


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, anti-clockwise viewed towards flywheel

Number of cylinders			6
Displacement, total		liters in ³	16,12 984
Firing order			1-5-3-6-2-4
Bore		mm in	144 5,67
Stroke		mm in	165 6,50
Compression ratio			16.8:1
Wet weight	Engine only	kg lb	1440 3175
	Power pac	kg lb	1840 4057

Performance

				rpm	1200	1500	1800	1900
ICFN Power	515 kW	without fan		kW	405	495	515	495
				hp	551	673	700	673
		with fan		See diagram for fan power consumption				
		890 mm						
Torque at:		ICFN Power 515 kW		Nm	3223	3151	2732	2488
				lbf ft	2377	2324	2015	1835
Max torque at engine speed	ICFN Power		1200 rpm	Nm	3220			
				lbf ft	2375			
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:		ICFN Power 515 kW		MPa	2,51	2,46	2,13	1,94
				psi	364	356	309	281
Max combustion pressure at:		ICFN Power 515 kW		MPa	17,7	18,3	18,3	17,4
				psi	2567	2654	2654	2523
Total mass moment of inertia, J (mR ²) (not including flywheel)				kgm ²	4,1			
				lbfft ²	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
Maximum		without fan		kW	85	152	284	345
				hp	116	207	386	469
Maximum Brake Torque:		without fan		Nm	676	968	1427	1498
				lbf ft	499	714	1053	1104
Brake Power:		without fan		kW	83	146	273	341
				hp	113	199	371	464
Brake		without fan		Nm	660	929	1372	1480
				lbf ft	487	685	1012	1092
Engine speed range for VCB activation:				rpm	1000-2200			
Minimum engine speed with VCB still active:				rpm	900			
Minimum oil temperature for VCB activation:				°C	55			

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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 and fuel quality	Oil: VDS3 10W/30, Fuel: MK1			
Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
Self circulating	Volvo 3828864	2	12	1°C 34°F

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption at max rpm at:	ICFN Power 515 kW	liter/h	0,025
		US gal/h	0,007
Oil system capacity including filters		liter	48
		US gal	12,68
Oil sump capacity:	Max	liter	42
		US gal	11,10
	Min	liter	32
		US gal	8,45
Oil change intervals/specifications	VDS3	h	600
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	rpm	1200	1500	1800	1900
Fuel to conform to		EN590 ASTM D 975 No 1D and 2D (Max 20 ppm sulphur and 7% FAME)			

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
System return flow at max. speed	liter/h	25,0
	US gal/h	6,6
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 micron size	μ	5
Governor type/make, standard	Volvo/EMS2.2	
Injection pump type/make	Delphi E3	

Intake and exhaust system		Inlet air temp	rpm	1200	1500	1800	1900
Air consumption at: (+25°C and 100kPa)	ICFN Power 515 kW		m³/min	27,1	35,9	37,9	38
			cfm	957	1268	1338	1342
 See front page for important information							
Max allowable air intake restriction including piping			kPa	5			
			psi	0,7			
Heat rejection to exhaust at:	ICFN Power 515 kW		kW	267	342	388	384
			BTU/min	15184	19449	22065	21838
Exhaust gas temperature after turbine at:	ICFN Power 515 kW		°C	473	475	534	515
			°F	883	887	993	959
 See front page for important information							
Max allowable back pressure in exhaust line (after turbine)			kPa	23	30	34	35
Pipe dimension Ø: 125 mm			psi	3,3	4,4	4,9	5,1
 See front page for important information							
Max allowable temperature drop between turbine and SCR muffler inlet.			°C	10	10	10	10
			°F	18	18	18	18
SCR muffler pressure drop			kPa	20	26	28	29
			psi	2,9	3,8	4,1	4,2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	ICFN Power 515 kW		m³/min	62,4	76,8	82,9	82,9
			cfm	2204	2712	2928	2928
Exhaust gas smoke	ICFN Power 515 kW		*Bosch	0,032	0,029	0,055	0,044

Cooling system

			rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	ICFN Power 515 kW	kW	8	8	9	9	
		BTU/min	455	455	512	512	
Heat rejection to coolant at:	ICFN Power 515 kW	kW	165	176	205	210	
		BTU/min	9383	10009	11658	11942	
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 ²	1,42				
		foot ²	15,28				
HD radiator core area		m ²	0,87				
		foot ²	9,36				
Fan diameter	890 mm	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 ² radiator with hoses	liter	37				
	Pusher syst. Core thickness 63mm	US gal	9,8				
	STD.1,42m ² radiator with hoses	liter	30				
	Puller syst. Core thickness 41mm	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				
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	ICFN Power 515 kW	kW BTU/min	75 4265	114 6483	129 7336	128 7279
Charge air mass flow	ICFN Power 515 kW	kg/s	0,54	0,72	0,76	0,76
Charge air inlet temp. (Charge air temp after turbo compressor)	ICFN Power 515 kW	°C °F	176 349	206 403	218 424	214 417
 See front page for important information Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)	ICFN Power 515 kW	°C °F	40 104	50 122	50 122	50 122
 See front page for important information Maximum pressure drop over charge air cooler incl. Piping (throttle not included)		kPa psi		14 2,03		
Charge air pressure at rated power (After charge air cooler)		kPa psi		196 28,43		
Standard charge air cooler core area		m ² foot ²		1,3 13,99		

Cooling performance: STD cooling package 1,42m² radiator and suction 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, 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
1800	515 700	48	118	6,7	236,6	300	0,044
		50	122	7	247,2	235	0,034
		51	124	7,2	254,3	200	0,029
		53	127	7,5	264,9	125	0,018
		54	129	7,7	271,9	85	0,012
		56	133	8,1	286,0	0	

Cooling performance: STD cooling package 1,42m² 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 ³ /s	ft ³ /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 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
1800	515	63	146	9,9	349,3	450	0,065
		65	148	10,0	352,8	300	0,044
	700	66	150	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 ³ /s	ft ³ /s	Pa	psi
1800	515	61	141	9,0	319,2	450	0,065
		62	143	9,3	329,8	300	0,044
	700	63	146	9,9	348,2	150	0,022
		64	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 ³ /s	ft ³ /s	Pa	psi
1800	515	59	137	8,0	281,8	450	0,065
		60	139	8,4	294,9	300	0,044
	700	61	142	8,9	313,2	150	0,022
		62	144	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 ³ /s	ft ³ /s	Pa	psi
1800	515	55	132	7,2	253,6	450	0,065
		56	134	7,5	265,2	300	0,044
	700	58	137	8,0	281,1	150	0,022
		59	138	8,2	290,6	0	

Cooling performance: STD cooling package 1,42m² 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, pulley 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
1800	515	55	130	7,0	247,6	450	0,065
		56	132	7,4	259,9	300	0,044
	700	57	135	7,8	275,5	150	0,022
		58	137	8,0	283,9	0	

Cooling performance: HD cooling package 0,87m² 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 1:0,88

Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1800	515 700	64	147	8,9	315,7	400	0,058
		66	150	9,4	332,9	300	0,044
		67	153	10,0	352,7	200	0,029
		69	156	10,6	372,7	100	0,015
		71	159	11,2	397,1	0	

Cooling performance: HD cooling package 0,87m² 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 ³ /s	ft ³ /s	Pa	psi
1800	515 700	61	142	8,4	295,5	400	0,058
		63	146	8,9	314,5	300	0,044
		65	149	9,3	329,8	200	0,029
		67	152	9,8	346,6	100	0,015
		68	154	10,3	364,1	0	

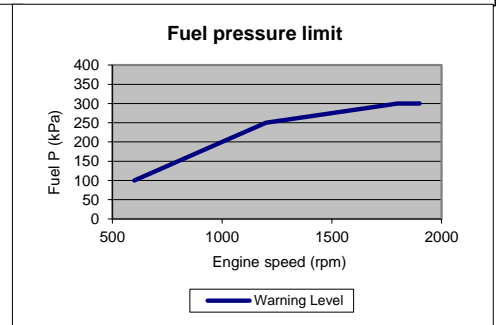
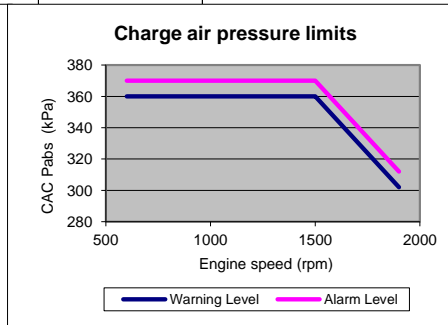
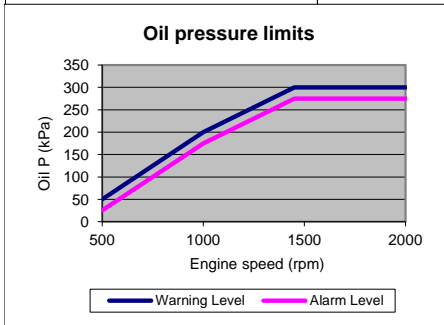
Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronus	
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	

Parameter	Warning level	Alarm level	Engine protection	
Parameter for Power Pack	Default setting	Level	Action.	Default/Alternative
Oil temp	125°C	Setting +5°C		Shut down. ON/OFF*
Oil pressure	Low idle	50 kPa	25 kPa	Shut down. ON/OFF*
	Rated speed	300 kPa	275 kPa	Shut down. ON/OFF*
Oil level	Min level	-	-	-
Coolant temp	105°C	107°C		Shut down. ON/OFF*
Coolant level	Low level	-	-	-
Fuel feed pressure	Low idle	-	100 kPa	-
	1200	-	250 kPa	-
Water in fuel	High level	-	-	-
Crank case pressure	Press inc			Shut down. ON/OFF*
Air filter pressure drop	5 kPa	-	-	-
Altitude, above sea	Automatic derating, see section derating			
Charge air temp	80°C	85°C		Shut down. ON/OFF*
Charge air pressure	Warning map value + 5kPa	Alarm map value + 5kPa		Shut down. ON/OFF*
Engine speed	120%	-		Shut down. ON/OFF*
Cat temp protection (exhaust)	-	-	Derates the engine in order to not exceed exhaust T>550°C	

* Off: disables the function, i e no shut down.

Parameter	Warning level	Alarm level	Engine protection			
Parameter for Mobile	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after sec	Forced shut down after 2 sec
Oil temp	125°C	127°C	127°C	130°C	N/A	N/A
Oil pressure	Warning map value	Alarm map value	N/A	N/A	N/A	Alarm map value
Oil level	Min level	N/A	N/A	N/A	N/A	N/A
Coolant temp	105°C	107°C	107°C	108°C	N/A	N/A
Coolant level	Low level	N/A	N/A	N/A	N/A	N/A
Fuel feed pressure	Warning map value	N/A	N/A	N/A	N/A	N/A
Water in fuel	High level	N/A	N/A	N/A	N/A	N/A
Crank case pressure	N/A	Press incr 5kPa	N/A	N/A	N/A	Press incr 5kPa
Air filter pressure drop	-	5 kPa	N/A	N/A	N/A	N/A
Altitude, above sea	Automatic derating, see section derating					
Charge air temp	80°C	85°C	85°C	86°C	N/A	N/A
Charge air pressure	Warning map value	Alarm map value	Alarm map value	Alarm map value	N/A	N/A
Engine speed	120%	N/A	N/A	N/A	N/A	N/A
Cat temp protection (exhaust)	-	-	Derates the engine in order to not exceed exhaust T>550°C			

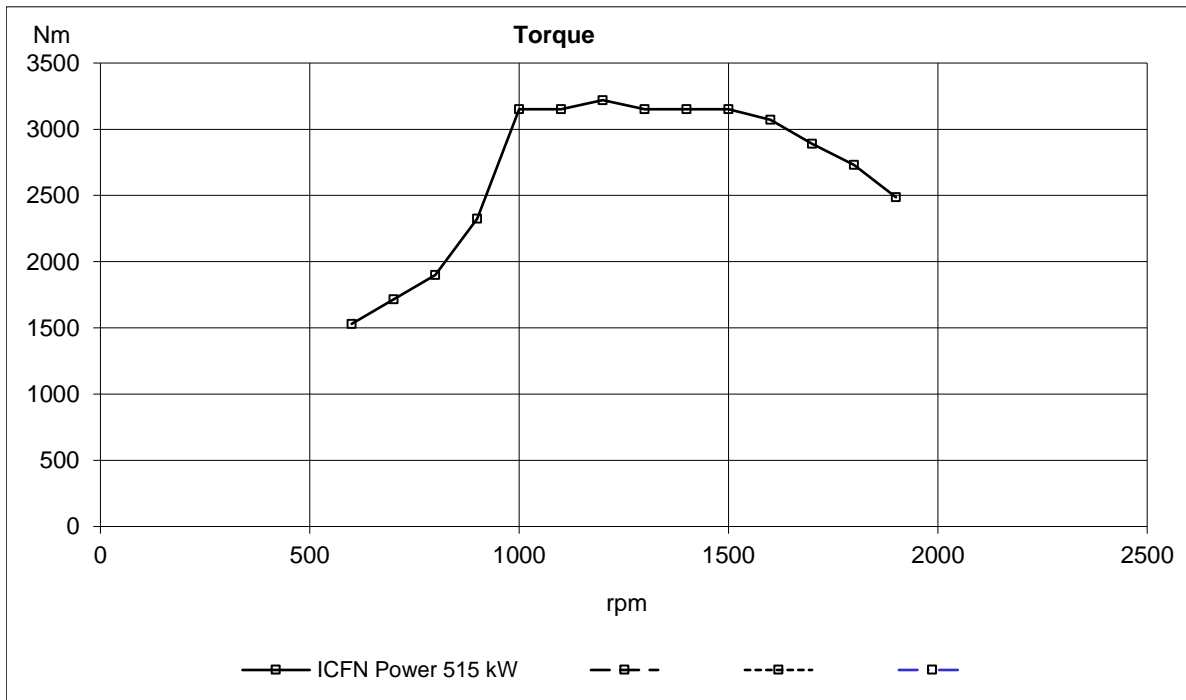
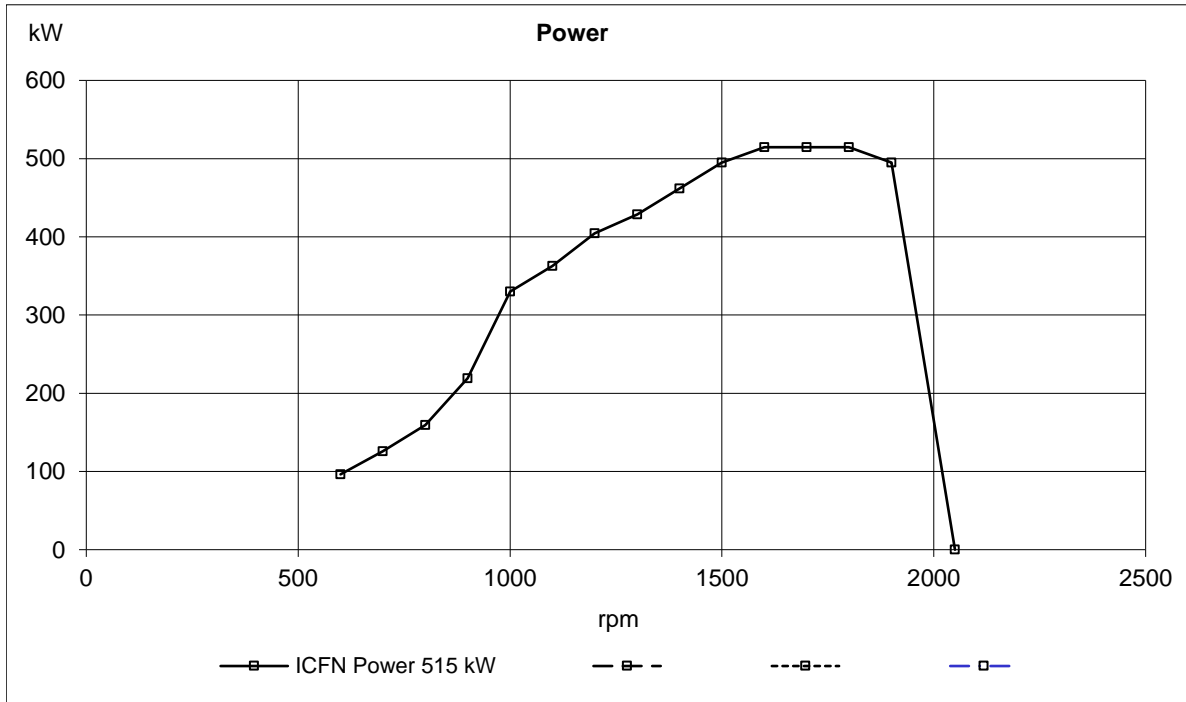


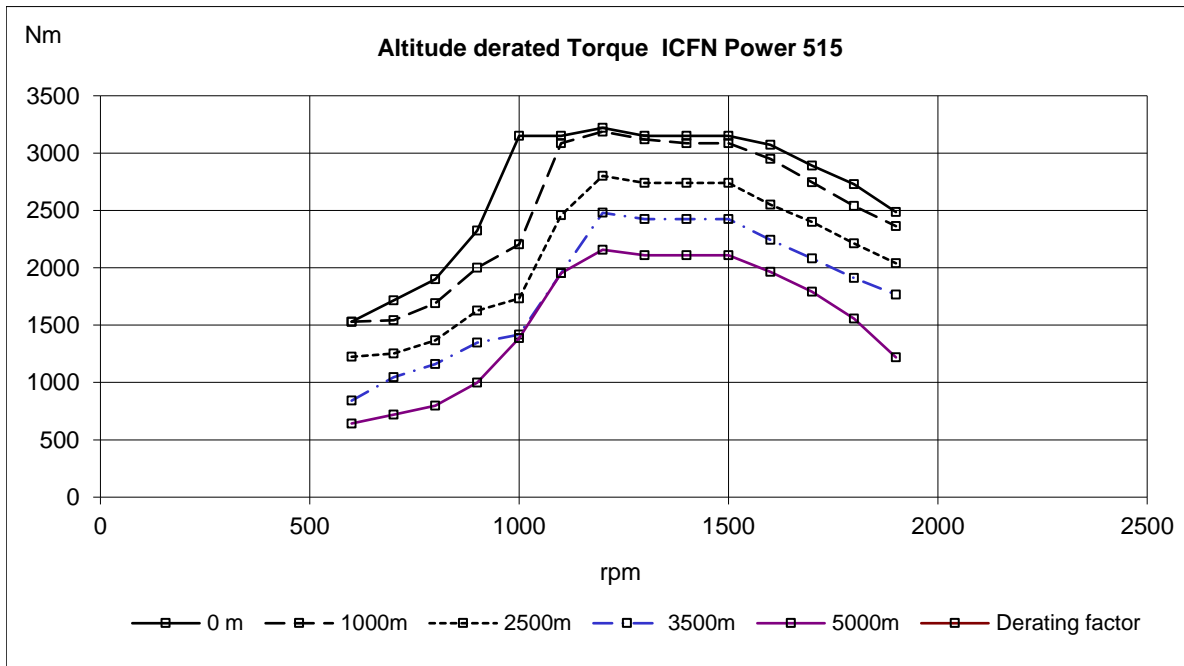
Electrical system

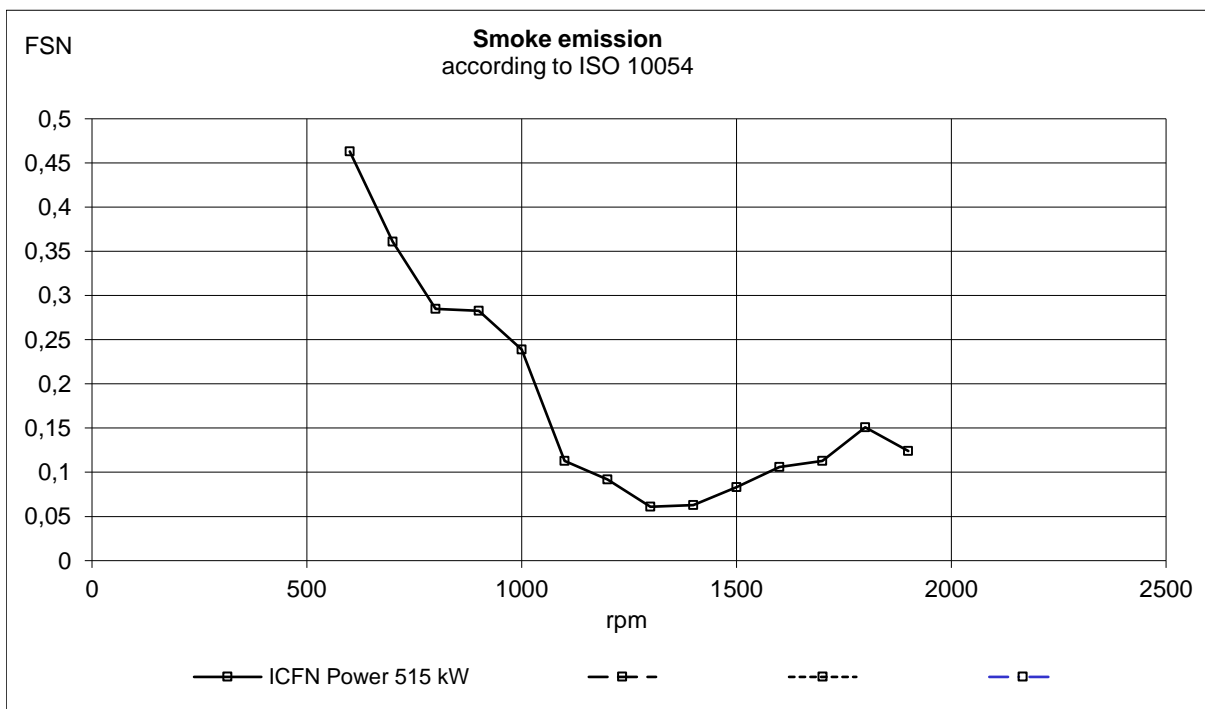
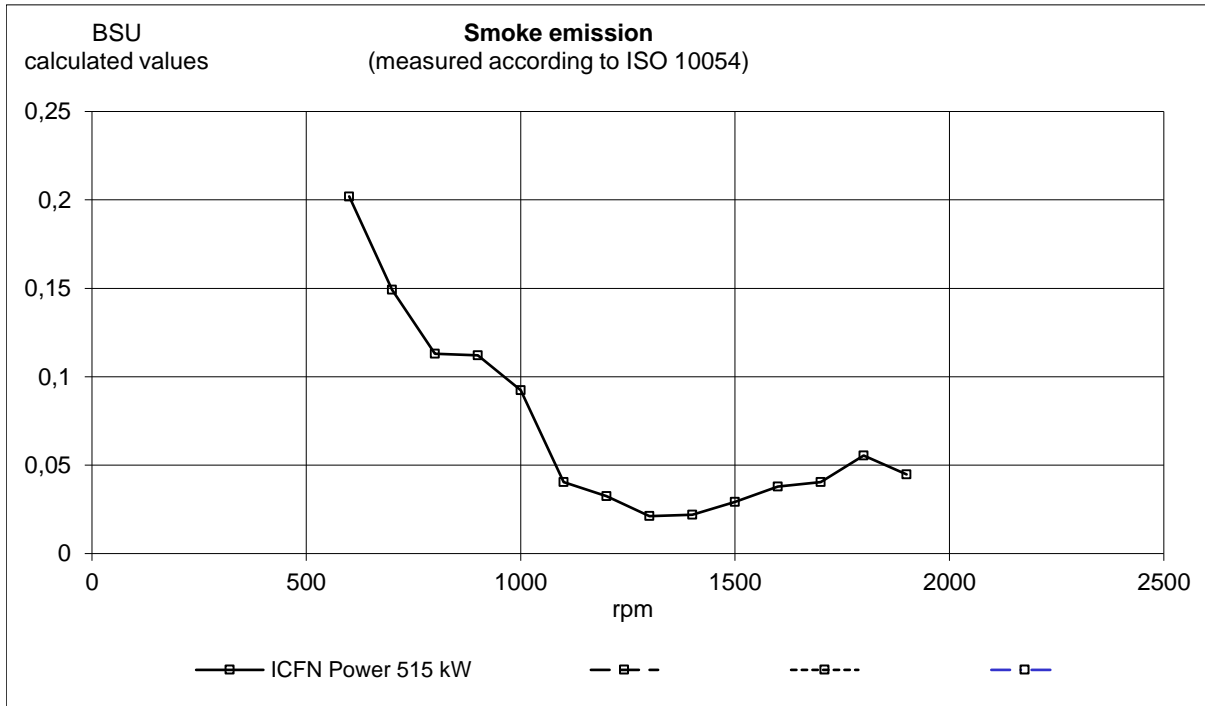
Voltage and type		24 V	
Alternator:	make	Bosch	
	output	80	
	tacho output	Hz/alternator rev.	6
	drive ratio	3.9:1	
Starter motor:	make	Melco	
	type	105P70	
	output	kW	7
		hp	9,5
Number of teeth on:	flywheel	153	
	starter motor	12	
Max wiring resistance main circuit		mΩ	2
Cranking current at +20°C		A	280
Crank engine speed at 20°C		rpm	150
Starter motor battery capacity	max	Ah/A	2*225
	min at +5°C	Ah/A	-
Inlet manifold heater (at 20 V)		kW	4
Power relay for the manifold heater		A	1

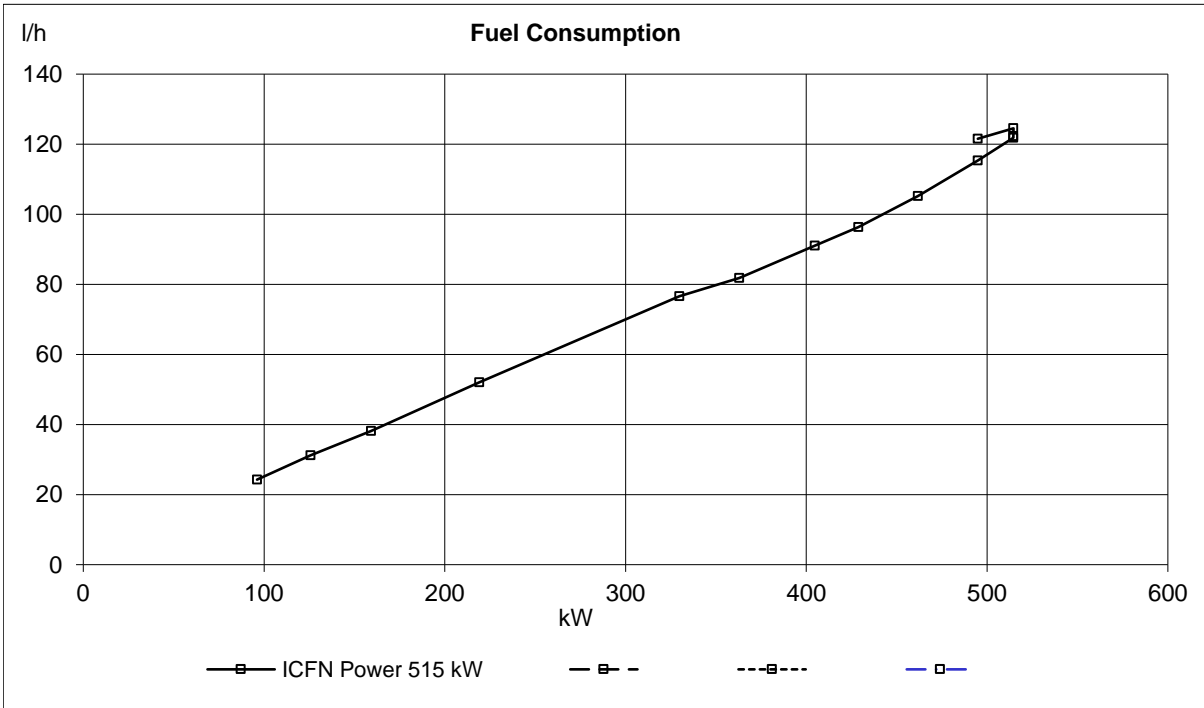
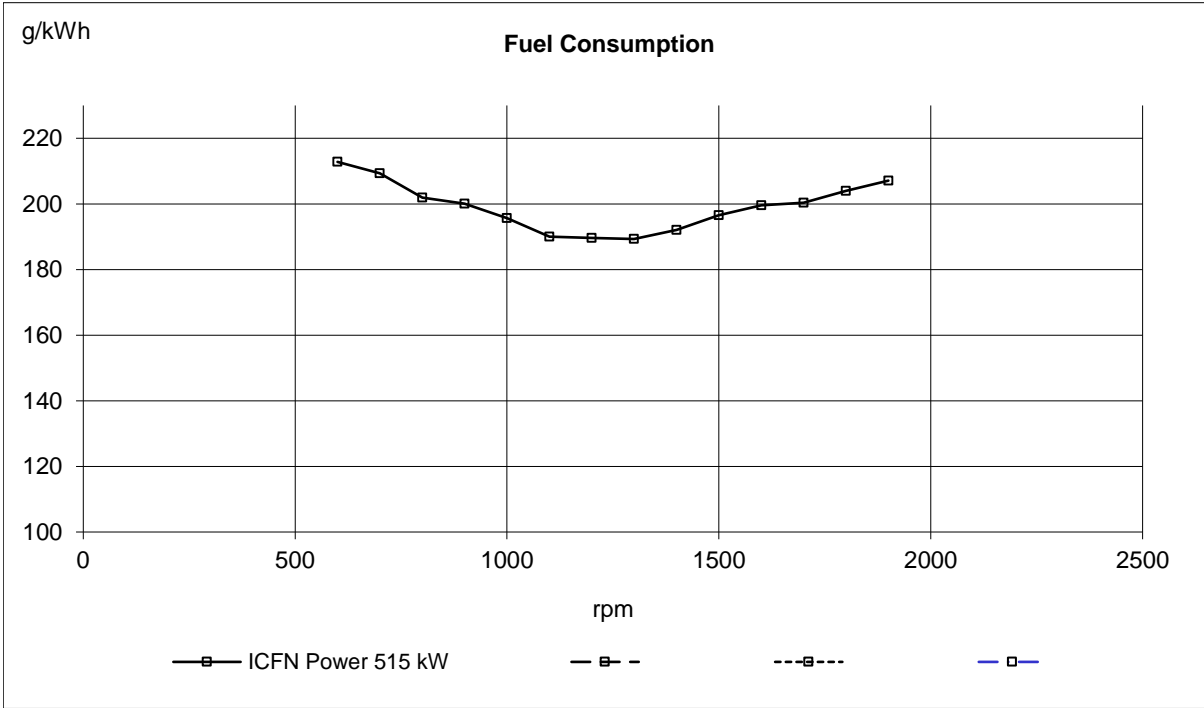
Power take off

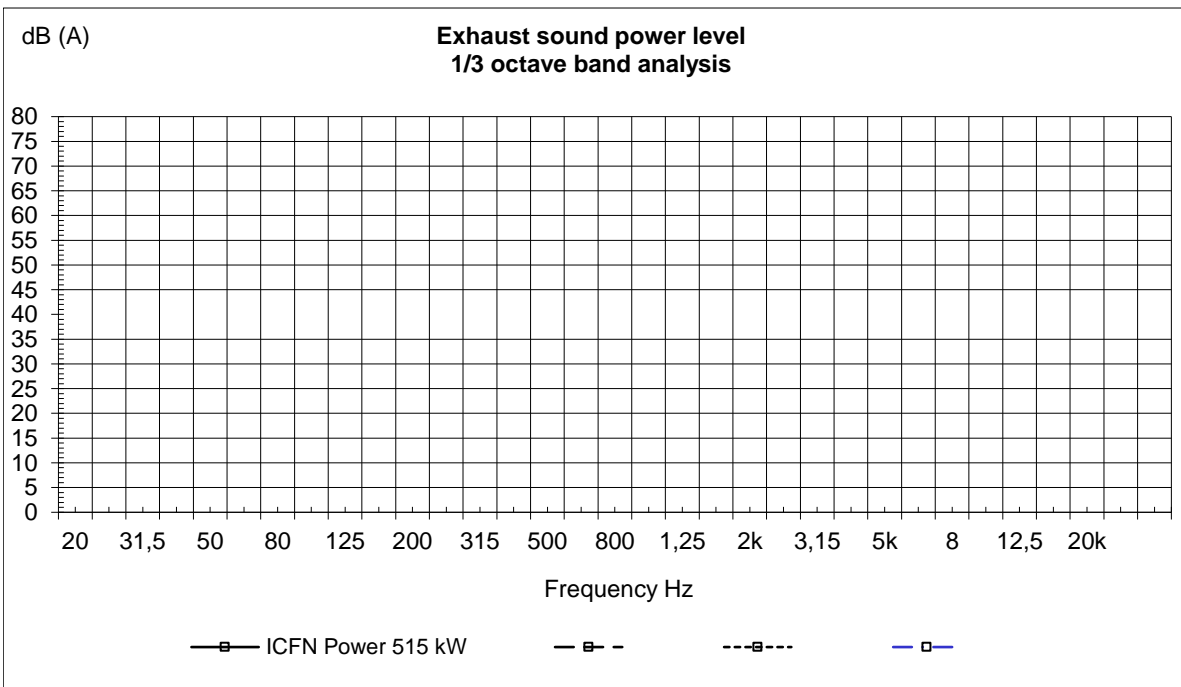
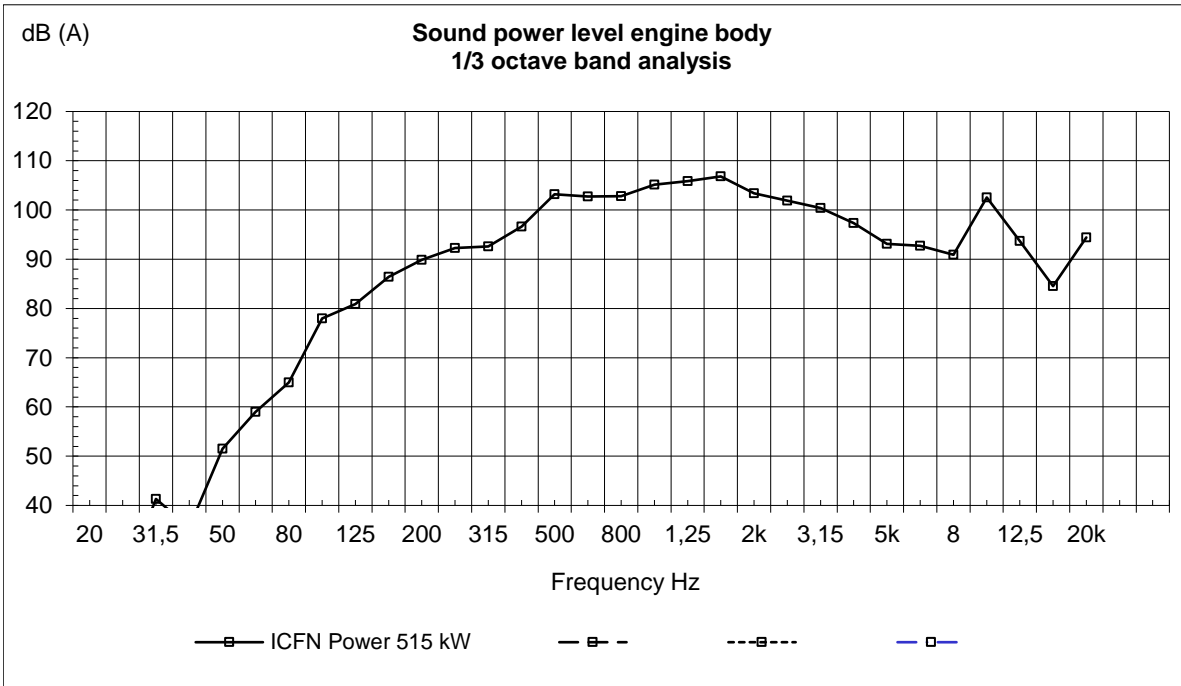
		rpm	1200	1500	1800	1900
Front end in line with crank shaft max:		Nm lbf ft	TBD			
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	26	33	40	
		hp	35	45	54	
	max down	kW	60	75	90	
		hp	82	102	122	
	max right	kW	26	33	40	
		hp	35	45	54	
Timing gear at compressor PTO max:		Nm lbf ft	300 221			
Speed ratio direction of rotation viewed from flywheel side			1.31:1/ ccw			
Timing gear at servo pump max:		Nm lbf ft	100 74			
Speed ratio direction of rotation viewed from flywheel side			1,75:1 / ccw			
Max allowed bending moment in flywheel housing		Nm lbf ft	15000 11063			
Max. rear main bearing load		N lbf	5000 1124,0			

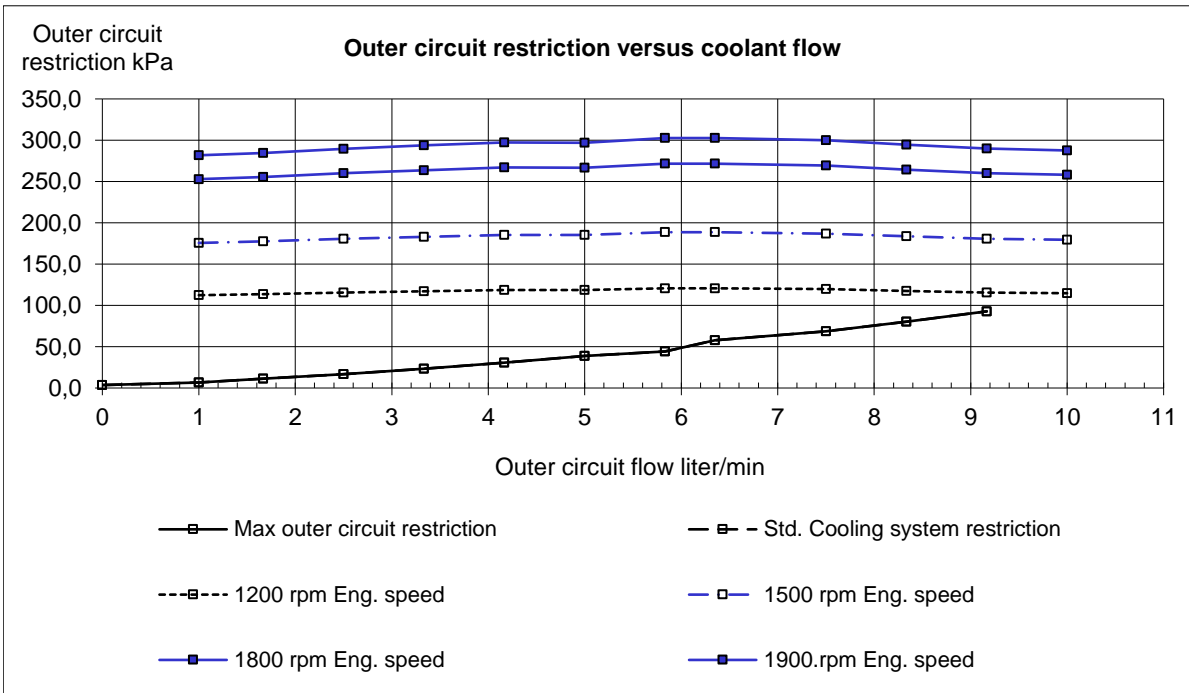
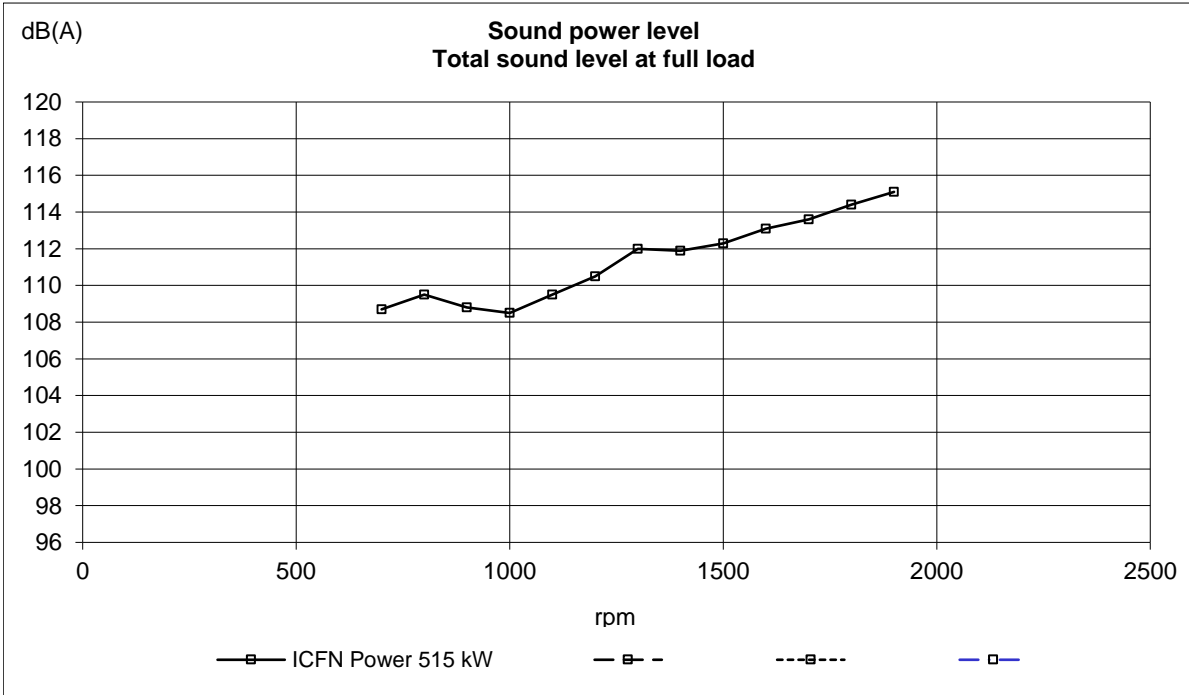


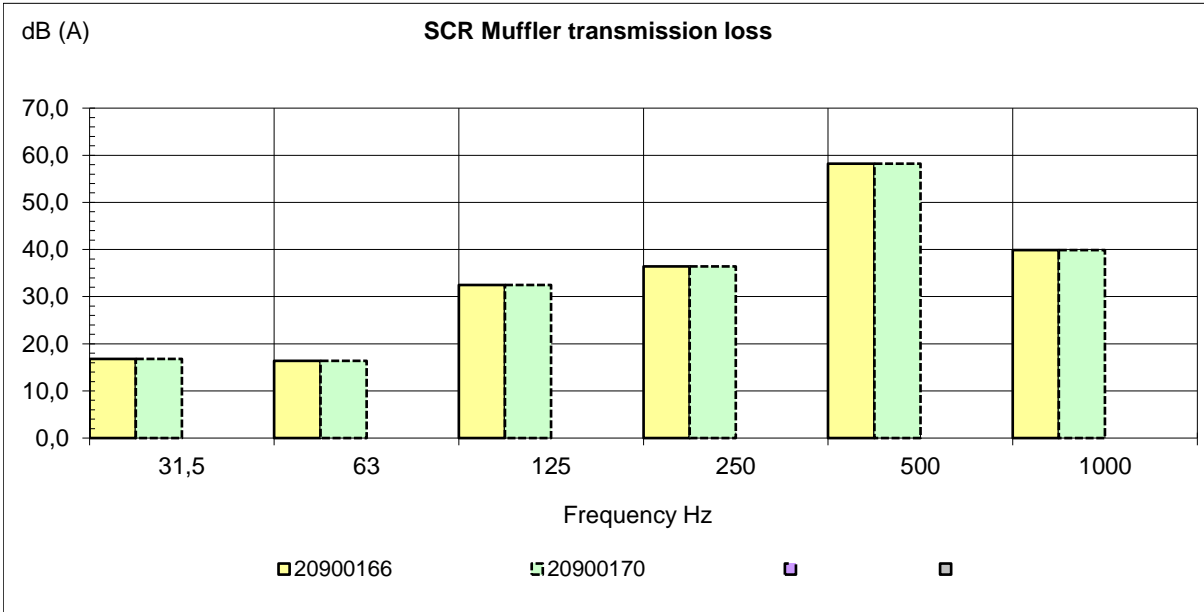




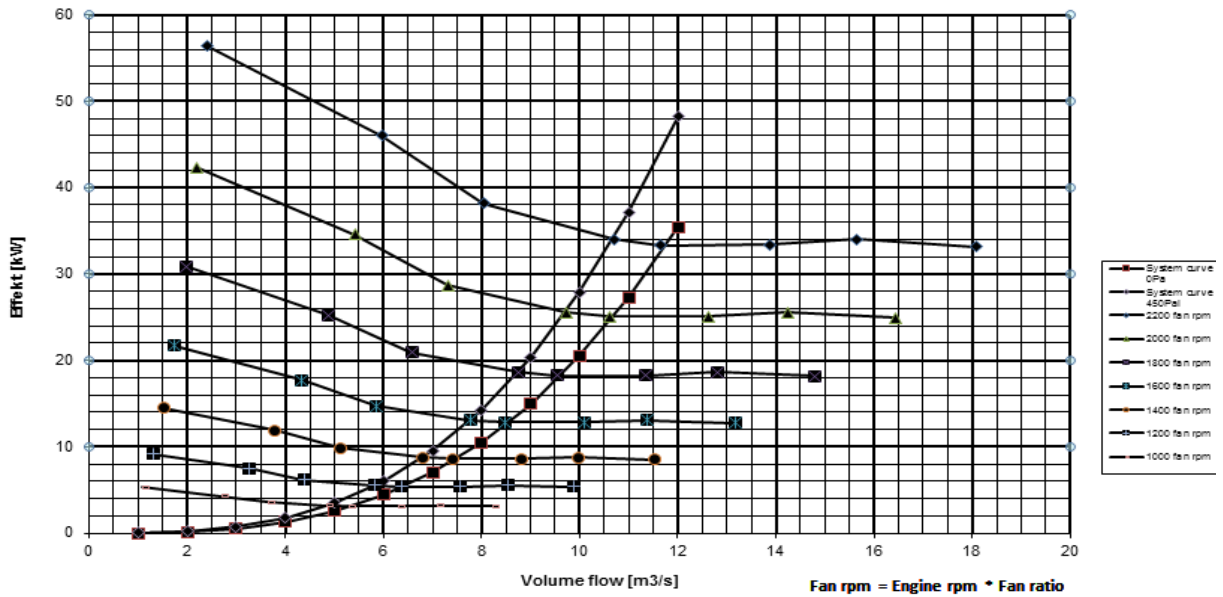








Fan power 890mm Pusher fan



Fan power 890mm Puller fan

