


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	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			16.8
Wet weight (Not including after treatment system)	Engine only	kg	1440
		lb	3175
	Power pac	kg	1840
		lb	4057

Performance				rpm	1200	1500	1800	1900
IFN Power	515 kW	without fan	kW	405	495	515	495	
			hp	550	673	700	673	
	with fan 890 mm	kW	401	488	503	482		
		hp	545	664	684	655		
ICFN Power	without fan	kW	See diagram for fan power consumption					
		hp	See diagram for fan power consumption					
	with fan 890 mm	kW	See diagram for fan power consumption					
		hp	See diagram for fan power consumption					
Torque at:	IFN Power 515 kW	Nm	3220	3150	2732	2488		
		lbf ft	2375	2323	2015	1835		
	ICFN Power	Nm						
		lbf ft						
Max torque at engine speed	IFN 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:	IFN Power 515 kW	MPa	2,51	2,46	2,13	1,94		
		psi	364	356	309	281		
Max combustion pressure at:	IFN Power 515 kW	MPa	16,7	19,1	18,9	16,5		
		psi	2422	2770	2741	2393		
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)

		rpm	1200	1500	1900	2200
Maximum Brake Power:	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: Dependent on operation before activation.	without fan	kW	83	146	273	341
		hp	113	199	371	464
Brake Torque: Dependent on operation before activation.	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 515 kW	liter/h	0,03
		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
		h	
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	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)	IFN Power 515 kW	m³/min cfm	26,8 946	34,0 1201	35,3 1247	36 1271
 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 515 kW	kW BTU/min	293 16663	374 21269	423 24056	437 24852
Exhaust gas temperature after turbine at:	IFN Power 515 kW	°C °F	496 925	501 934	544 1011	550 1022
 See front page for important information The supplied turbine outlet flow restrictor must be used. Pipe dimension Ø: 125 mm						
Max allowable back pressure in exhaust line at maximum power (after flow restrictor).		kPa psi	9 1,3	13 1,9	15 2,2	15 2,2
Min allowable back pressure in exhaust line (after flow restrictor).		kPa psi	7 1,0			
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power 515 kW	m³/min cfm	70,1 2476	84,7 2991	90,4 3192	92,1 3253
Exhaust gas smoke	IFN Power 515 kW	*Bosch Units	0,077	0,035	0,058	0,073

Cooling system

		rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	IFN Power 515 kW	kW	9	10	11	11
		BTU/min	512	569	626	626
Heat rejection to coolant at:	IFN Power 515 kW	kW	160	188	210	214
		BTU/min	9099	10691	11942	12170
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			
	890 mm	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			
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	4,2	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 US gal	2			

Charge air cooler system		rpm	1200	1500	1800	1900
Heat rejection to charge air cooler	IFN Power 515 kW	kW	73	101	97	101
		BTU/min	4151	5744	5516	5744
	ICFN Power	kW	72	86	99	100
		BTU/min	4095	4891	5630	5687
Charge air mass flow	IFN Power 515 kW	kg/s	0,54	0,68	0,7	0,71
	ICFN Power	kg/s	0,54	0,68	0,7	0,71
Charge air inlet temp. (Charge air temp after turbo compressor)	IFN Power 515 kW	°C	180	200	189	192
		°F	356	392	372	378
	ICFN Power	°C	180	200	189	192
		°F	356	392	372	378
 See front page for important information Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	42	47	50	50
		°F	108	117	122	122
	ICFN Power	°C	42	47	50	50
		°F	108	117	122	122
 See front page for important information Maximum pressure drop over charge air cooler incl. piping		kPa			14	
		psi			2,03	
Charge air pressure (After charge air cooler)		kPa			196	
		psi			28,43	
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	Engine power	Air on temp		Air flow		External restriction							
		°C	°F	m ³ /s	ft ³ /s	Pa	psi						
rpm	kW hp	°C	°F	m ³ /s	ft ³ /s	Pa	psi						
								515	126	6,7	236,6	300	0,044
								700	129	7	247,2	235	0,034
								55	131	7,2	254,3	200	0,029
								57	135	7,5	264,9	125	0,018
								58	136	7,7	271,9	85	0,012
60	140	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	54	129	7	247,2	295	0,043
		56	133	7,4	261,3	225	0,033
		57	135	7,6	268,4	180	0,026
		59	138	7,9	279,0	100	0,015
		61	142	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	65	149	9,9	349,3	450	0,065
		66	151	10,0	352,8	300	0,044
		68	154	10,5	372,2	150	0,022
		68	155	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	63	145	9,0	319,2	450	0,065
		64	147	9,3	329,8	300	0,044
		65	150	9,9	348,2	150	0,022
		66	151	10,3	362,3	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 1:0,97

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	61	142	8,0	281,8	450	0,065
		62	143	8,4	294,9	300	0,044
		63	146	8,9	313,2	150	0,022
		64	148	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	58	136	7,2	253,6	450	0,065
		59	138	7,5	265,2	300	0,044
		60	141	8,0	281,1	150	0,022
		61	142	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	515 700	57	134	7,0	247,6	450	0,065
		58	137	7,4	259,9	300	0,044
		60	140	7,8	275,5	150	0,022
		61	141	8,0	283,9	0	

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronus	
Governor droop	0%	
Governor response	Adjustable PI-constants	1,000
Idle speed	600-900 rpm	700,000
Stop function	Energize 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		125°C	Setting +5°C	Shut down. ON/OFF*
Oil pressure	Low idle	kPa	50 kPa	25 kPa	Shut down. ON/OFF*
	Rated speed	kPa	300 kPa	275 kPa	Shut down. ON/OFF*
Oil level			Min Level	-	-
Piston cooling pressure >1000 rpm	kPa				
Coolant temp	°C		105°C	107°C	Shut down. ON/OFF*
Coolant level			-	-	-
Fuel feed pressure	Low idle	kPa	100 kPa	-	-
	1200 rpm		250 kPa	-	-
Water in fuel					-
Crank case pressure	kPa		Press inc.		Shut down. ON/OFF*
Air filter pressure drop			5 kPa		-
Altitude, above sea	m				Automatic derating, see section derating
Charge air temp	°C		80°C	85°C	Shut down. ON/OFF*
Charge air pressure	kPa		Warning map	Alarm map value +	Shut down. ON/OFF*
Engine speed	rpm	100 - 120% of rated speed	120% of rated speed	Alarm level	Shut down. ON/OFF*

* Off means no shut down, alarm only

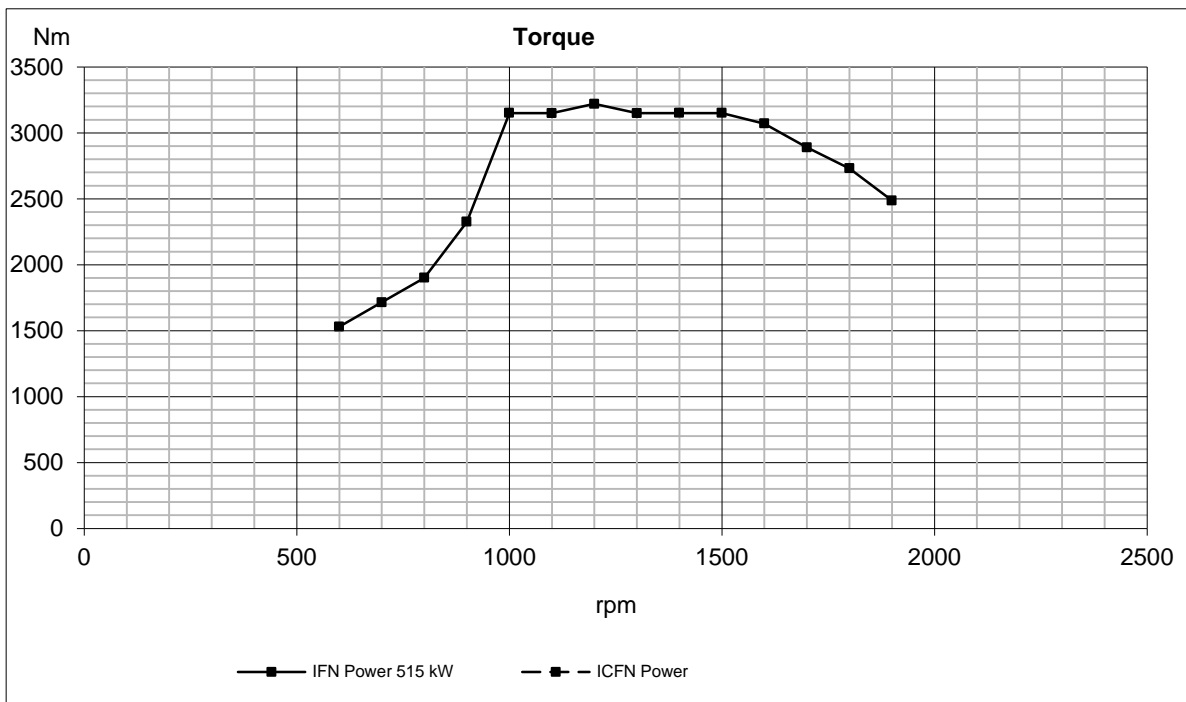
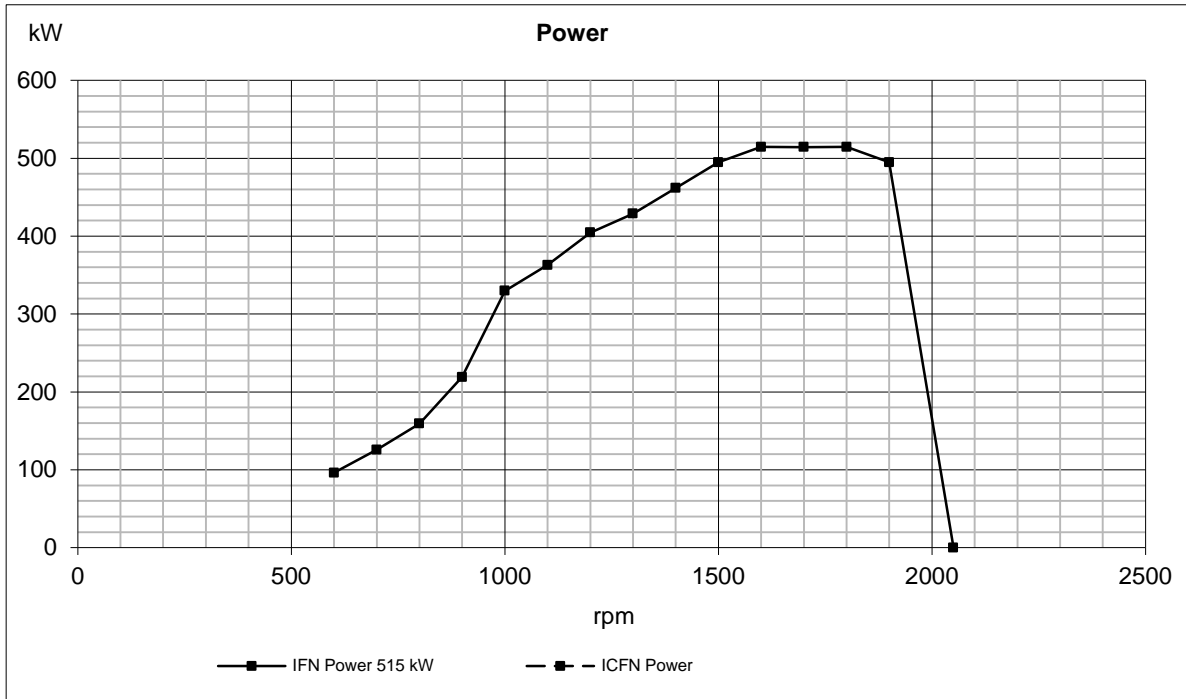
Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Fill in forced idle value	Fill in forced shut down value
Coolant temp	105°C	107°C	107°C	108°C	N/A	N/A
Oil temp	125°C	127°C	127°C	130°C	N/A	N/A
Low oil pressure	Warning	Alarm	N/A	N/A	N/A	Alarm map value
High charge air temp	80°C	85°C	85°C	86°C	N/A	N/A
High charge air pressure	Warning map value	Alarm map value	Alarm map value	Alarm map value	N/A	N/A
Parameters	Yellow	Red	Derate 70% to		Forced idle after 5	Forced shut down after 15

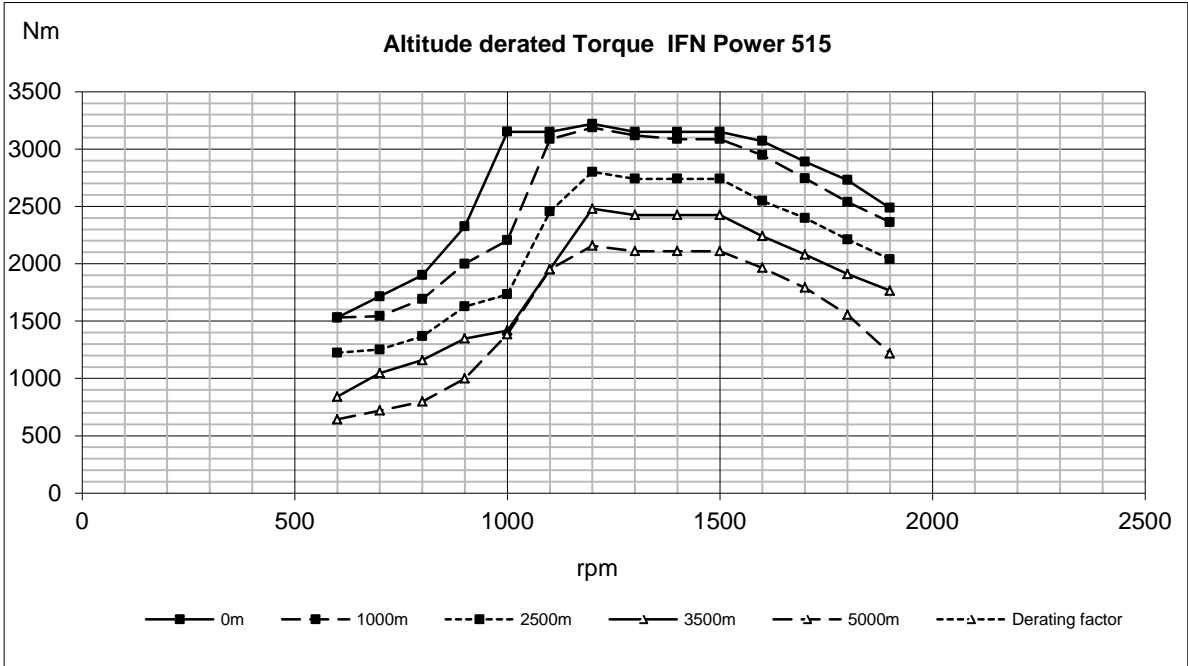
Electrical system

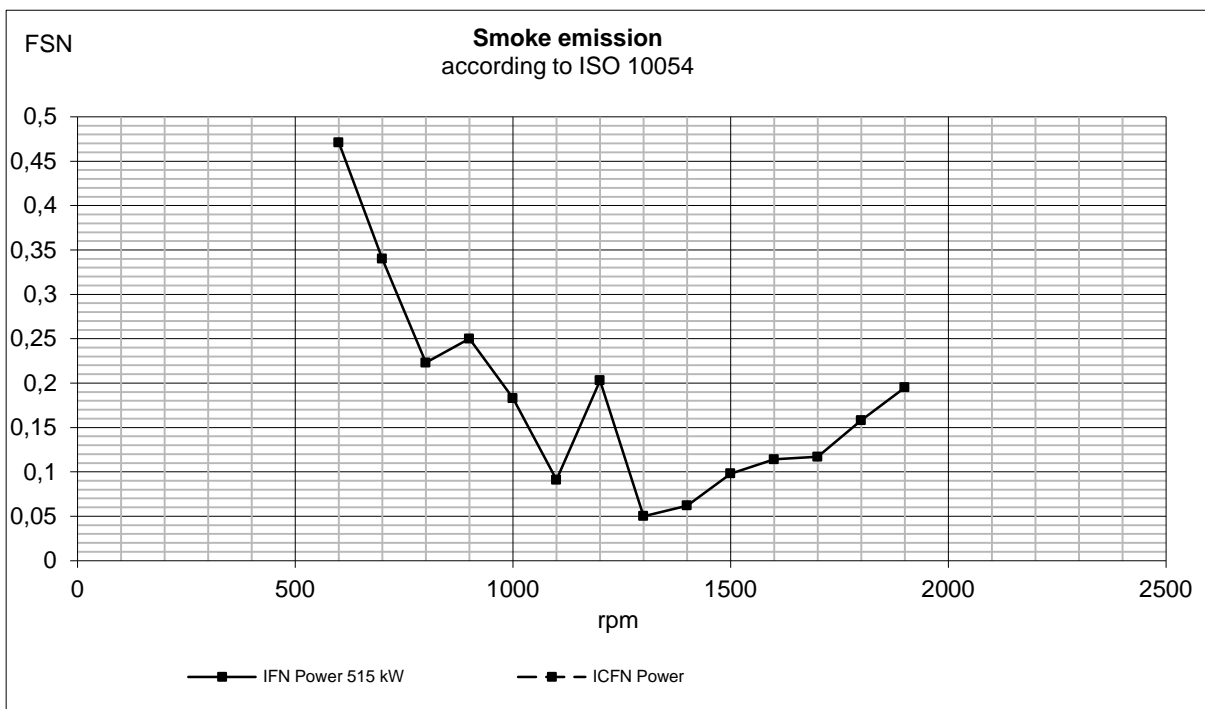
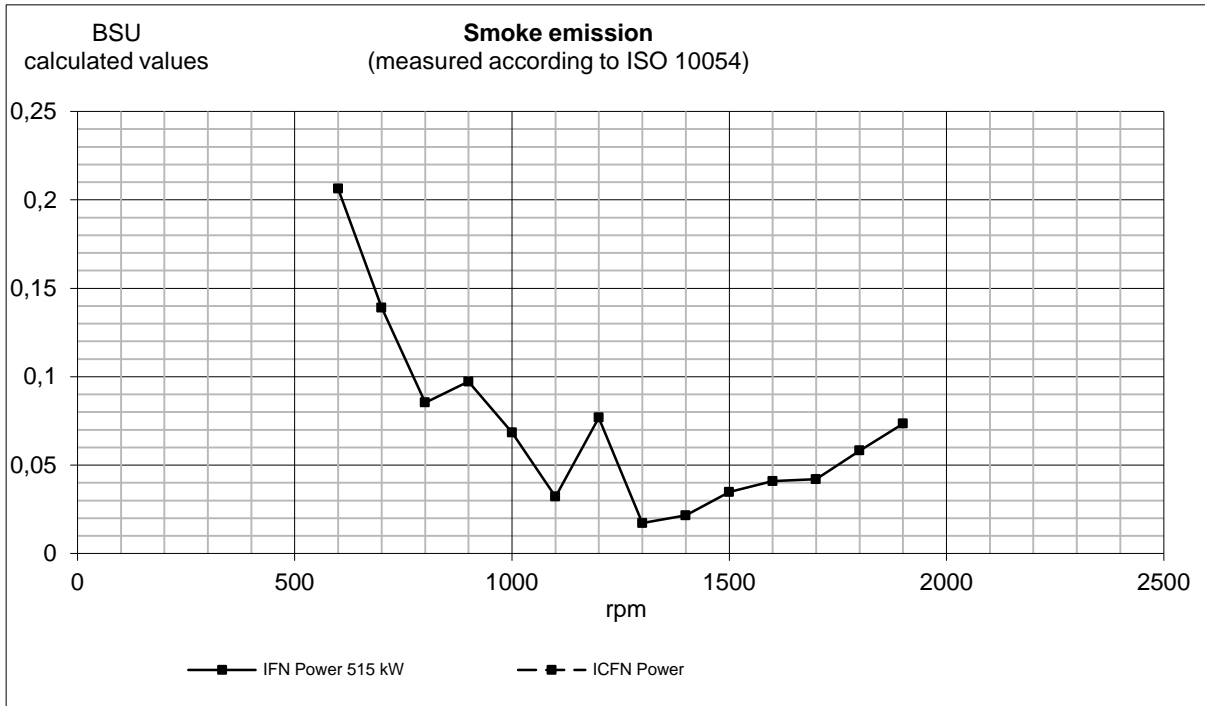
Voltage and type				24 V
Alternator:	make			Bosch
	output	A		80
	tacho output	Hz/alternator rev.		6
	drive ratio			3.9:1
Starter motor:	make			Melco
	type			105P70
	output	kW	7	
		hp	9,5	
Number of teeth on:	flywheel			153
	starter motor			12
Max wiring resistance main circuit		mΩ	2	
Cranking current at +20°C		A	280	
Crank engine speed at 20°C		rpm	150	
Starter motor battery capacity	max	Ah/A	2x225	
	min at +5°C	Ah/A	-	
Inlet manifold heater (at 20 V)		kW	4	
Power relay for the manifold heater		A	1	

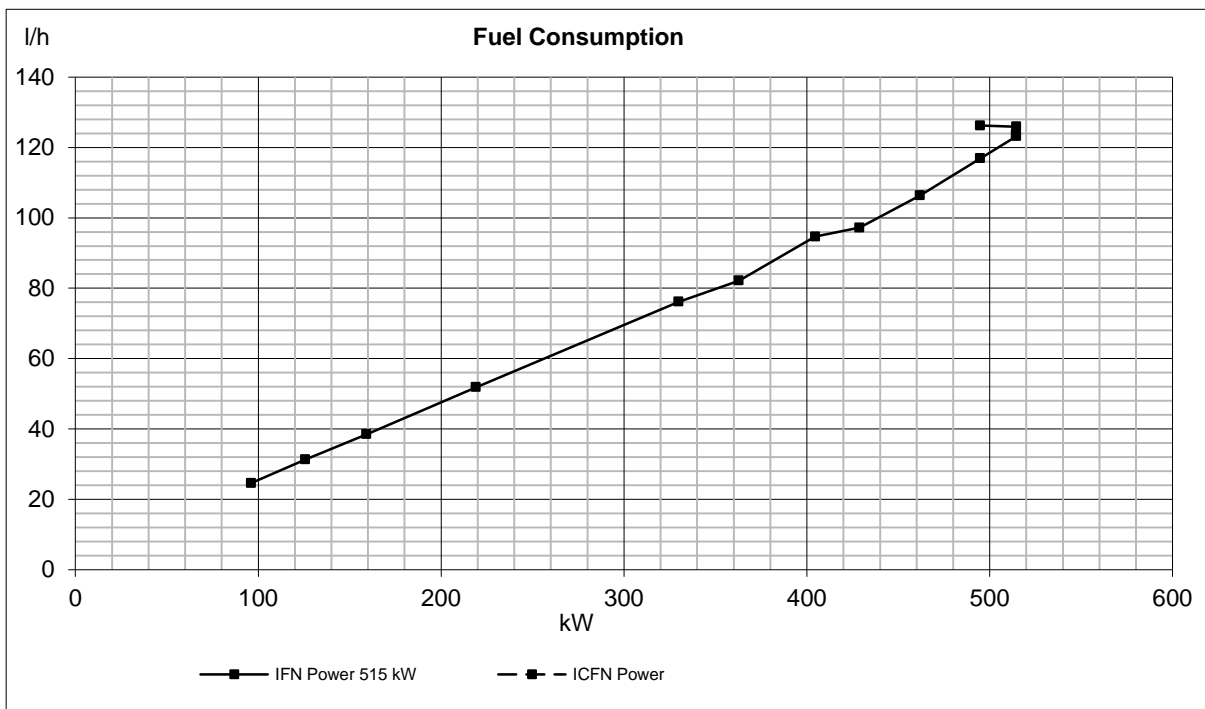
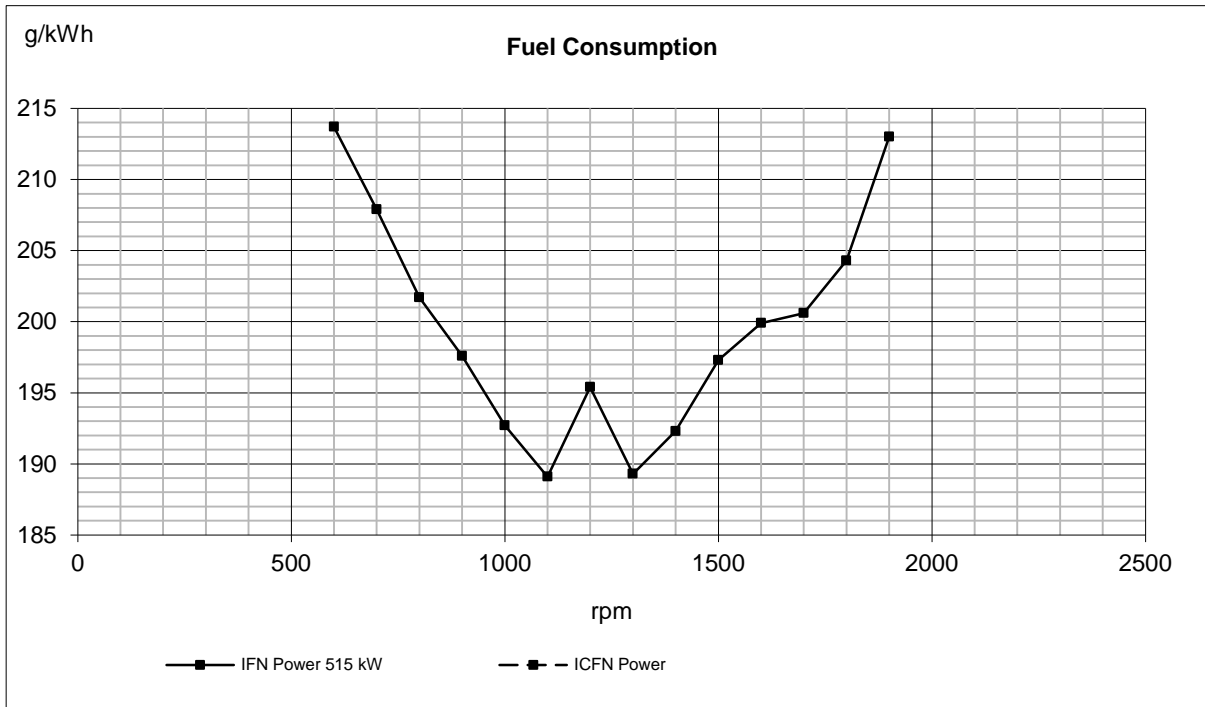
Power take off

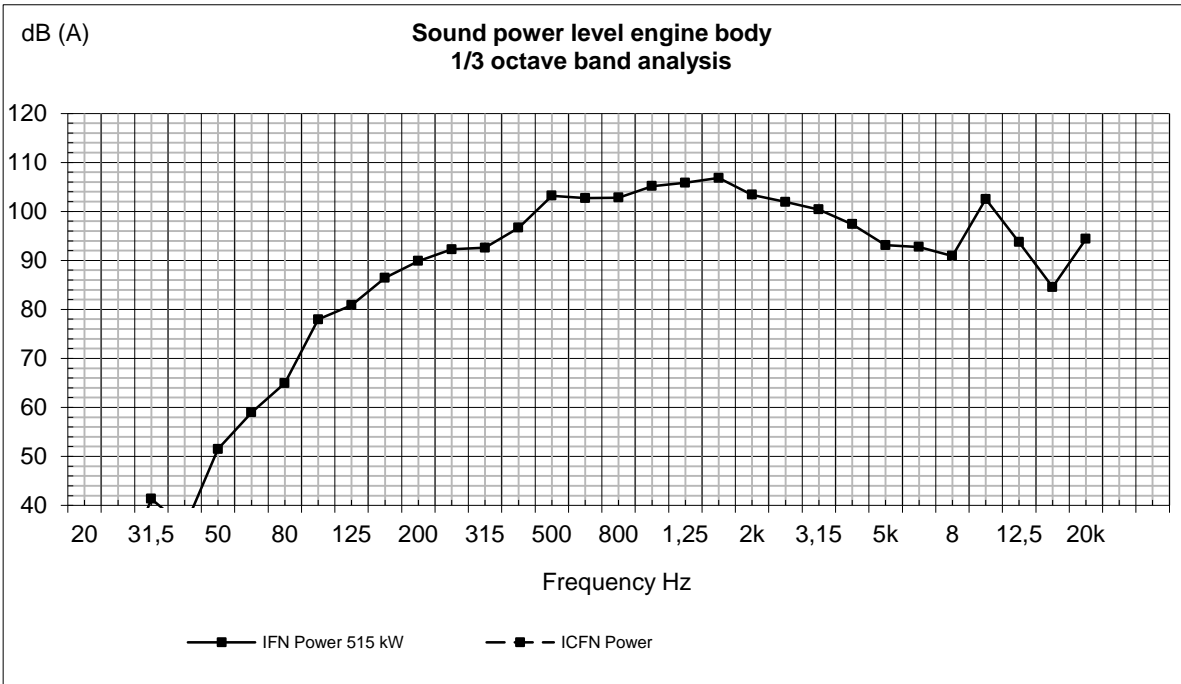
	rpm	1200	1500	1800	1900
Front end in line with crank shaft max:	Nm lbf ft	TBD			
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	26	33	40
		hp	35	45	54
	max down	kW	60	75	90
		hp	82	102	122
	max right	kW	26	33	40
		hp	35	45	54
Timing gear at compressor PTO max:	Nm lbf ft	600 443			
Speed ratio direction of rotation viewed from flywheel side		1.31:1/anti clockwise			
Timing gear at servo pump PTO max:	Nm lbf ft				
Speed ratio direction of rotation viewed from flywheel side					
Timing gear at hydraulic pump PTO max:	Nm lbf ft				
Speed ratio direction of rotation viewed from flywheel side					
Max allowed bending moment in flywheel housing	Nm lbf ft	15000 11063			
Max. rear main bearing load	N lbf	5000 1124,0			

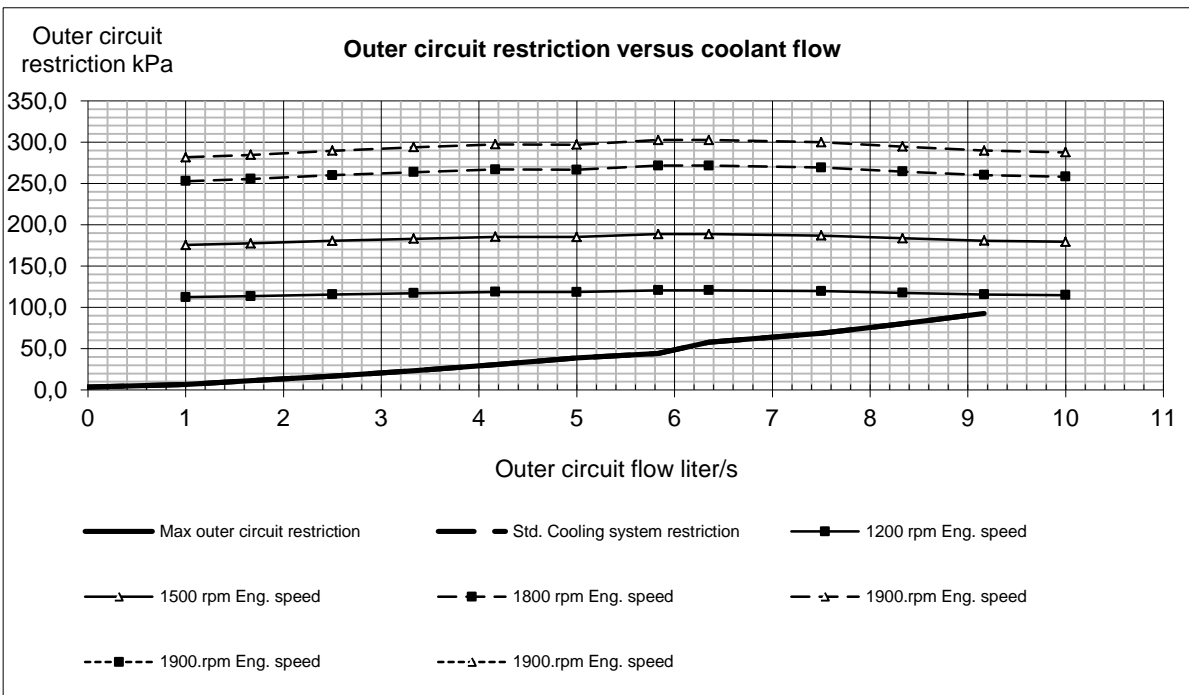
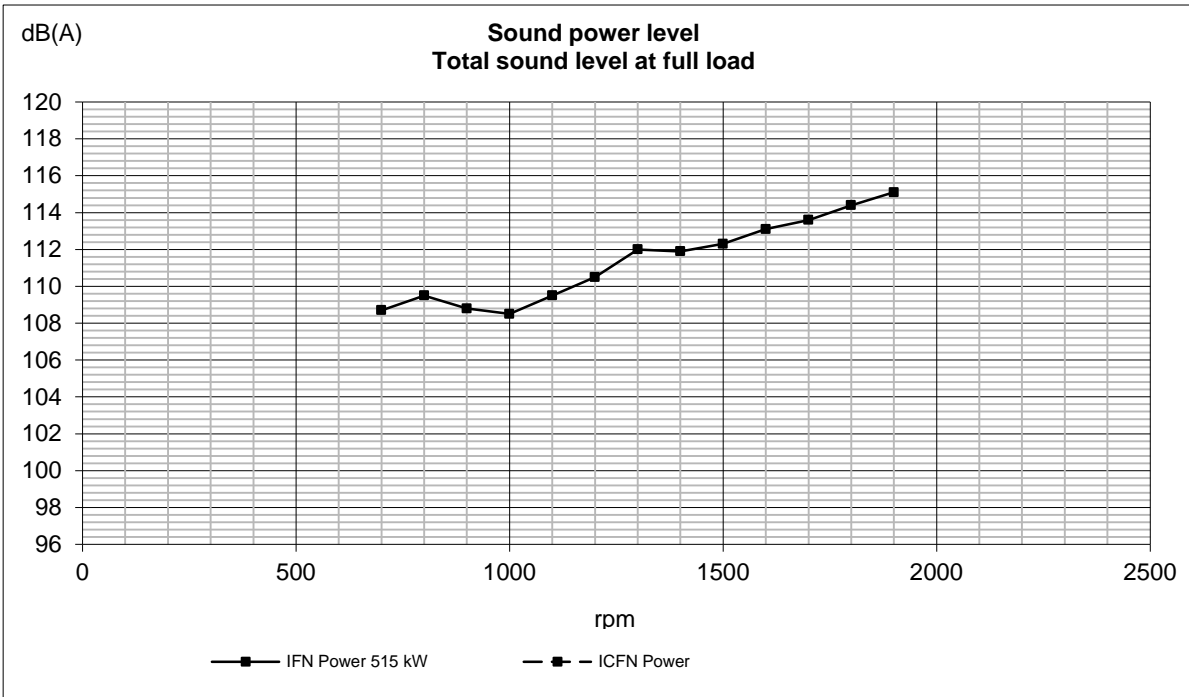




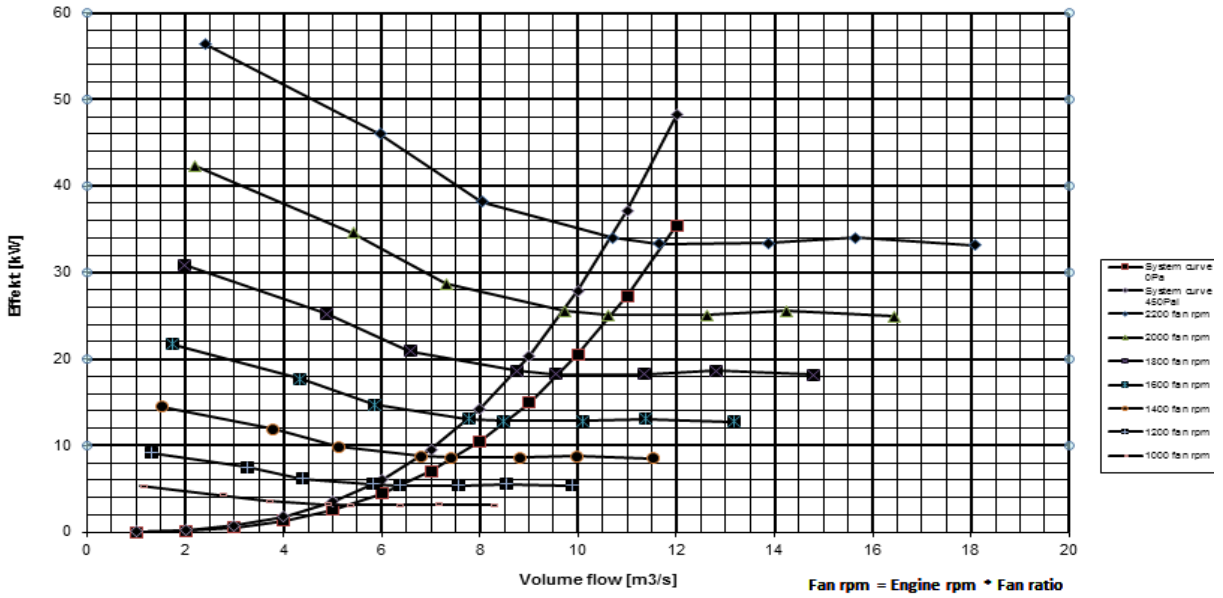








Fan power 890mm Pusher fan



Fan power 890mm Puller fan

