


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, counterclockwise viewed towards flywheel

Number of cylinders			6
Displacement, total		liters	16,12
		in ³	984
Firing order			1-5-3-6-2-4
Bore		mm	144
		in	5,67
Stroke		mm	165
		in	6,50
Compression ratio			17,0:1
Wet weight	Engine only (Estimated) (excl after treatment comp.)	kg	1604
		lb	3536
	Power pac	kg	-
		lb	

Performance

				rpm	1200	1500	1800	1900
IFN Power	565 kW	without fan		kW	406	507	565	565
				hp	552	690	768	768
		with fan		See diagram for fan power consumption				
		mm						
Torque at:		IFN Power		Nm	3230	3230	2997	2840
				lbf ft	2382	2382	2211	2094
Max torque at engine speed		rpm	1260 rpm	Nm	3260			
				lbf ft	2404			
Power tolerance				%	±2			
Mean piston speed				m/s	6,6	8,3	9,9	10,5
				ft/sec	21,7	27,1	32,5	34,3
Effective mean pressure at:		IFN Power		MPa	2,52	2,52	2,34	2,21
				psi	365	365	339	321
Max combustion pressure at:		IFN Power		MPa	18,1	19,7	19,8	19,1
				psi	2625	2857	2871	2770
Total mass moment of inertia, J (mR ²) (not including flywheel)				kgm ²	1,43			
				lbft ²	33,9			
Friction Power				kW	25	38	53	59
				hp	34	52	72	80

Derating see Technical Diagrams

Engine brake performance (only engines with VCB)

		rpm	1200	1500	1900	2200
Brake power:	without fan	kW	76	125	219	295
		hp	103	170	298	401
Brake torque:	without fan	Nm	605	796	1101	1280
		lbf ft	446	587	812	944
Engine speed range for VCB activation:		rpm	1000-2300			
Min engine speed with VCB still active:		rpm	1000			
Min oil temperature for VCB activation:		°C	55			

Cold start performance

*Cold start limit temperature	without starting aid	°C	-10		
		°F	14		
	with manifold heater 4 kW	°C	-25		
		°F	-13		
with manifold heater 4 kW and block heater	°C	-30			
	°F	-22			
*Specify oil quality	T>-15°C Oil VDS4/VDS3 15W/40 T<-15°C Oil VDS4/VDS3 5W/40				
Heater type	Make	Power kW	Engaged hours (-30°C)	Cooling water temp engine block	
Self circulating	Volvo 21578298	2	12	1°C 34°F	

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption (average)		liter/h	0,03	
		US gal/h	0,008	
		liter/h		
		US gal/h		
Oil system capacity including filters		liter	48	
		US gal	12,68	
Oil sump capacity: (both variants)	Max	liter	42	
		US gal	11,10	
	Min	liter	32	
		US gal	8,45	
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	300 - 650	
		psi	44 - 94	



Lubrication system

Lubrication oil temperature in sump:	max	°C	130	
		°F	266	
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	165	
	US gal/h	43,6	
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	-125	
	psi	-18,1	
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	°C	60	
Prefilter / Water separator micron size	μ	10	
Fuel filter filtration efficiency	96%	μ	6
	75%	μ	4
Engine Control System, standard	Volvo/EMS2.3		
Specific UREA consumption in Nonroad Transient Cycle (NRTC)	Vol%	N/A	
Fuel to conform to			

Intake and exhaust system

		rpm	1200	1500	1800	1900
Charge air consumption at: (+25°C and 100kPa)	IFN Power	m³/min	25,0	34,0	40,6	40,6
		cfm	883	1201	1434	1434
 See front page for important information		kPa	5			
Max allowable air intake restriction including piping		psi	0,7			
Heat rejection to exhaust at:	IFN Power	kW	290	367	435	452
		BTU/min	16492	20871	24738	25705
Exhaust gas temperature after turbine at:	IFN Power	°C	522	494	492	509
		°F	972	921	918	948
 See front page for important information		kPa	6	10	15	15
Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm		psi	0,9	1,5	2,1	2,2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power	m³/min	68,0	85,0	97	99
		cfm	2401	3002	3426	3496

Cooling system		rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	IFN Power	kW	10	9	10	10
		BTU/min	569	512	569	569
Heat rejection to coolant at:	IFN Power	kW	156	179	205	210
		BTU/min	8872	10180	11658	11942
Coolant		Yellow Volvo Coolant Solution (VCS)				
Radiator cooling system type		Closed circuit				
Standard radiator core area	IFN Power	m ²	1,42			
		foot ²	15,28			
HD radiator core area		m ²	0,87			
		foot ²	9,36			
Fan diameter	890 mm	IFN Power	mm	890		
			in	35,04		
Fan power consumption	890 mm	kW hp	See diagram for actual fan drive ratio power.			
Fan drive ratio	fan Ø890		See diagram for cooling performance			
Coolant capacity:	Engine	liter	24			
		US gal	6,3			
	STD. 1,42m ² radiator with hoses Pusher syst. Core thickness 63mm	liter	37			
		US gal	9,8			
	STD. 1,42m ² radiator with hoses Puller syst. Core thickness 41mm	liter	30			
		US gal	7,9			
HD 0,87m ² radiator with hoses	liter	32				
	US gal	8,5				
Coolant pump		drive/ratio	belt/1,77:1 cw			
Coolant flow with standard system		l/s	4,7	5,8	7	7,3
		US gal/s	1,2	1,5	1,8	1,9
Minimum coolant flow		l/s	4,3	5,4	6,6	6,9
		US gal/s	1,1	1,4	1,7	1,8
Maximum outer circuit restriction incl. piping		kPa	70,0			
		psi	10,2			
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	1800	1900
Heat rejection to charge air cooler	IFN Power	kW	69	100	126	121
		BTU/min	3924	5687	7165	6881
Charge air mass flow	IFN Power	kg/s	0,49	0,67	0,8	0,8
Charge air inlet temp. (Charge air temp after turbo compressor)	IFN Power	°C	176	190	205	198
		°F	349	374	401	388
 See front page for important information Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	40	45	50	50
		°F	104	113	122	122
 See front page for important information Maximum pressure drop over charge air cooler incl. piping		kPa	12			
		psi	1,74			
Charge air pressure (After charge air cooler)		kPa	202	237	251	236
		psi	29,30	34,37	36,40	34,23
Standard charge air cooler core area		m ²	1,3			
		foot ²	13,99			

Cooling performance: STD cooling package 1,42m² radiator and suction 890mm fan

Cooling air flow and external restriction at different radiator air temperatures based on 107°C

TTT and a 40/60% glycol/water mix. Tamb=40°C

Fix fan drive ratio 1:1,04

Engine speed	Engine power	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1900	565	58,2	136,8	12,9	28,4	0	0,00
	768	56,9	134,4	12,3	27,1	150	0,022
		55,6	132,1	11,6	25,6	300	0,044
		54,2	129,6	11	24,3	450	0,065
1500	507	53,2	128	10,8	23,8	0	0,000
	690	51,6	125	10	22,0	150	0,022
		49,8	122	9,3	20,5	300	0,044
		47,5	118	8,5	18,7	450	0,065

Cooling performance: STD cooling package 1,42 m² radiator and pusher 890mm 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.

Fix fan drive ratio 1:1,13

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	565	65	149	10,0	353,1	450	0,065
	768	66	151	10,5	371,9	300	0,044
		67	153	11,1	392,3	150	0,022
		68	155	11,7	413,5	0	

Fix fan drive ratio 1:1,04

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	565	63	145	9,1	321,7	450	0,065
	768	64	147	9,6	338,3	300	0,044
		65	149	10,2	358,4	150	0,022
		66	151	10,7	377,2	0	

Cooling performance: STD cooling package 1,42 m² radiator and pusher 890mm 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.

Fix fan drive ratio 1:0,97

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	565	61	141	8,4	297,7	450	0,065
	768	62	143	8,3	294,5	300	0,044
		63	146	9,4	331,3	150	0,022
		64	148	9,8	346,8	0	

Fix fan drive ratio 1:0,88

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	565	58	136	7,6	269,5	450	0,065
	768	59	137	8,0	281,5	300	0,044
		60	141	8,5	298,8	150	0,022
		61	142	8,8	310,4	0	

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	

Engine sensors and switch settings		Alarm level		Engine protection	
Parameter	Unit	Setting range	Default setting	Level	Action. Default/Alternative
Oil temp	°C	Setting +5	120		Derate. ON/OFF*
Oil pressure	Low idle	kPa	map	90,0	Shut down, ON/OFF*
	Rated speed	kPa	map	310	Shut down, ON/OFF*
Oil level					
Piston cooling pressure >1000 rpm	kPa				
Coolant temp	°C	setting+2	103	setting+4	Derate. ON/OFF*
Coolant level		See cooling system	On	low level	
Fuel feed pressure	1200rpm	kPa	100		
Water in fuel		Alarm When Closed			
Crank case pressure	kPa	Rapid Pres inc			Shut down, ON/OFF*
Air filter pressure drop			5		
Altitude, above sea	m				Automatic derating, see section derating
Charge air temp	°C	Setting+5	80	Setting+10	Derate. ON/OFF*
Charge air pressure	kPa	map	map+30	map+40	Derate. ON/OFF*
Engine speed	rpm	N/A	2250	Alarm level	Shut down, ON/OFF*

* Off means no shut down, alarm only

Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after sec	Forced shut down after 1.5 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	map	map	10kPa<limit	N/A	N/A	35kPa<limit
High charge air temp	85°C	90°C	90°C	91°C	N/A	N/A
High charge air pressure	map+30k Pa	map+40k Pa	map+30kPa	map+40kPa	N/A	N/A

Electrical system

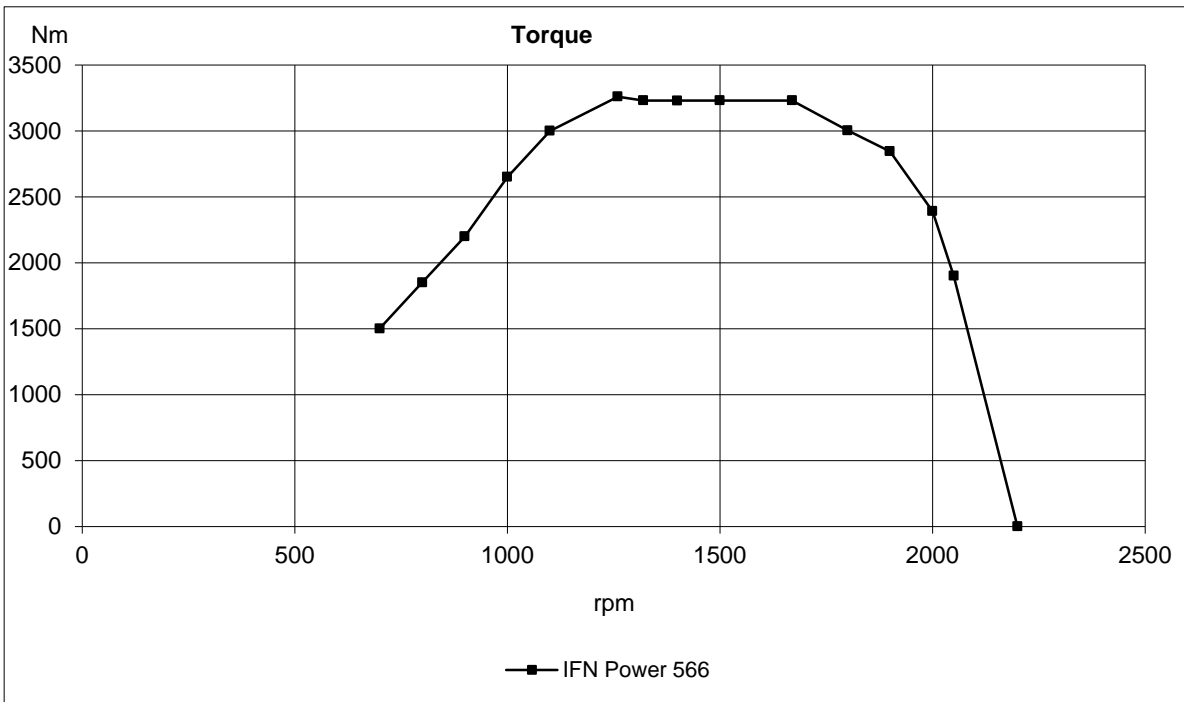
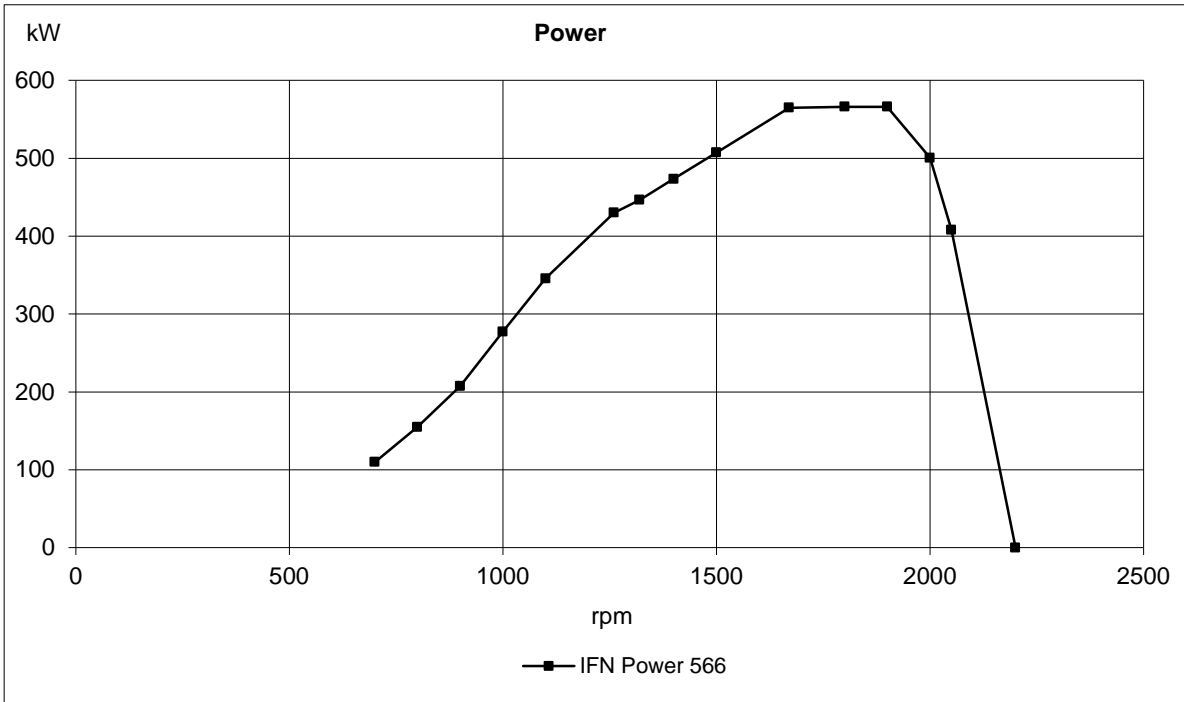
Voltage and type				24V		
Alternator:	make			Bosch		
Alternator:	output	A		110/150		
	tacho output	Hz/alternator rev.		6		
	drive ratio			3,9:1		
Starter motor:	make			Melco		
	type			105P70		
	output	kW		7		
		hp		9,5		
Number of teeth on:	flywheel			153		
	starter motor			12		
Max wiring resistance main circuit		mΩ		2		
Cranking current at +20°C		A		280		
Crank engine speed at 20°C		rpm		150		
Starter motor battery capacity	max	Ah/A		2x225		
	min at +5°C	Ah/A				
Inlet manifold heater (at 20 V)		kW		4		
Power relay for the manifold heater		A		1		
Conditions:	Temperature	°C		25	0	-15
(4 mΩ main circuit resistance@	Battery	Ah / CCA		235 / 1300	145 / 1050	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 @ 0°C		Ah / CCA		140/800		

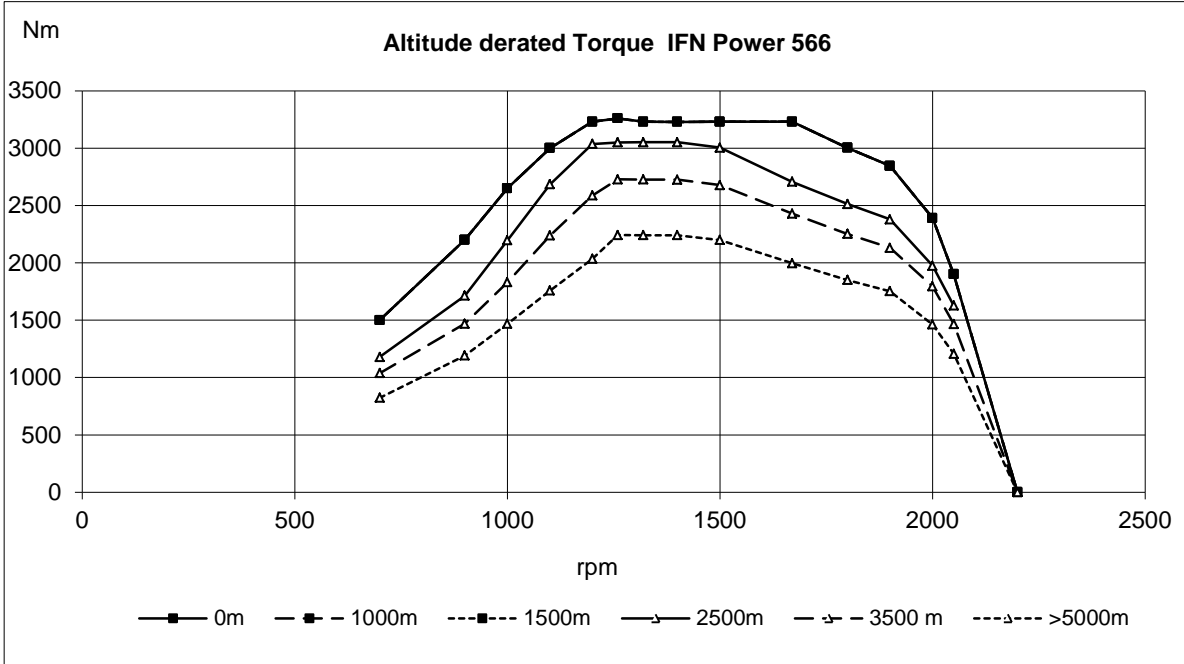
Power take off

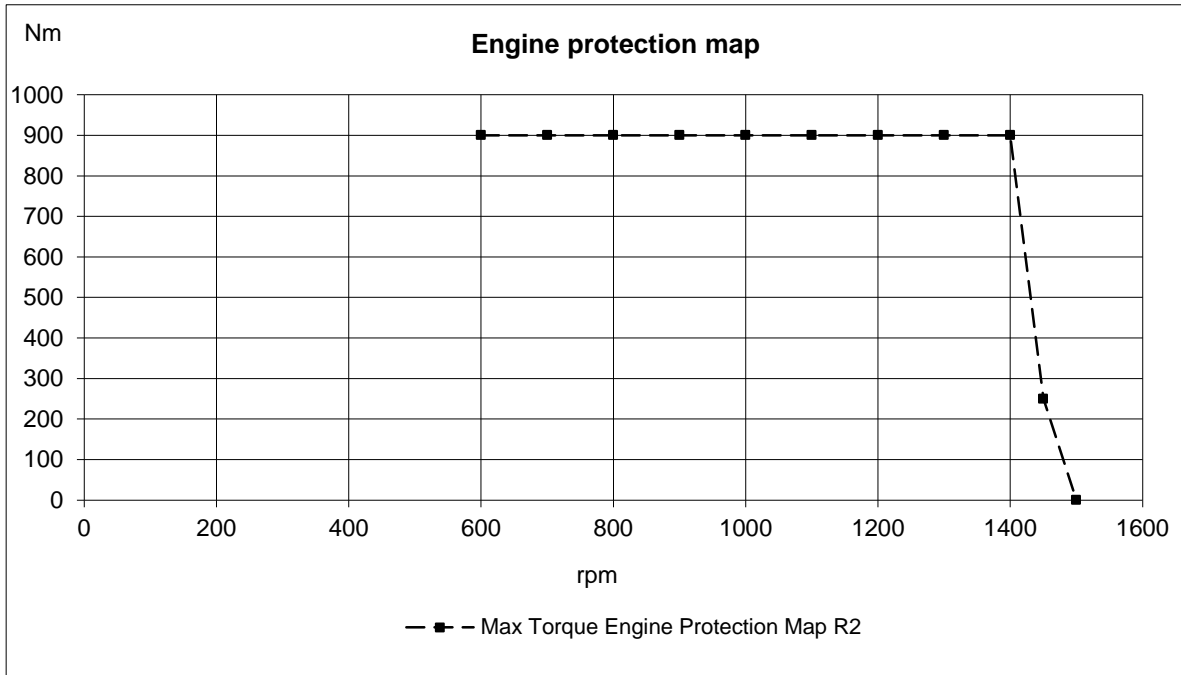
	rpm	1200	1500	1800	1900
Front end in line with crank shaft max:*	Nm	2840	2840	2370	2230
(with a total added mass moment of inertia, J (mR ²)≤0,05 kgm ²)	lbf ft	2095	2095	1748	1645
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	26	33	40
		hp	35	45	54
	max down	kW	60	75	90
		hp	82	102	122
	max right	kW	26	33	40
		hp	35	45	54
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			
Timing gear at compressor PTO max:*	Nm	300			
	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	5000			
	lbf	1124,0			

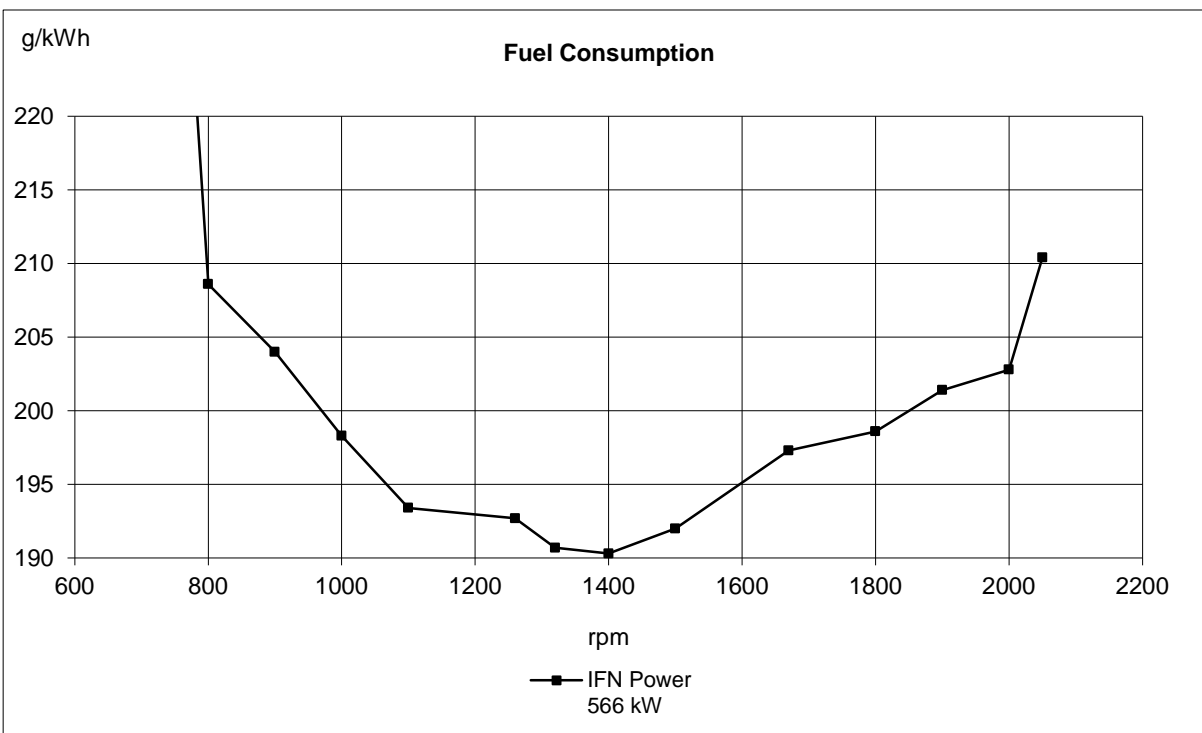
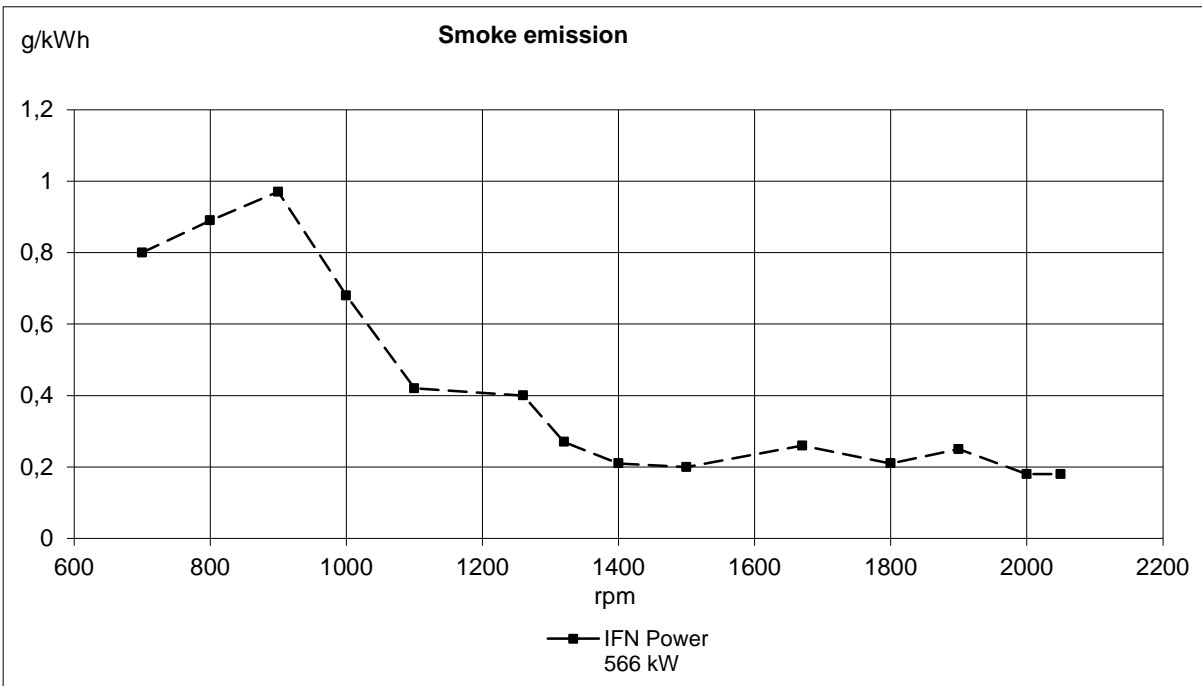
* Maximum allowed torque at individual PTO's.

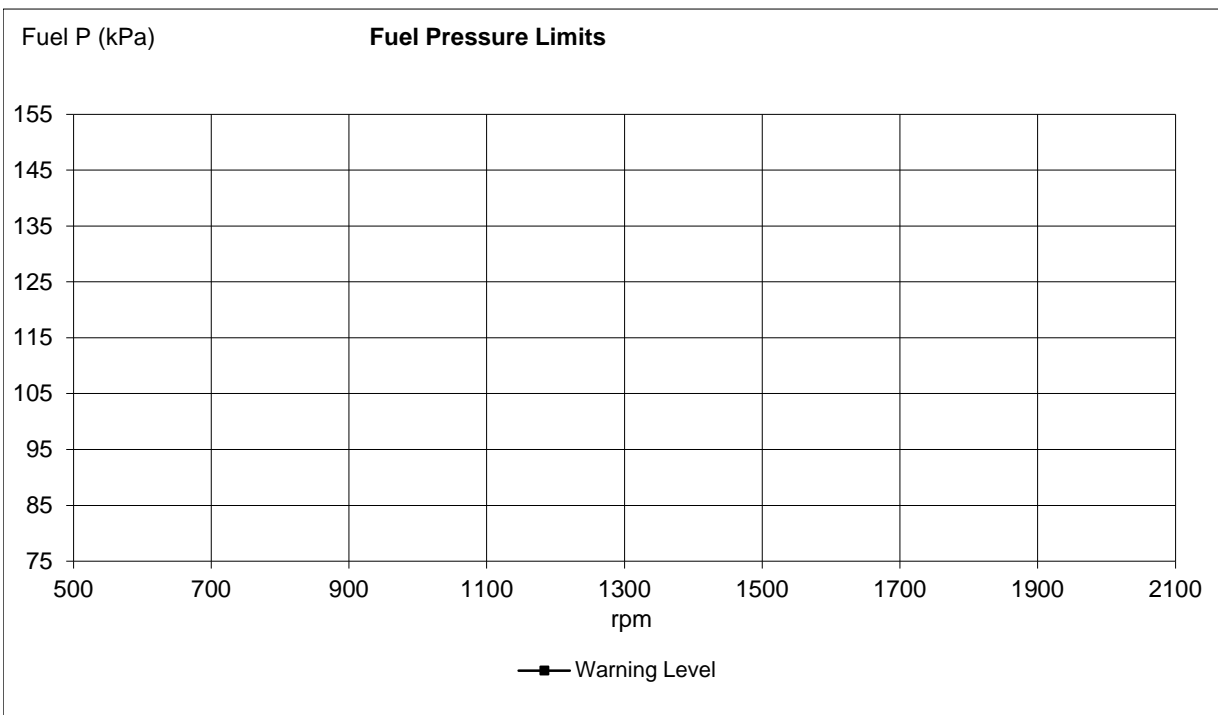
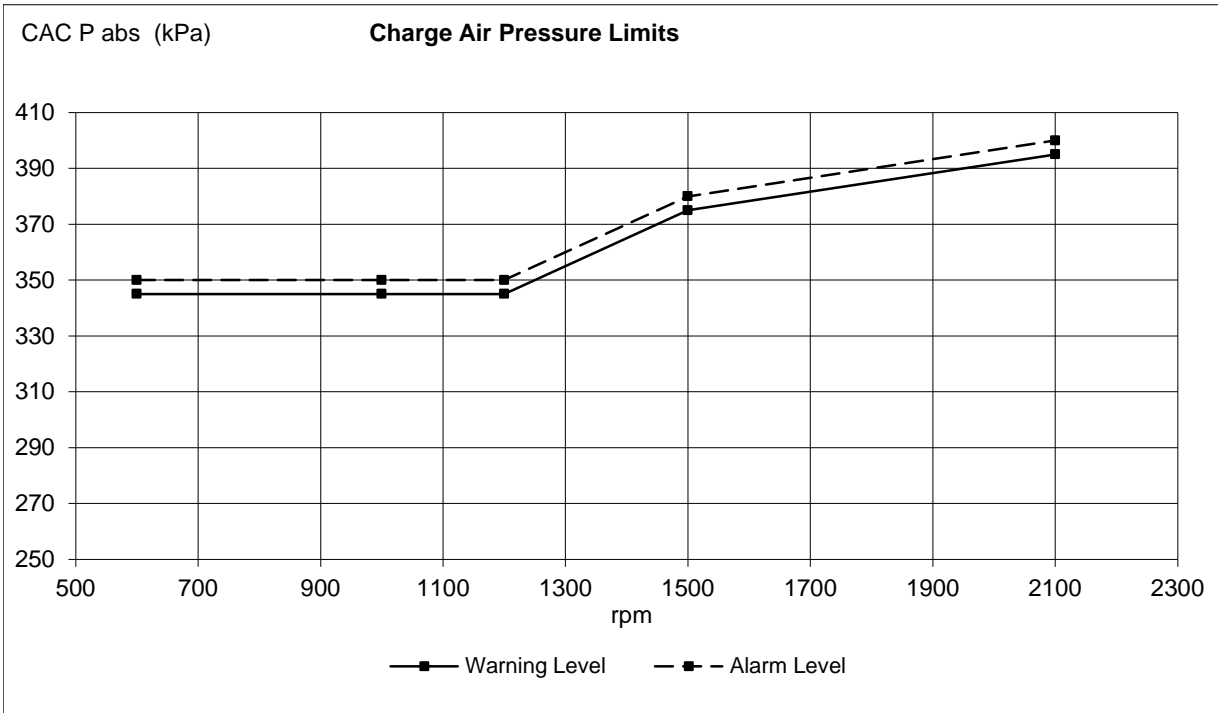
If more than one PTO output is used simultaneously, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

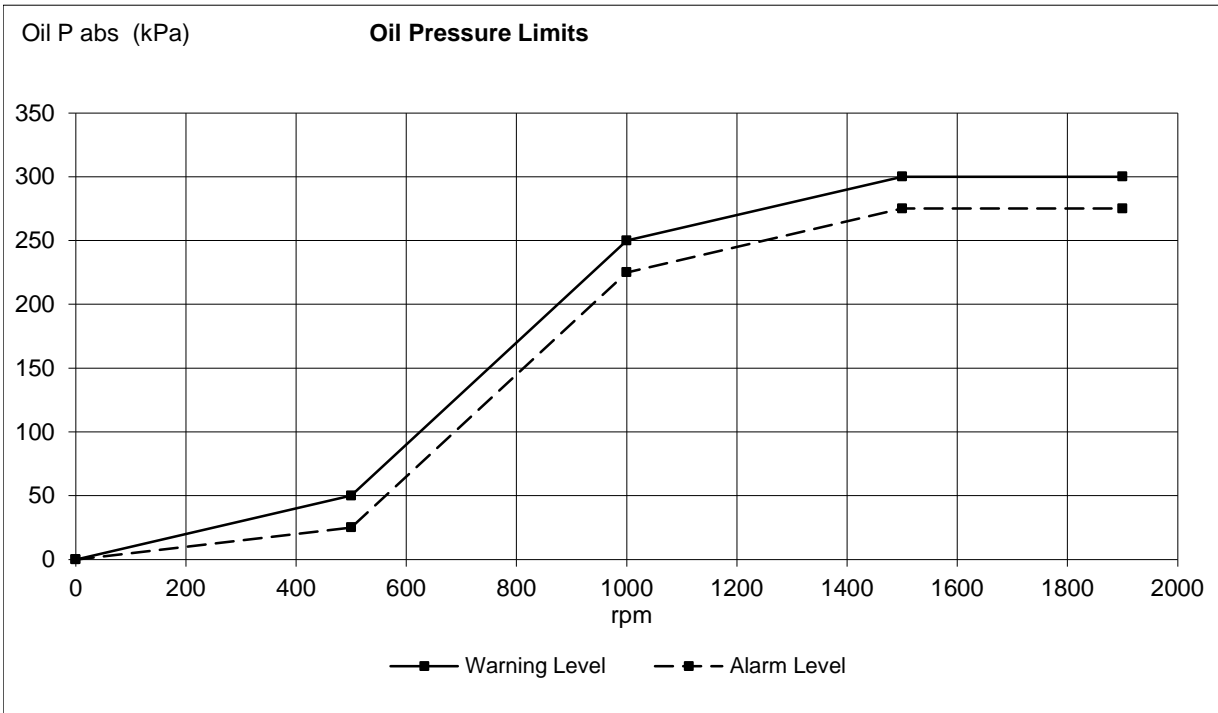


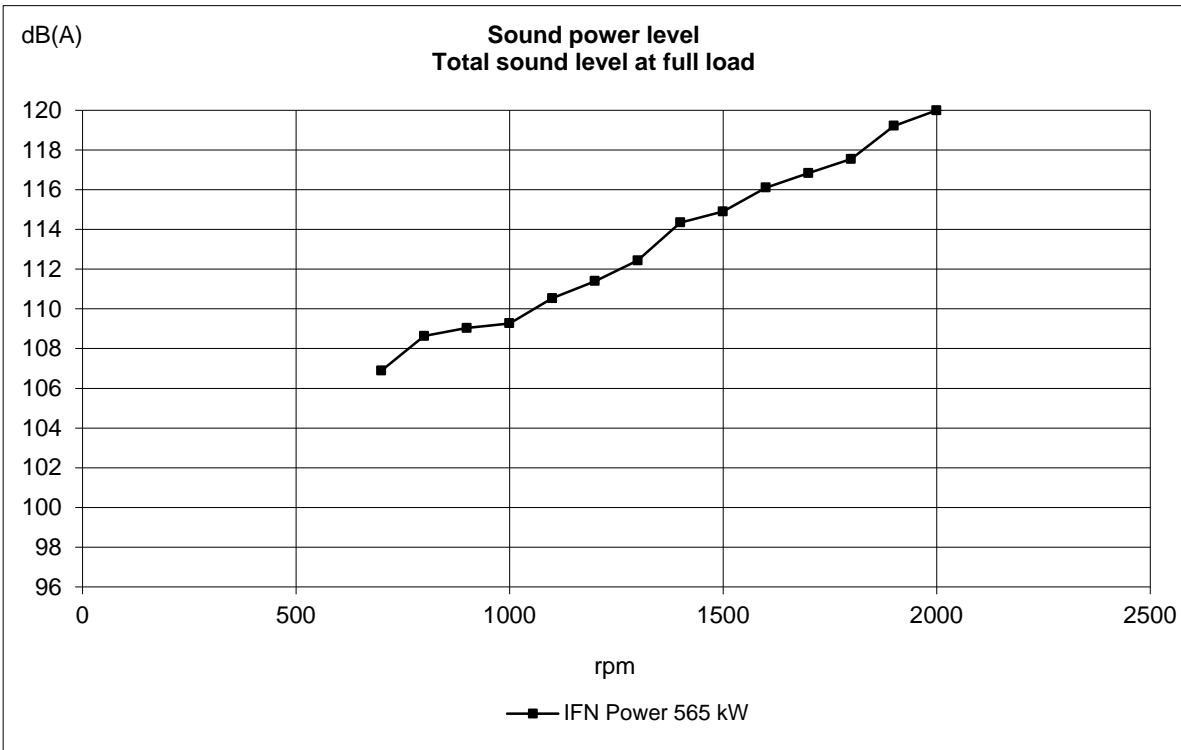
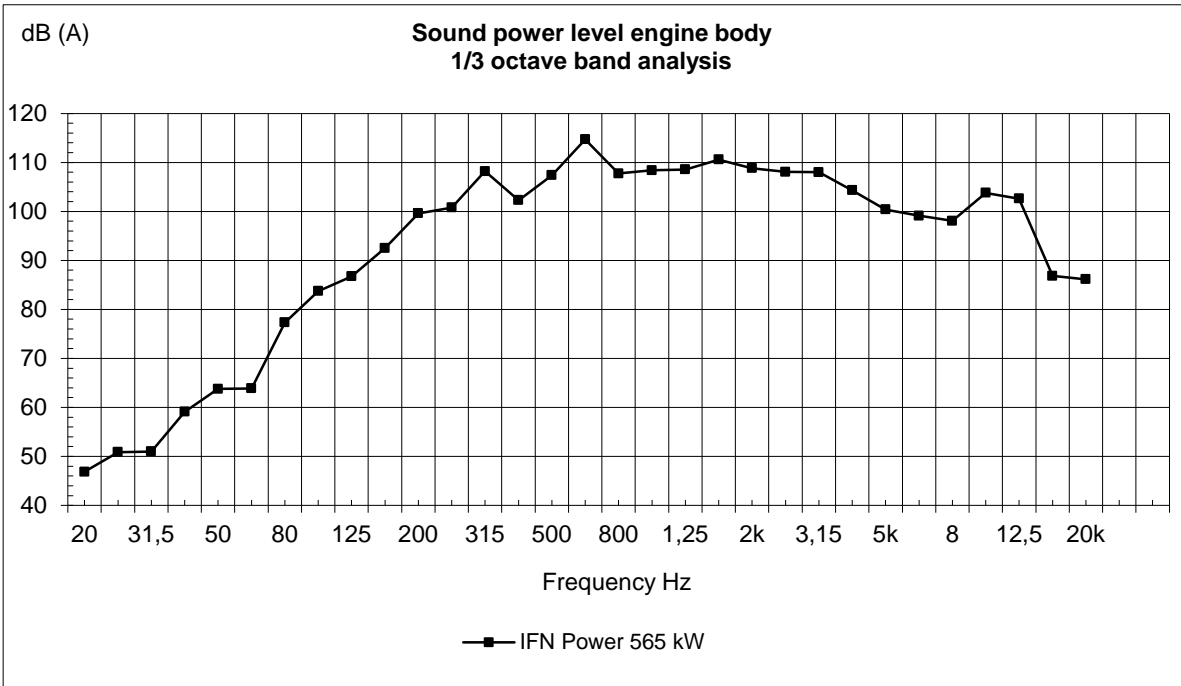


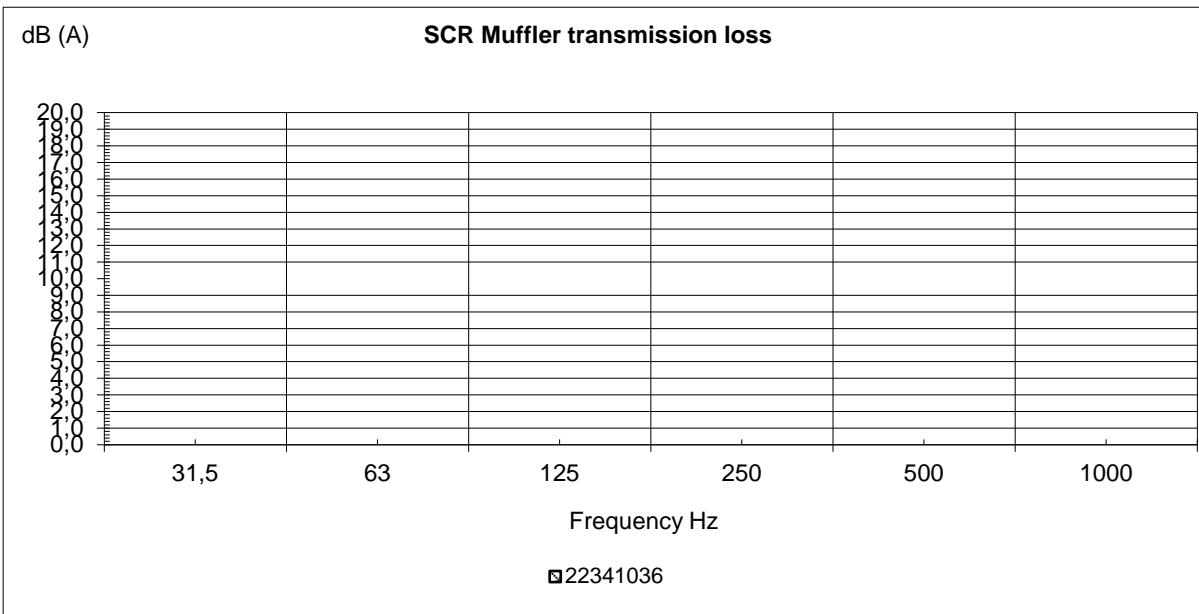
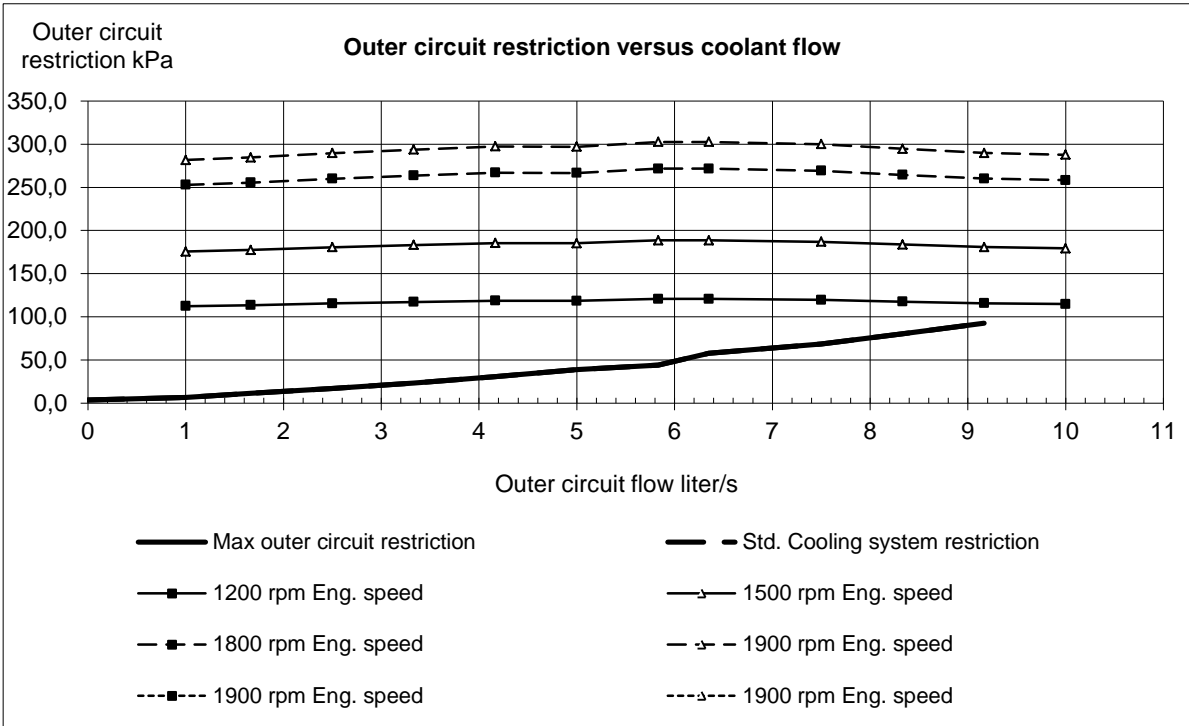




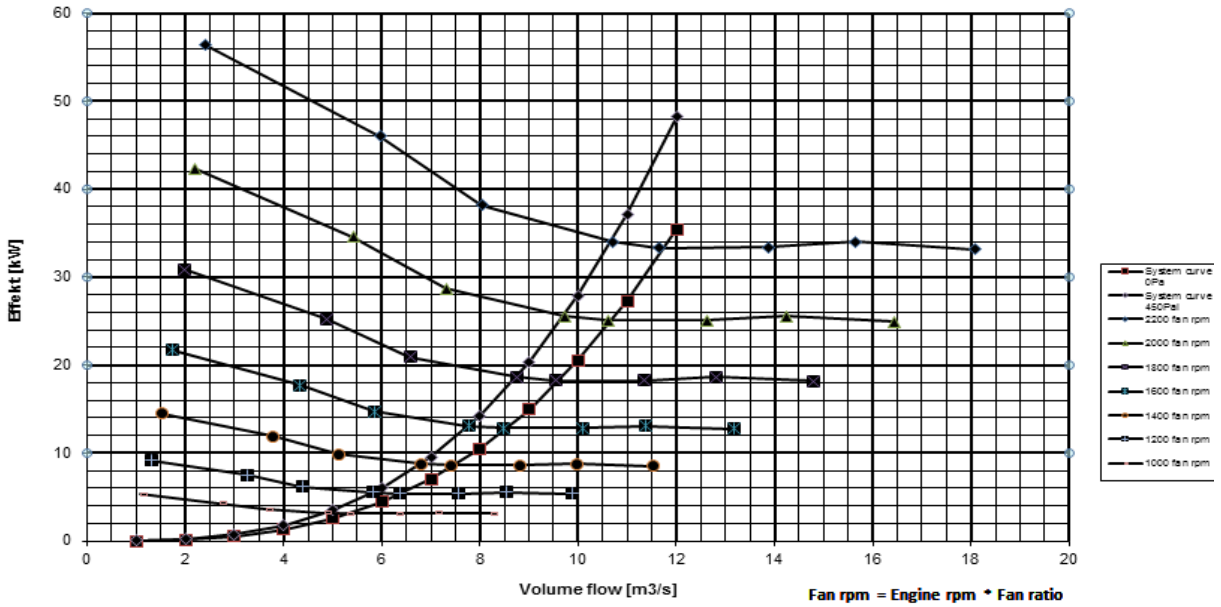




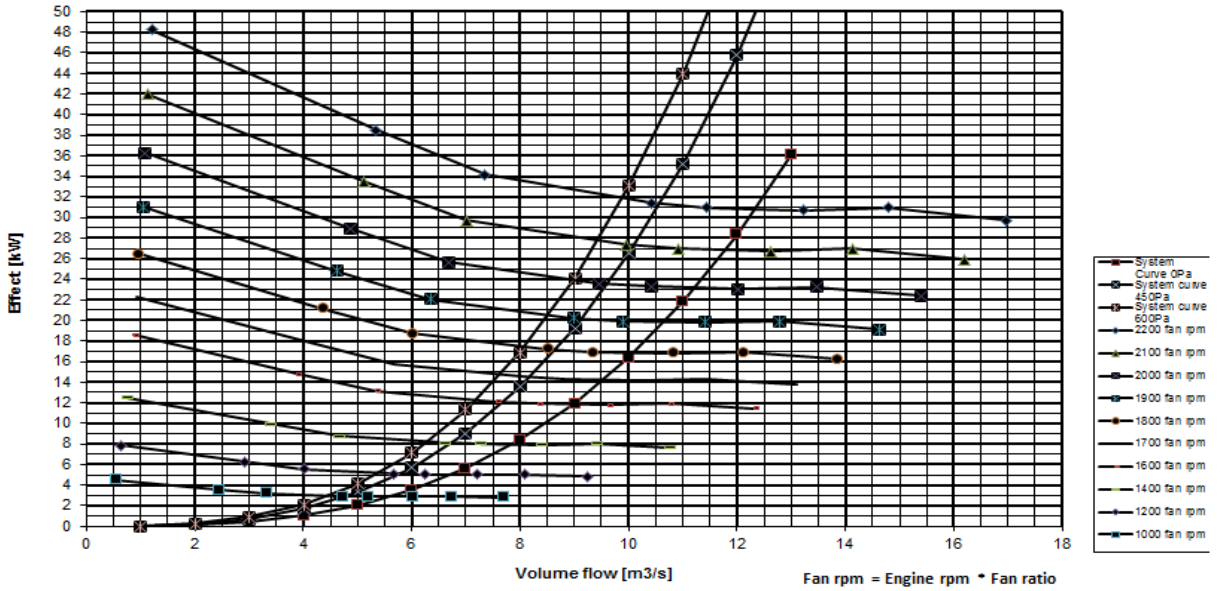




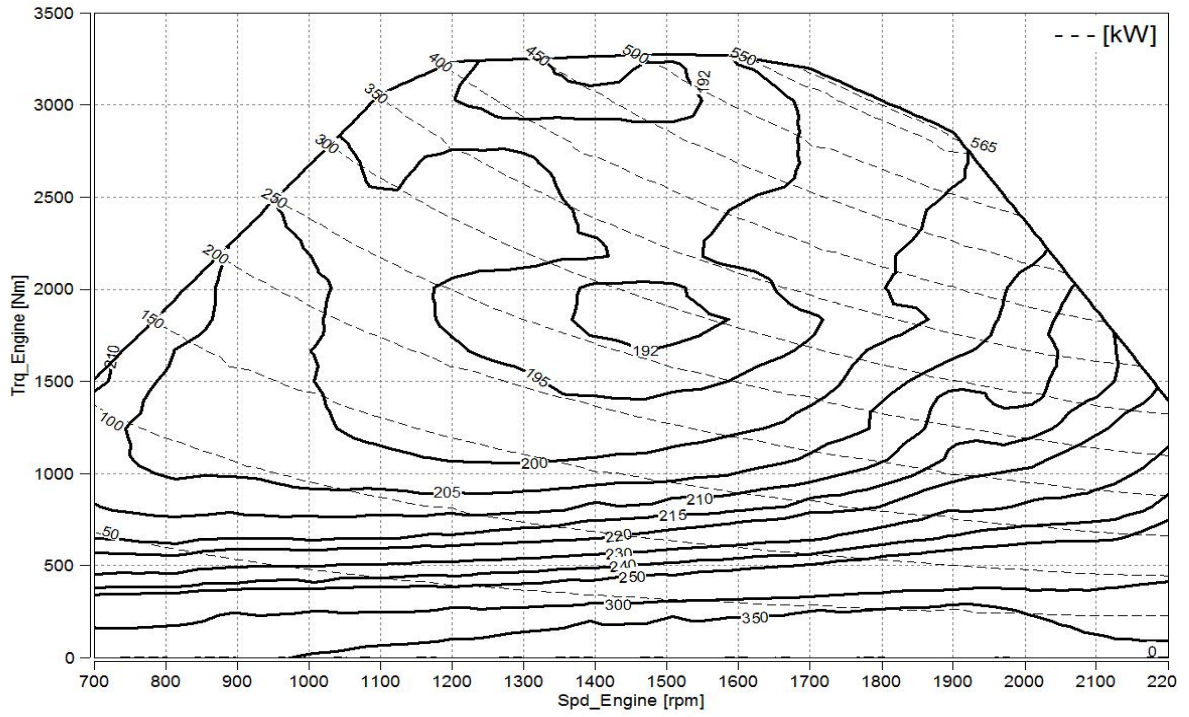
Fan power 890mm Pusher fan



Fan power 890mm Puller fan



BSFC [g/kWh]



Fuel flow [Lph]

