

VOLVO PENTA	Document No	Issue Index
TAD1662VE	21617501	05

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

Performance				rpm	1200	1500	1800	1900
ICFN Power 515 kW		without fan		kW	405	495	515	495
		with fan		hp	551	673	700	673
Torque at:		890 mm ICFN Power 515 kW		kW	See diagram for fan power consumption			
				hp				
				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			
				lbft 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)

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

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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 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	0
System return flow at max. speed	liter/h US gal/h	25,0 6,6
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
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 cfm	27,1 957	35,9 1268	37,9 1338	38 1342
 See front page for important information Max allowable air intake restriction including piping			kPa psi		5 0,7		
Heat rejection to exhaust at:	ICFN Power 515 kW		kW BTU/min	267 15184	342 19449	388 22065	384 21838
Exhaust gas temperature after turbine at:	ICFN Power 515 kW		°C °F	473 883	475 887	534 993	515 959
 See front page for important information 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
 See front page for important information Max allowable temperature drop between turbine and SCR muffler inlet.			°C °F	10 18	10 18	10 18	10 18
SCR muffler pressure drop			kPa psi	20 2,9	26 3,8	28 4,1	29 4,2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	ICFN Power 515 kW		m³/min cfm	62,4 2204	76,8 2712	82,9 2928	82,9 2928
Exhaust gas smoke	ICFN Power 515 kW		*Bosch	0,032	0,029	0,055	0,044

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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			m²	1,42			
			foot²	15,28			
HD radiator core area			m²	0,87			
			foot²	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. 1,42m² radiator with hoses		liter	37			
	Pusher syst. Core thickness 63mm		US gal	9,8			
	STD.1,42m² radiator with hoses		liter	30			
	Puller syst. Core thickness 41mm		US gal	7,9			
	HD 0,87m² 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			

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Charge air cooler system		rpm	1200	1500	1800	1900
Heat rejection to charge air cooler	ICFN Power 515 kW	kW	75	114	129	128
		BTU/min	4265	6483	7336	7279
Charge air mass flow	ICFN Power 515 kW	kg/s	0,54	0,72	0,76	0,76
Charge air inlet temp.	ICFN Power 515 kW	°C	176	206	218	214
(Charge air temp after turbo compressor)		°F	349	403	424	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	40	50	50	50
		°F	104	122	122	122
 See front page for important information Maximum pressure drop over charge air cooler incl. Piping (throttle not included)						
		kPa	14			
		psi	2,03			
Charge air pressure at rated power		kPa	196			
(After charge air cooler)		psi	28,43			
Standard charge air cooler core area		m²	1,3			
		foot²	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	515 700	63	146	9,9	349,3	450	0,065
		65	148	10,0	352,8	300	0,044
		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	515 700	61	141	9,0	319,2	450	0,065
		62	143	9,3	329,8	300	0,044
		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	515 700	59	137	8,0	281,8	450	0,065
		60	139	8,4	294,9	300	0,044
		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	515 700	55	132	7,2	253,6	450	0,065
		56	134	7,5	265,2	300	0,044
		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	515 700	55	130	7,0	247,6	450	0,065
		56	132	7,4	259,9	300	0,044
		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

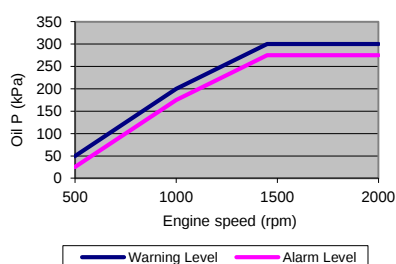
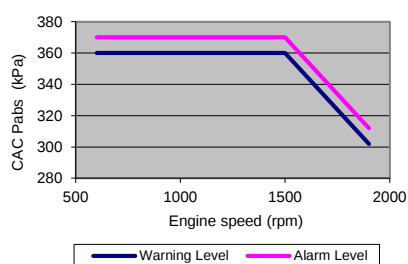
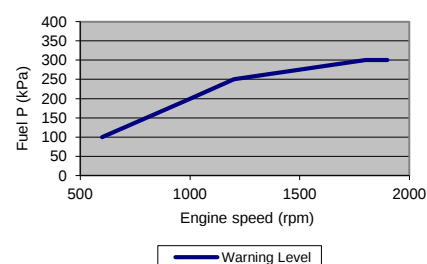
Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1800	515 700	61	142	8,4	295,5	400	0,058
		63	146	8,9	314,5	300	0,044
		65	149	9,3	329,8	200	0,029
		67	152	9,8	346,6	100	0,015
		68	154	10,3	364,1	0	

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	Low idle	-	100 kPa		-	
pressure	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			

Oil pressure limits

Charge air pressure limits

Fuel pressure limit


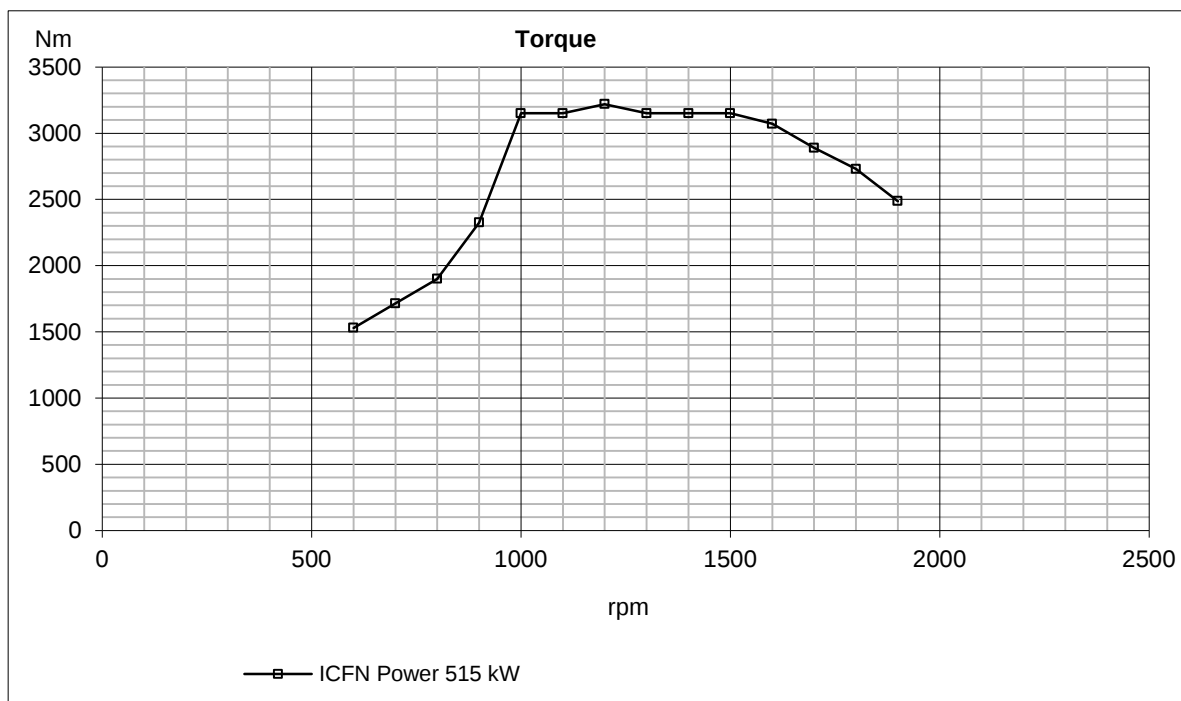
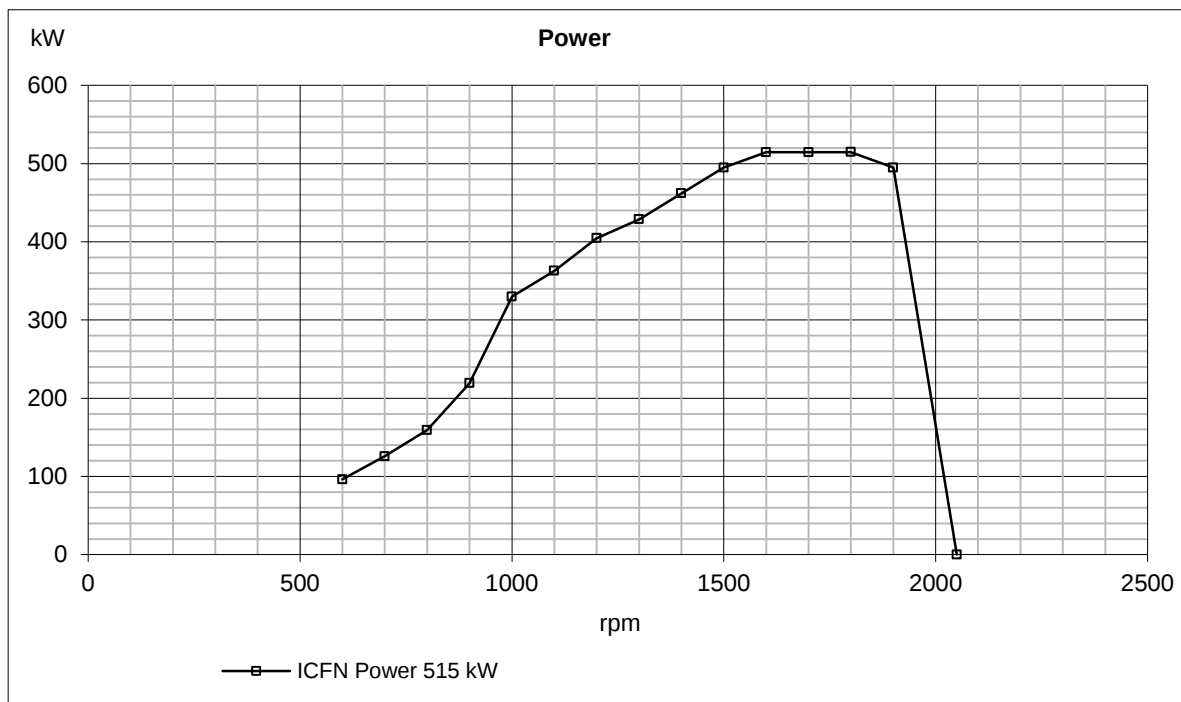
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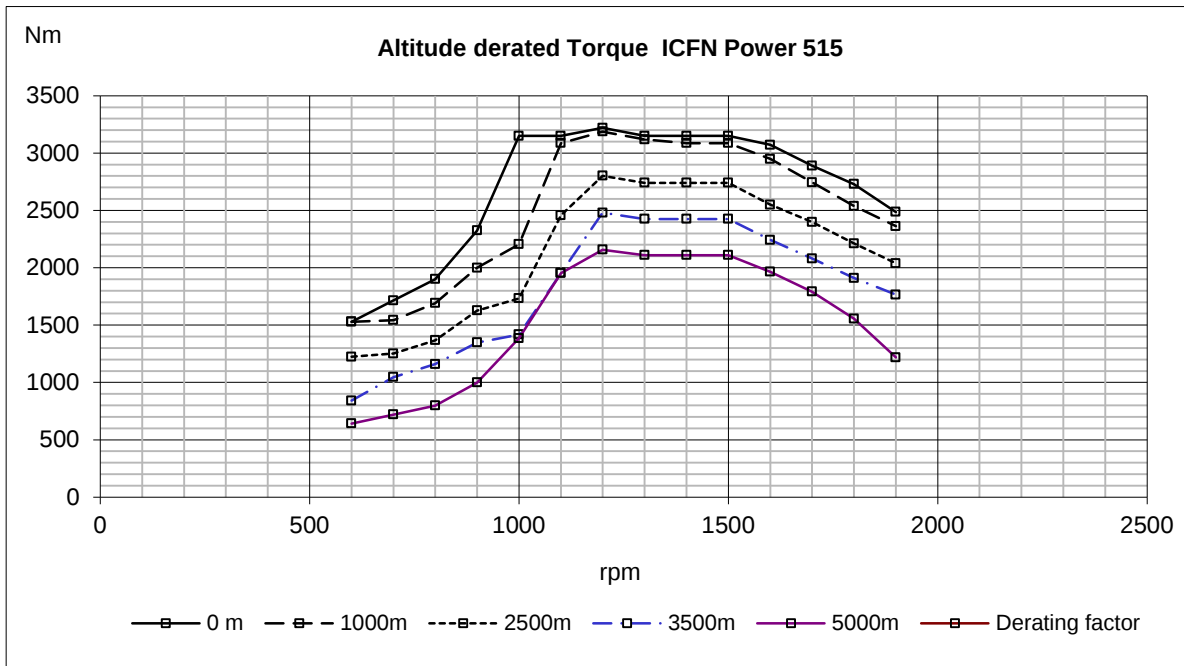
Electrical system

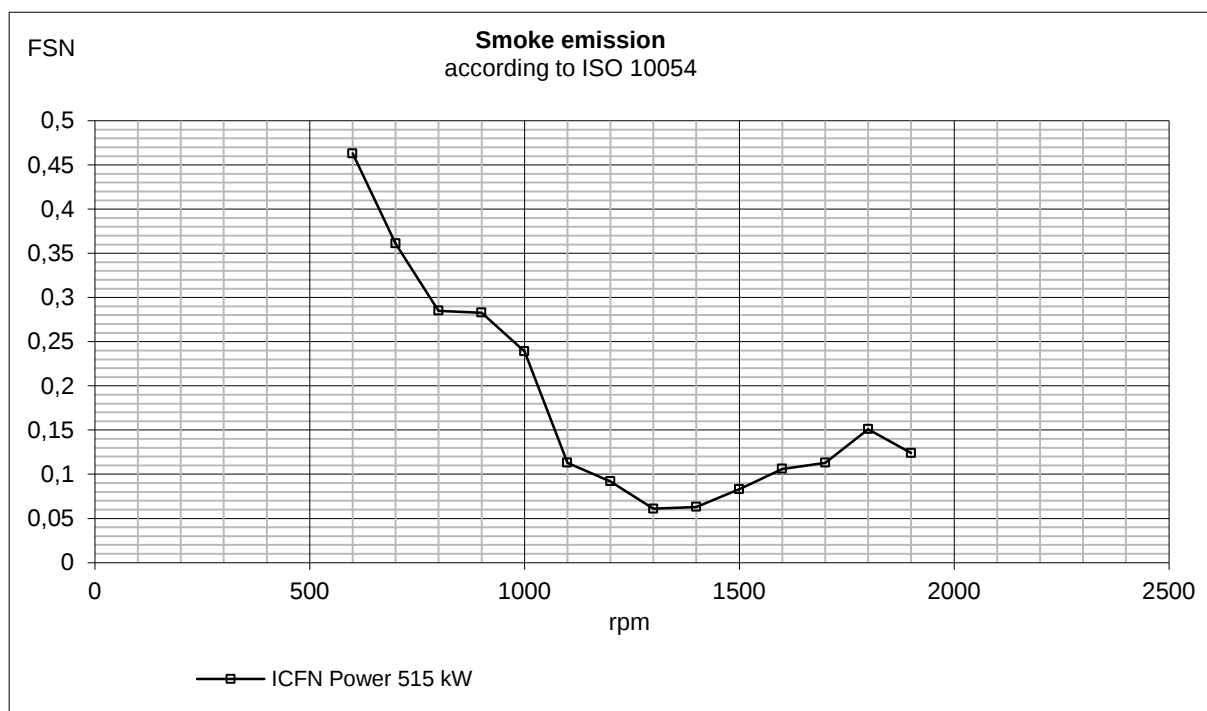
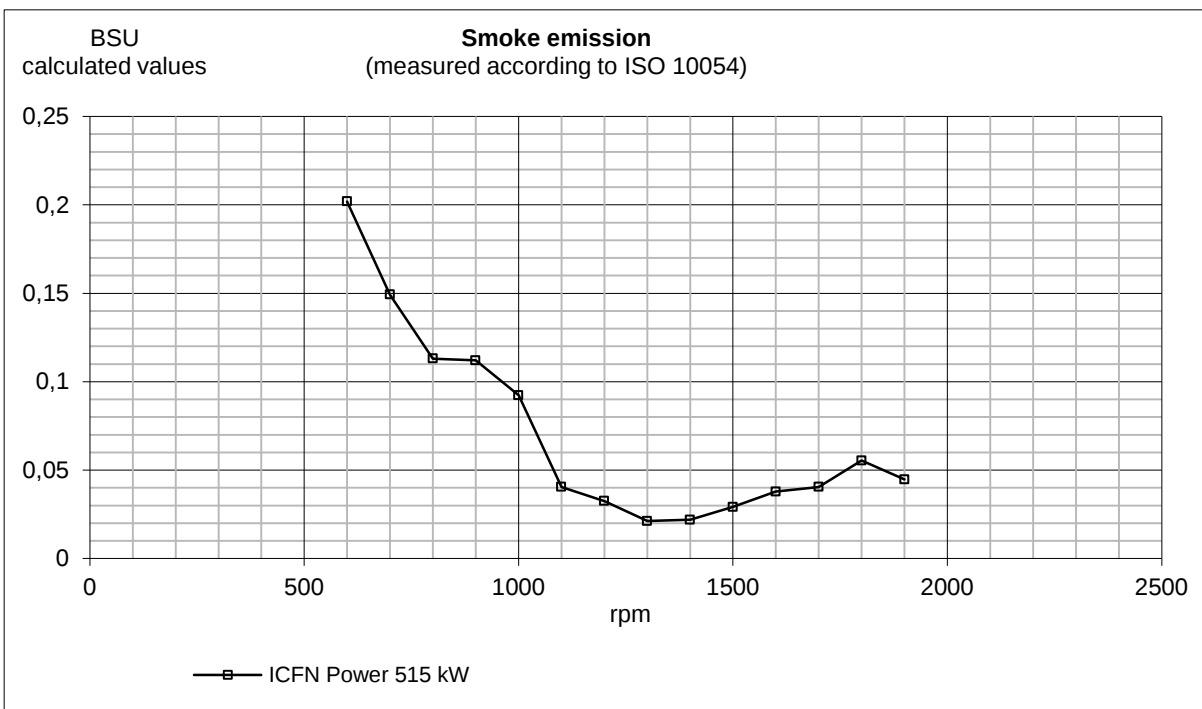
Voltage and type			24 V
Alternator:	make		Bosch
	output	A	80
	tacho output	Hz/alternator rev.	6
	drive ratio		3.9:1
Starter motor:	make		Melco
	type		105P70
	output	kW hp	7 9,5
	Number of teeth on:	flywheel starter motor	153 12
Max wiring resistance main circuit		mΩ	2
Cranking current at +20°C		A	280
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

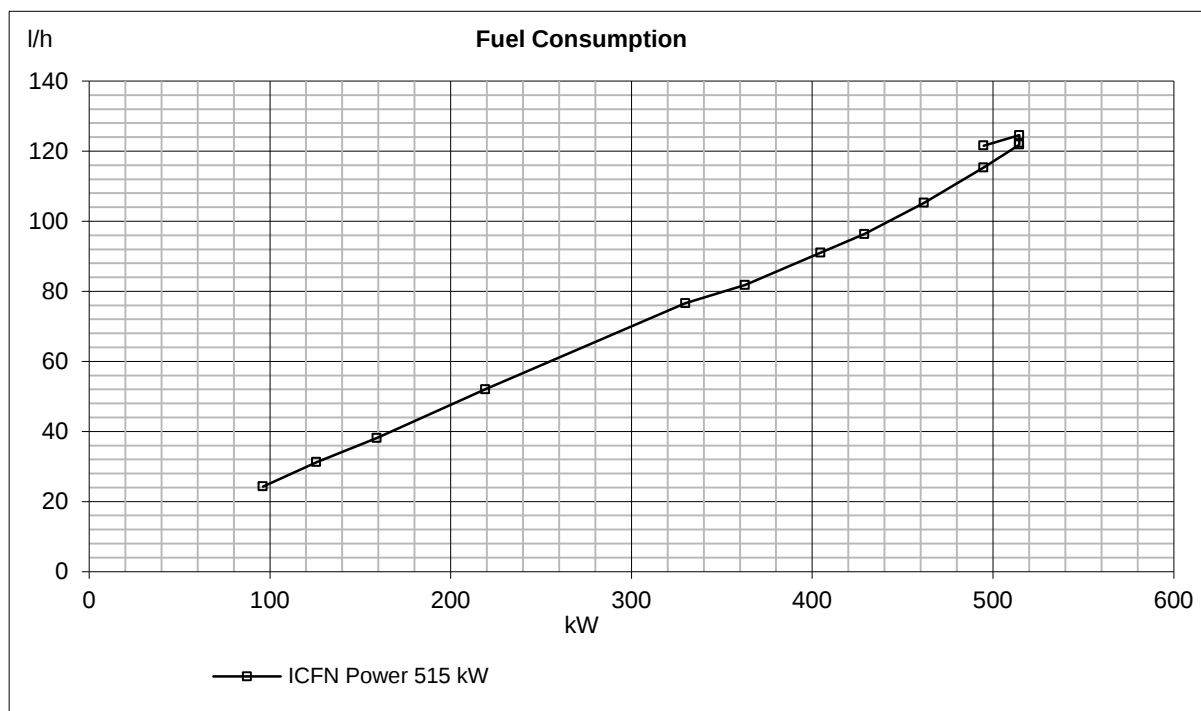
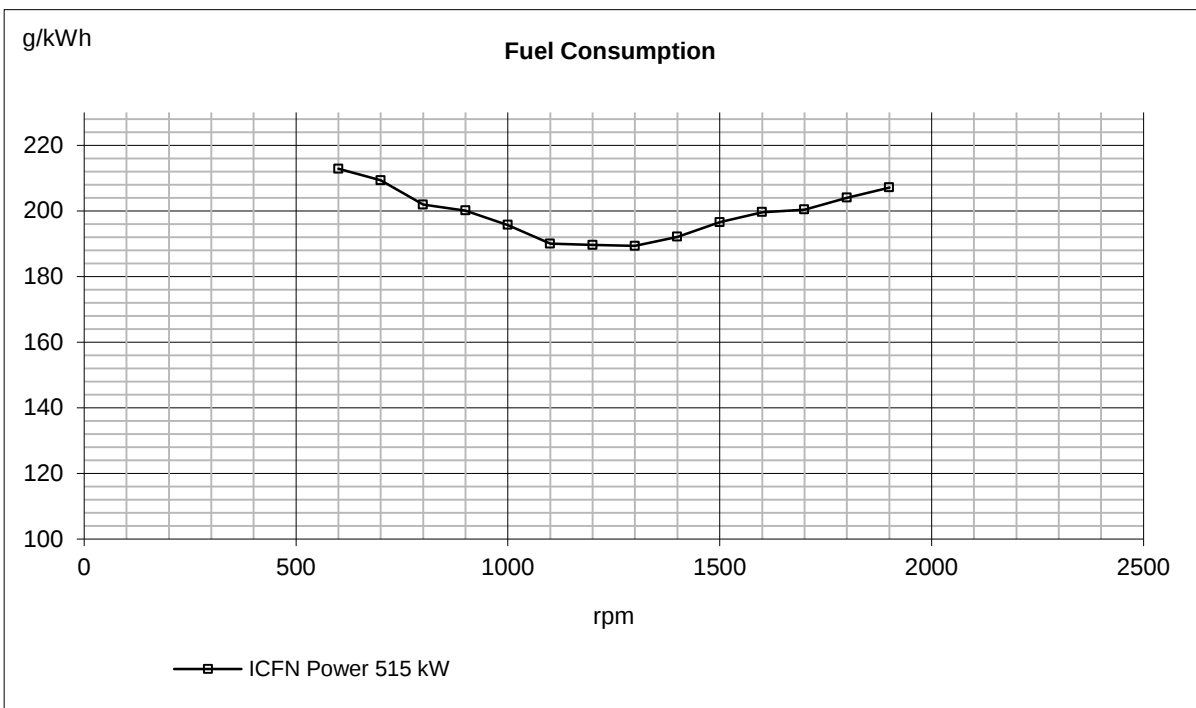
Power take off

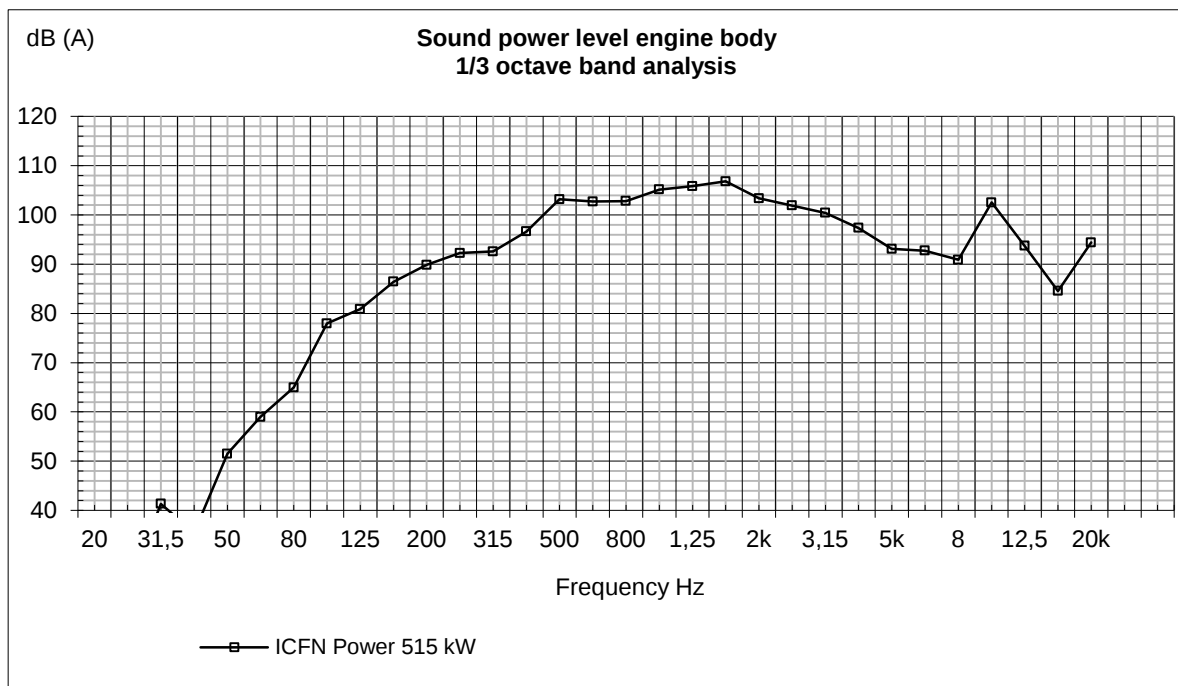
Power take off		rpm	1200	1500	1800	1900
Front end in line with crank shaft max:		Nm lbf ft	TBD			
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	26	33	40	
		hp	35	45	54	
	max down	kW	60	75	90	
		hp	82	102	122	
	max right	kW	26	33	40	
		hp	35	45	54	
Timing gear at compressor PTO max:		Nm lbf ft	600 443			
Speed ratio direction of rotation viewed from flywheel side			1.31:1/anti clockwise			
Max allowed bending moment in flywheel housing		Nm lbf ft	15000 11063			
Max. rear main bearing load		N lbf	5000 1124.0			

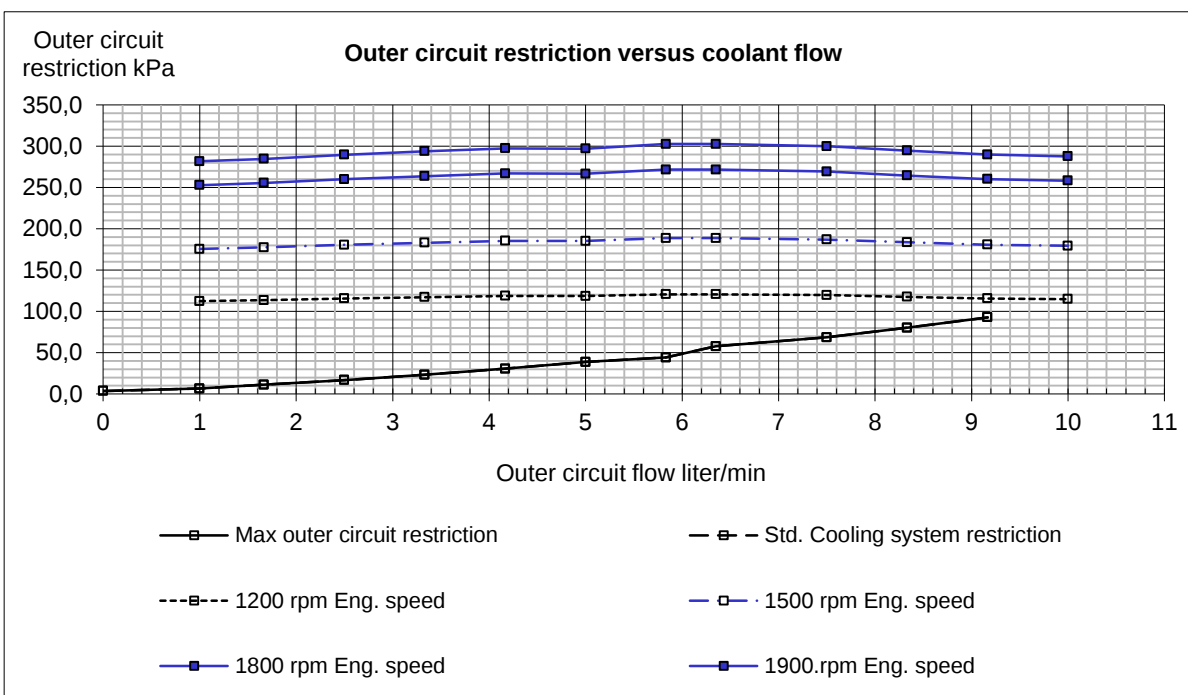
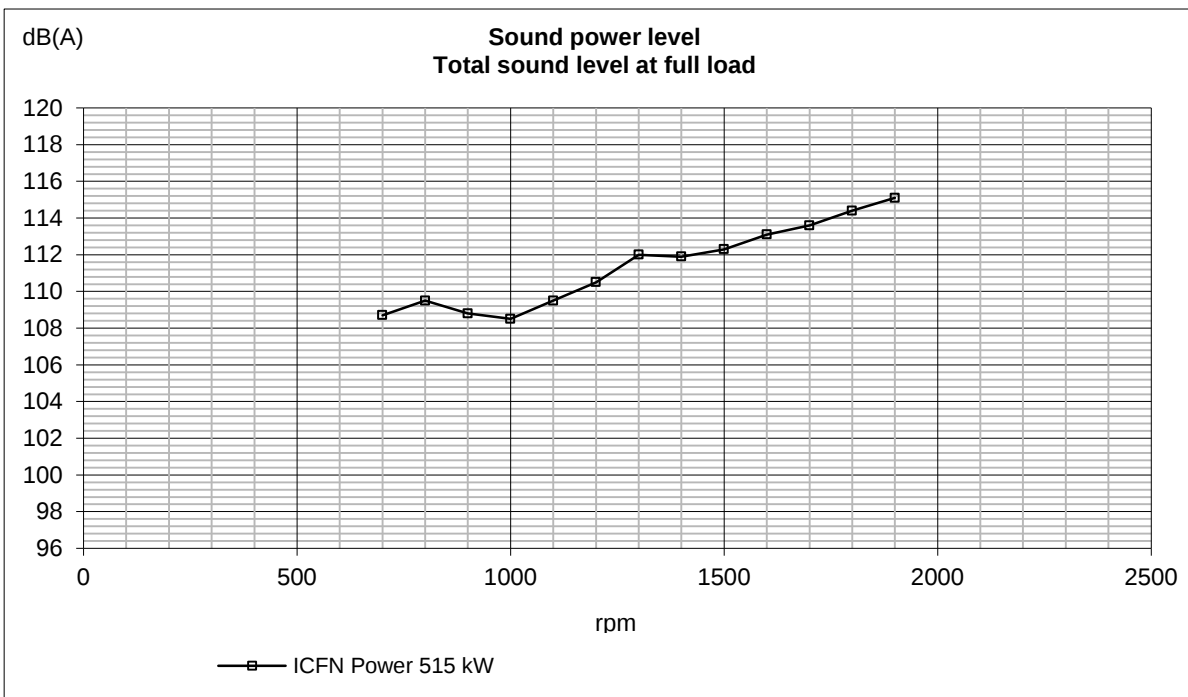


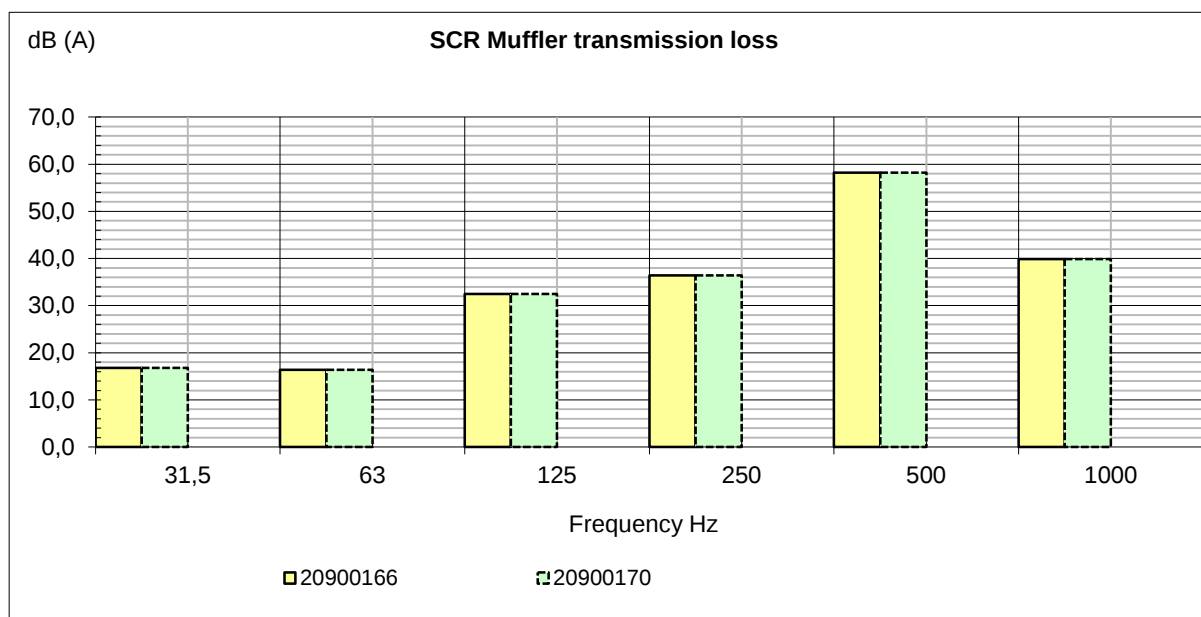




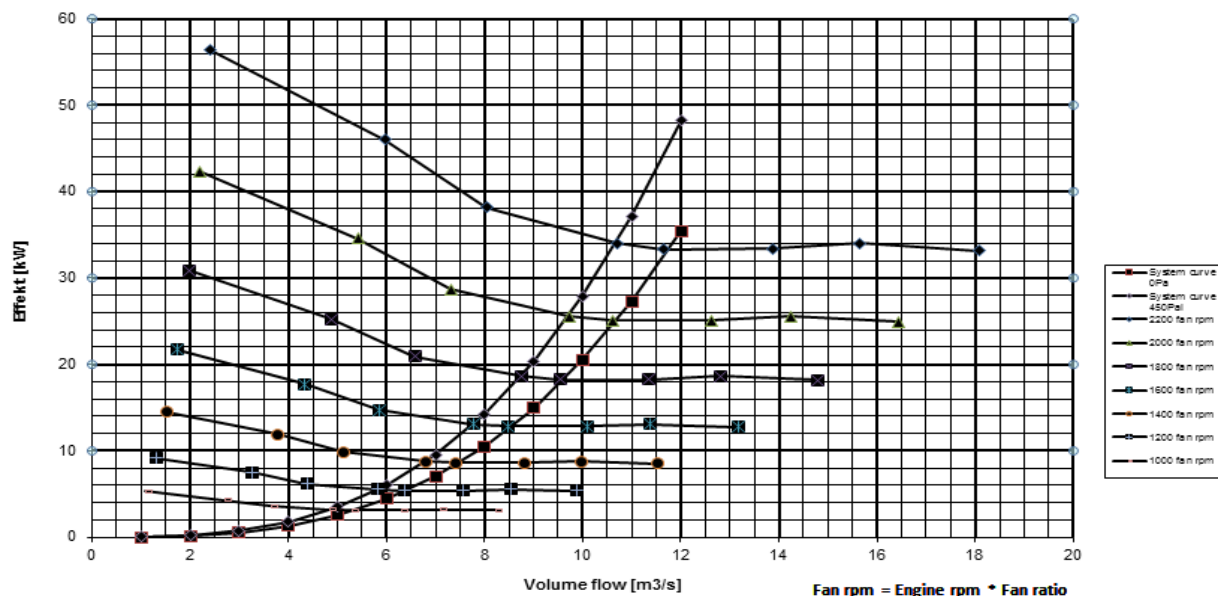








Fan power 890mm Pusher fan



Fan power 890mm Puller fan

