


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
IFN Power	450 kW	without fan		kW	366	450	450	424
				hp	498	612	612	577
		with fan		kW	See diagram for fan power consumption			
		890 mm		hp				
ICFN Power	450 kW	without fan		kW	366	450	450	424
				hp	498	612	612	577
		with fan		kW	See diagram for fan power consumption			
		890 mm		hp				
Torque at:	IFN Power 450 kW			Nm	2913	2865	2387	2131
				lbf ft	2148	2113	1761	1572
		ICFN Power 450 kW		Nm	2913	2865	2387	2131
				lbf ft	2148	2113	1761	1572
Max torque at engine speed	ICFN Power	1200 rpm		Nm	2913			
				lbf ft	2148			
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 450 kW			MPa	2,27	2,23	1,86	1,66
				psi	329	324	270	241
Max combustion pressure at:	IFN Power 450 kW			MPa	16,4	17,4	16,8	16,2
				psi	2378	2523	2436	2349
Total mass moment of inertia, J (mR ²) (not including flywheel)				kgm ² lbf ²	4,1 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			

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:	IFN Power 450 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

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	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)	IFN Power 450 kW		m³/min cfm	25,1 886	32,0 1130	34,5 1218	35,1 1240
 See front page for important information							
Max allowable air intake restriction including piping			kPa psi			5 0,7	
Heat rejection to exhaust at:	IFN Power 450 kW		kW BTU/min	249 14183	312 17766	353,1 20080	334,4 19017
Exhaust gas temperature after turbine at:	IFN Power 450 kW		°C °F	467 873	458 856	479 894	452 846
 See front page for important information							
Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm			kPa psi	21 3,0	28 4,1	32 4,6	33 4,8
 See front page for important information			°C	10	10	10	10
Max allowable temperature drop between turbine and SCR muffler inlet.			°F	18	18	18	18
SCR muffler pressure drop			kPa psi	18 2,6	24 3,5	26 3,8	27 3,9
Exhaust gas flow at: (temp and pressure after turbine at the corresponding	IFN Power 450 kW		m³/min cfm	59,9 2115	71,3 2518	77,5 2737	75,6 2670
Exhaust gas smoke	IFN Power 450 kW		*Bosch Units	0,026	0,027	0,044	0,034

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Cooling system		rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	IFN Power 450 kW	kW	8	8	9	9
		BTU/min	455	455	512	512
Heat rejection to coolant at:	IFN Power 450 kW	kW	142	160	185	185
		BTU/min	8075	9099	10521	10521
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 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			
Coolant flow with standard system		l/s	4,5	5,8	7	7,3
		US gal/s	1,2	1,5	1,8	1,9
Minimum coolant flow		l/s	4,0	5,3	6,5	6,8
		US gal/s	1,1	1,4	1,7	1,8
Maximum outer circuit restriction incl. piping		kPa	85,0			
		psi	12,3			
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	IFN Power 450 kW	kW	58	78	88	90
		BTU/min	3298	4436	5004	5118
Charge air mass flow	IFN Power 450 kW	kg/s	0,50	0,61	0,66	0,67
	ICFN Power 450 kW	kg/s				
Charge air inlet temp. (Charge air temp after turbo compressor)	IFN Power 450 kW	°C	145	180	185	185
		°F	293	356	365	365
	ICFN Power 450 kW	°C				
		°F				
 See front page for important information Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)	IFN Power 450 kW	°C	39	47	50	50
		°F	102	117	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 (After charge air cooler)		kPa			177	
		psi			25,67	
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 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 hp	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1800	450	56	133	7,2	254,3	330	0,048
	612	57	135	7,4	261,3	295	0,043
		60	140	8	282,5	150	0,022
		61	142	8,2	289,6	100	0,015
		63	145	8,7	307,2	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 hp	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1800	450	58	136	7,6	268,4	320	0,046
	612	59	138	7,8	275,5	270	0,039
		61	142	8,2	289,6	170	0,025
		62	144	8,4	296,6	115	0,017
		64	147	8,9	314,3	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	450	69	156	9,9	349,3	450	0,065
	612	70	158	10,0	352,8	300	0,044
		71	159	10,5	372,2	150	0,022
		71	160	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	450	67	153	9,0	319,2	450	0,065
		68	155	9,3	329,8	300	0,044
	612	69	157	9,9	348,2	150	0,022
		70	158	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	450	65	150	8,0	281,8	450	0,065
		66	151	8,4	294,9	300	0,044
	612	68	154	8,9	313,2	150	0,022
		68	155	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	450	63	145	7,2	253,6	450	0,065
		64	146	7,5	265,2	300	0,044
	612	65	149	8,0	281,1	150	0,022
		66	150	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, pully 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	450	62	143	7,0	247,6	450	0,065
		63	145	7,4	259,9	300	0,044
	612	64	148	7,8	275,5	150	0,022
		65	149	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	450 612	69	156	10,7	378,1	0	
		67	153	10,1	357,8	100	0,015
		65	148	9,3	329,9	200	0,029
		62	144	8,7	307,2	300	0,044
		59	139	8,0	284,2	400	0,058

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

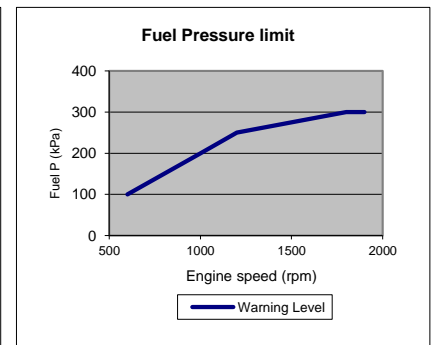
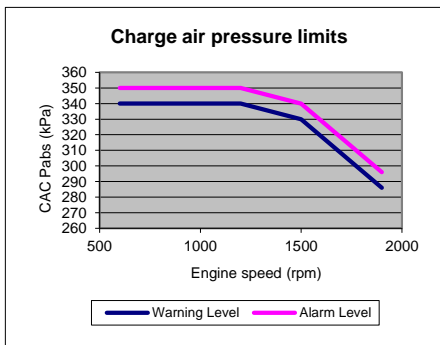
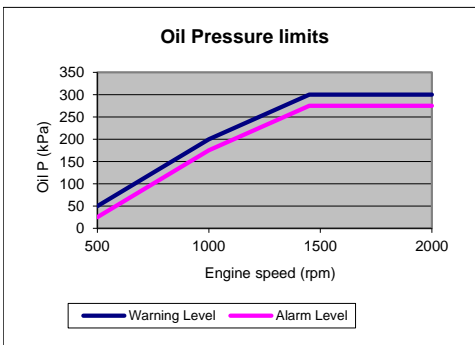
Engine speed rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1800	450 612	66	151	9,9	349,0	0	
		64	147	9,2	326,5	100	0,015
		62	143	8,7	306,8	200	0,029
		59	138	8,1	286,4	300	0,044
		57	134	7,6	268,9	400	0,058

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	

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			

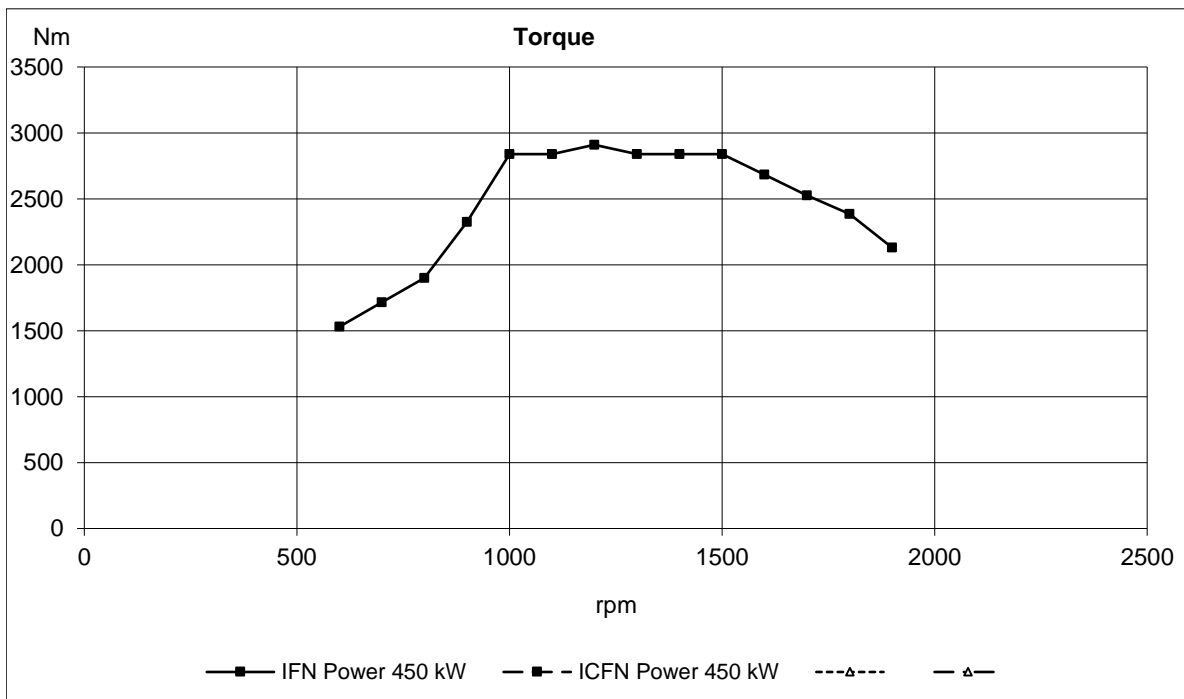
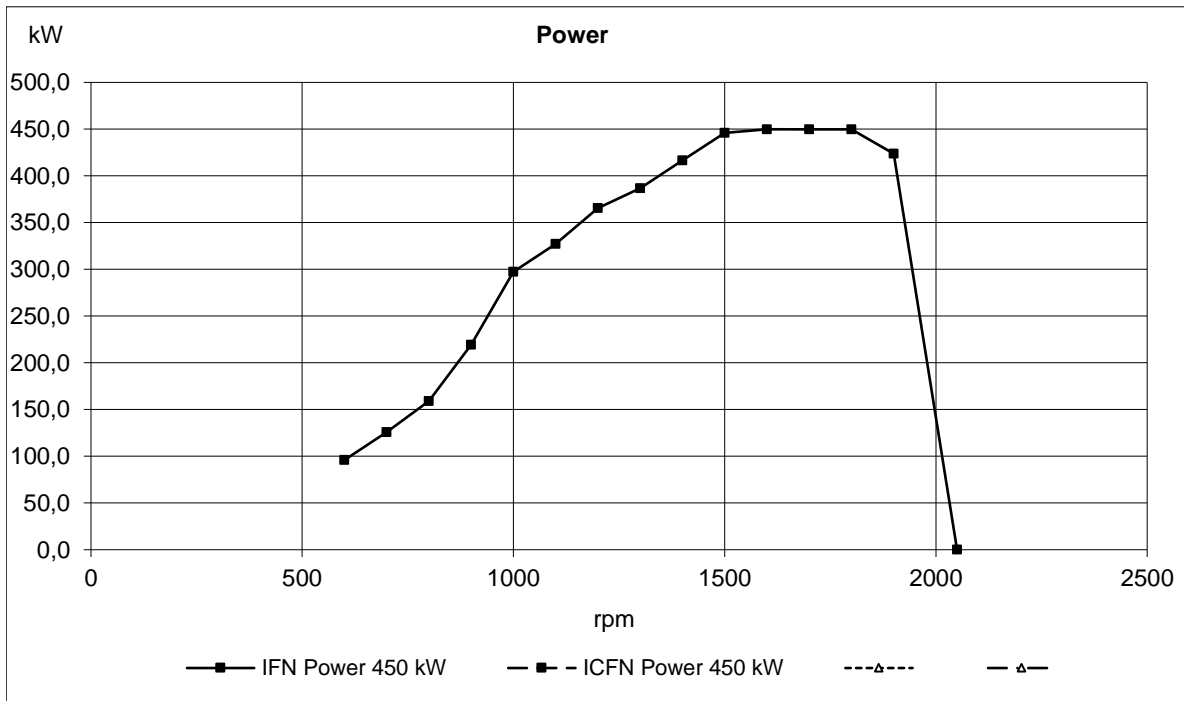


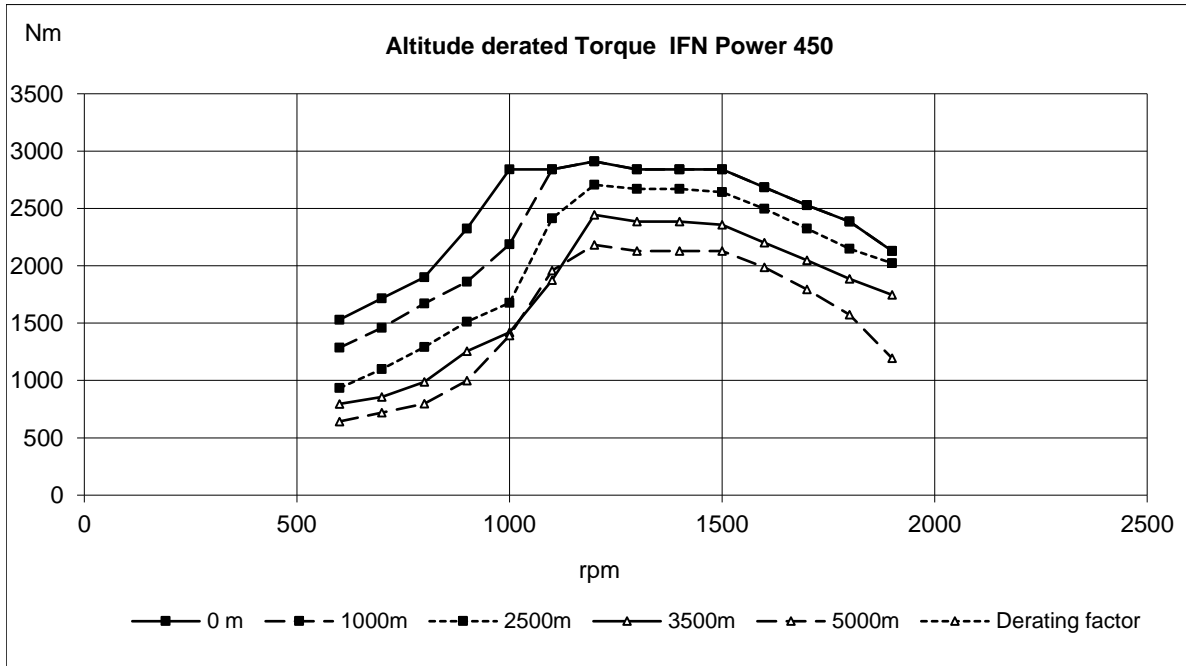
Electrical system

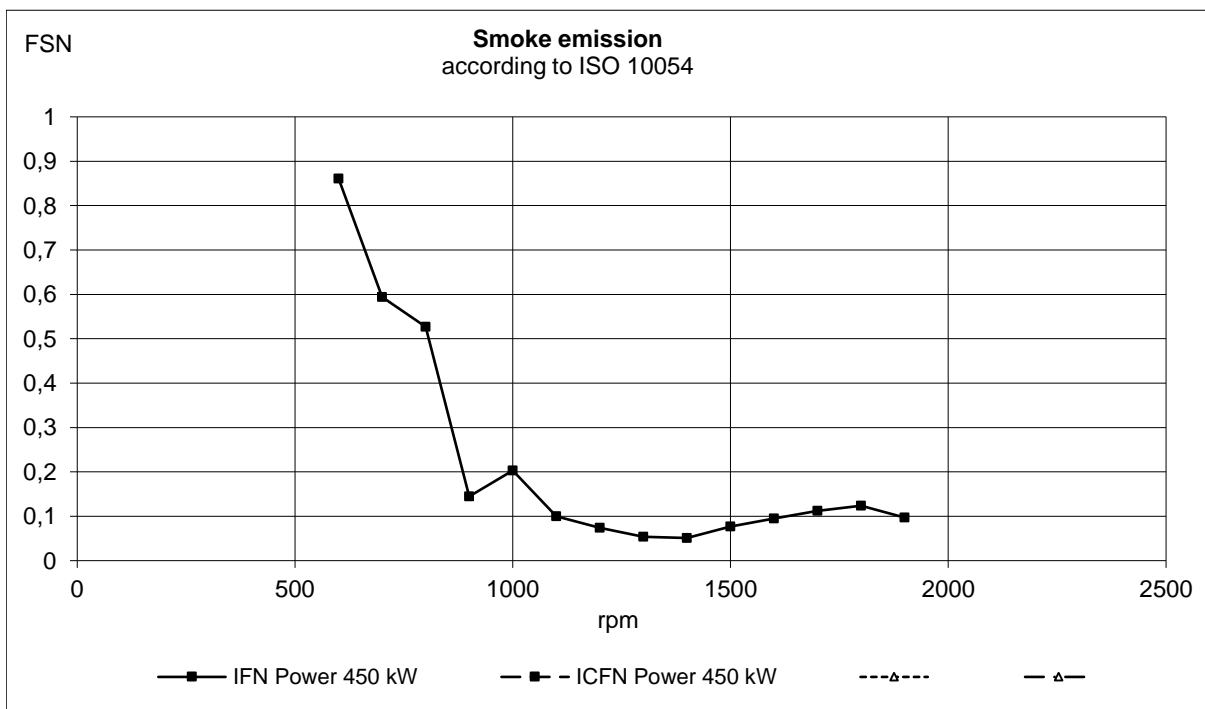
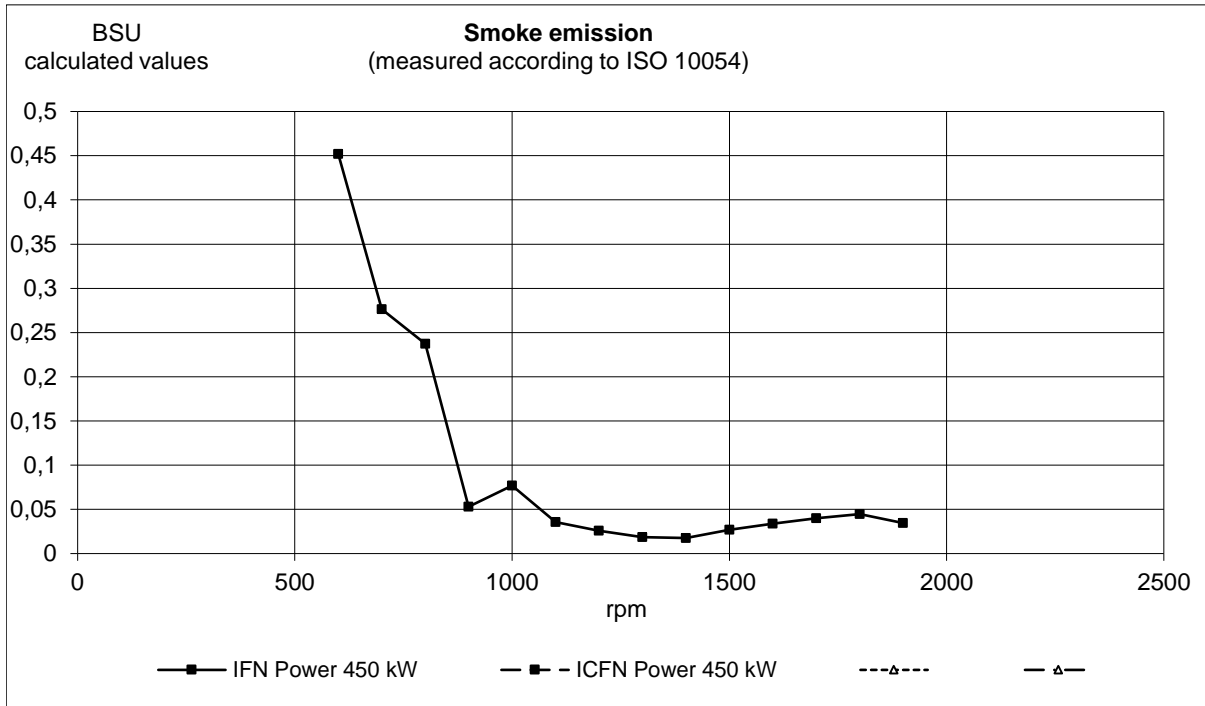
Voltage and type				24 V
Alternator:	make			Bosch
	output	A		80
	tacho output	Hz/alternator rev.		6
	drive ratio			3.9:1
Starter motor:	make			Melco
	type			105P70
	output	kW		7
		hp		9,5
Number of teeth on:	flywheel			153
	starter motor			12
Max wiring resistance main circuit		mΩ		2
Cranking current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

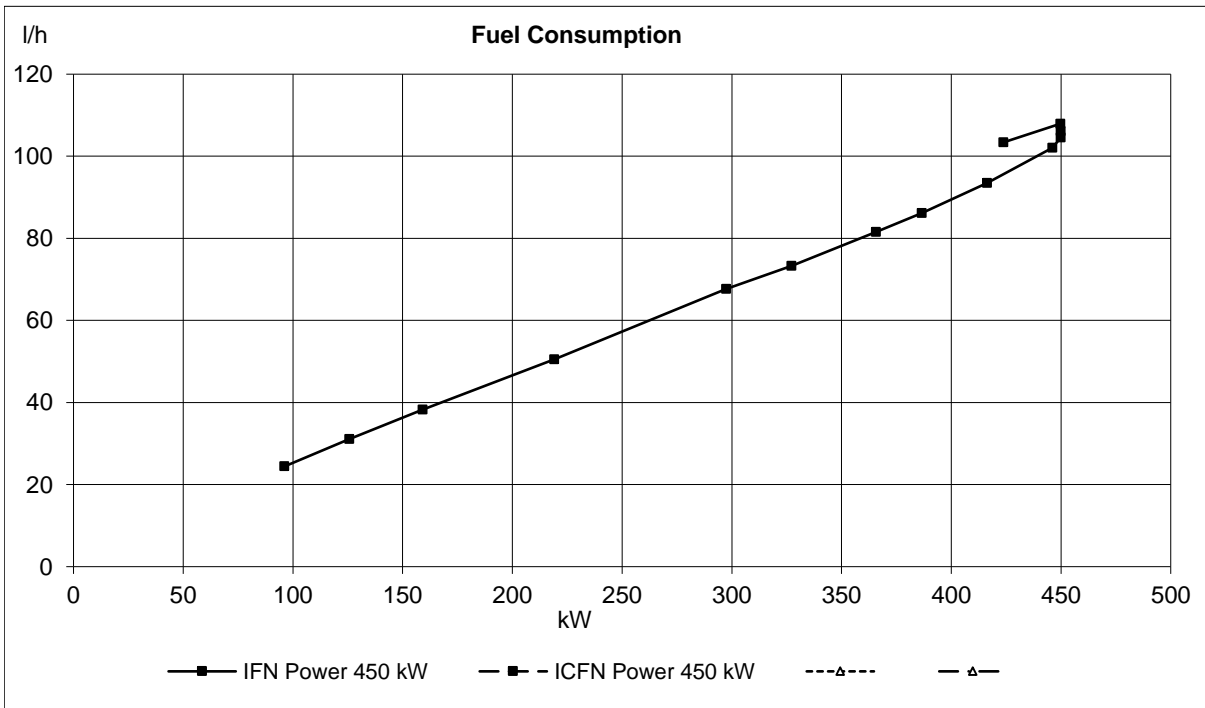
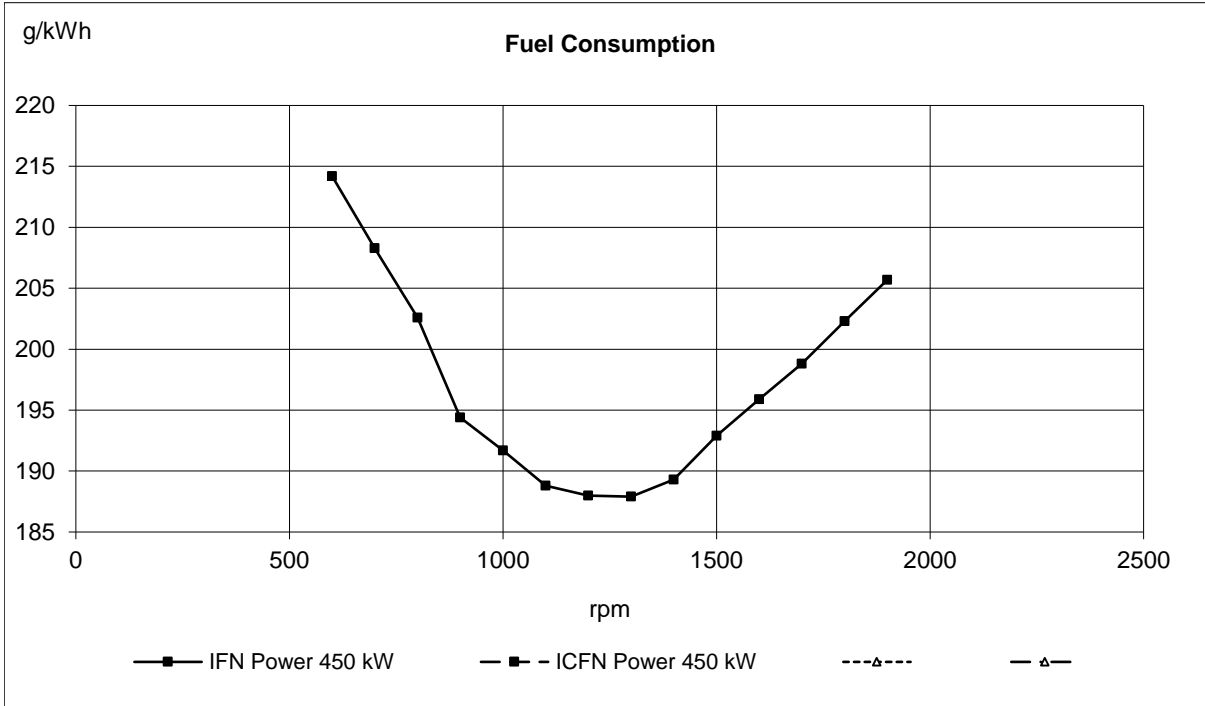
Power take off

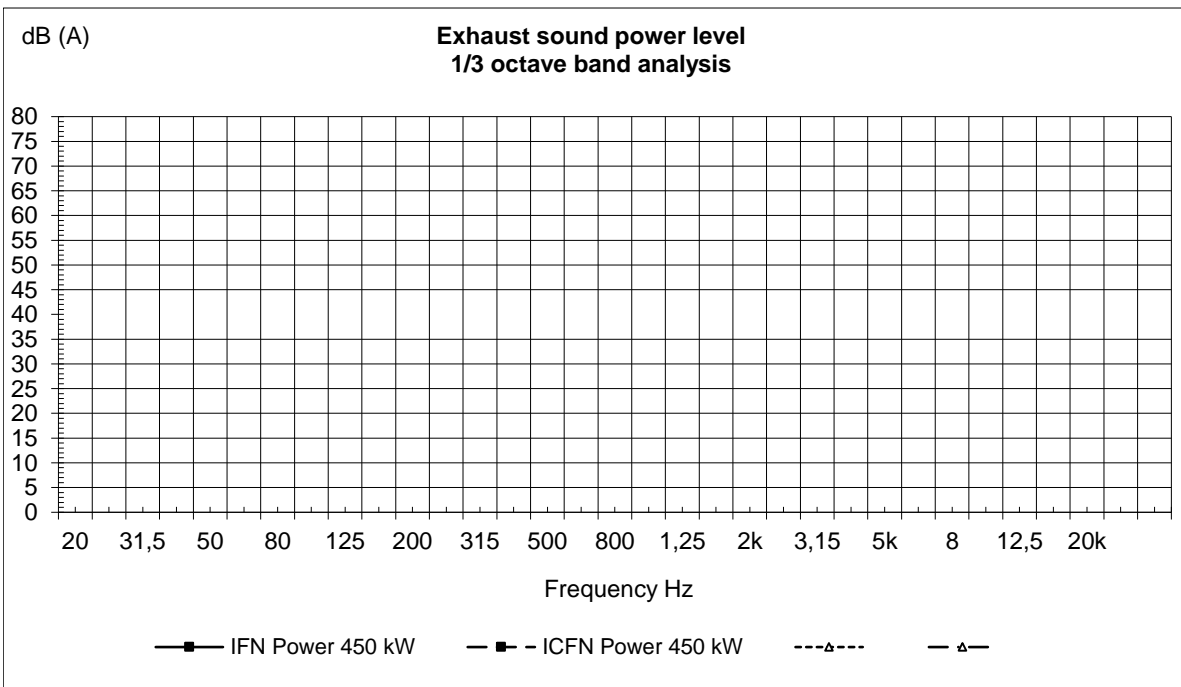
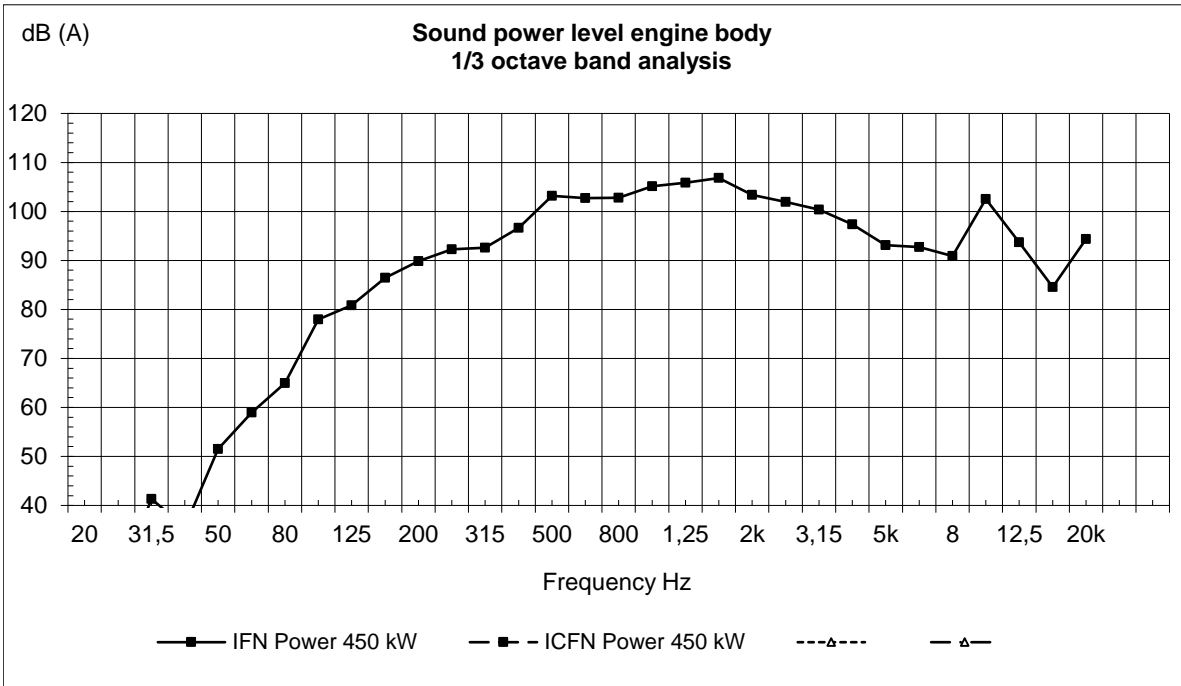
		rpm	1200	1500	1800	1900
Front end in line with crank shaft max:		Nm lbf ft	TBD			
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	26	33	40	
		hp	35	45	54	
	max down	kW	60	75	90	
		hp	82	102	122	
	max right	kW	26	33	40	
		hp	35	45	54	
Timing gear at compressor PTO max:		Nm lbf ft	300 221			
Speed ratio direction of rotation viewed from flywheel side			1.31:1/ ccw			
Timing gear at servo pump PTO max:		Nm lbf ft	100 74			
Speed ratio direction of rotation viewed from flywheel side			1.75:1/ ccw			
Timing gear at hydraulic pump PTO max:		Nm lbf ft	N/A			
Speed ratio direction of rotation viewed from flywheel side			N/A			
Max allowed bending moment in flywheel housing		Nm lbf ft	15000 11063			
Max. rear main bearing load		N lbf	5000 1124,0			

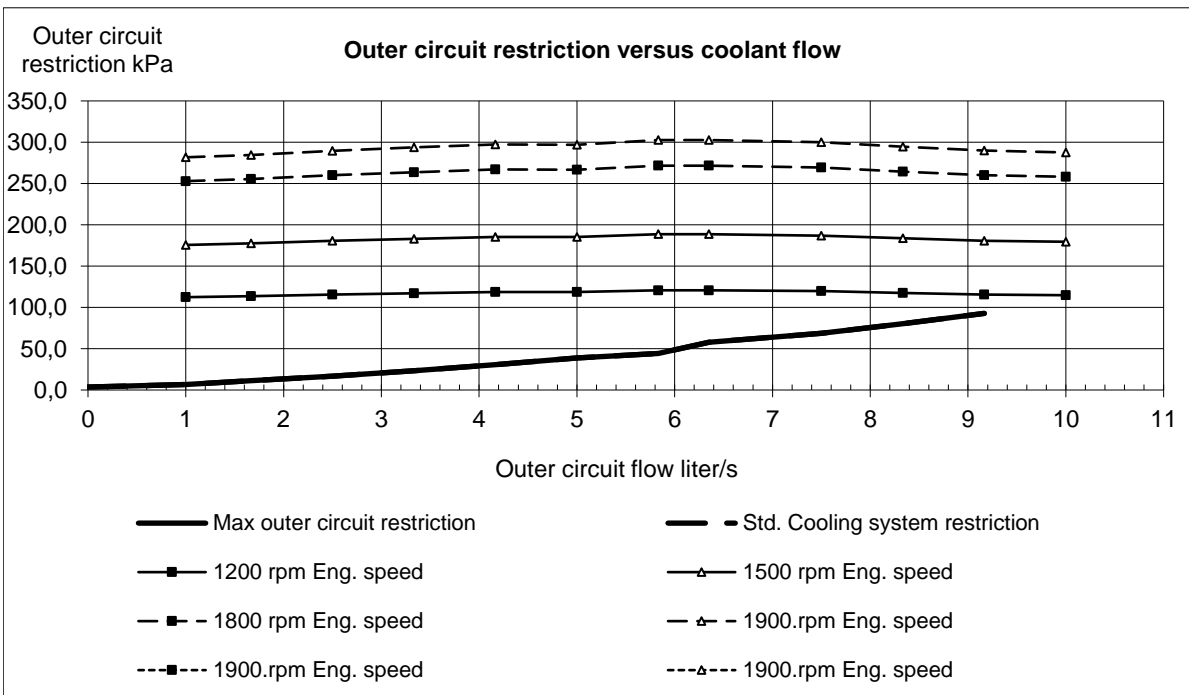
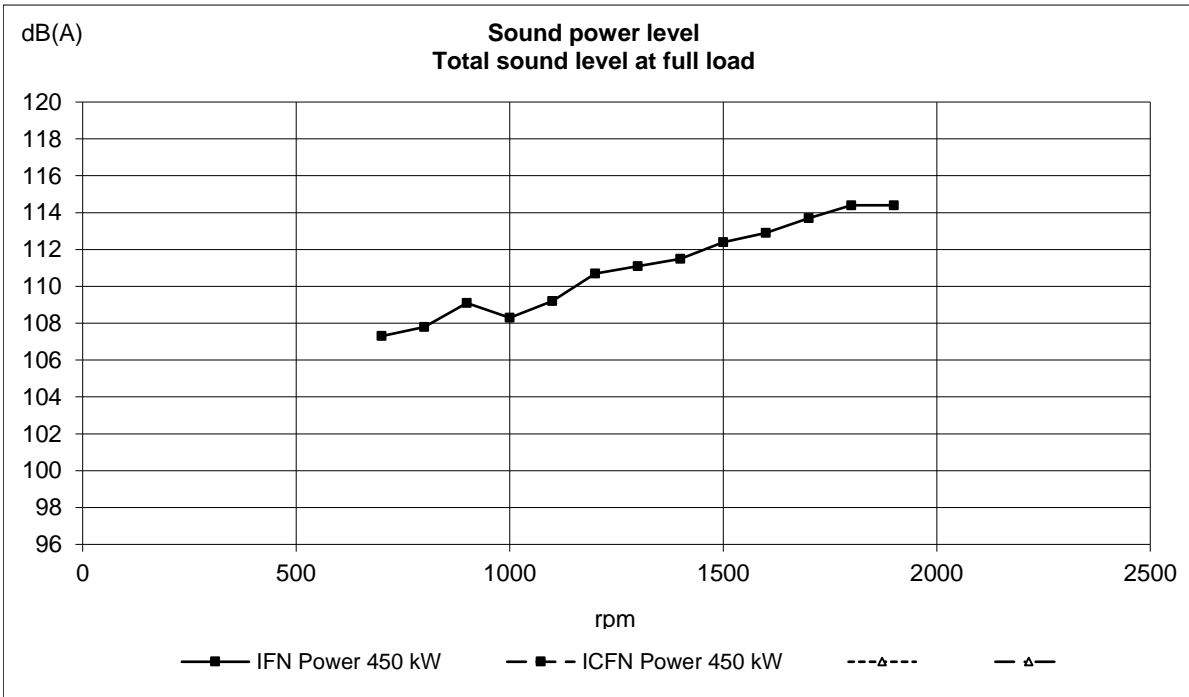


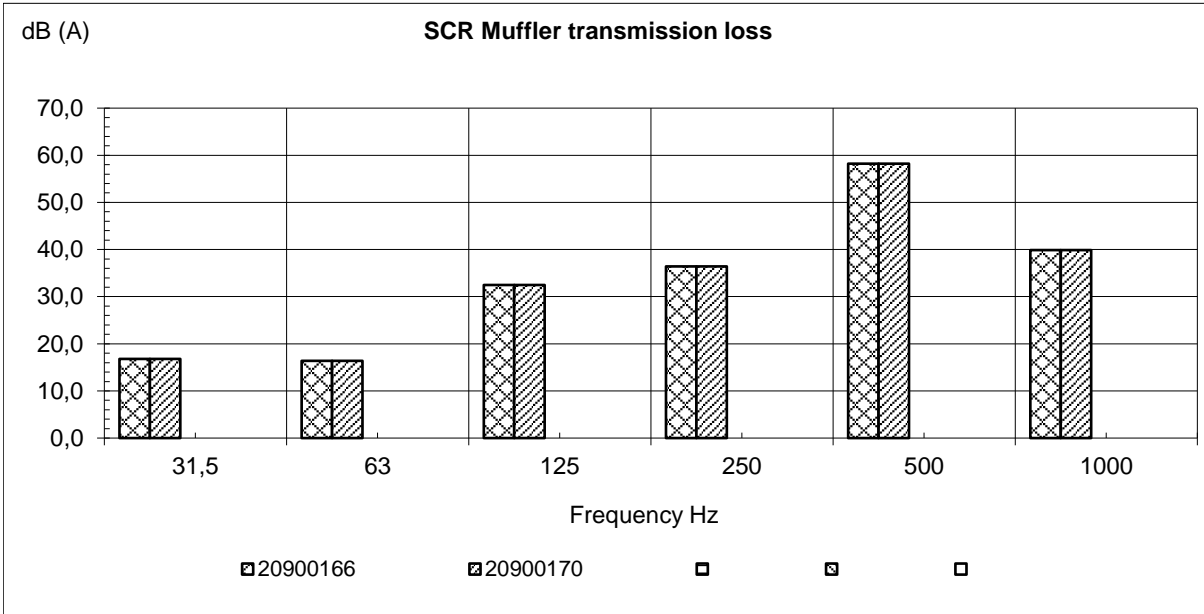




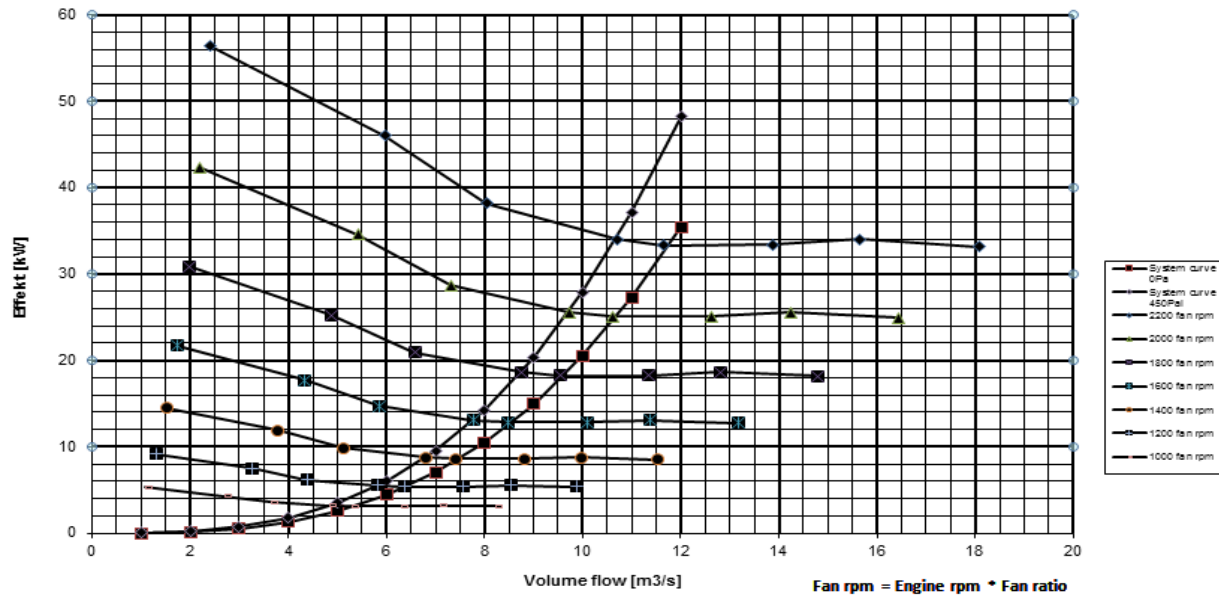








Fan power 890mm Pusher fan



Fan power 890mm Puller fan

