VOLVO PENTA **TAD1672VE**	Document No **22293864**	Issue Index **09**

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 penalities 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 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			17,0:1
Wet weight	Engine only (Estimated) (excl after treatment comp.)	kg lb	1565 3450
	Power pac	kg lb	

Performance				**rpm**	**1200**	**1500**	**1800**	**1900**
IFN Power	515 kW	without fan		kW hp	396 538	495 673	515 700	495 673
		with fan 890 mm		kW hp	See diagram for fan power consumption			
Torque at:		IFN Power		Nm lbf ft	3150 2323	3150 2323	2732 2015	2488 1835
Max torque at engine speed		rpm	1260 rpm	Nm lbf ft	3200 2360			
Power tolerance				%	±2			
Mean piston speed				m/s ft/sec	6,6 21,7	8,3 27,1	9,9 32,5	10,5 34,3
Effective mean pressure at:		IFN Power		MPa psi	2,45 356	2,46 356	2,13 309	1,94 281
Max combustion pressure at:		IFN Power		MPa psi	19 2755	20 2900	20 2900	19 2755
Total mass moment of inertia, J (mR^2) (not including flywheel)				kgm^2 $lbft^2$	4,1 97,3			
Friction Power				kW hp	26 35	39 53	58 79	65 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	
		°F	-13	
	#REF!	°C	-30	
		°F	-22	
*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 (meassured 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
⚠ **See front page for important information** 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
⚠ **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.		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	m²	1,42			
			foot²	15,28			
HD radiator core area			m²	0,87			
			foot²	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. 1,42m² radiator with hoses Pusher syst. Core thickness 63mm		liter	37			
			US gal	9,8			
	STD.1,42m² radiator with hoses Puller syst. Core thickness 41mm		liter	30			
			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			

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.	IFN Power	°C	175	200	205	200
(Charge air temp after turbo compressor)		°F	347	392	401	392
⚠ **See front page for important information** Max allowable Charge air outlet temp.		°C	40	45	55	50
(Charge air temp after charge air cooler)		°F	104	113	131	122
⚠ **See front page for important information** Maximum pressure drop over charge air cooler incl. piping		kPa	14			
		psi	2,03			
Charge air pressure		kPa	213	235	212	200
(After charge air cooler)		psi	30,89	34,08	30,75	29,01
Standard charge air cooler core area		m²	1,3			
		foot²	13,99			

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	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1800	515	50	122	7	247,2	295	0,043
	700	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	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1800	405	64	146	9,9	349,3	450	0,065
	551	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	Engine power	Air on temp		Air flow		External restriction	
	kW						
rpm	hp	°C	°F	m^3/s	ft^3/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	Engine power	Air on temp		Air flow		External restriction	
	kW						
rpm	hp	°C	°F	m^3/s	ft^3/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	Engine power	Air on temp		Air flow		External restriction	
	kW						
rpm	hp	°C	°F	m^3/s	ft^3/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 1,42m² 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	Engine power	Air on temp		Air flow		External restriction	
	kW						
rpm	hp	°C	°F	m^3/s	ft^3/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	Isochronous		Isochronous
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

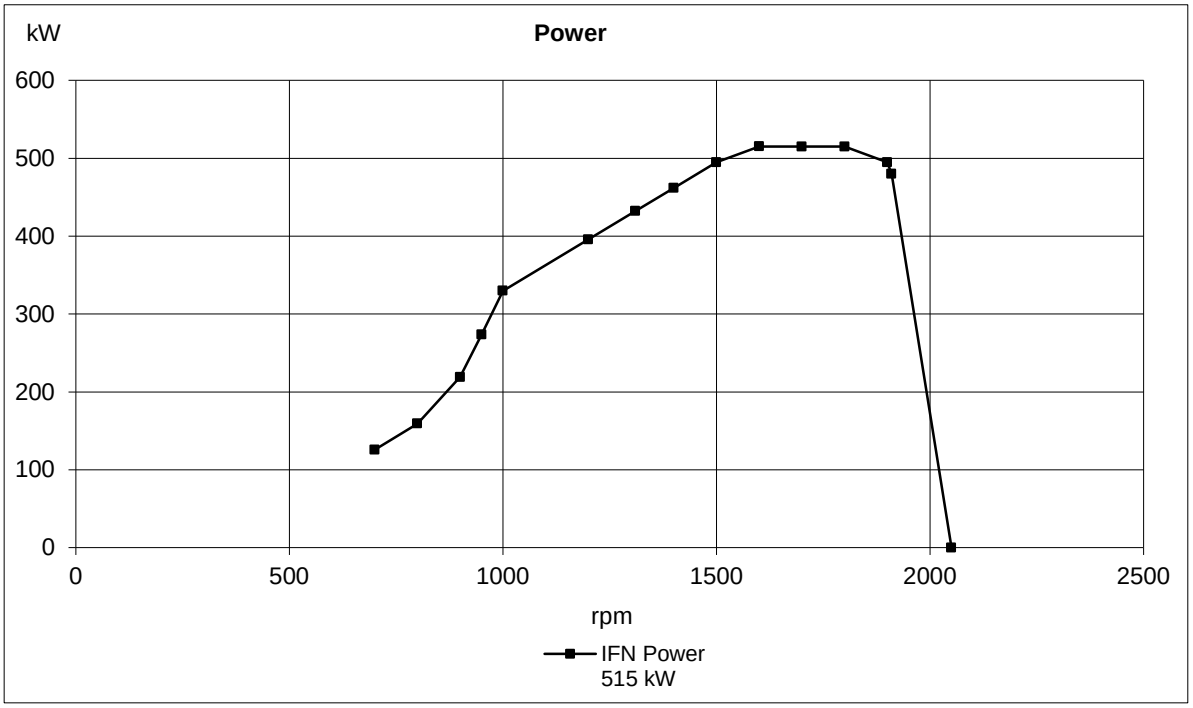
Engine sensors and switch settings					Engine protection action	
Parameter		Unit	Warning setting (Yellow)	Alarm setting	Default	Optional (Module or conversion
Oil temp		°C	125	130	Derate	Shut down.
Oil pressure	Low idle	kPa	80	55,0	Shut down	Shut down.
	Rated speed	kPa	300	275	Shut down	Shut down.
Oil level			Low level	N/A	Fault code only	Fault code only
Piston cooling pressure >1000 rpm		kPa	Not avaliable on this engine			
Coolant temp		°C	105	107	Derate	Shut down.
Coolant level			N/A	Low level	Derate	Shut down.
Fuel feed pressure	Low idle	kPa		N/A	Fault code only	Fault code only
	Rated speed		See Fuel pressure limits	N/A	Fault code only	Fault code only
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

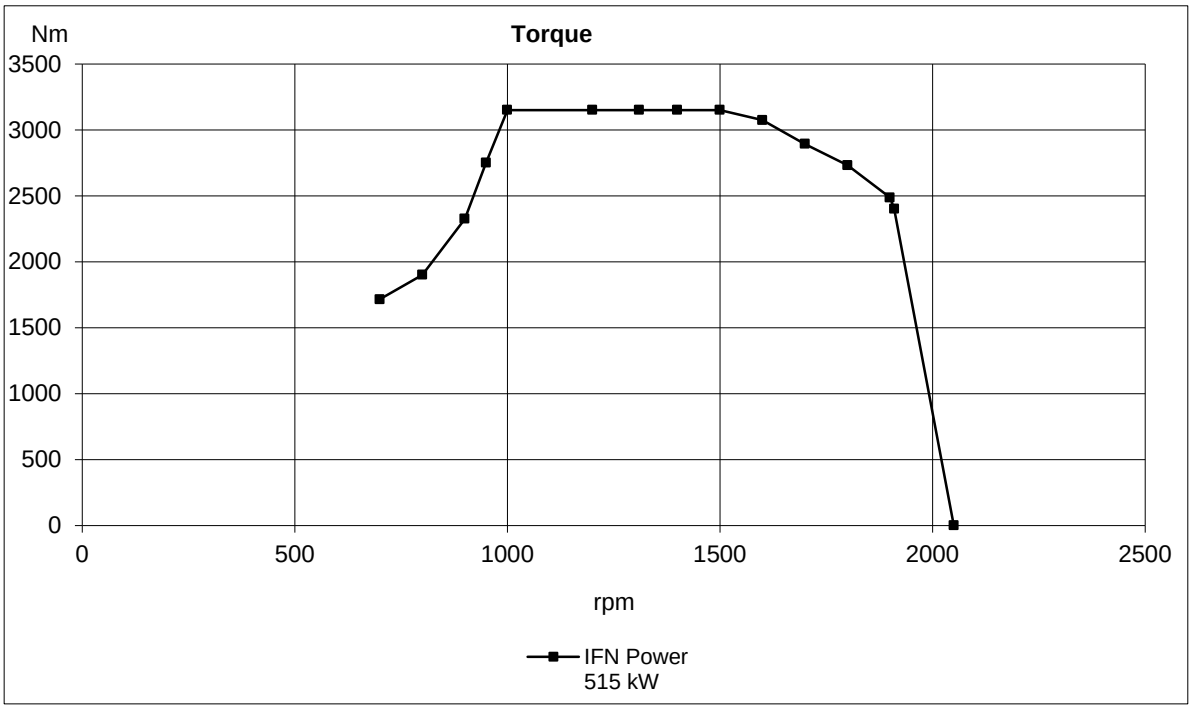
Derate parameters	Derated 0% to	Derated 100% to engine	Forced idle after 5	Forced shut down after
Oil temp	130°C	132°C	N/A	N/A
Coolant temp	107°C	108°C	N/A	N/A
Charge air temp	125°C	126°C	N/A	N/A
EGR temp	N/A	N/A	N/A	N/A
Low oil pressure	See Oil pressure limits		N/A	At alarm
Charge air pressure	See Charge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

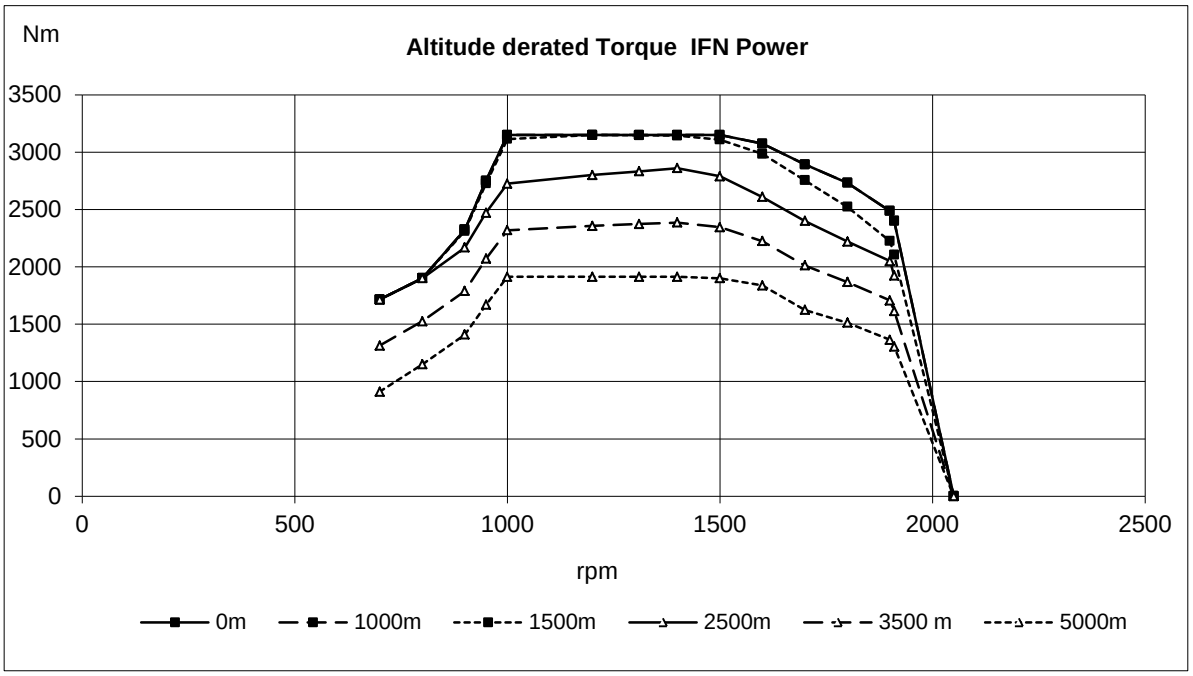
Electrical system

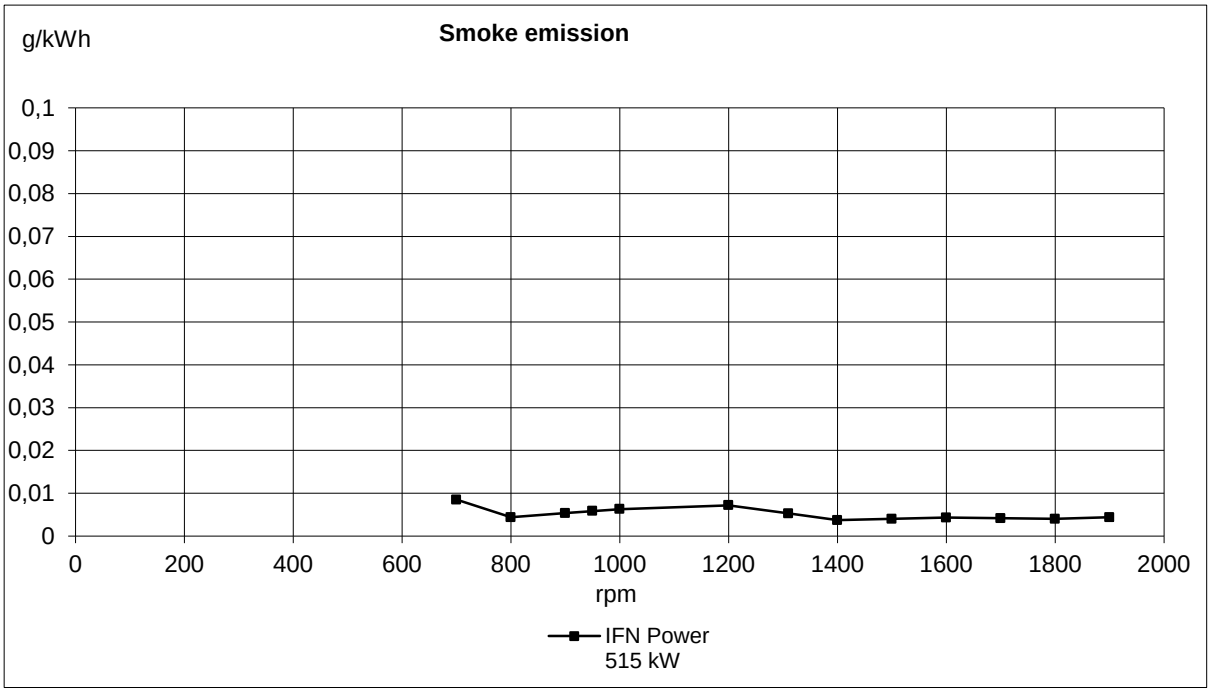
Voltage and type					24V		
Alternator:	make				Bosch		
	output	A			110/150		
	tacho output	Hz/alternator rev.			6		
	drive ratio				3,9:1		
Starter motor:		make			Melco		
		type			105P70		
		output	kW		7		
			hp		9,5		
Number of teeth on:		flywheel			153		
		starter motor			12		
Inlet manifold heater (at 20 V)			kW		2		
Power relay for the manifold heater			A		1		
Conditions:	**Temperature**		**°C**		**0**	**-15**	**-25**
(4,2 mΩ main circuit resistance@ 20°C)	**Battery**		**Ah / CCA**		**185/1150**	**185/1150**	**185/1150**
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		**140/800**	**140/900**	**185/1150**

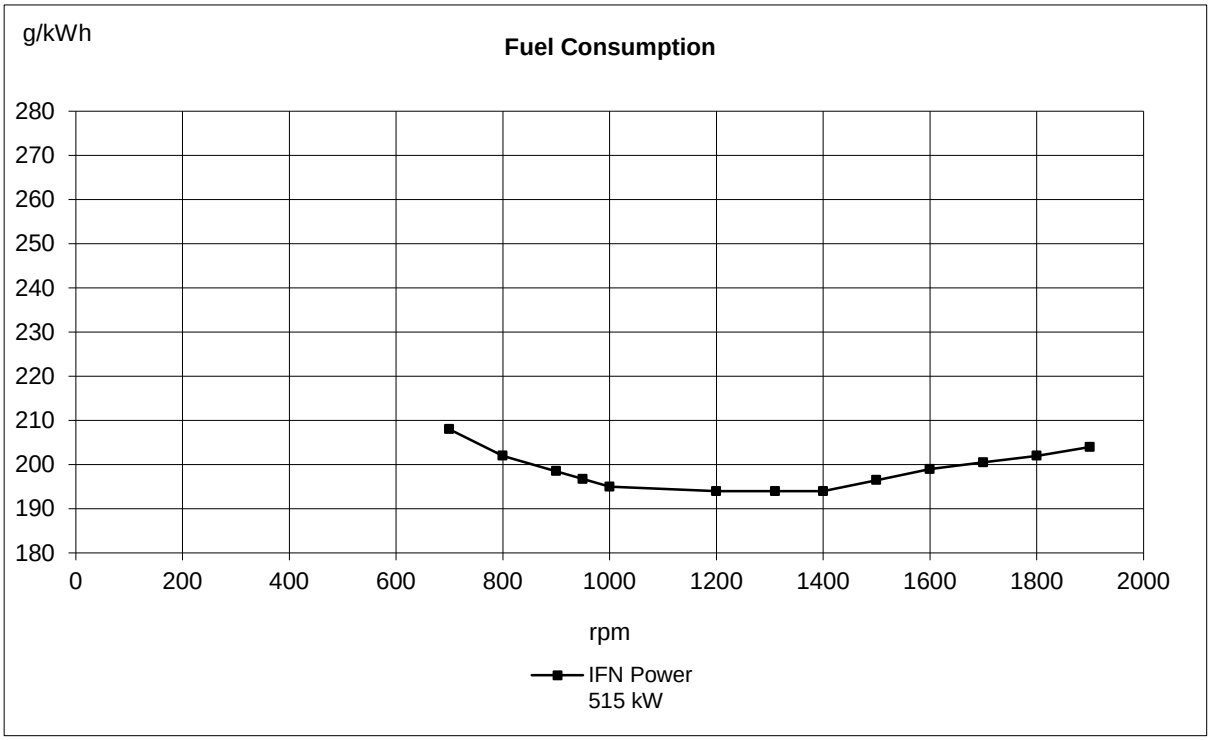
Power take off		**rpm**	**1200**	**1500**	**1800**	**1900**
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	26	33	40	
		hp	35	45	54	
	max down	kW	60	75	90	
		hp	82	102	122	
	max right	kW	26	33	40	
		hp	35	45	54	
Timing gear at compressor PTO max:		Nm	600			
		lbf ft	443			
Speed ratio direction of rotation viewed from flywheel side			1,31:1 / Counterclockwise			
Timing gear at servo pump max:		Nm	100			
		lbf ft	74			
Speed ratio direction of rotation viewed from flywheel side			1,58:1 / Counterclockwise			
Max allowed bending moment in flywheel housing		Nm	15000			
		lbf ft	11063			
Max. rear main bearing load		N	5000			
		lbf	1124,0			

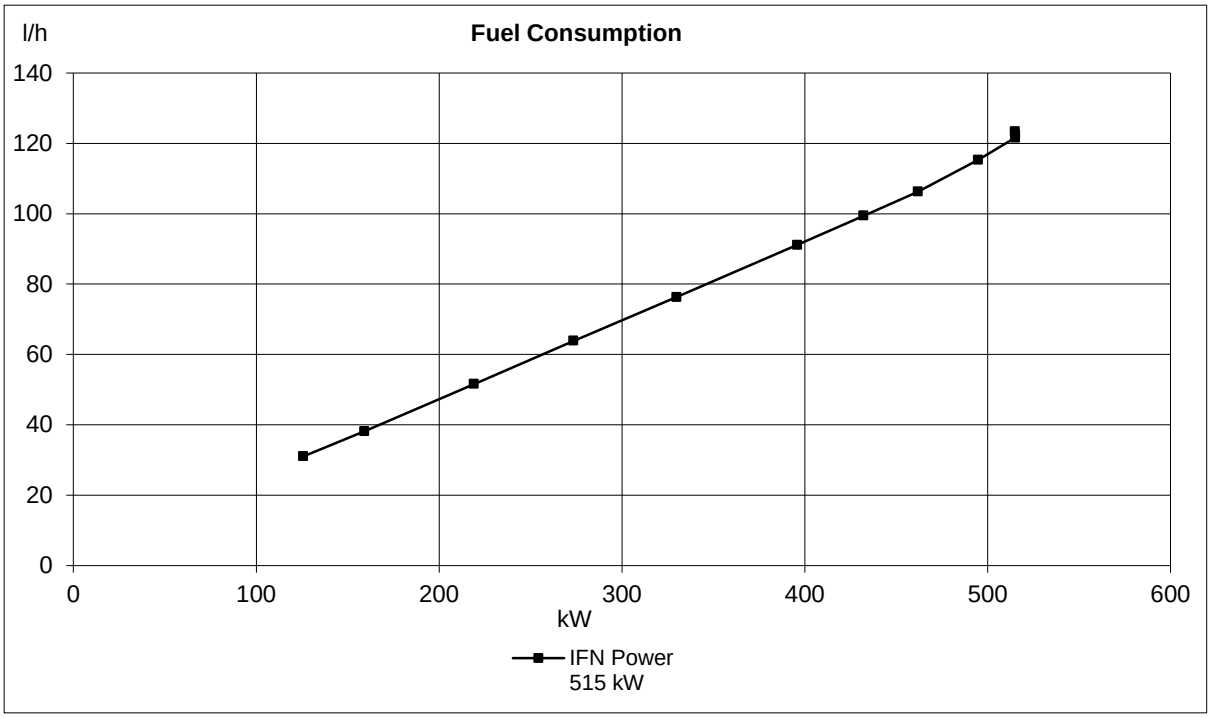

kW
Power
600
500
400
300
200
100
0
0
500
1000
1500
2000
2500
rpm
IFN Power
515 kW

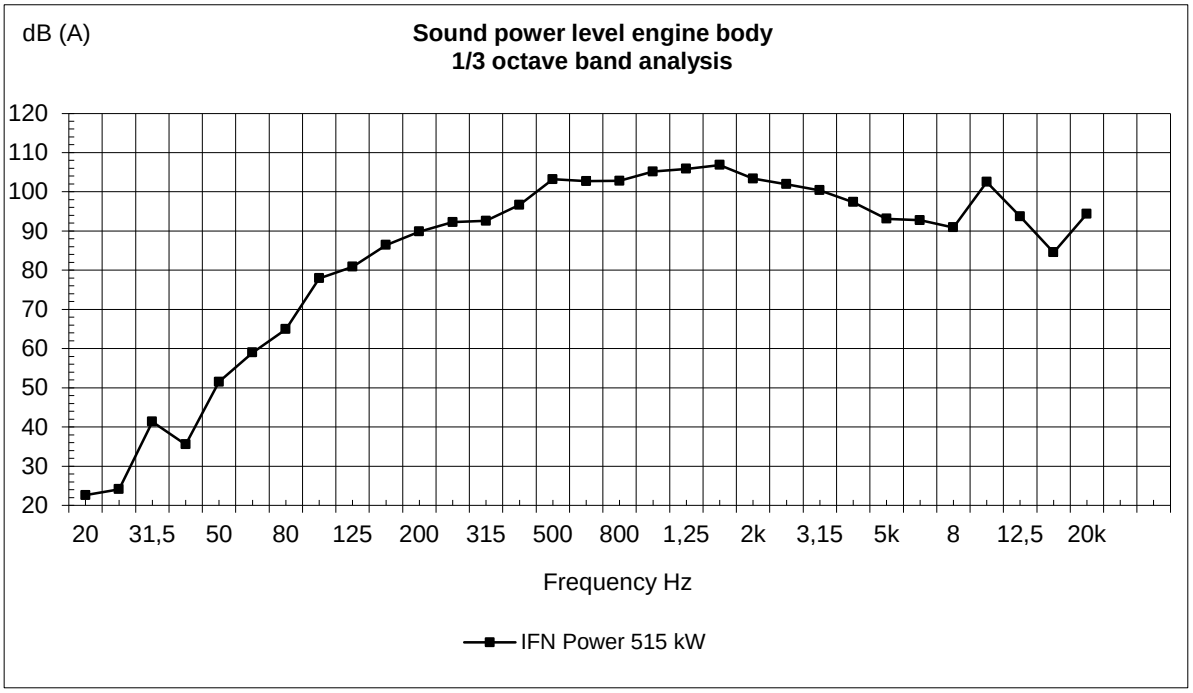

Nm
Torque
3500
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
IFN Power
515 kW

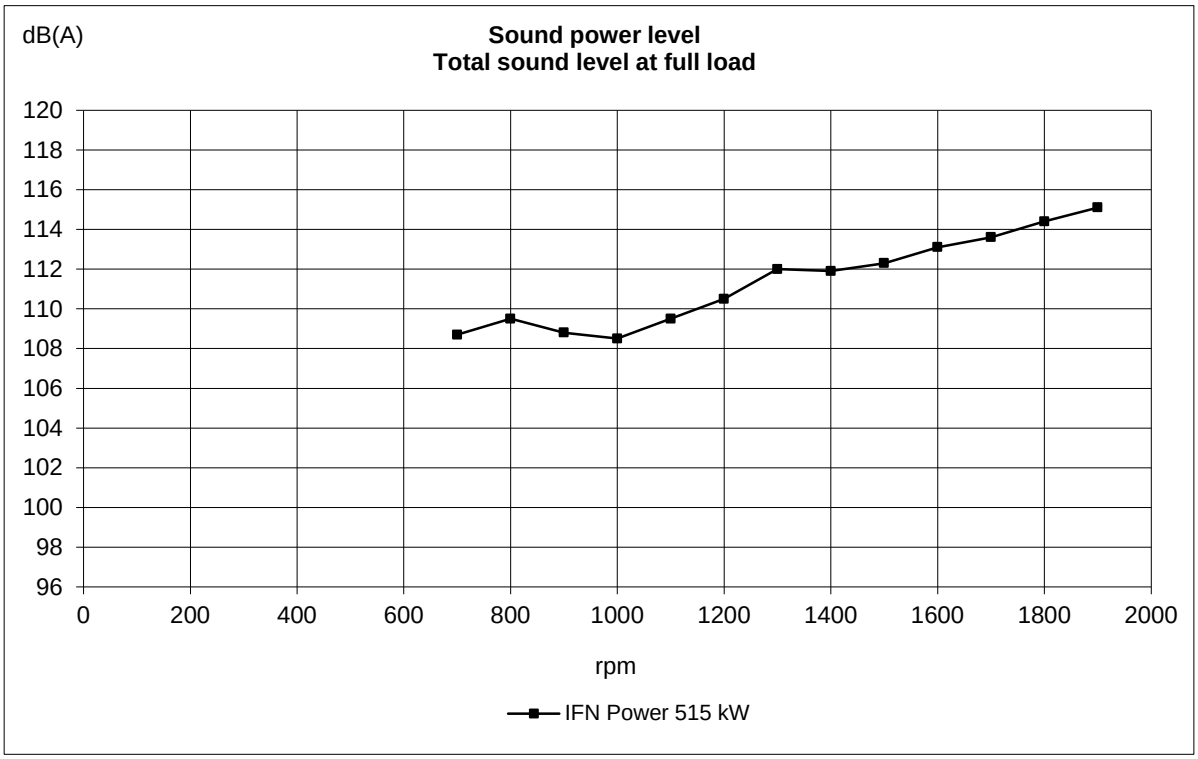

Nm
Altitude derated Torque IFN Power
3500
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
0m
1000m
1500m
2500m
3500 m
5000m

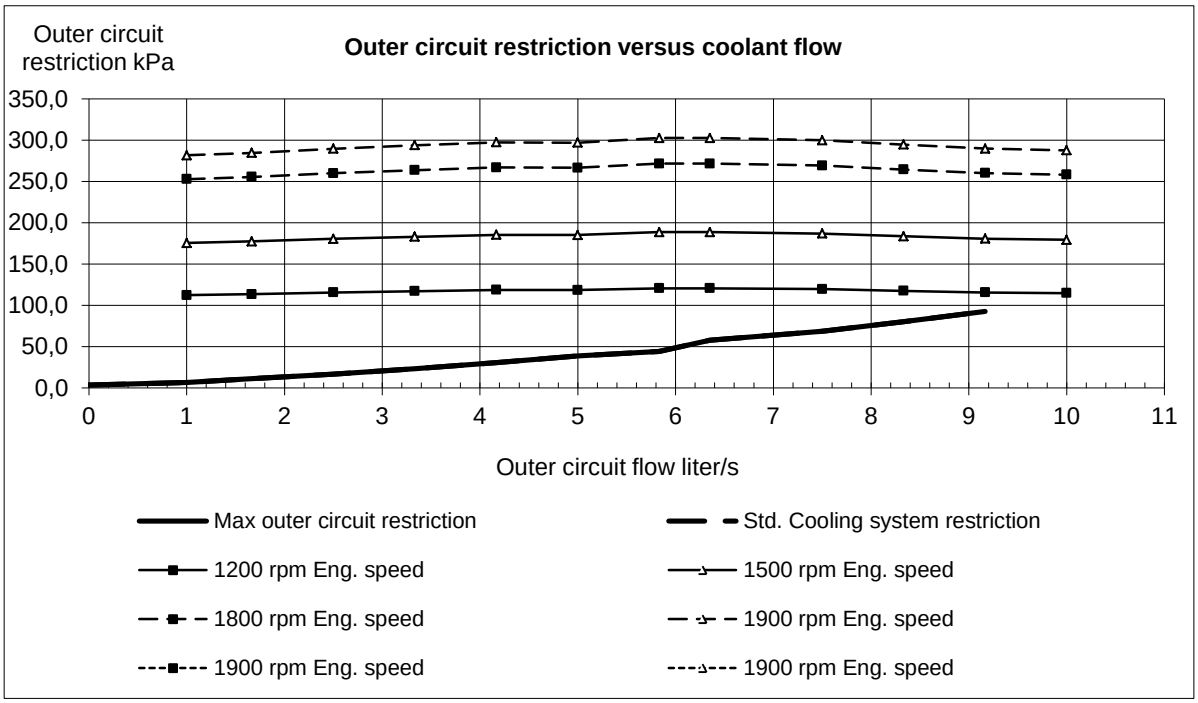

Smoke emission
g/kWh
0,1
0,09
0,08
0,07
0,06
0,05
0,04
0,03
0,02
0,01
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
rpm
IFN Power
515 kW

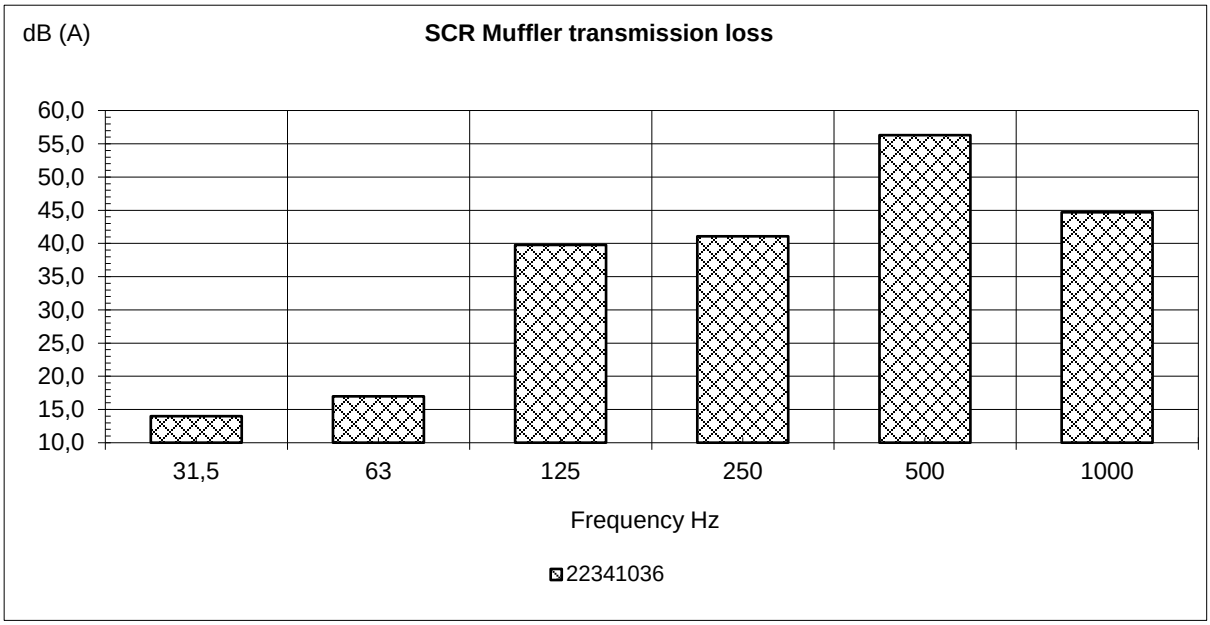

g/kWh
Fuel Consumption
280
270
260
250
240
230
220
210
200
190
180
0
200
400
600
800
1000
1200
1400
1600
1800
2000
rpm
IFN Power
515 kW

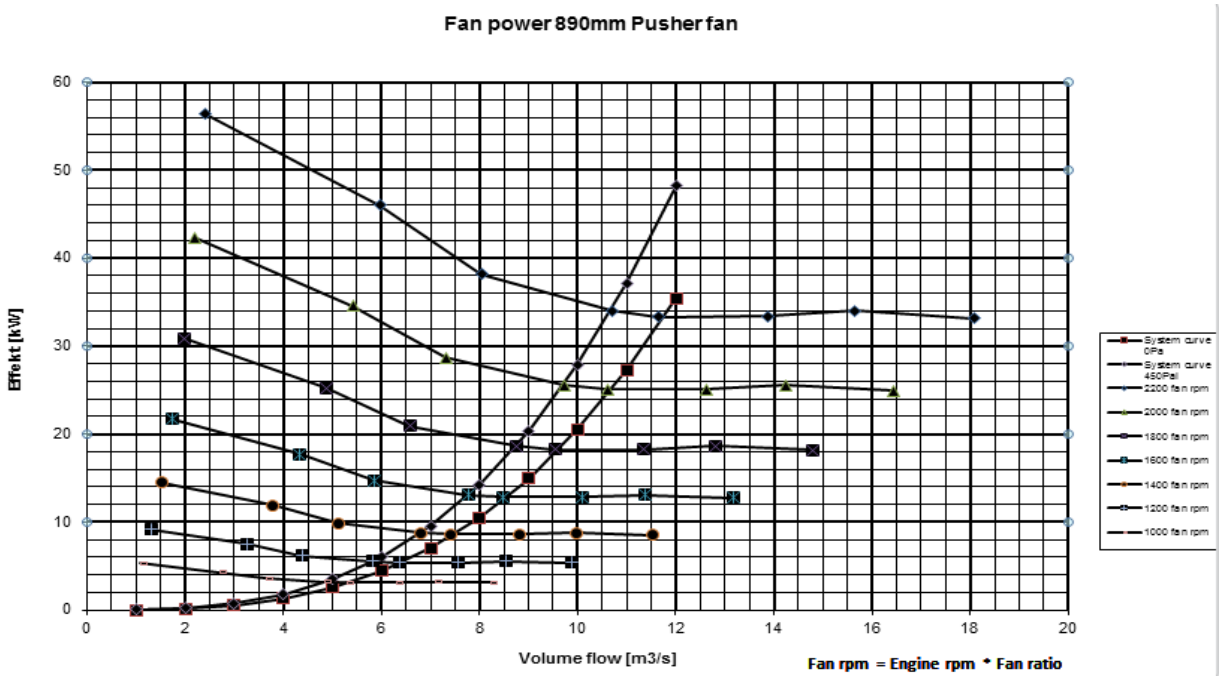

Fuel Consumption
l/h
140
120
100
80
60
40
20
0
0
100
200
300
400
500
600
kW
IFN Power
515 kW

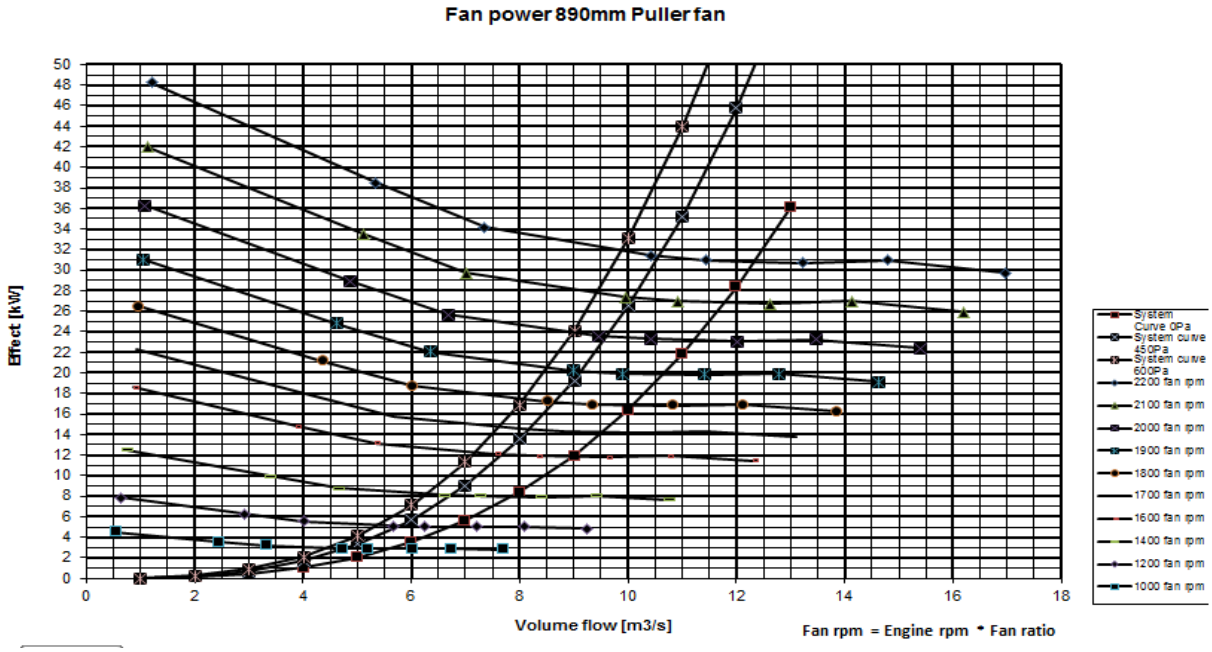

dB (A)
Sound power level engine body
1/3 octave band analysis
120
110
100
90
80
70
60
50
40
30
20
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
IFN Power 515 kW


dB(A)
Sound power level
Total sound level at full load
120
118
116
114
112
110
108
106
104
102
100
98
96
0
200
400
600
800
1000
1200
1400
1600
1800
2000
rpm
IFN Power 515 kW

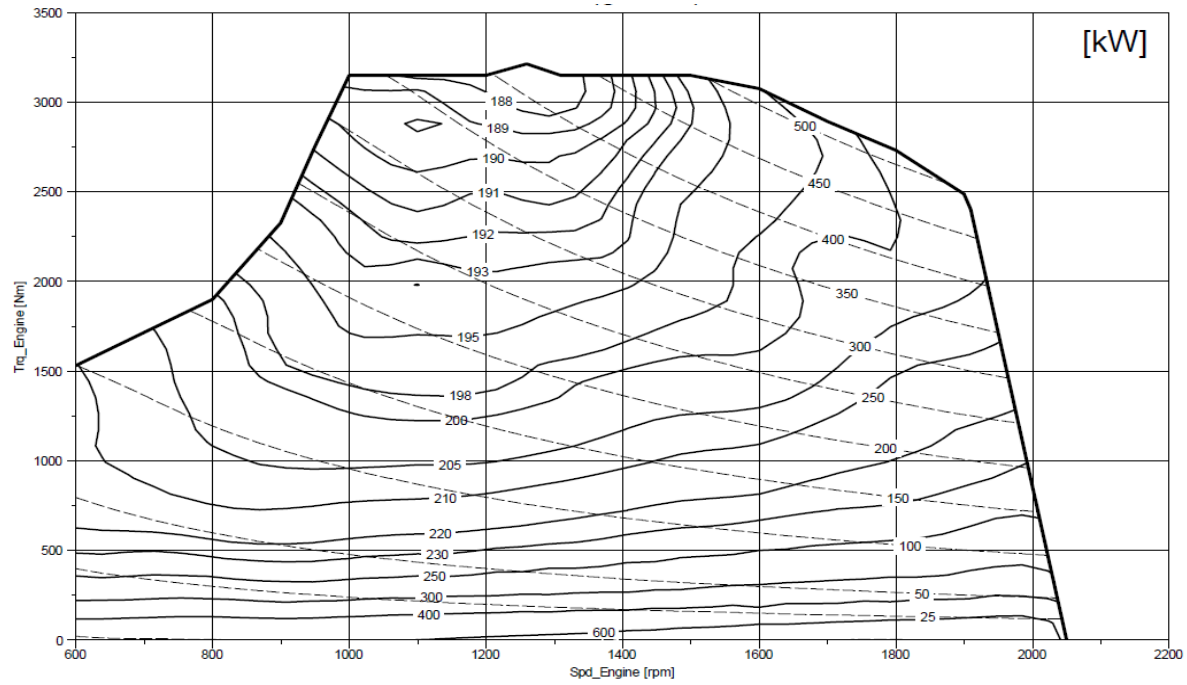

Outer circuit restriction kPa
Outer circuit restriction versus coolant flow
350,0
300,0
250,0
200,0
150,0
100,0
50,0
0,0
0
1
2
3
4
5
6
7
8
9
10
11
Outer circuit flow liter/s
Max outer circuit restriction
Std. Cooling system restriction
1200 rpm Eng. speed
1500 rpm Eng. speed
1800 rpm Eng. speed
1900 rpm Eng. speed
1900 rpm Eng. speed
1900 rpm Eng. speed


dB (A)
SCR Muffler transmission loss
60,0
55,0
50,0
45,0
40,0
35,0
30,0
25,0
20,0
15,0
10,0
31,5
63
125
250
500
1000
Frequency Hz
22341036


Fan power 890mm Pusher fan
Effekt [kW]
Volume flow [m3/s]
Fan rpm = Engine rpm * Fan ratio
System curve 0Pa
System curve 450Pa
2200 fan rpm
2000 fan rpm
1800 fan rpm
1600 fan rpm
1400 fan rpm
1200 fan rpm
1000 fan rpm


Fan power 890mm Puller fan
Effect [kW]
Volume flow [m3/s]
Fan rpm = Engine rpm * Fan ratio
System Curve 0Pa
System curve 450Pa
System curve 600Pa
2200 fan rpm
2100 fan rpm
2000 fan rpm
1900 fan rpm
1800 fan rpm
1700 fan rpm
1600 fan rpm
1400 fan rpm
1200 fan rpm
1000 fan rpm

BSFC [g/kWh]



Fuel consumption [l/h]