


**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 <sup>3</sup>	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	1565
		lb	3450
	Power pac	kg	
		lb	

**Performance**

				rpm	1200	1500	1800	1900
IFN Power	515 kW	without fan		kW	396	495	515	495
				hp	538	673	700	673
		with fan		kW	See diagram for fan power consumption			
		890 mm		hp				
Torque at:	IFN Power			Nm	3150	3150	2732	2488
				lbf ft	2323	2323	2015	1835
Max torque at engine speed		rpm	1260 rpm	Nm	3200			
				lbf ft	2360			
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	2,45	2,46	2,13	1,94
				psi	356	356	309	281
Max combustion pressure at:	IFN Power			MPa	19	20	20	19
				psi	2755	2900	2900	2755
Total mass moment of inertia, J (mR <sup>2</sup> ) (not including flywheel)				kgm <sup>2</sup>	4,1			
				lbft <sup>2</sup>	97,3			
Friction Power				kW	26	39	58	65
				hp	35	53	79	88

**Derating see Technical Diagrams**

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

		rpm	1200	1500	1900	2200
Brake power:	without fan	kW	85	152	284	345
		hp	116	207	386	469
Brake torque:	without fan	Nm	676	968	1427	1498
		lbf ft	499	714	1053	1104
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	-10		
		°F	14		
	#REF!	°C	-25		
	#REF!	°F	-13		
*Specify oil and fuel quality	T>-15°C Oil VDS4/VDS3 15W/40				
	T<-15°C Oil VDS4/VDS3 5W/40				
Block heater type	Make	Power kW	Engaged hours	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 at max rpm at:	IFN Power	liter/h	0,03
		US gal/h	0,008
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	1000 / See manual
	VDS4	h	1000 / See manual
Engine angularity limits:	front up	°	30
	front down	°	30
	side tilt	°	30
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**

System supply flow at max. Speed	liter/h US gal/h	165 43,6
Fuel supply line max. restriction (measured at fuel inlet connection)	kPa psi	10 1,5
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection)	kPa psi	16,5 2,4
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 micron size	μ	5
Engine Control System, standard	Volvo/EMS2.3	
Specific UREA consumption, NRTC	Vol%	5,9
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
Change air consumption at: (+25°C and 100kPa)	IFN Power	m³/min cfm	27,2 961	34,5 1218	37,5 1324	37 1307
 <b>See front page for important information</b>						
Max allowable air intake restriction including piping		kPa psi	6 0,9			
Heat rejection to exhaust at:	IFN Power	kW BTU/min	278 15810	358 20359	402 22861	392 22293
Exhaust gas temperature after turbine at:	IFN Power	°C °F	455 851	480 896	500 932	500 932
 <b>See front page for important information</b>						
Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm		kPa psi	23 3,3	30 4,4	34 4,9	35 5,1
 <b>See front page for important information</b>						
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	20 2,9	25 3,6	30 4,4	31 4,5
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power	m³/min cfm	68,5 2419	90,0 3178	98 3461	95 3355

**Cooling system**

		rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	IFN Power	kW	8	9	10	10
		BTU/min	455	512	569	569
Heat rejection to coolant at:	IFN Power	kW	156	187	213	212
		BTU/min	8872	10635	12113	12056
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	IFN Power	m <sup>2</sup>	1,42			
		foot <sup>2</sup>	15,28			
HD radiator core area		m <sup>2</sup>	0,87			
		foot <sup>2</sup>	9,36			
Fan diameter	890 mm	IFN Power	mm	890		
			in	35,04		
Fan power consumption	890 mm	kW	See diagram for actual fan drive ratio power.			
		hp				
Fan drive ratio	fan Ø890	See diagram for cooling performance				
Coolant capacity:	Engine	liter	24			
		US gal	6,3			
	STD. 1,42m <sup>2</sup> radiator with hoses Pusher syst. Core thickness 63mm	liter	37			
		US gal	9,8			
	STD.1,42m <sup>2</sup> radiator with hoses Puller syst. Core thickness 41mm	liter	30			
		US gal	7,9			
HD 0,87m <sup>2</sup> radiator with hoses	liter	32				
	US gal	8,5				
Coolant pump		drive/ratio	belt/1,77:1			
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	74	102	106	99
		BTU/min	4208	5801	6028	5630
Charge air mass flow	IFN Power	kg/s	0,53	0,67	0,72	0,7
Charge air inlet temp. (Charge air temp after turbo compressor)	IFN Power	°C	175	200	205	200
		°F	347	392	401	392
 <b>See front page for important information</b> Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	40	45	55	50
		°F	104	113	131	122
 <b>See front page for important information</b> Maximum pressure drop over charge air cooler incl. piping		kPa	14			
		psi	2,03			
Charge air pressure (After charge air cooler)		kPa	213	235	212	200
		psi	30,89	34,08	30,75	29,01
Standard charge air cooler core area		m <sup>2</sup>	1,3			
		foot <sup>2</sup>	13,99			

**Cooling performance: STD cooling package 1,42m<sup>2</sup> radiator and suction 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 1:0,88**

Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
1800	515 700	50	122	7	247,2	295	0,043
		52	126	7,4	261,3	225	0,033
		53	127	7,6	268,4	180	0,026
		55	131	7,9	279,0	100	0,015
		57	135	8,3	293,1	0	

**Cooling performance: STD cooling package 1,42 m<sup>2</sup> 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 <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
1800	405 551	64	146	9,9	349,3	450	0,065
		65	148	10,0	352,8	300	0,044
		66	151	10,5	372,2	150	0,022
		67	152	10,9	384,2	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 <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
1800	405	61	142	9,0	319,2	450	0,065
	551	62	144	9,3	329,8	300	0,044
		64	146	9,9	348,2	150	0,022
		65	148	10,3	362,3	0	

**Fix fan drive ratio 1:0,97**

Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
1800	405	59	138	8,0	281,8	450	0,065
	551	60	140	8,4	294,9	300	0,044
		62	143	8,9	313,2	150	0,022
		63	145	9,3	326,7	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 <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
1800	405	56	132	7,2	253,6	450	0,065
	551	57	134	7,5	265,2	300	0,044
		58	137	8,0	281,1	150	0,022
		59	139	8,2	290,6	0	

**Cooling performance: STD cooling package 1,42m<sup>2</sup> radiator and pusher 890mm electronically controlled visco 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.

**Visco fan drive, pully ratio 1:0,88**

Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
1800	405	55	131	7,0	247,6	450	0,065
	551	56	133	7,4	259,9	300	0,044
		58	136	7,8	275,5	150	0,022
		59	137	8,0	283,9	0	

**Engine management system**

Functionality	Alternatives			Default setting
Governor mode	Droop	Isocronous		Isocronous
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	Default	Optional (Module or conversion)
Oil temp	°C	125	130	Derate	Shut down.
Oil pressure	kPa	80	55,0	Shut down	Shut down.
Low idle		300	275	Shut down	Shut down.
Rated speed					
Oil level		Low level	N/A	Fault code only	Fault code only
Piston cooling pressure >1000 rpm	kPa	Not available on this engine			
Coolant temp	°C	105	107	Derate	Shut down.
Coolant level		N/A	Low level	Derate	Shut down.
Fuel feed pressure	kPa	See Fuel pressure limits	N/A	Fault code only	Fault code only
Low idle			N/A	Fault code only	Fault code only
Rated speed					
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 high peaks	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

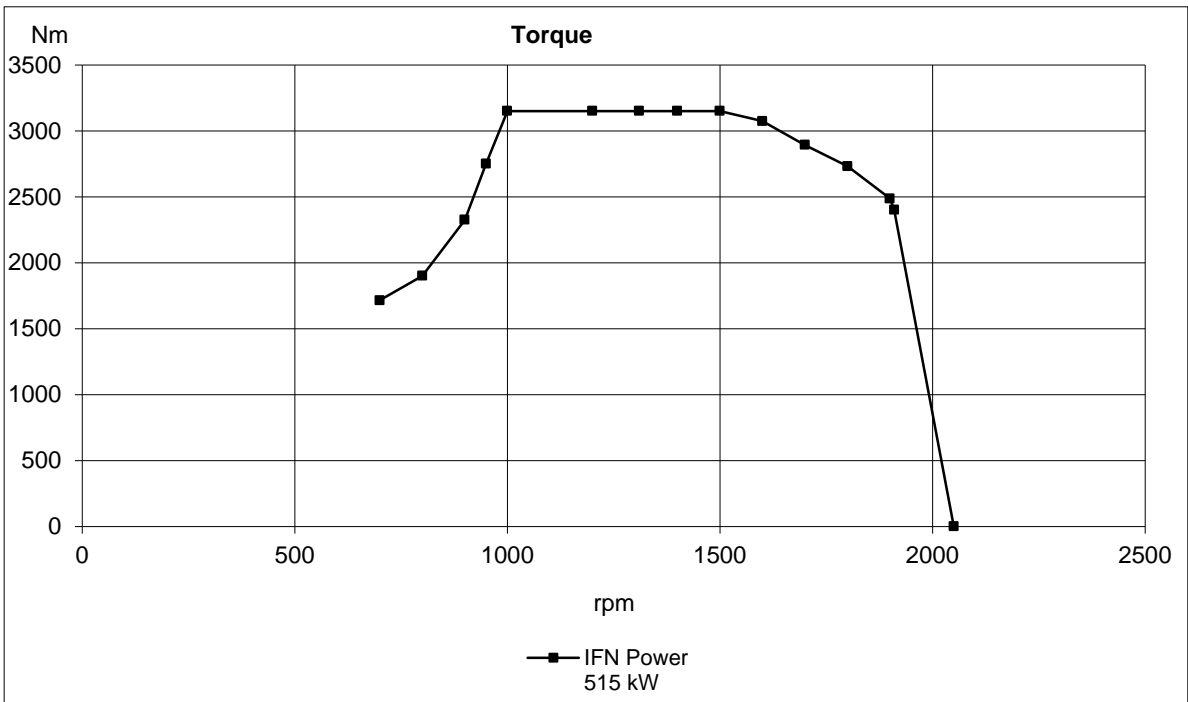
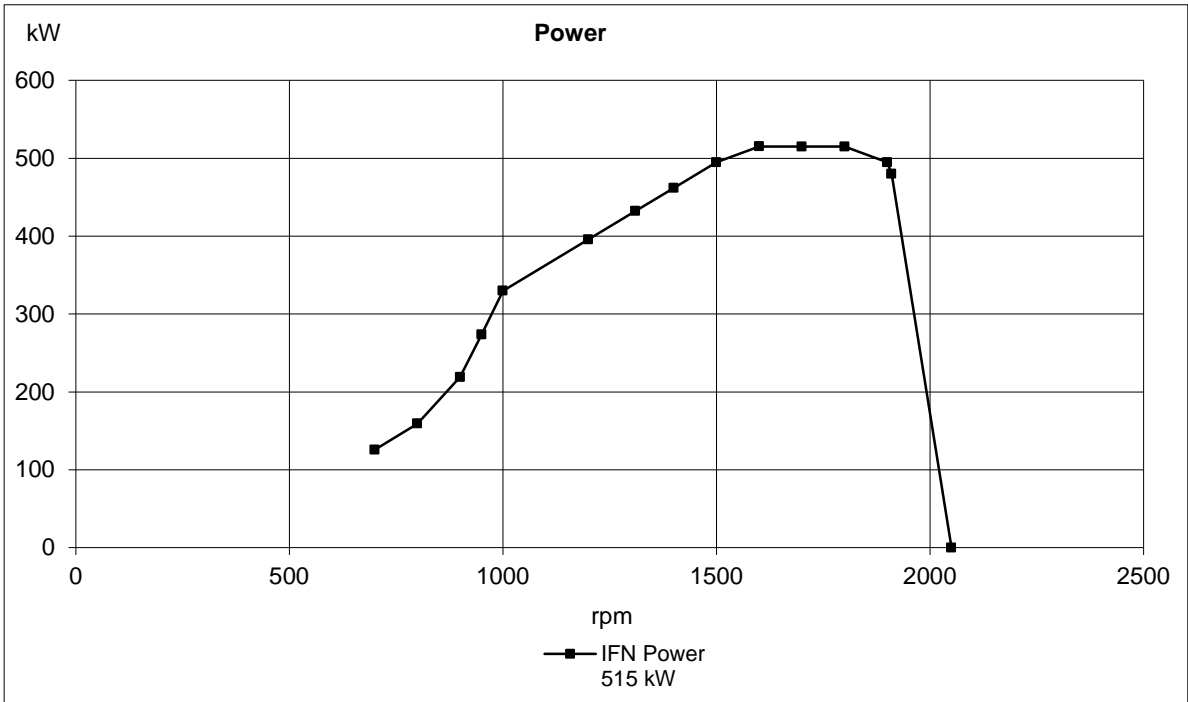
Derate parameters	Derated 0% to	Derated 100% to engine	Forced idle after 5	Forced shut down after
Oil temp	130°C	132°C	N/A	N/A
Coolant temp	107°C	108°C	N/A	N/A
Charge air temp	125°C	126°C	N/A	N/A
EGR temp	N/A	N/A	N/A	N/A
Low oil pressure	See Oil pressure limits		N/A	At alarm
Charge air pressure	See Charge air pressure limits		N/A	N/A

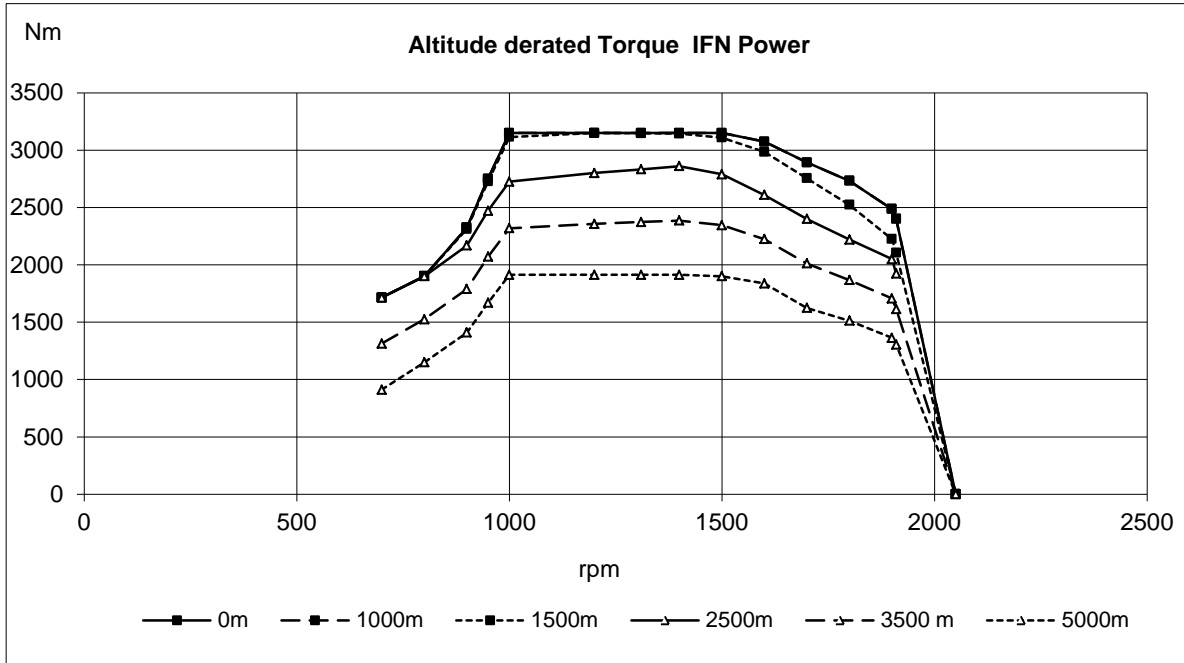
**Electrical system**

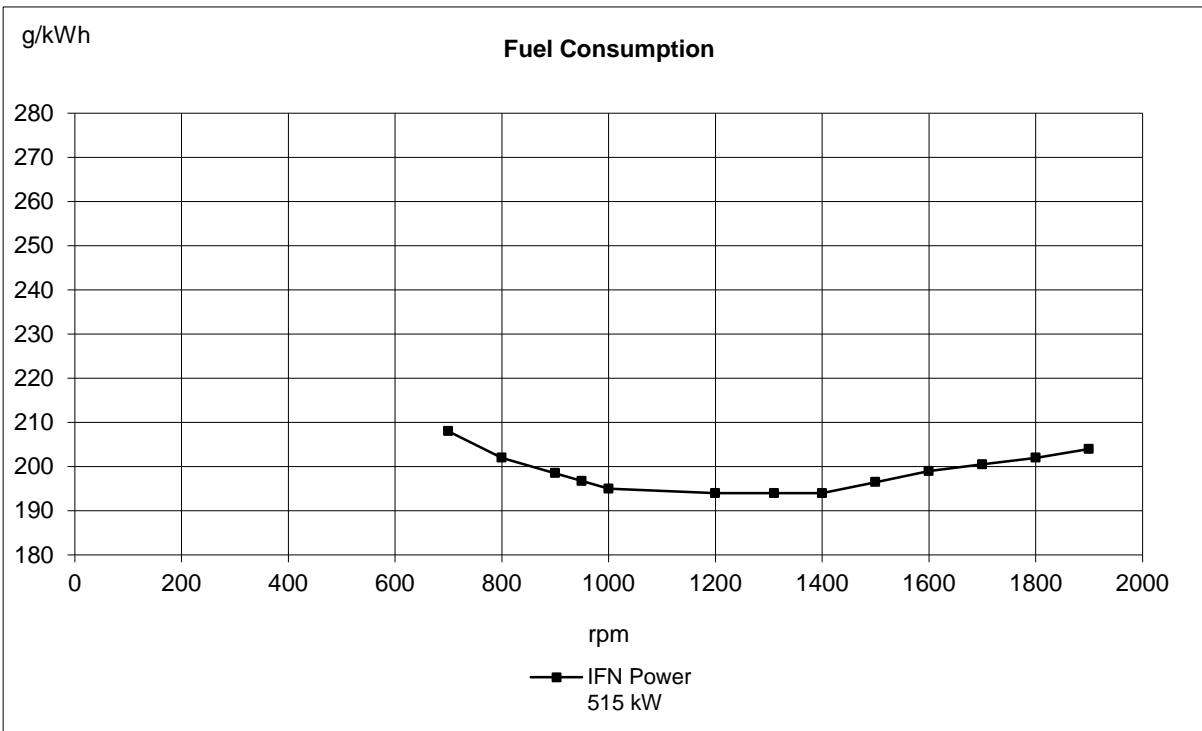
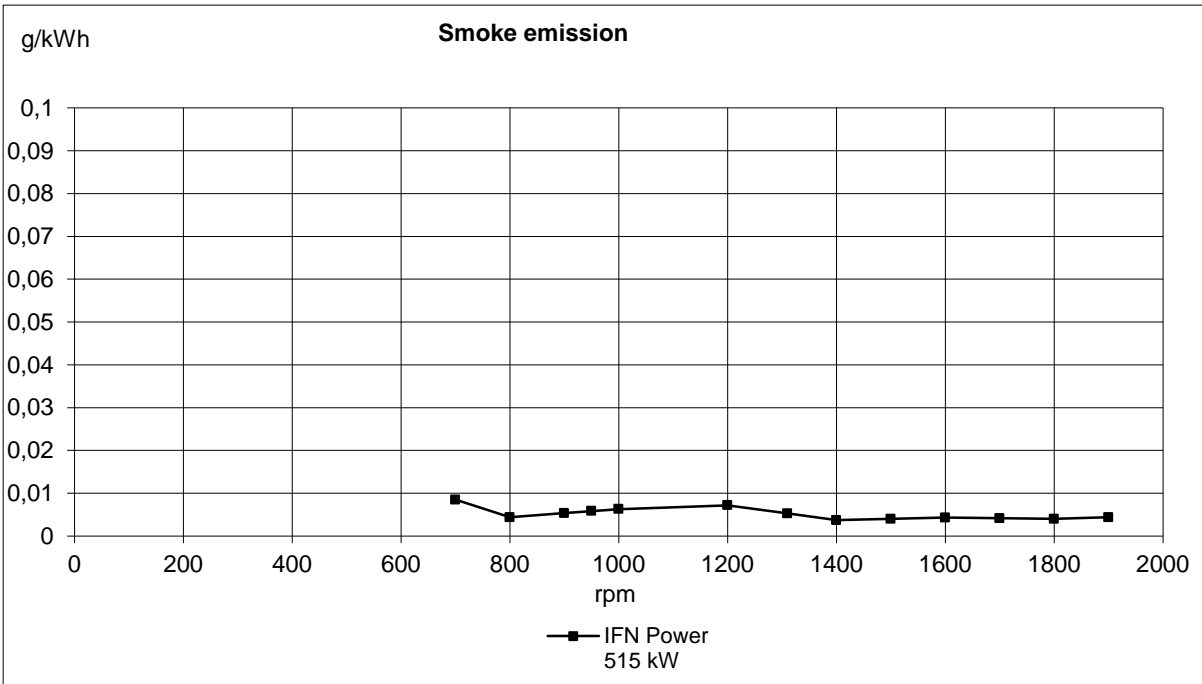
Voltage and type		24V			
Alternator:	make	Bosch			
	output	A	110/150		
	tacho output	Hz/alternator rev.	6		
	drive ratio	3,9:1			
Starter motor:	make	Melco			
	type	105P70			
	output	kW	7		
		hp	9,5		
Number of teeth on:	flywheel	153			
	starter motor	12			
Inlet manifold heater (at 20 V)		kW	2		
Power relay for the manifold heater		A	1		
<b>Conditions:</b> (4,2 mΩ main circuit resistance@ 20°C)	<b>Temperature</b>	°C	<b>0</b>	<b>-15</b>	<b>-25</b>
	<b>Battery</b>	<b>Ah / CCA</b>	<b>185/1150</b>	<b>185/1150</b>	<b>185/1150</b>
Crank speed	rpm	124	101	81	
Crank current	A	435	562	686	
Starter input power during crank	kW				
Battery power during crank	kW				
Min battery @ 0°C	Ah / CCA	<b>140/800</b>	<b>140/900</b>	<b>185/1150</b>	

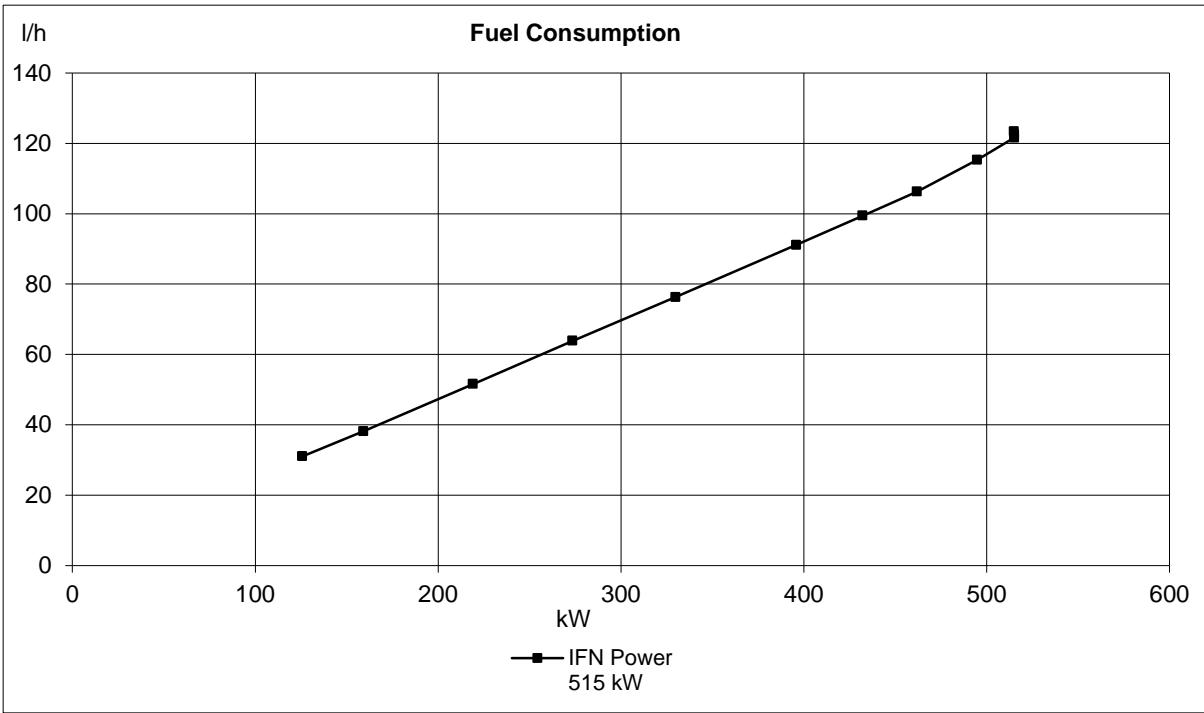
**Power take off**

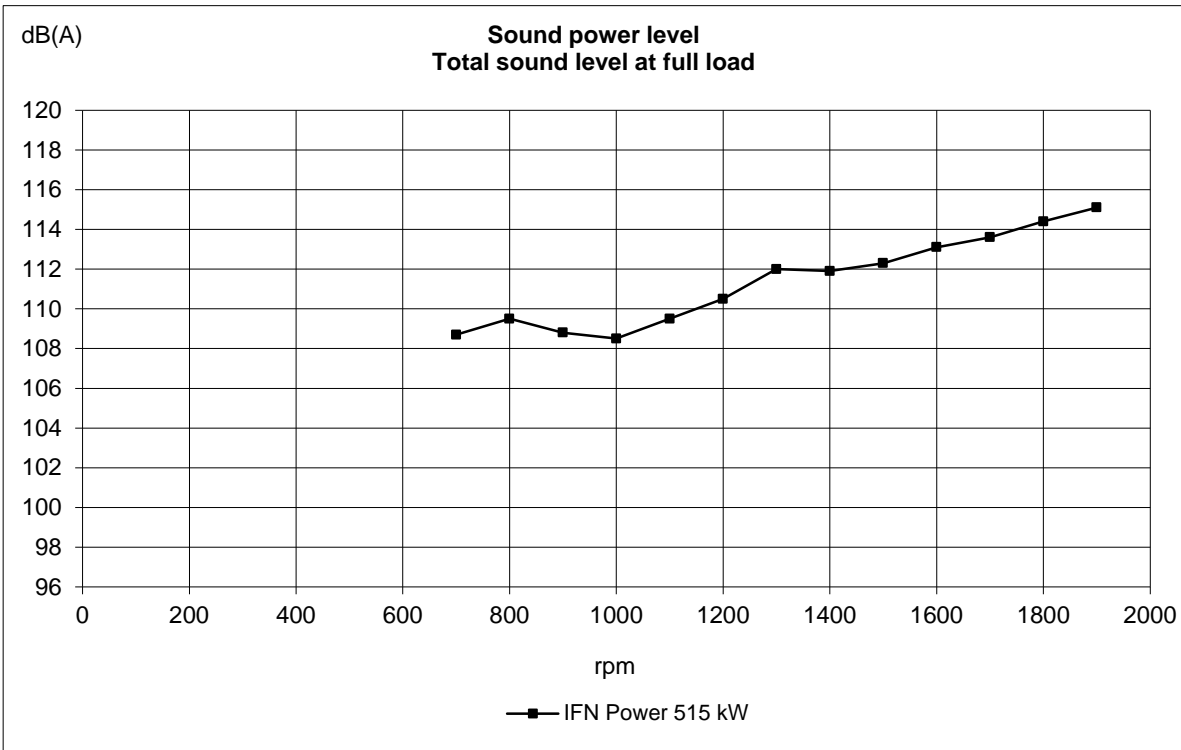
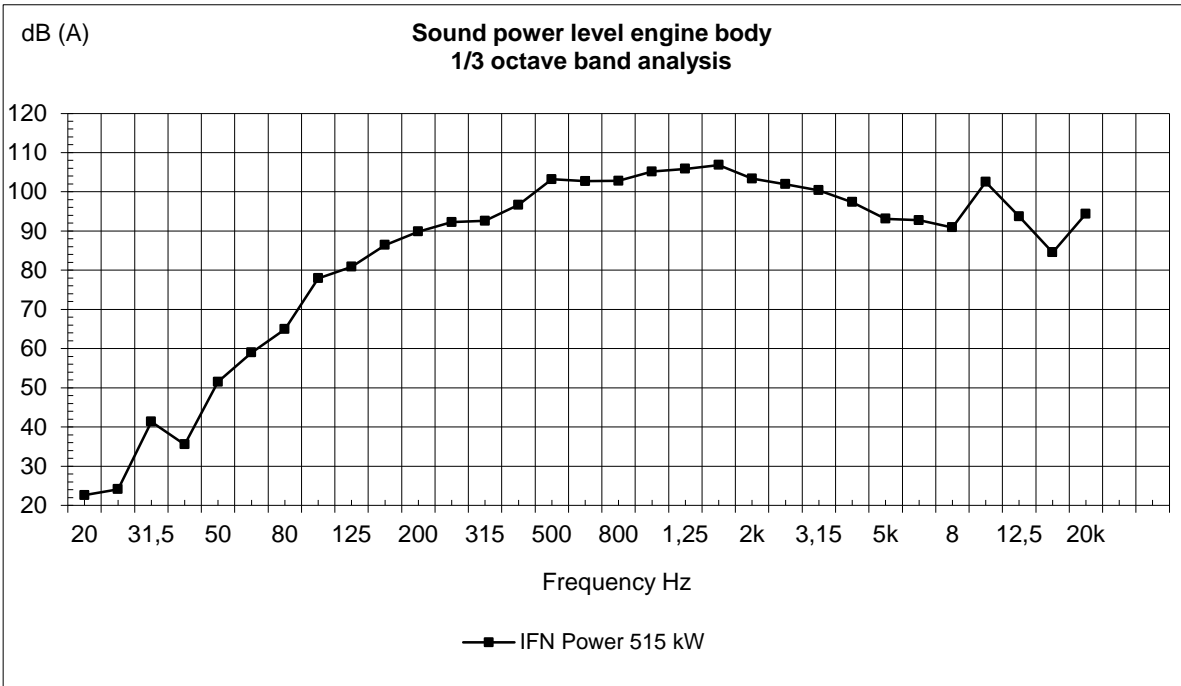
		rpm	1200	1500	1800	1900
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	26	33	40	
		hp	35	45	54	
	max down	kW	60	75	90	
		hp	82	102	122	
	max right	kW	26	33	40	
		hp	35	45	54	
Timing gear at compressor PTO max:		Nm	300			
		lbf ft	221			
Speed ratio direction of rotation viewed from flywheel side		1,31:1 / ccw				
Timing gear at servo pump 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	5000			
		lbf	1124,0			

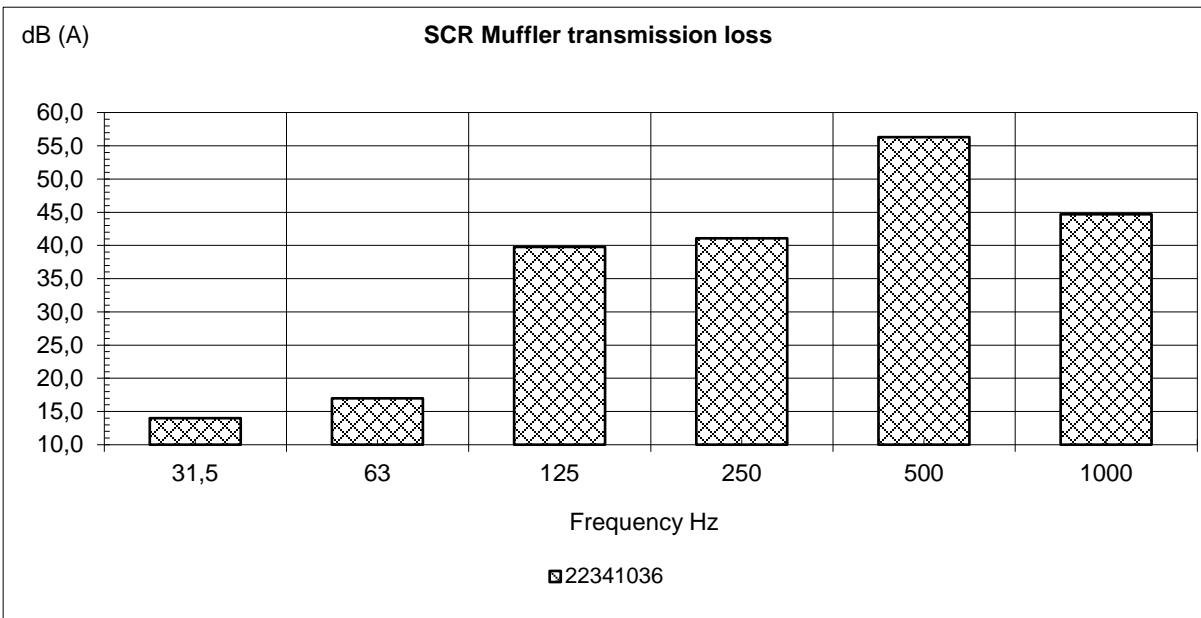
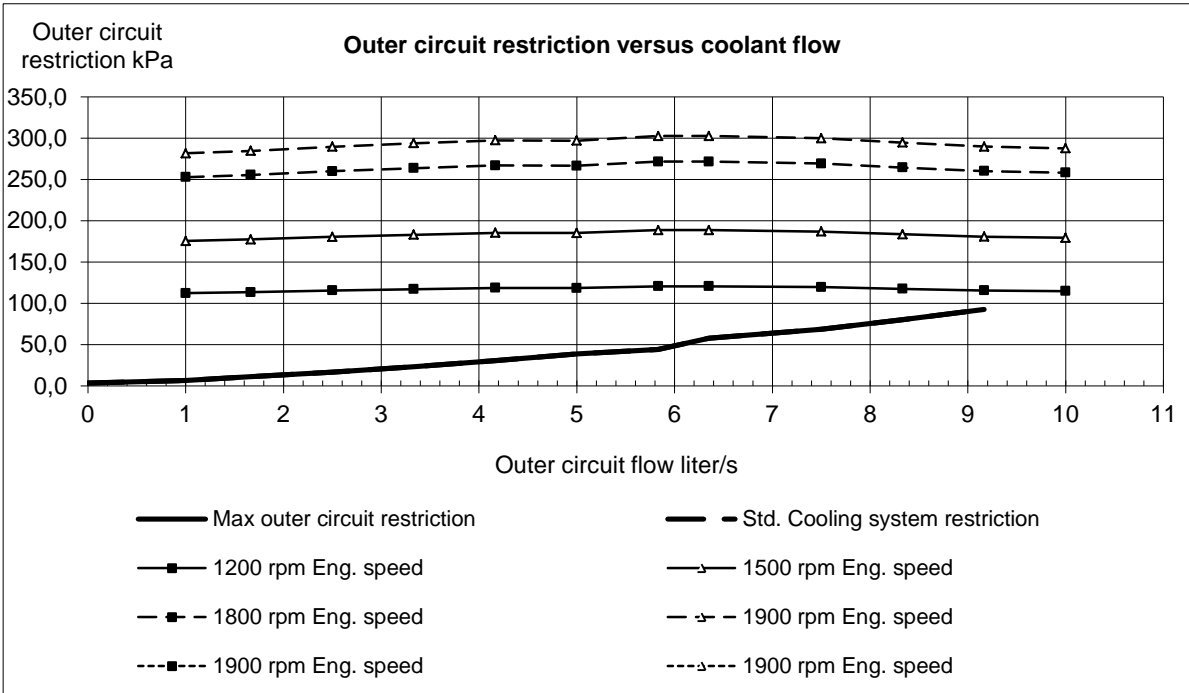




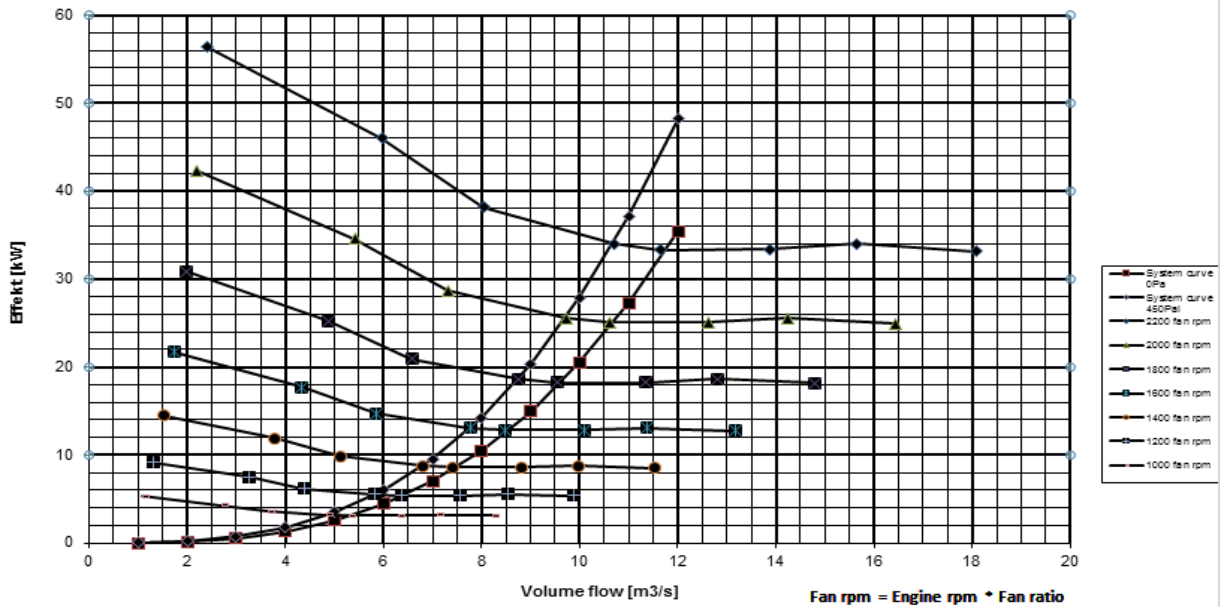




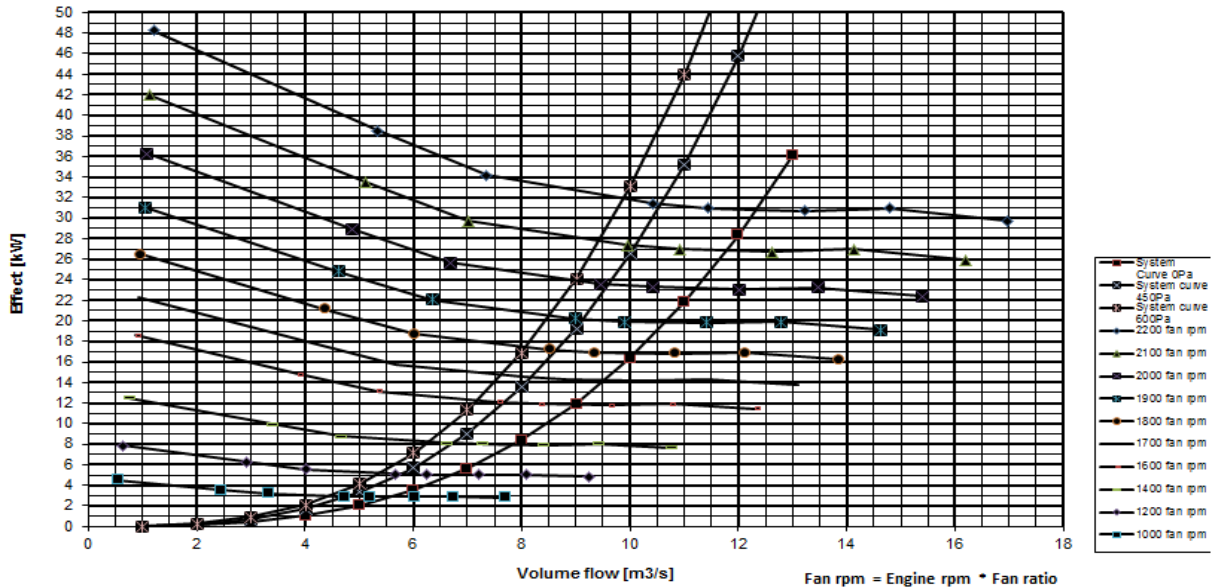




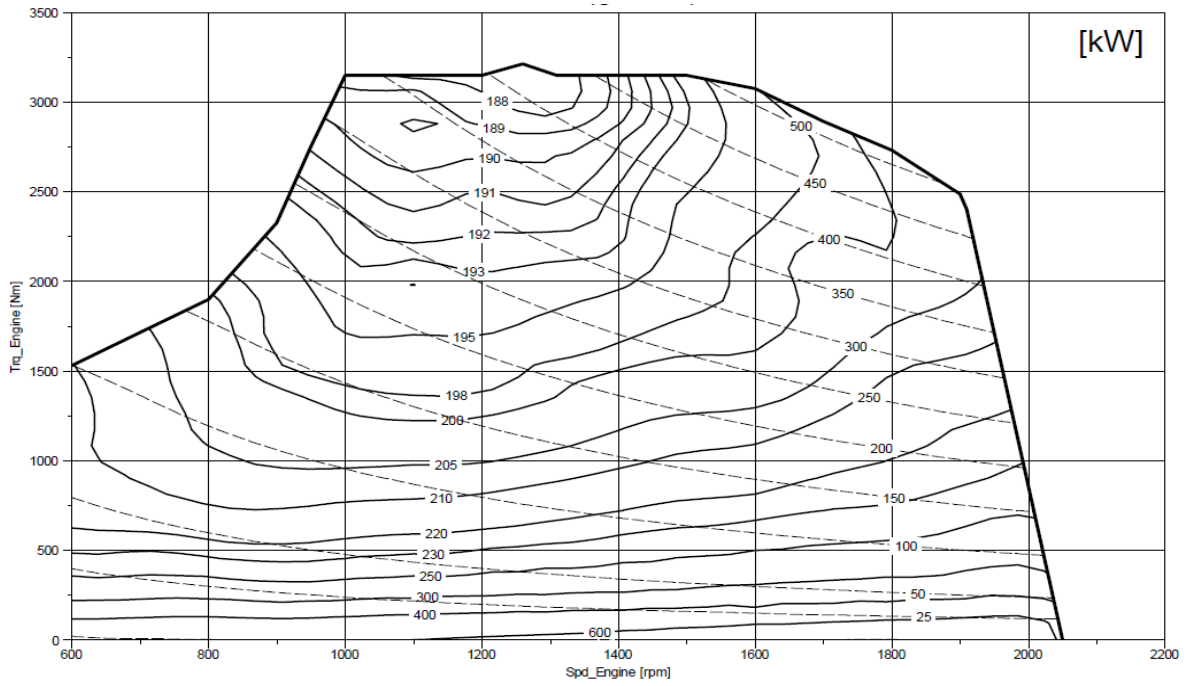
Fan power 890mm Pusher fan



Fan power 890mm Puller fan



BSFC [g/kWh]



Fuel consumption [l/h]

