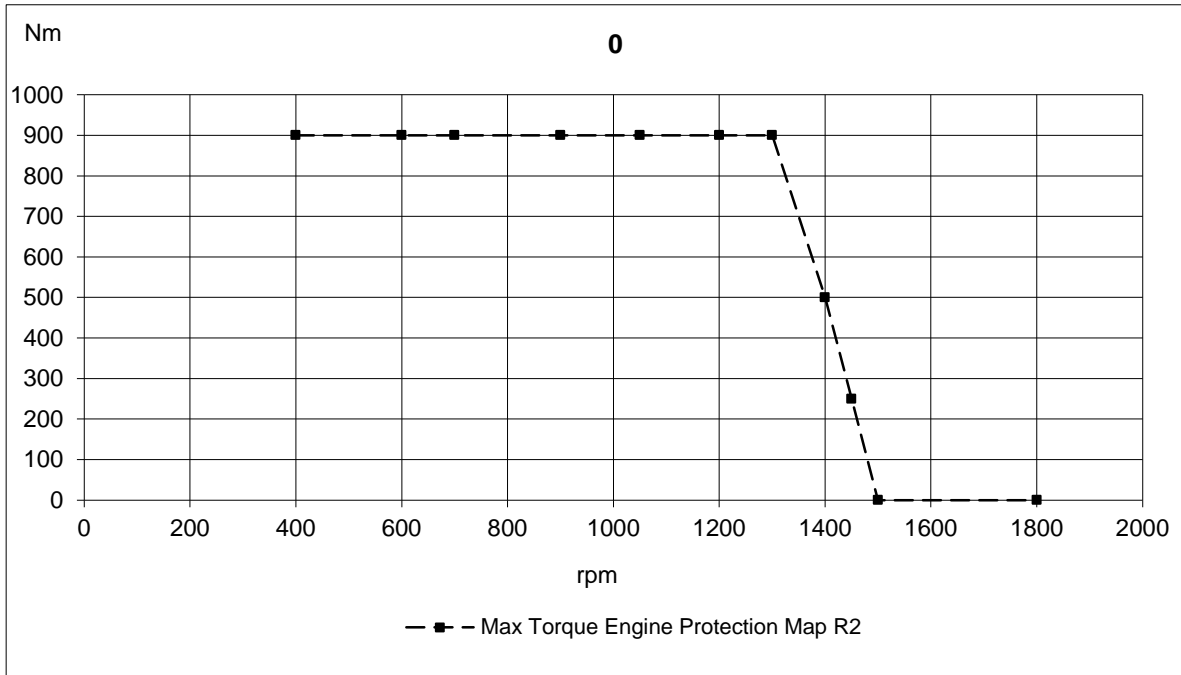
\* **Maximum allowed torque at individual PTO's.**

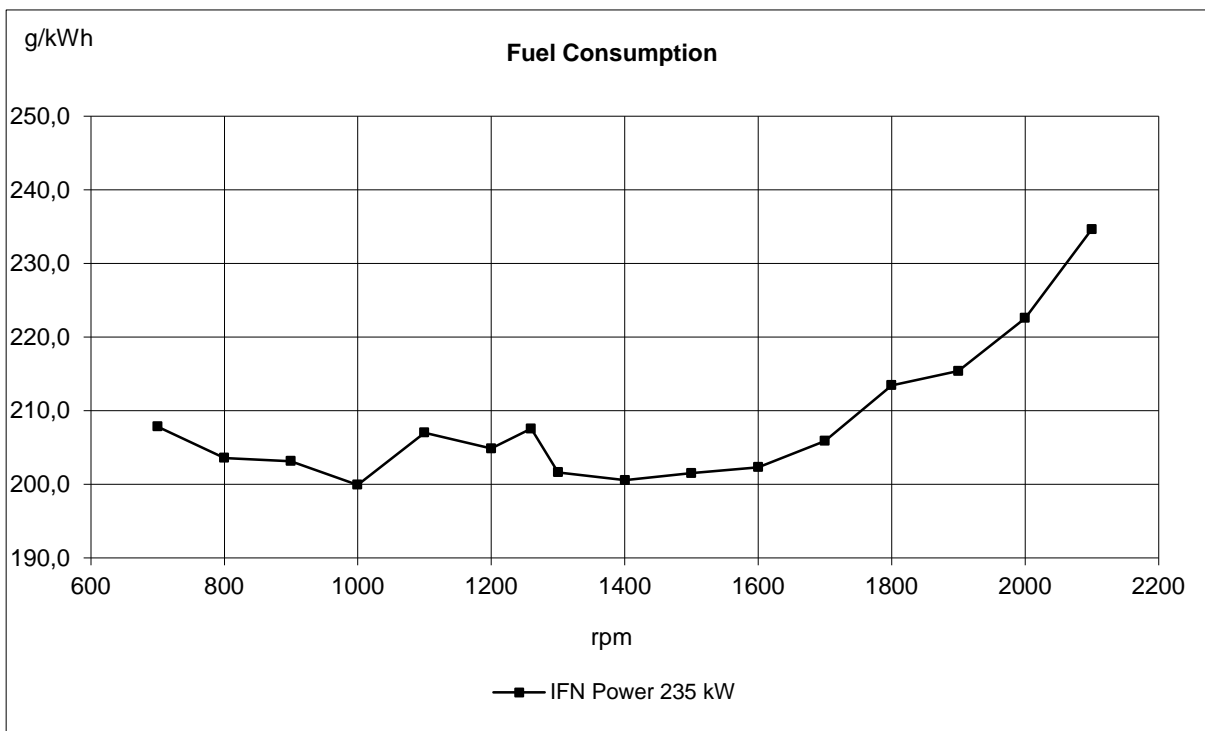
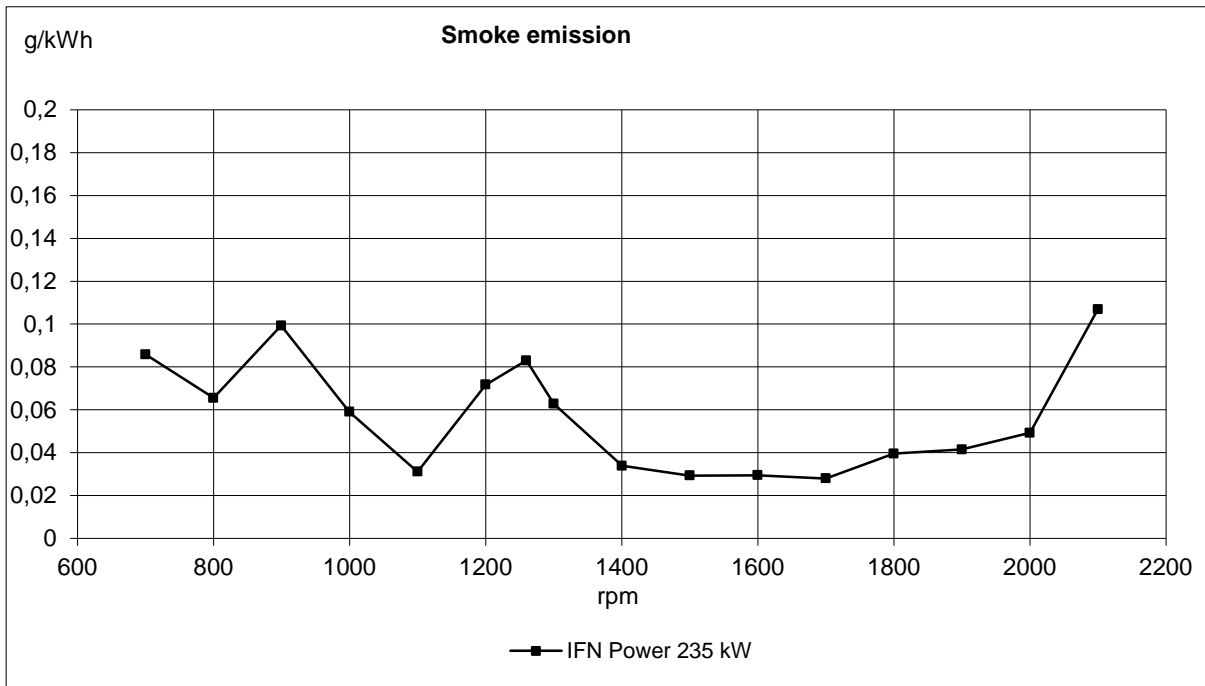
**If more than one PTO output is used simultaneously, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.**

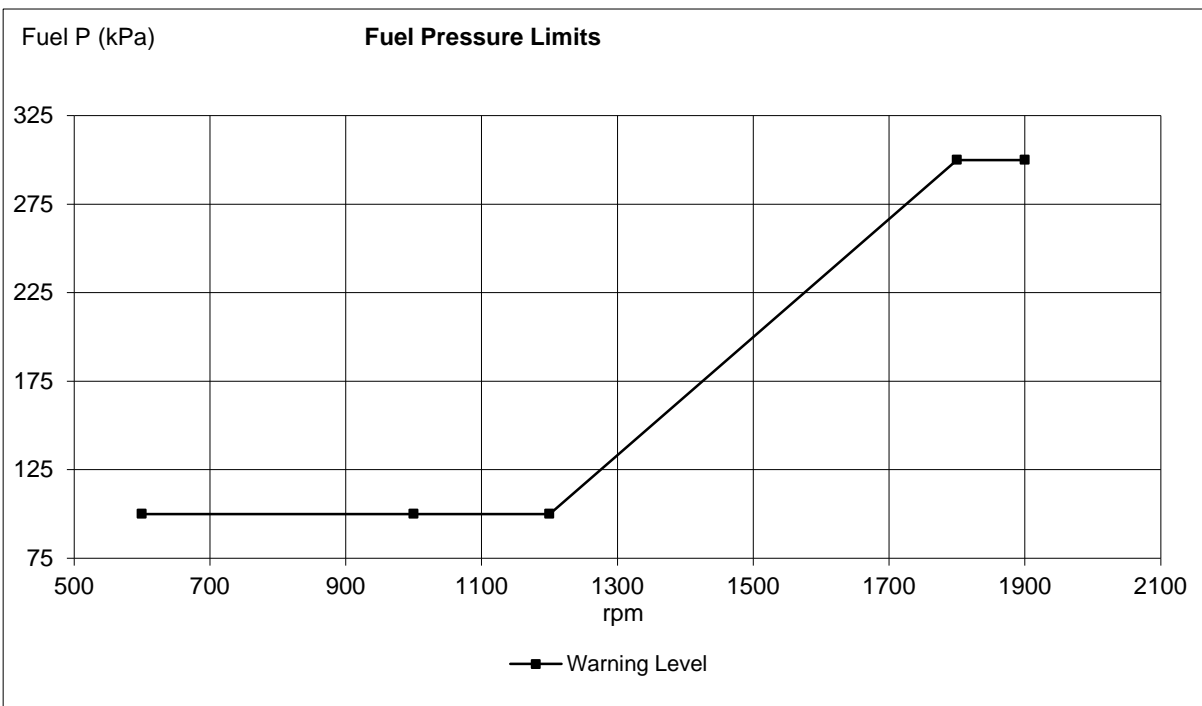
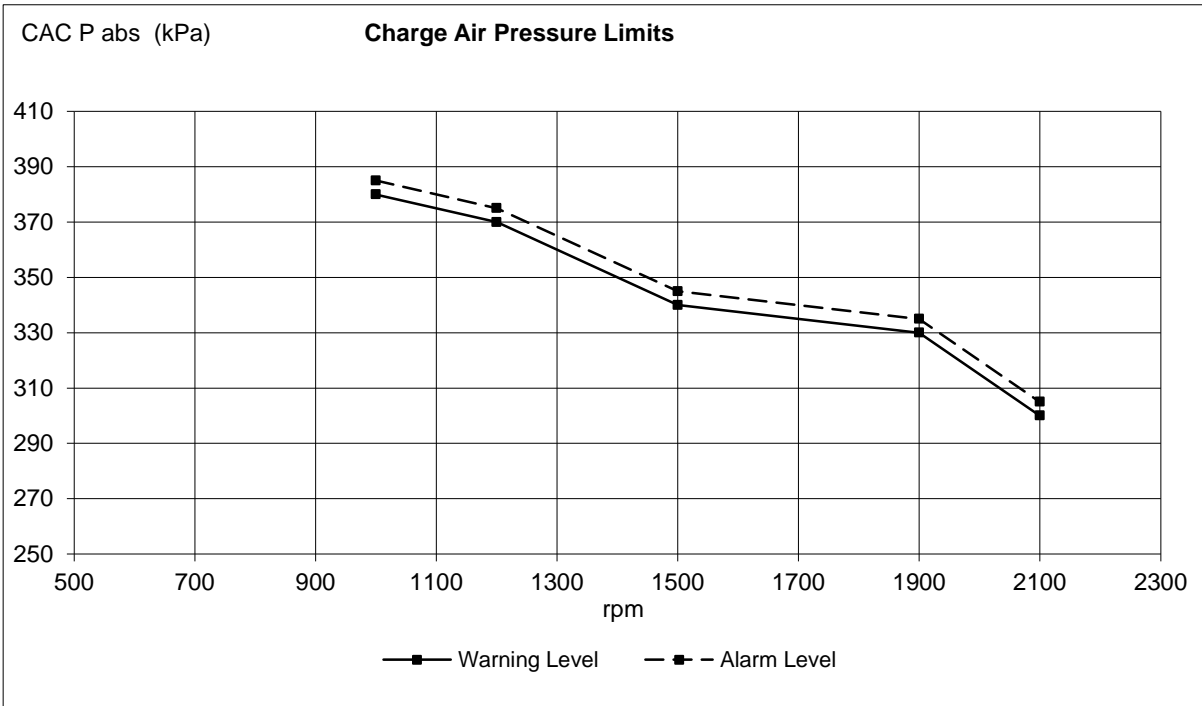


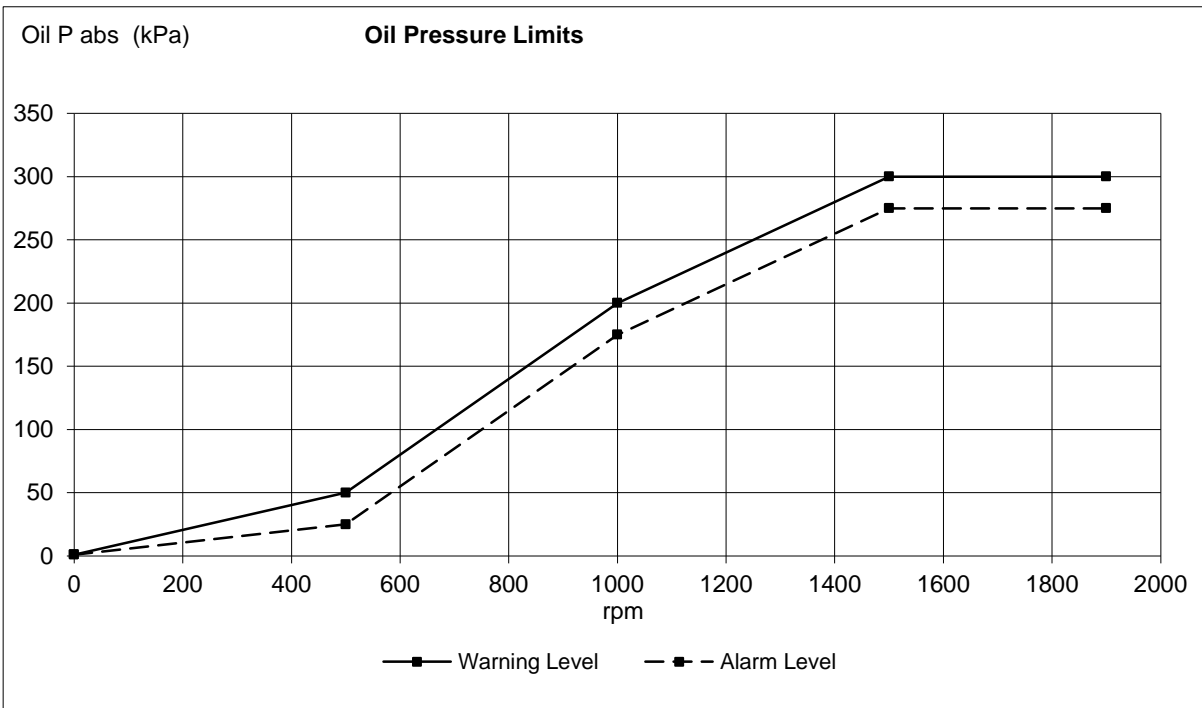


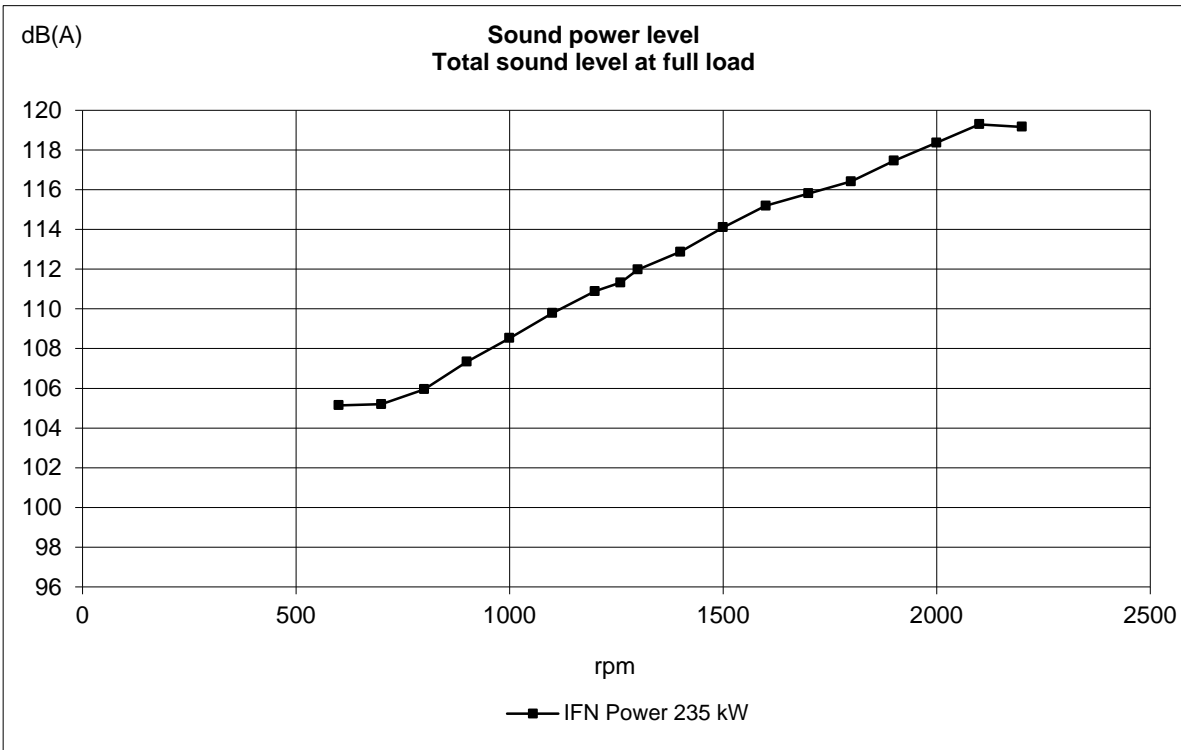
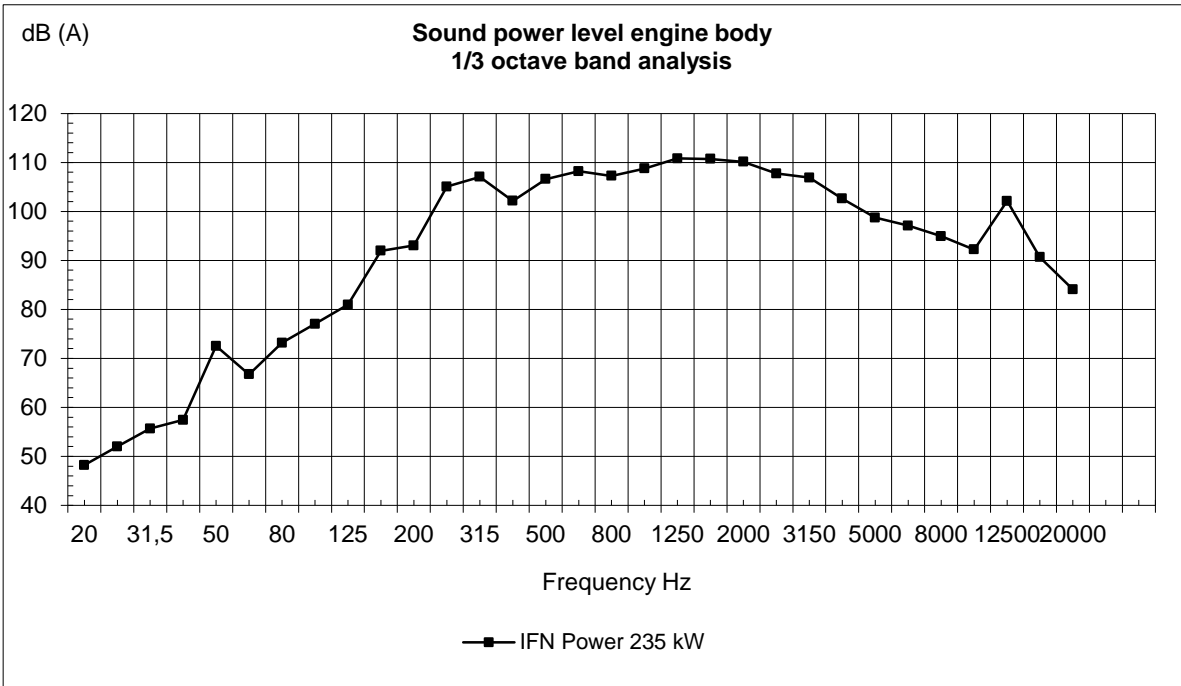


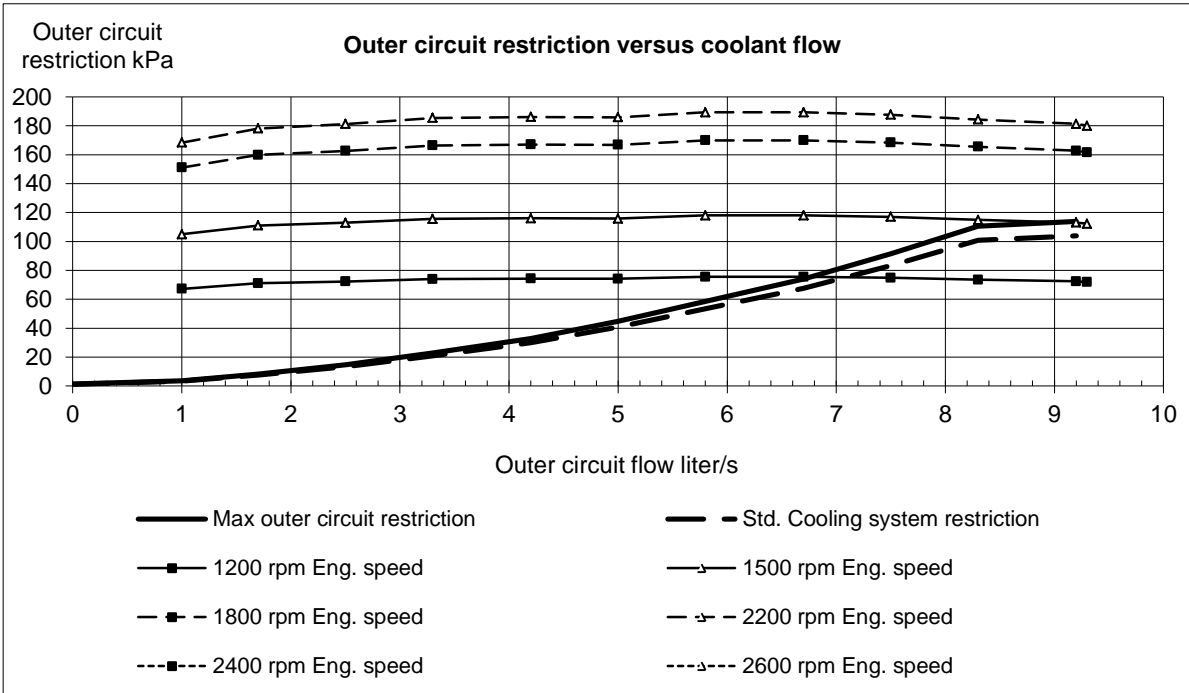




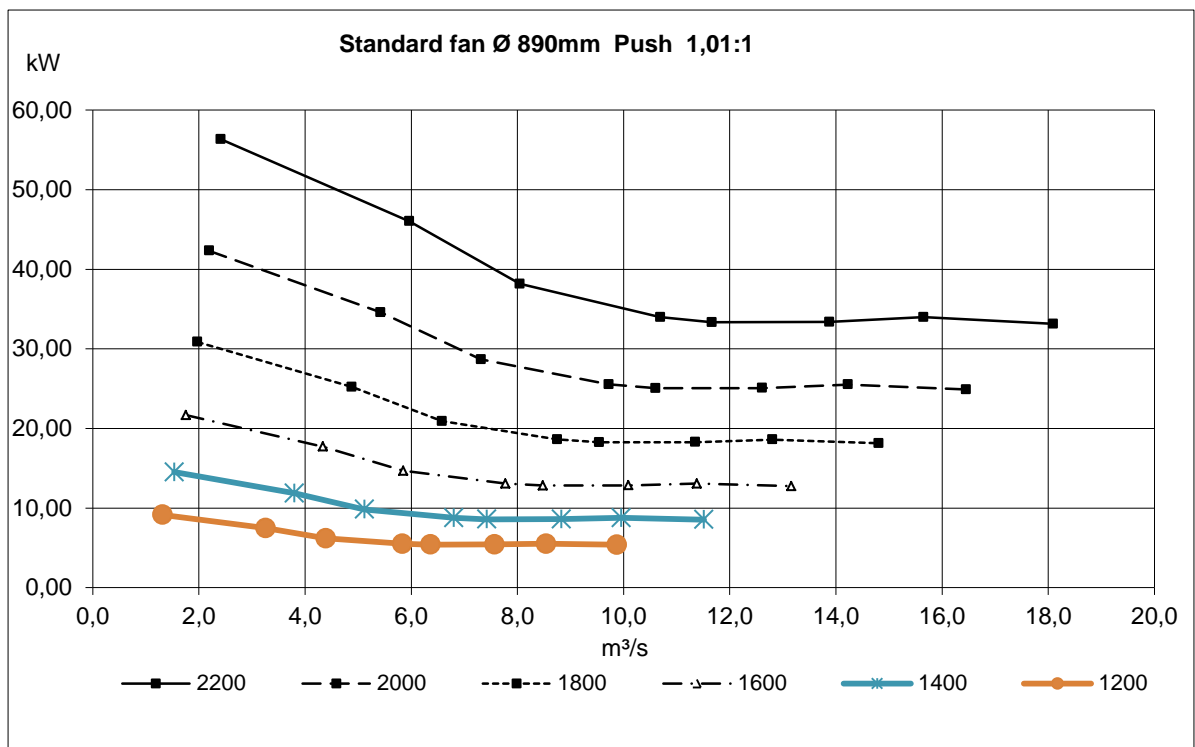
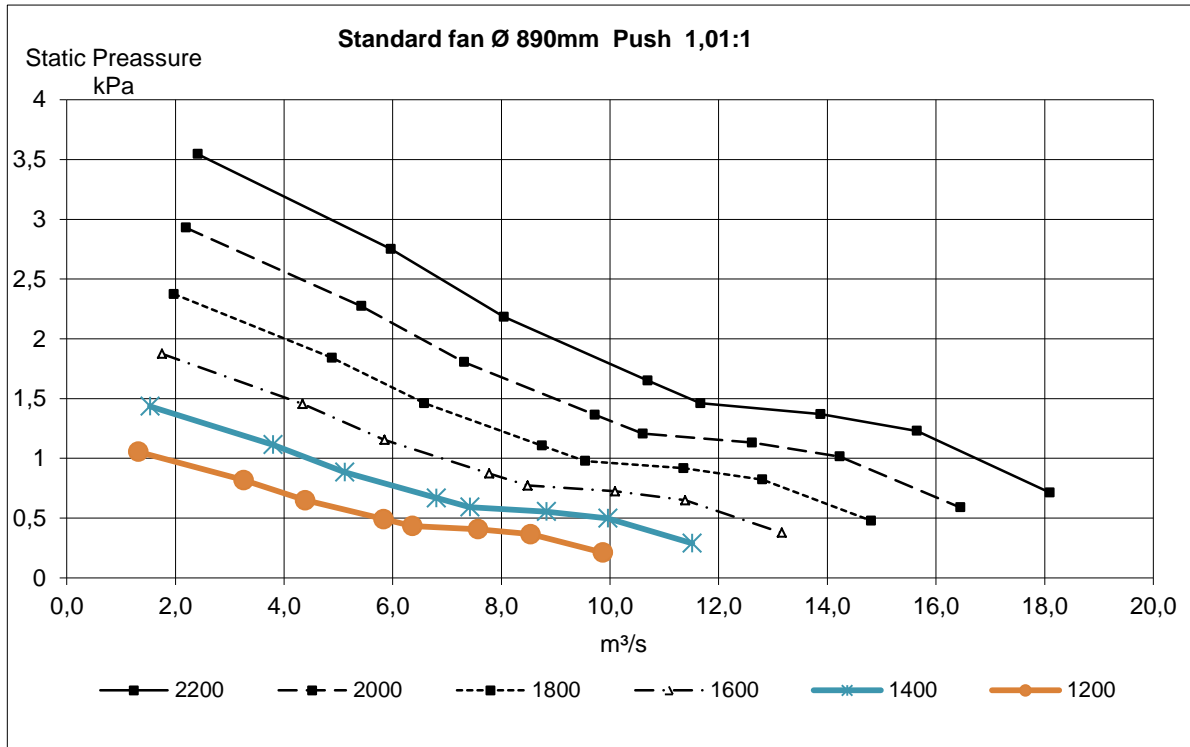




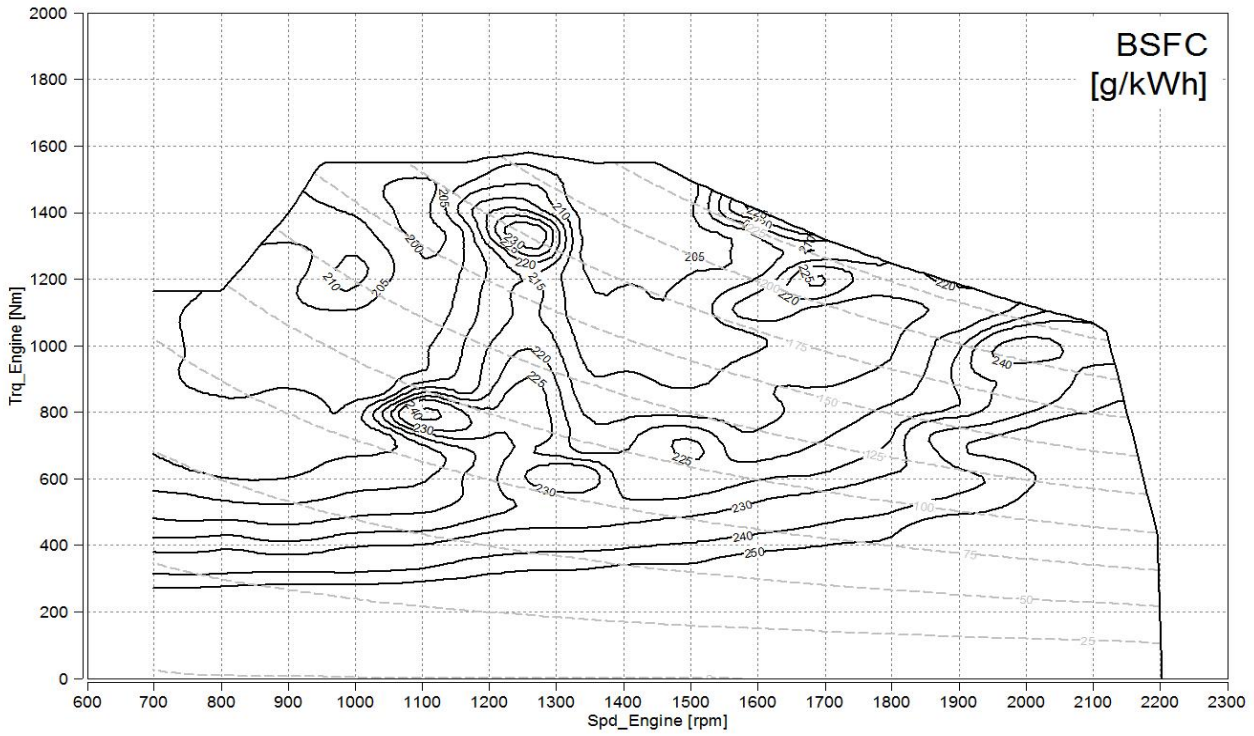








BSFC [g/kWh]



Fuel consumption [l/h]

