VOLVO PENTA **TAD1643VE-B**	Document No **22821848**	Issue Index **06**

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	1604 3536
	Power pac	kg lb	-

Performance				**rpm**	**1200**	**1500**	**1800**	**1900**
IFN Power 565 kW		without fan		kW hp	406 552	507 690	565 768	565 768
		with fan mm		kW hp	See diagram for fan power consumption			
Torque at:		IFN Power		Nm lbf ft	3230 2382	3230 2382	2997 2211	2840 2094
Max torque at engine speed		rpm	1260 rpm	Nm lbf ft	3260 2404			
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	2,52 365	2,52 365	2,34 339	2,21 321
Max combustion pressure at:		IFN Power		MPa psi	18,1 2625	19,7 2857	19,8 2871	19,1 2770
Total mass moment of inertia, J (mR^2) (not including flywheel)				kgm^2 $lbft^2$	1,43 33,9			
Friction Power				kW hp	25 34	38 52	53 72	59 80
Derating see Technical Diagrams								

Engine brake performance (only engines with VCB)		rpm	1200	1500	1900	2200
Brake power:	without fan	kW	76	125	219	295
		hp	103	170	298	401
Brake torque:	without fan	Nm	605	796	1101	1280
		lbf ft	446	587	812	944
Engine speed range for VCB activation:		rpm	1000-2300			
Min engine speed with VCB still active:		rpm	1000			
Min oil temperature for VCB activation:		°C	55			

Cold start performance

*Cold start limit temperature	without starting aid	°C °F	-10 14	
	with manifold heater 4 kW	°C °F	-25 -13	
	with manifold heater 4 kW and block heater	°C °F	-30 -22	
*Specify oil quality	T>-15°C Oil VDS4/VDS3 15W/40 T<-15°C Oil VDS4/VDS3 5W/40			
Heater type	Make	Power kW	Engaged hours (-30°C)	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 (average)		liter/h US gal/h	0,03 0,008	
		liter/h US gal/h		
		liter/h US gal/h		
Oil system capacity including filters		liter US gal	48 12,68	
Oil sump capacity: (both variants)	Max	liter US gal	42 11,10	
	Min	liter US gal	32 8,45	
Oil change intervals/specifications	VDS3	h	500	
	VDS4	h	500	
Engine angularity limits:	front up	°	30	
	front down	°	30	
	side tilt	°	30	
Oil pressure at rated speed		kPa psi	300 - 650 44 - 94	

Lubrication system

Lubrication oil temperature in sump:	max	°C °F	130 266
Oil filter filtration efficiency (in accordance with ISO 4548-12)	99%	µ	38
	50%	µ	14

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	165 23,9
Fuel supply line min. pressure, during engine stand still (meassured at fuel inlet connection)		kPa psi	-125 -18,1
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		°C	60
Prefilter / Water separator micron size		µ	10
Fuel filter filtration efficiency	96%	µ	6
	75%	µ	4
Engine Control System, standard		Volvo/EMS2.3	
Specific UREA consumption in Nonroad Transient Cycle (NRTC)		Vol%	N/A
Fuel to conform to			

Intake and exhaust system		**rpm**	**1200**	**1500**	**1800**	**1900**
Charge air consumption at: (+25°C and 100kPa)	IFN Power	m³/min cfm	25,0 883	34,0 1201	40,6 1434	40,6 1434
⚠ **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	kW BTU/min	290 16492	367 20871	435 24738	452 25705
Exhaust gas temperature after turbine at:	IFN Power	°C °F	522 972	494 921	492 918	509 948
⚠ **See front page for important information** Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm		kPa psi	6 0,9	10 1,5	15 2,1	15 2,2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power	m³/min cfm	68,0 2401	85,0 3002	97 3426	99 3496

Cooling system			rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:		IFN Power	kW	10	9	10	10
			BTU/min	569	512	569	569
Heat rejection to coolant at:		IFN Power	kW	156	179	205	210
			BTU/min	8872	10180	11658	11942
Coolant			Yellow Volvo Coolant Solution (VCS)				
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 cw			
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	69	100	126	121
		BTU/min	3924	5687	7165	6881
Charge air mass flow	IFN Power	kg/s	0,49	0,67	0,8	0,8
Charge air inlet temp.	IFN Power	°C	176	190	205	198
(Charge air temp after turbo compressor)		°F	349	374	401	388
⚠ **See front page for important information** Max allowable Charge air outlet temp.		°C	40	45	50	50
(Charge air temp after charge air cooler)		°F	104	113	122	122
⚠ **See front page for important information** Maximum pressure drop over charge air cooler incl. piping		kPa	12			
		psi	1,74			
Charge air pressure		kPa	202	237	251	236
(After charge air cooler)		psi	29,30	34,37	36,40	34,23
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 external restriction at different radiator air temperatures based on 107°C TTT and a 40/60% glycol/water mix. Tamb=40°C

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
1900	565	58,2	136,8	12,9	28,4	0	0,00
	768	56,9	134,4	12,3	27,1	150	0,022
		55,6	132,1	11,6	25,6	300	0,044
		54,2	129,6	11	24,3	450	0,065
1500	507	53,2	128	10,8	23,8	0	0,000
	690	51,6	125	10	22,0	150	0,022
		49,8	122	9,3	20,5	300	0,044
		47,5	118	8,5	18,7	450	0,065

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 kW	Air on temp		Air flow		External restriction	
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1900	565	65	149	10,0	353,1	450	0,065
	768	66	151	10,5	371,9	300	0,044
		67	153	11,1	392,3	150	0,022
		68	155	11,7	413,5	0	

Fix fan drive ratio 1:1,04

Engine speed	Engine power kW	Air on temp		Air flow		External restriction	
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1900	565	63	145	9,1	321,7	450	0,065
	768	64	147	9,6	338,3	300	0,044
		65	149	10,2	358,4	150	0,022
		66	151	10,7	377,2	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	Engine power kW	Air on temp		Air flow		External restriction	
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1900	565	61	141	8,4	297,7	450	0,065
	768	62	143	8,3	294,5	300	0,044
		63	146	9,4	331,3	150	0,022
		64	148	9,8	346,8	0	

Fix fan drive ratio 1:0,88

Engine speed	Engine power kW	Air on temp		Air flow		External restriction	
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1900	565	58	136	7,6	269,5	450	0,065
	768	59	137	8,0	281,5	300	0,044
		60	141	8,5	298,8	150	0,022
		61	142	8,8	310,4	0	

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		

Engine sensors and switch settings			Alarm level		Engine protection	
Parameter		**Unit**	**Setting range**	**Default setting**	**Level**	**Action. Default/Alternative**
Oil temp		°C	Setting +5	120		Derate. ON/OFF*
Oil pressure	Low idle	kPa	map	90,0		Shut down, ON/OFF*
	Rated speed	kPa	map	310		Shut down, ON/OFF*
Oil level						
Piston cooling pressure >1000 rpm		kPa				
Coolant temp		°C	setting+2	103	setting+4	Derate. ON/OFF*
Coolant level			See cooling system	On	low level	
Fuel feed pressure	1200rpm	kPa	100			
Water in fuel			Alarm When Closed			
Crank case pressure		kPa	Rapid Pres inc			Shut down, ON/OFF*
Air filter pressure drop				5		
Altitude, above sea		m				Automatic derating, see section derating
Charge air temp		°C	Setting+5	80	Setting+10	Derate. ON/OFF*
Charge air pressure		kPa	map	map+30	map+40	Derate. ON/OFF*
Engine speed		rpm	N/A	2250	Alarm level	Shut down, ON/OFF*

* Off means no shut down, alarm only

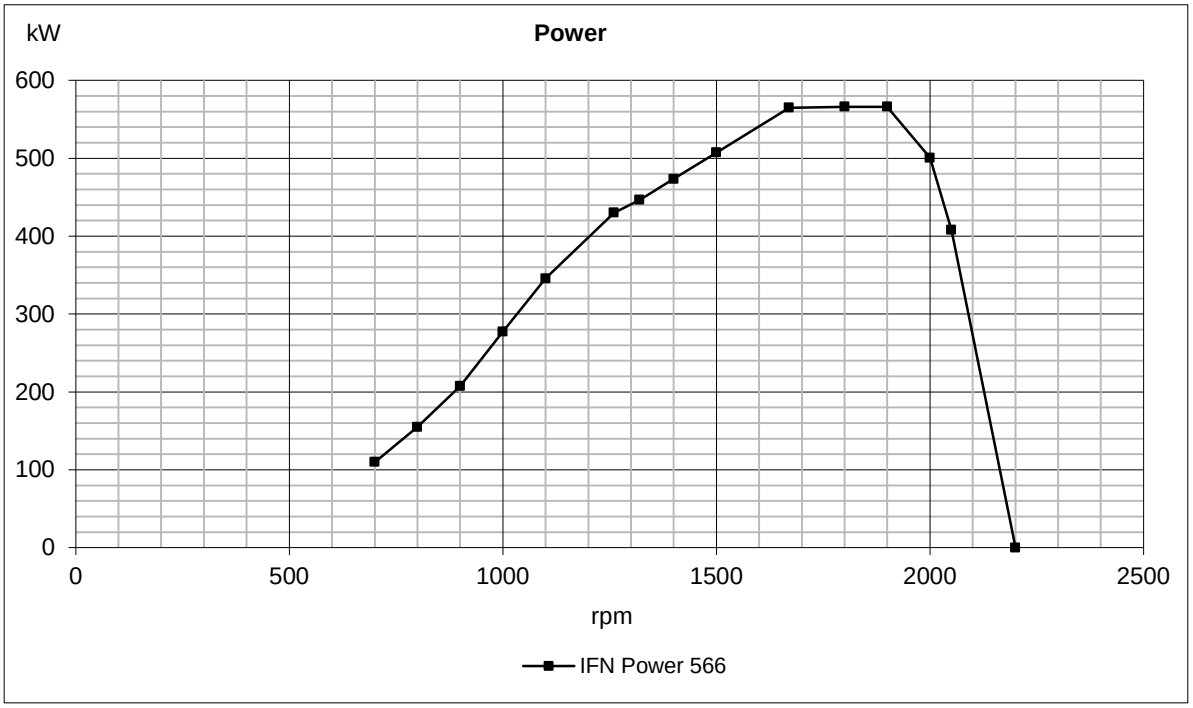
Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after sec	Forced shut down after 1.5 sec
Coolant temp	105°C	107°C	107°C	108°C	N/A	N/A
Oil temp	125°C	130°C	130°C	132°C	N/A	N/A
Low oil pressure	map	map	10kPa<limit	N/A	N/A	35kPa<limit
High charge air temp	85°C	90°C	90°C	91°C	N/A	N/A
High charge air pressure	map+30kPa	map+40kPa	map+30kPa	map+40kPa	N/A	N/A

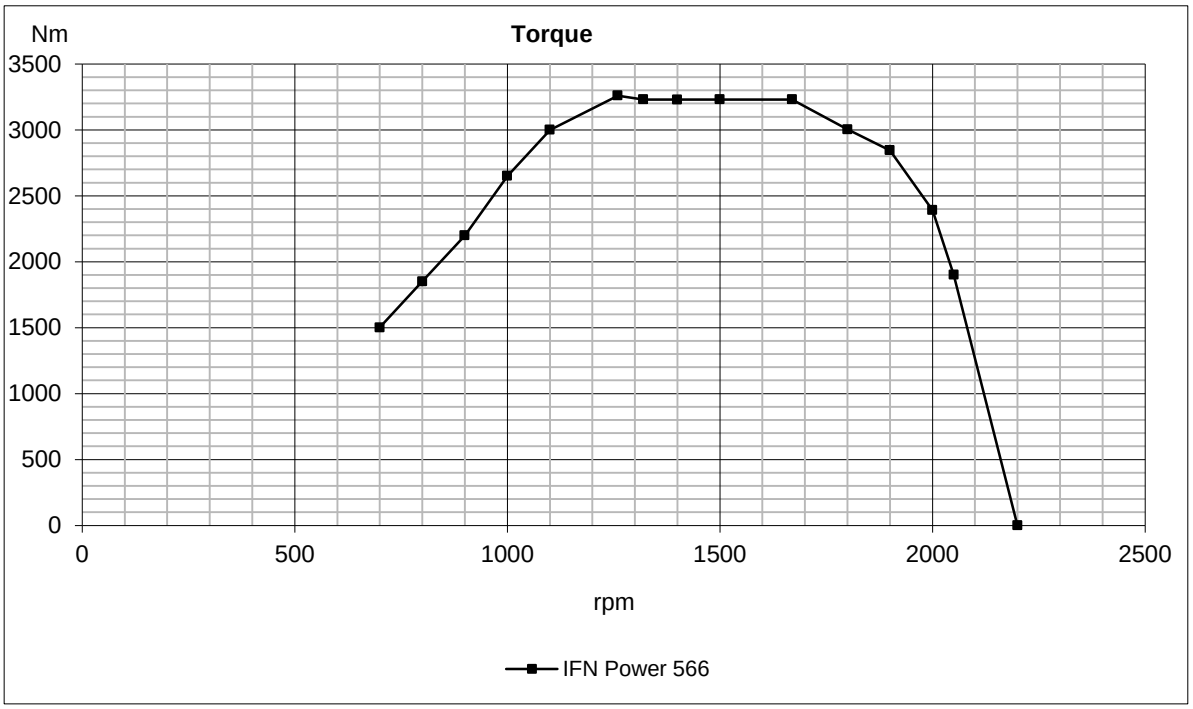
Electrical system

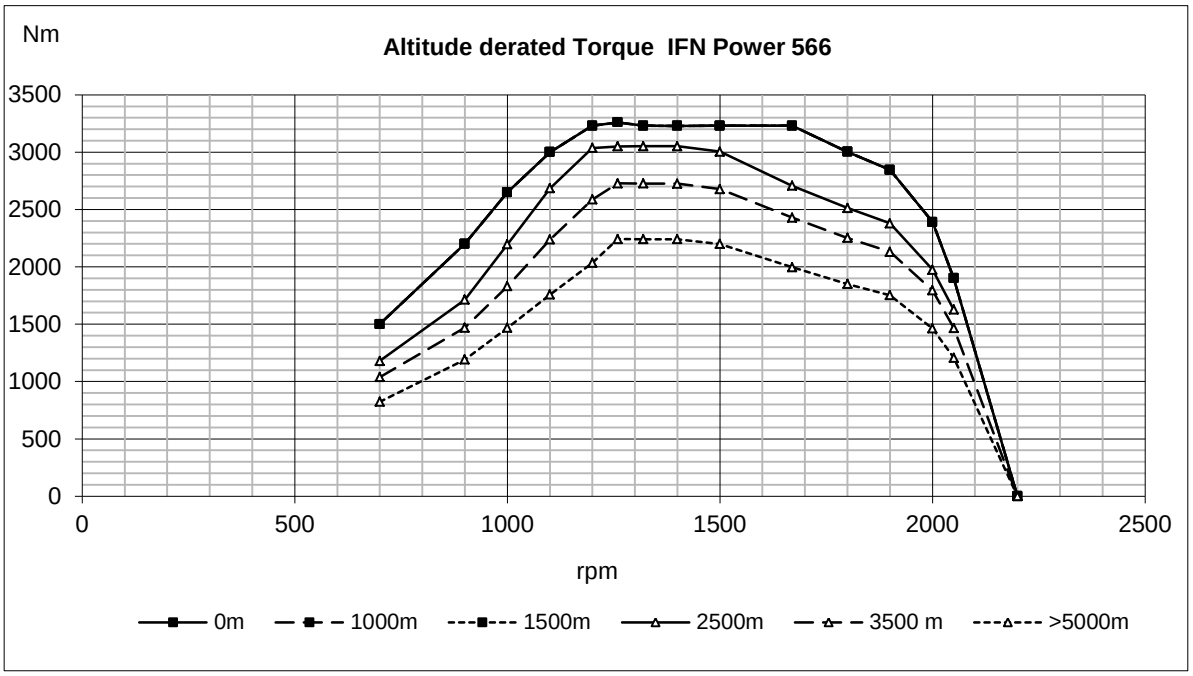
Voltage and type					24V		
Alternator:	make				Bosch		
Alternator:	output	A			110/150		
	tacho output	Hz/alternator rev.			6		
	drive ratio				3,9:1		
Starter motor:		make			Melco		
		type			105P70		
		output	kW		7		
			hp		9,5		
Number of teeth on:		flywheel			153		
		starter motor			12		
Max wiring 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		
Conditions:	**Temperature**		**°C**		**25**	**0**	**-15**
(4 mΩ main circuit resistance@	**Battery**		**Ah / CCA**		**235 / 1300**	**145 / 1050**	**145 / 1050**
Crank speed			rpm		171	118	98
Crank current			A		290	400	480
Starter input power during crank			kW		6,2	7,5	7,7
Battery power during crank			kW		6,5	8,1	8,5
Min battery @ 0°C			Ah / CCA		140/800		

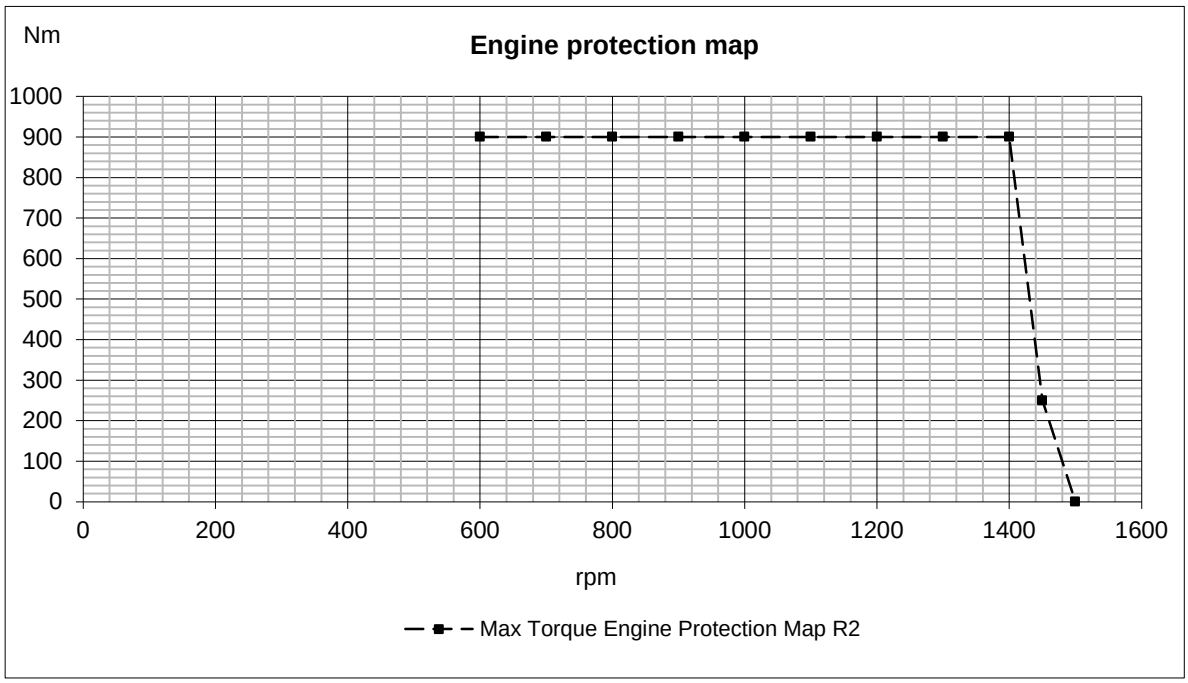
Power take off		**rpm**	**1200**	**1500**	**1800**	**1900**
Front end in line with crank shaft max:*		Nm	2840	2840	2370	2230
(with a total added mass moment of inertia, J (mR2)≤0,05 kgm²)		lbf ft	2095	2095	1748	1645
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	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 servo pump PTO max:*		Nm	100			
		lbf ft	74			
Speed ratio direction of rotation viewed from flywheel side			1,58:1/ccw			
Timing gear at compressor PTO max:*		Nm	600			
		lbf ft	443			
Speed ratio direction of rotation viewed from flywheel side			1,31:1/ccw			
Max allowed bending moment in flywheel housing		Nm	15000			
		lbf ft	11063			
Max. rear main bearing load		N	5000			
		lbf	1124,0			

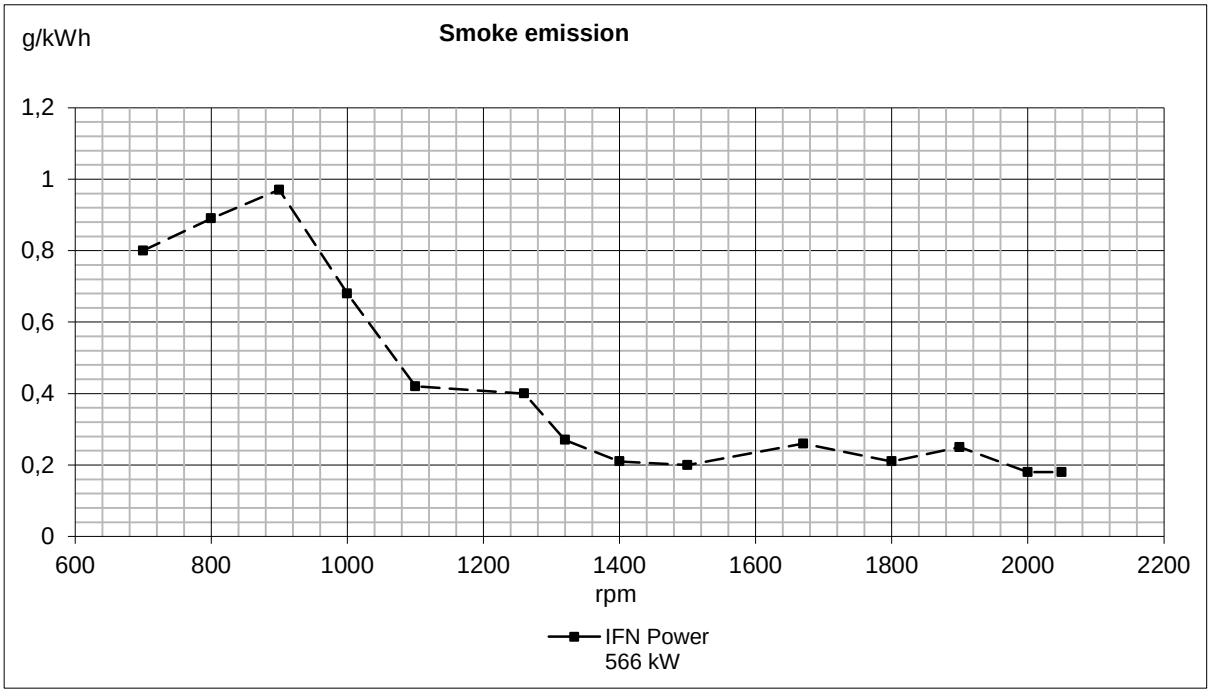
**** Maximum allowed torque at individual PTO´s.***
If more then one PTO output is used simultaniusly, calculations needs to be performed to determine available maximum.
Available torque depends on application inertia.

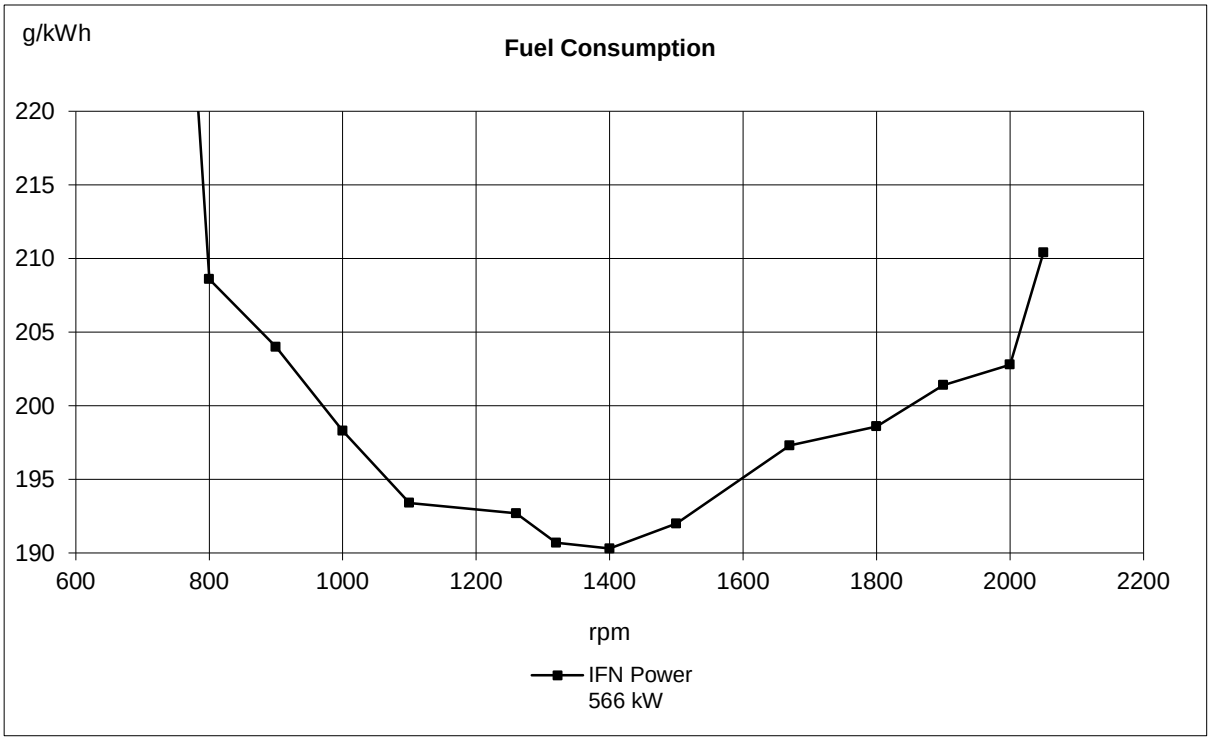

kW
Power
600
500
400
300
200
100
0
0
500
1000
1500
2000
2500
rpm
IFN Power 566

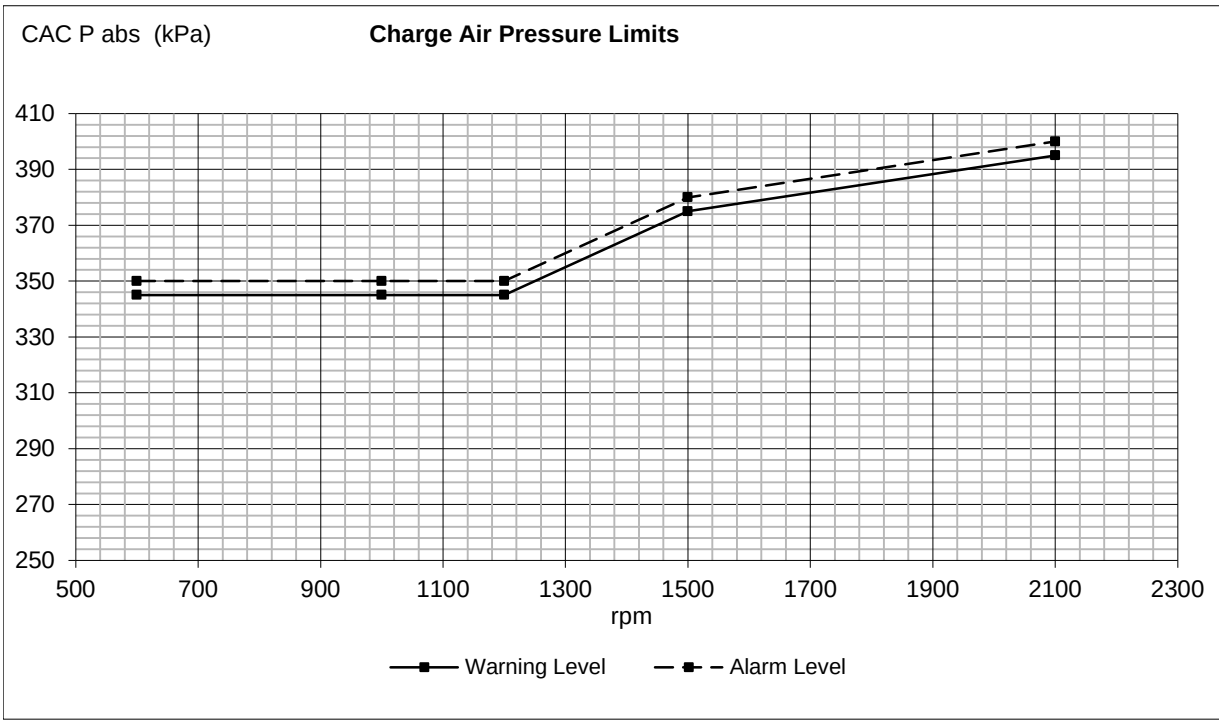

Nm
Torque
3500
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
IFN Power 566

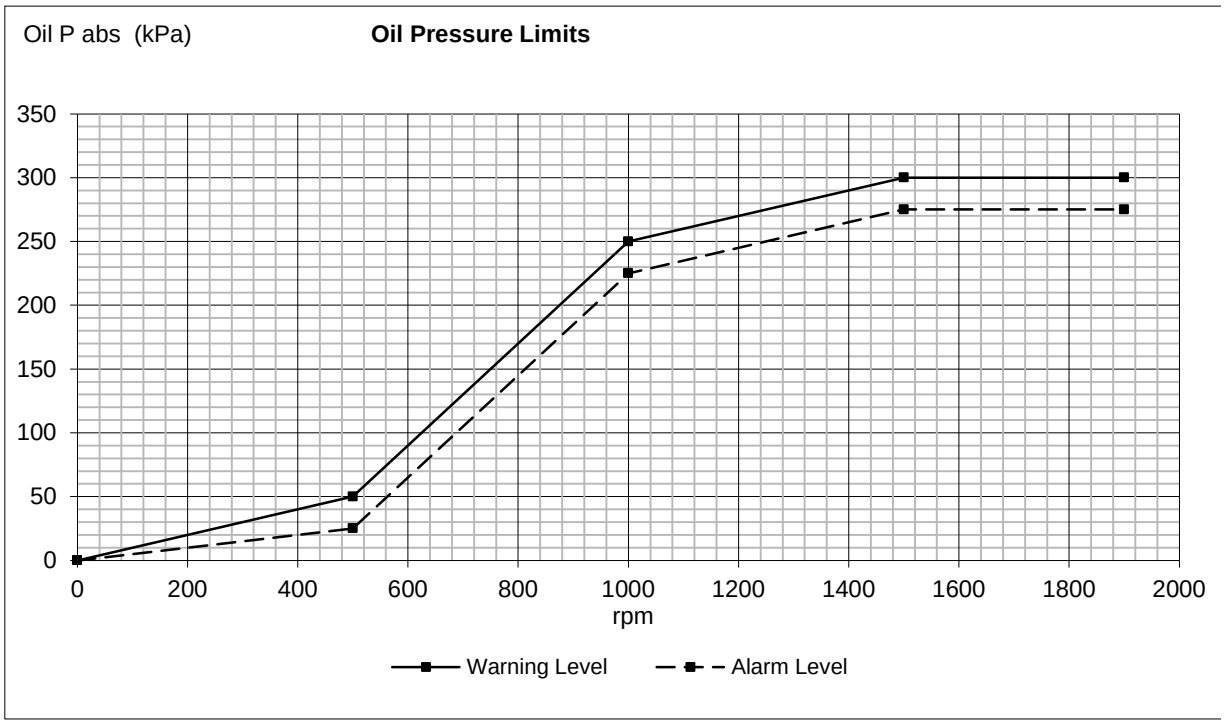

Nm
Altitude derated Torque IFN Power 566
3500
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
0m
1000m
1500m
2500m
3500 m
>5000m

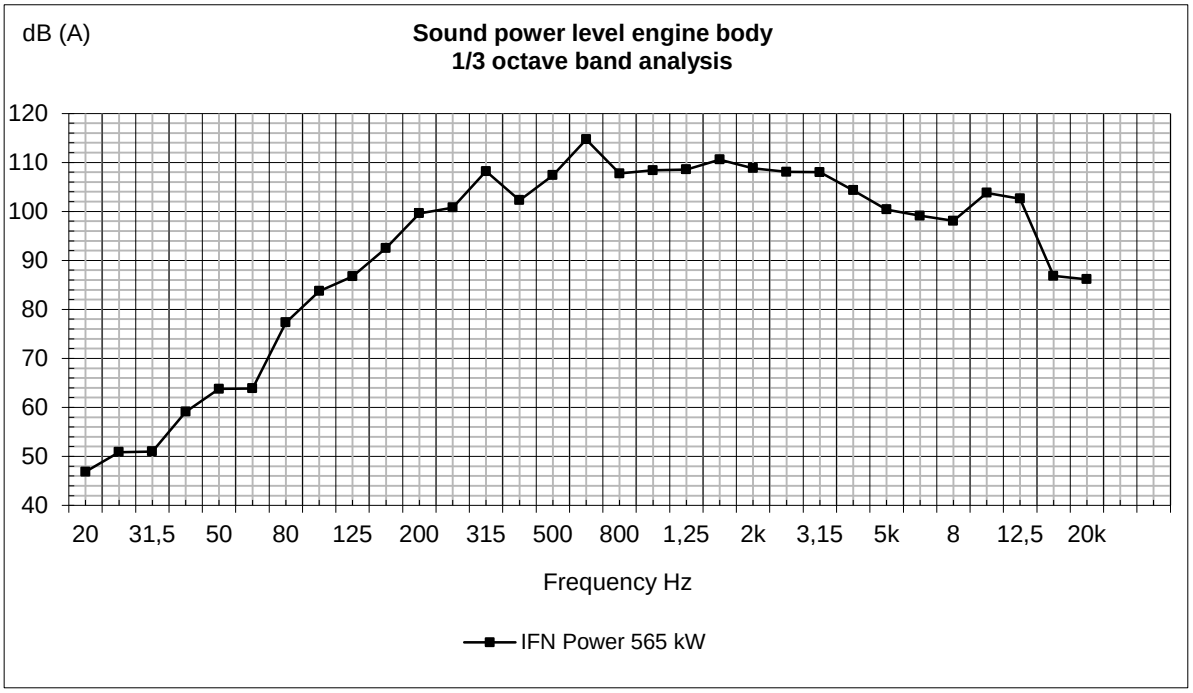

Nm
Engine protection map
1000
900
800
700
600
500
400
300
200
100
0
0
200
400
600
800
1000
1200
1400
1600
rpm
Max Torque Engine Protection Map R2

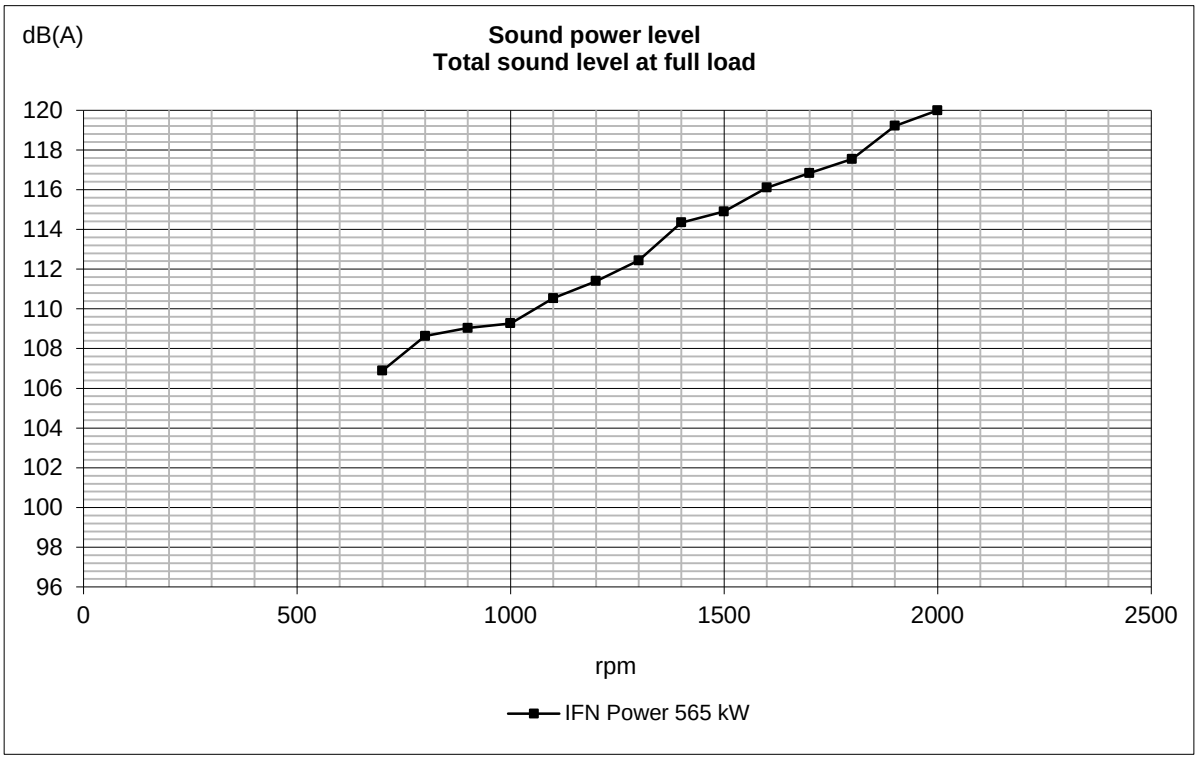

Smoke emission
g/kWh
1,2
1
0,8
0,6
0,4
0,2
0
600
800
1000
1200
1400
1600
1800
2000
2200
rpm
IFN Power
566 kW

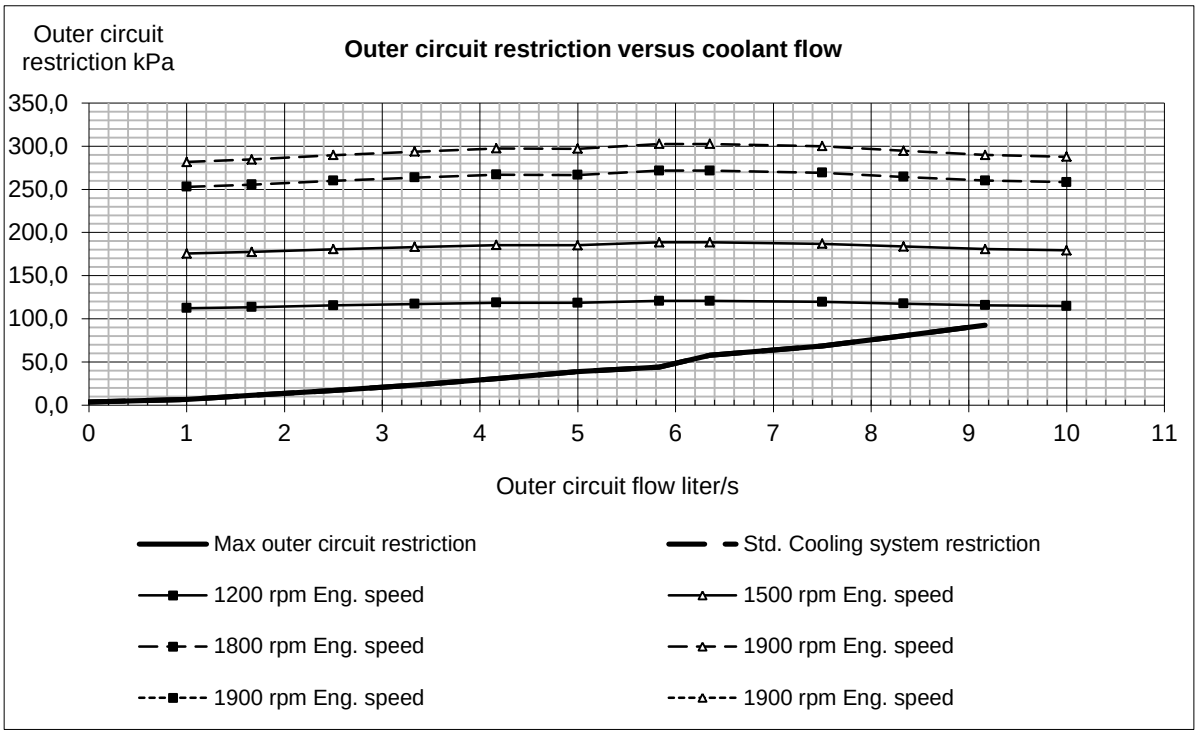

Fuel Consumption
g/kWh
220
215
210
205
200
195
190
600
800
1000
1200
1400
1600
1800
2000
2200
rpm
IFN Power
566 kW


CAC P abs (kPa)
Charge Air Pressure Limits
410
390
370
350
330
310
290
270
250
500
700
900
1100
1300
1500
1700
1900
2100
2300
rpm
Warning Level
Alarm Level

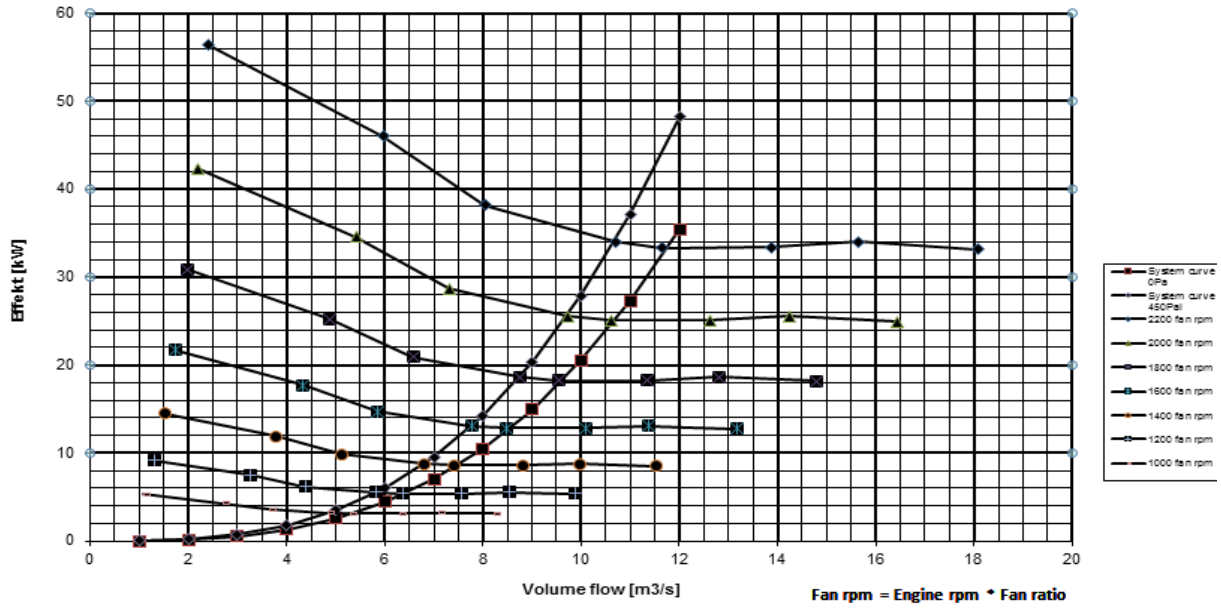

Oil P abs (kPa)
Oil Pressure Limits
350
300
250
200
150
100
50
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
rpm
Warning Level
Alarm Level


dB (A)
Sound power level engine body
1/3 octave band analysis
120
110
100
90
80
70
60
50
40
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
IFN Power 565 kW

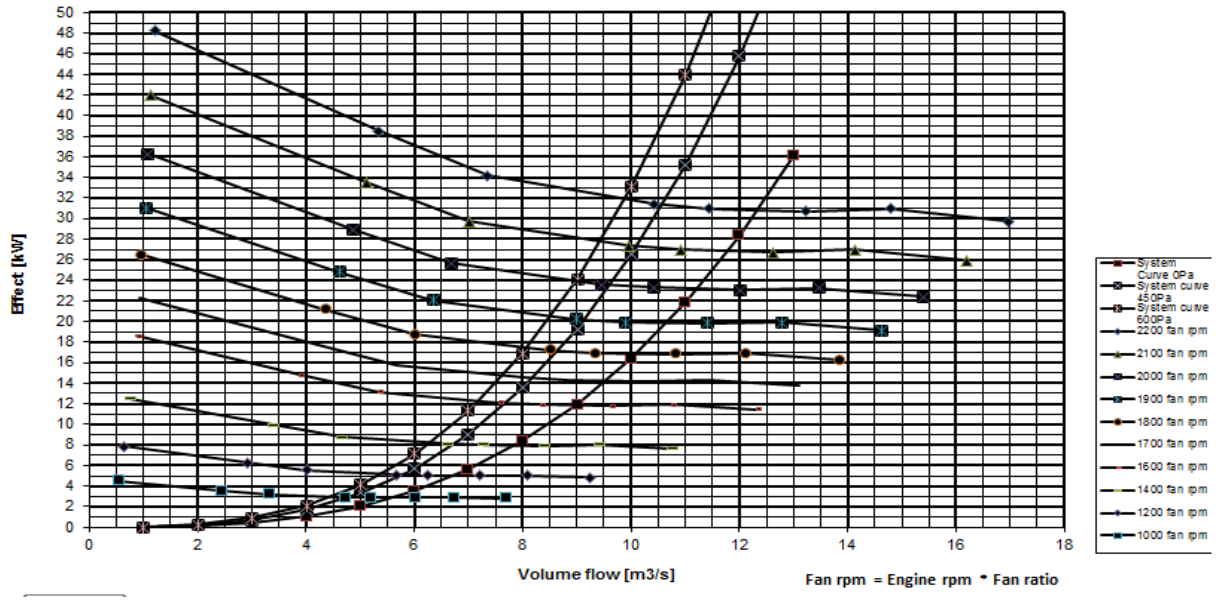

dB(A)
Sound power level
Total sound level at full load
120
118
116
114
112
110
108
106
104
102
100
98
96
0
500
1000
1500
2000
2500
rpm
IFN Power 565 kW


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

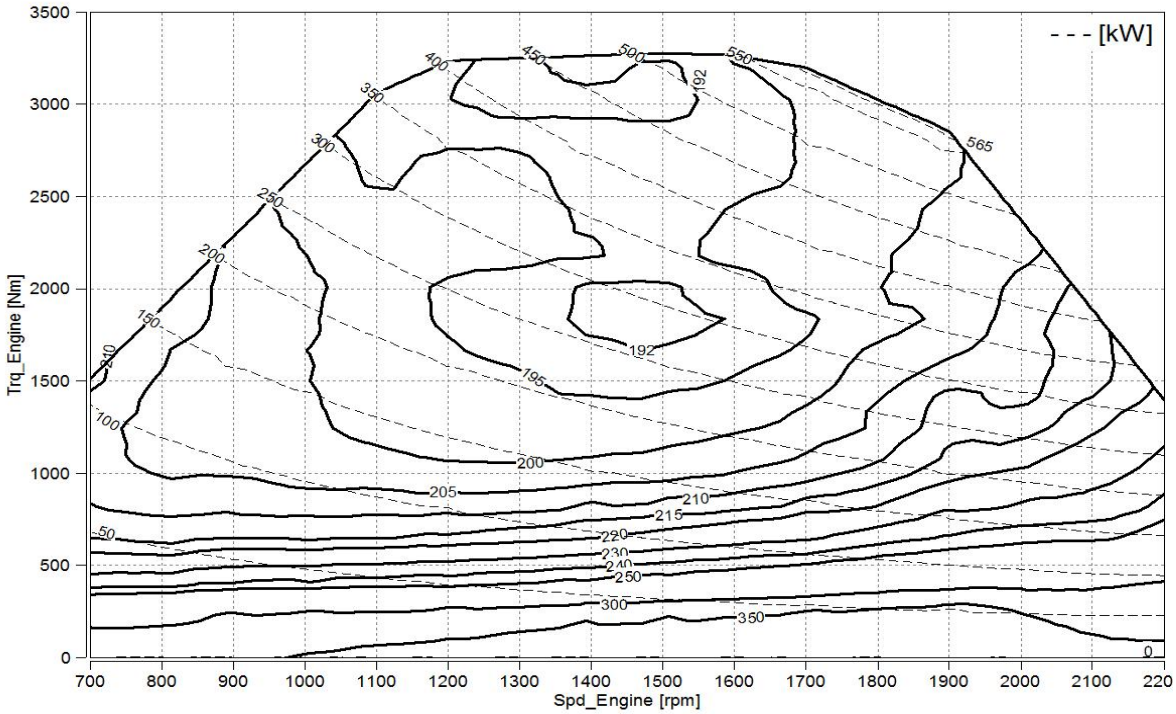
Fan power 890mm Pusher fan



Fan power 890mm Puller fan



BSFC [g/kWh]



Fuel flow [Lph]