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	12,78
		in^3	780
Firing order			1-5-3-6-2-4
Bore		mm	131
		in	5,16
Stroke		mm	158
		in	6,22
Compression ratio			17,8:1
Wet weight	Engine only (Estimated) (excl after treatment comp.)	kg	1325
		lb	2921
	Power pac	kg	1790
		lb	3946

Performance				**rpm**	**1200**	**1500**	**1800**	**1900**
IFN Power 375 kW		without fan		kW	326	375	375	375
				hp	443	510	510	510
		with fan 890 mm		kW	318	363	355	351
				hp	433	494	483	477
Torque at:		IFN Power		Nm	2595	2387	1989	1885
				lbf ft	1914	1761	1467	1390
Max torque at engine speed		rpm	1200 rpm	Nm	2595			
				lbf ft	1914			
Power tolerance				%	±2			
Mean piston speed				m/s	6,3	7,9	9,5	10,0
				ft/sec	20,7	25,9	31,1	32,8
Effective mean pressure at:		IFN Power		MPa	2,55	2,35	1,96	1,85
				psi	370	340	284	269
Max combustion pressure at:		IFN Power		MPa	17,8	17,4	16,7	16,4
				psi	2581	2523	2422	2378
Total mass moment of inertia, J (mR^2) (not including flywheel)				kgm^2	1,143			
				$lbft^2$	27,1			
Friction Power				kW	21	31	45	51
				hp	29	42	61	69
Derating see Technical Diagrams								

Engine brake performance (only engines with VCB)		rpm	1200	1500	1900	2200
Brake power:	without fan	kW	70	128	240	283
		hp	95	174	326	385
Brake torque:	without fan	Nm	557	815	1206	1228
		lbf ft	411	601	890	906
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	-15	
		°F	5	
	with manifold heater 3 kW	°C	-25	
		°F	-13	
	with manifold heater 3 kW and block heater	°C	-30	
		°F	-22	
*Specify oil and fuel quality	T>-15°C Oil VDS3 or VDS4 15W/40 T<-15°C Oil VDS3 or VDS4 5W/40			
Heater type	Make	Power kW	Engaged hours (-30°C)	Cooling water temp engine block
Self circulating	Volvo 21578298	2	12	-1°C 30°F

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption (average)			Vol%	0,02
Oil system capacity including filters			liter US gal	36 9,51
Oil pan capacity: (both variants)		Max	liter US gal	30 7,93
		Min	liter US gal	19 5,02
Oil change intervals/specifications	VDS3		h	1000
	VDS4		h	1000
Engine angularity limits:		front up	°	11
		front down	°	11
		side tilt	°	11
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	130 34,3
Fuel supply line max. restriction (measured at fuel inlet connection)		kPa psi	30 4,4
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 (Measured at fuel inlet connection)		°C °F	60 140
Prefilter / Water separator micron size		µ	10
Fuel filter filtration efficiency	96%	µ	6
	75%	µ	4
Governor type/make, standard		Volvo/EMS2.3	
Specific UREA consumption in Nonroad Transient Cycle (NRTC)		Vol%	5,7
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	22,0 777	27,0 954	28 989	28 989
⚠ **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	222 12625	282 16037	299 17004	304 17288
Exhaust gas temperature after turbine at:	IFN Power	°C °F	452 846	490 914	506 943	513 955
⚠ **See front page for important information** Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm		kPa psi	14 2,0	17 2,5	19 2,8	20 2,9
⚠ **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	9 1,3	9 1,3	11 1,6	12 1,7
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power	m³/min cfm	52,0 1836	61,0 2154	64 2260	66 2331

Cooling system			rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	IFN Power		kW	8,3	9,7	9,7	9,8
			BTU/min	472	552	552	557
Heat rejection to coolant at:	IFN Power		kW	127	150	163	167
			BTU/min	7222	8530	9270	9497
Coolant			Yellow Volvo Coolant Solution (VCS)				
Radiator cooling system type				Closed circuit			
Standard radiator core area			m²	0,8			
			foot²	8,61			
Fan diameter	890 mm		mm	890			
			in	35,04			
Fan power consumption	890 mm		kW	4,0	6,0	10,0	12,0
			hp	5	8	14	16
Fan drive ratio	fan Ø890			0,84:1 ccw			
Coolant capacity:	engine		liter	20			
			US gal	5,3			
	std. 0,8m² radiator with hoses		liter	24			
			US gal	6,3			
Coolant pump			drive/ratio	belt/1,41:1 cw			
Coolant flow with standard system			l/s	3,7	4,7	5,7	6
			US gal/s	1,0	1,2	1,5	1,6
Minimum coolant flow			l/s	3,2	4,2	5,5	5,5
			US gal/s	0,8	1,1	1,5	1,5
Maximum outer circuit restriction incl. piping			kPa	65,0			
			psi	9,4			
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	64	69	67	69
		BTU/min	3640	3924	3810	3924
Charge air mass flow	IFN Power	kg/s	0,44	0,51	0,53	0,53
Charge air inlet temp.	IFN Power	°C	190	185	177	178
(Charge air temp after turbo compressor)		°F	374	365	351	352
⚠ **See front page for important information** Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	46	49	50	50
		°F	115	120	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	232	205	175	168
(After charge air cooler)		psi	33,65	29,73	25,38	24,37
Standard charge air cooler core area		m²	0,8			
		foot²	8,61			

Cooling performance: 0.8 m² radiator and pull 890 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.

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	345	52	126	5,9	208,4	300	0,044
0,84	469	54	129	6,3	222,5	190	0,028
		57	135	6,9	243,7	0	

Cooling performance: 0.8 m² radiator and push 890 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.

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	375	60	140	7,6	268,4		
0,99	510	61	142	7,9	279,0		
		62	144	8,3	293,1		

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	125		Shut down, ON/OFF*
Oil pressure	Low idle	kPa	50	25,0		Shut down, ON/OFF*
	Rated speed	kPa	300	275		Shut down, ON/OFF*
Oil level						
Piston cooling pressure >1000 rpm		kPa				
Coolant temp		°C	107	105		Shut down, ON/OFF*
Coolant level			See cooling system	On		
Fuel feed pressure	1200rpm	kPa	100			
Water in fuel			Alarm When Closed			
Crank case pressure		kPa	Rapid Pres inc			Shut down,
Air filter pressure drop				5		
Altitude, above sea		m				Automatic derating, see section derating
Charge air temp		°C	125	120		Shut down, ON/OFF*
Charge air pressure		kPa	Alarm map value +30kPa	Warning map value +20kPa		Shut down, ON/OFF*
Engine speed		rpm	x % of rated speed	125% 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	Forced idle after sec	Forced shut down after 2 sec
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 map value	Alarm map value	N/A	N/A	N/A	Alarm map value
High charge air temp	120°C	125°C	125°C	126°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

Electrical system

Voltage and type					24V		
Alternator:	output	A			110/150		
	tacho output	Hz/alternator rev.			6		
	drive ratio				5,25		
Starter motor:	type				105P70 / (105P70 ISS för start/stop)		
	output		kW		7		
			hp		9,5		
Number of teeth on:	flywheel				153		
	starter motor				12		
Inlet manifold heater (at 20 V)			kW		3		
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	2590	2240	1560	1670
(with a total added mass moment of inertia, J (mR2)≤ 0,05 kgm²)		lbf ft	1910	1652	1151	1232
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	42	53	62	68
		hp	57	72	84	92
	max down	kW	36	44	52	60
		hp	49	60	71	82
	max right	kW	42	53	62	68
		hp	57	72	84	92
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			
Maximum torque on timing gear at rear PTO : *		Nm	1000			
		lbf ft	738			
Speed ratio direction of rotation viewed from flywheel side			1,31:1/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	4000			
		lbf	899,2			

**** 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.

Performance	Power (kW)	Rpm
IFN Power	375	1900

Sensors Alarm	Signal	Range	Alarm switch	Alarm Level	Derating level	Condition/Delay	Derating
Boost pressure	0,5-4,5 V	50 - 400 kPa	N/A	map value+30 kPa	map		Soft derate VE/
Boost temperaure	50-0 kΩ	-40° - 130 °C	N/A	120°C	125°C		Soft derate VE/
Coolant level switch	Digital		Alarm when closed	Low			
Coolant temperature	50-0 kΩ	-40° - 140 °C	N/A	105°C	107°C		Soft derate VE/
Crankcase pressure	0,5-4,5 V	0 -15 kPa	N/A	Rapid pres inc	Rapid pres inc		Shutdown
Engine Speed Cam	Frequency		N/A	Lost sign			N/A
Engine Speed Crank	Frequency		N/A	Lost sign			N/A
Exhaust gas temp			N/A	550	575		Soft derate VE/
Oil level sensor			Alarm when low level	N/A	N/A		N/A
Oil temperature	50-0 kW	-40° - 140 °C	N/A	125°C	127°C		Soft derate VE/

Sensors Alarm	Signal	Range	rpm Map					Condition	Derating
Charge Air pressure	0,5-4,5 V	50 - 400 kPa	**600**	**1000**	**1200**	**1500**	**1900**		
Warning Level			363	363	363	335	290		
Alarm Level			373	373	373	345	300		Soft derate VE/
Oil pressure	0,5-4,5 V	0-700 kPa	**0**	**500**	**1000**	**1500**	**1900**		
Warning Level			1	50	200	300	300		
Alarm Level			1	25	175	275	275		Shut down
Fuel pressure	0,5-4,5 V	0-700 kPa	**600**	**1000**	**1200**	**1800**	**1900**		
Warning Level			100	100	100	300	300		
Alarm Level			N/A	N/A	N/A	N/A	N/A		

Remarks

1) Soft derate Coolant temp	Speed / °C	105°C	107C	108°C	
Remaining torque in %	600	100%	100%	85%	
	1200	100%	100%	35%	
	1500	100%	100%	0%	

Derate map R2			
°C	105	107	108
%	0	0	100

2) Soft derate Oil temp	Speed / °C	125°C	127°C	130°C	
Remaining torque in %	600	100%	100%	85%	
	1200	100%	100%	35%	
	1500	100%	100%	0%	

Derate map R2			
°C	125	127	130
%	0	0	100

3)Soft derate Boost Temp	Speed / °C	120°C	125°C	126°C	
Remaining torque in %	600	100%	100%	85%	
	1200	100%	100%	35%	
	1500	100%	100%	0%	

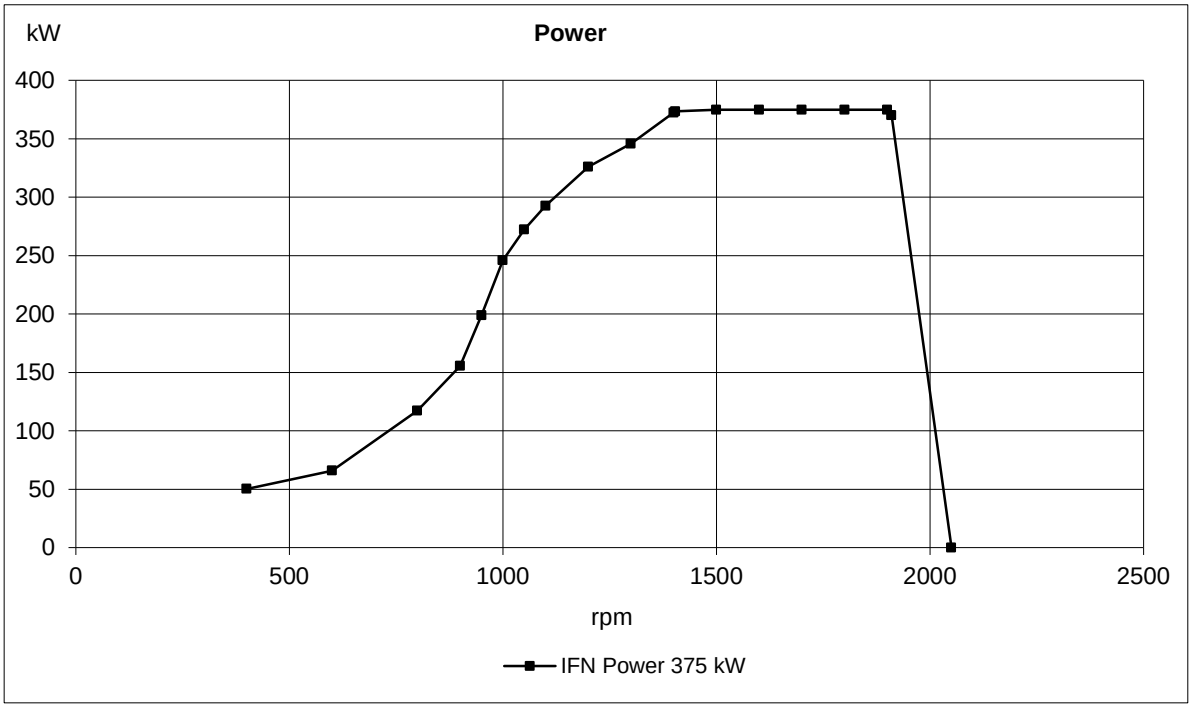
Derate map R2			
°C	120	125	126
%	0	0	100

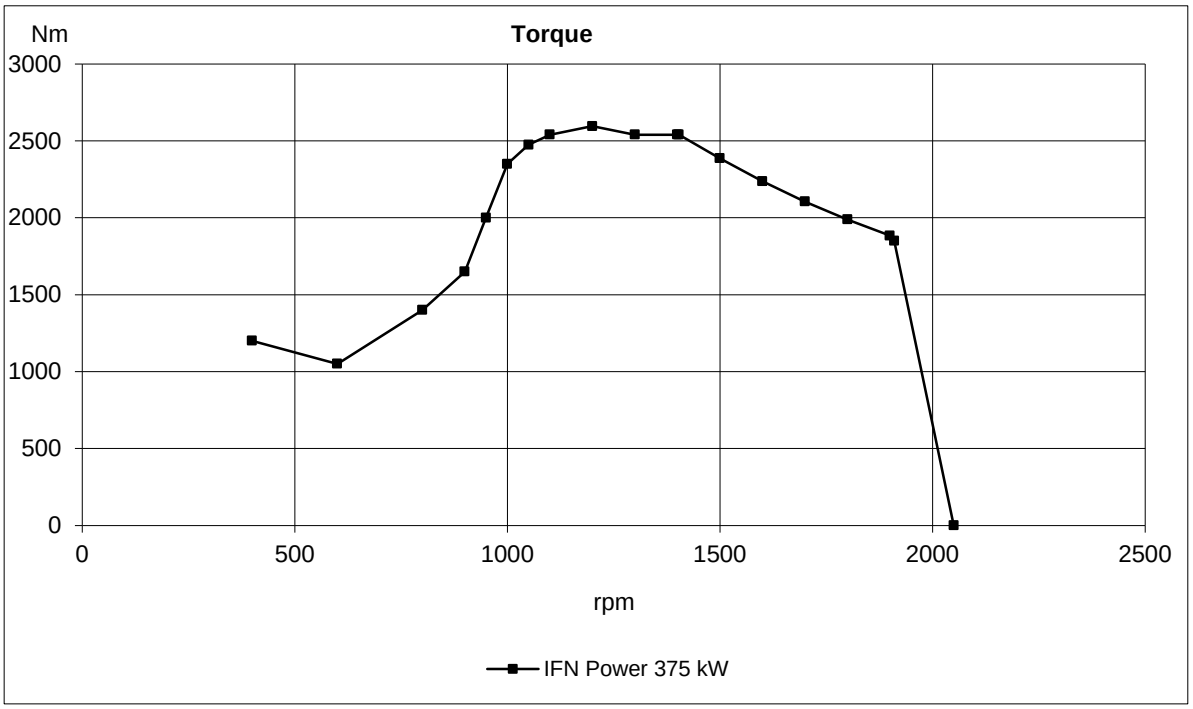
4)Soft derate Exhaust temp	Speed / °C	550°C	560°C	575°C	580°C
Remaining torque in %	600	100%	100%	100%	85%
	1200	100%	100%	100%	35%
	1500	100%	100%	100%	0%

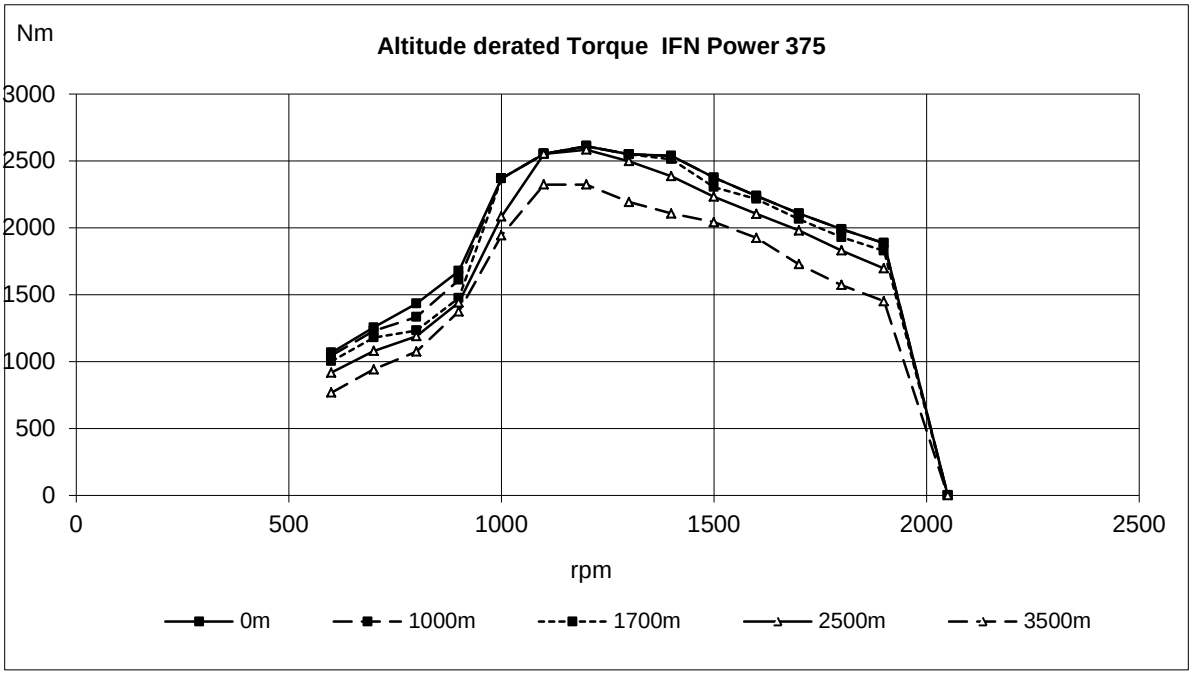
Derate map R2					
°C	550	560	575	580	
%	0	0	0	100	

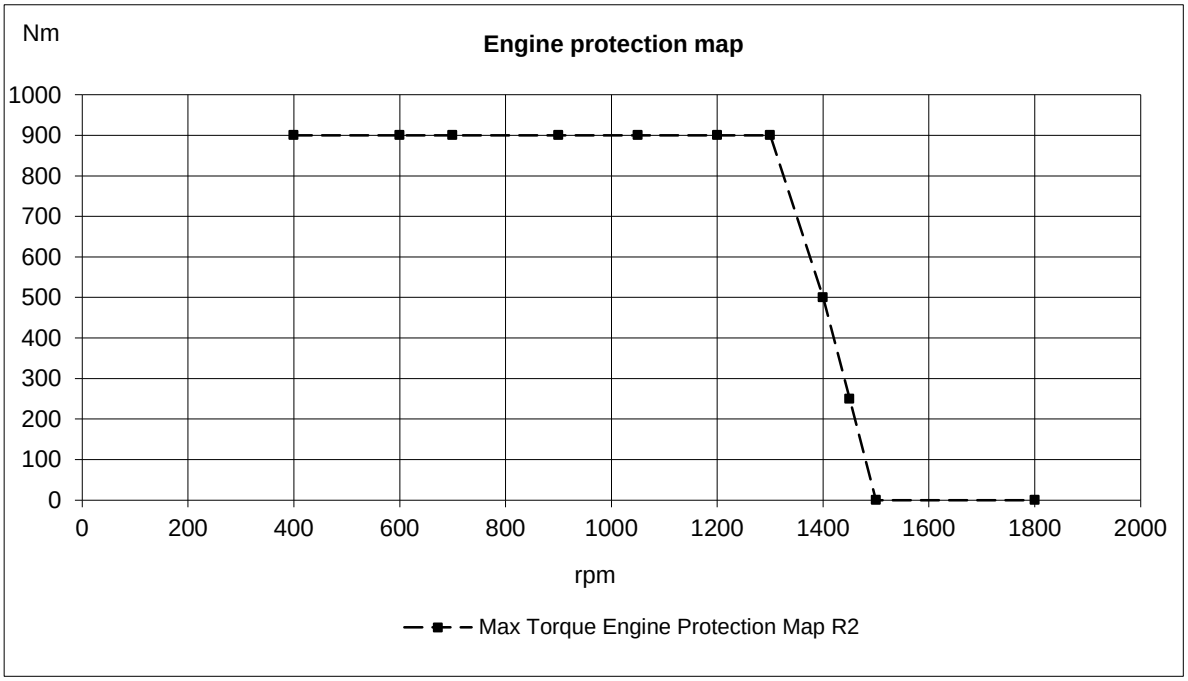
Max Torque High Map R2											
	400	600	700	800	900	1000	1050	1100	1200	1250	1300
	1200	1050	1225	1400	1650	2350	2475	2540	2595	2568	2540
	1400	1450	1500	1600	1700	1800	1900	1910	2012		
	2540	2466	2386	2237	2106	1989	1884	1850	500		

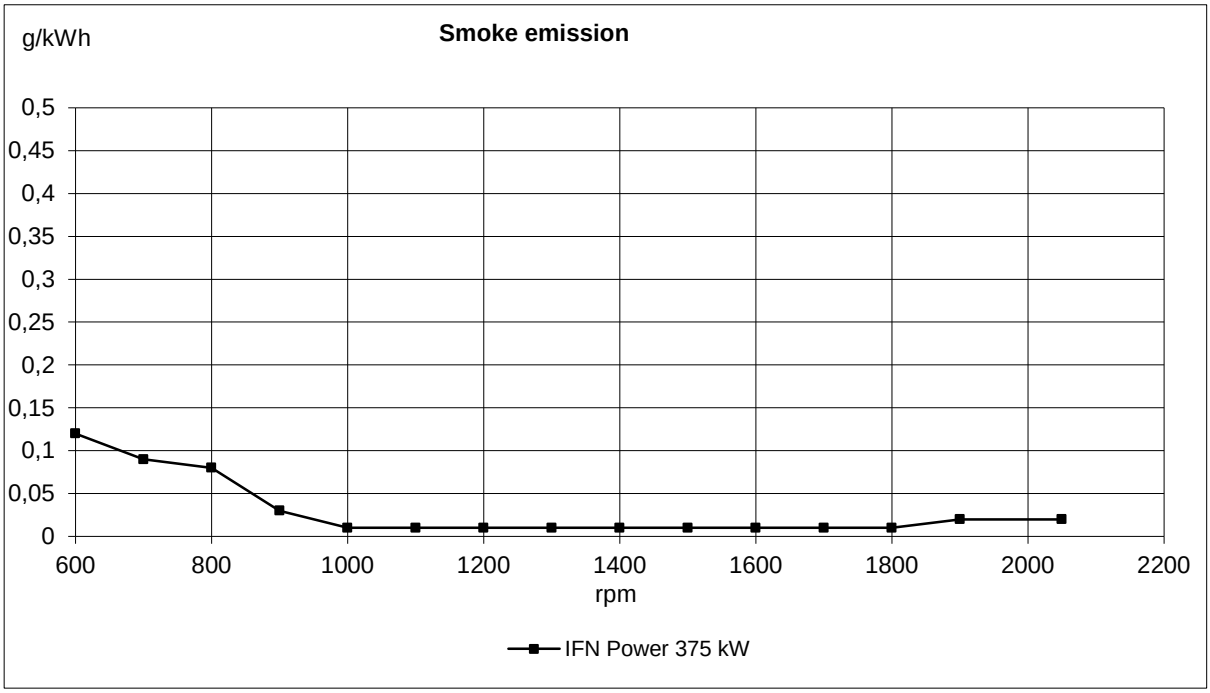
Max Torque Engine Protection Map R2											
	400	600	700	900	1050	1200	1300	1400	1450	1500	1800
	900	900	900	900	900	900	900	500	250	0	0

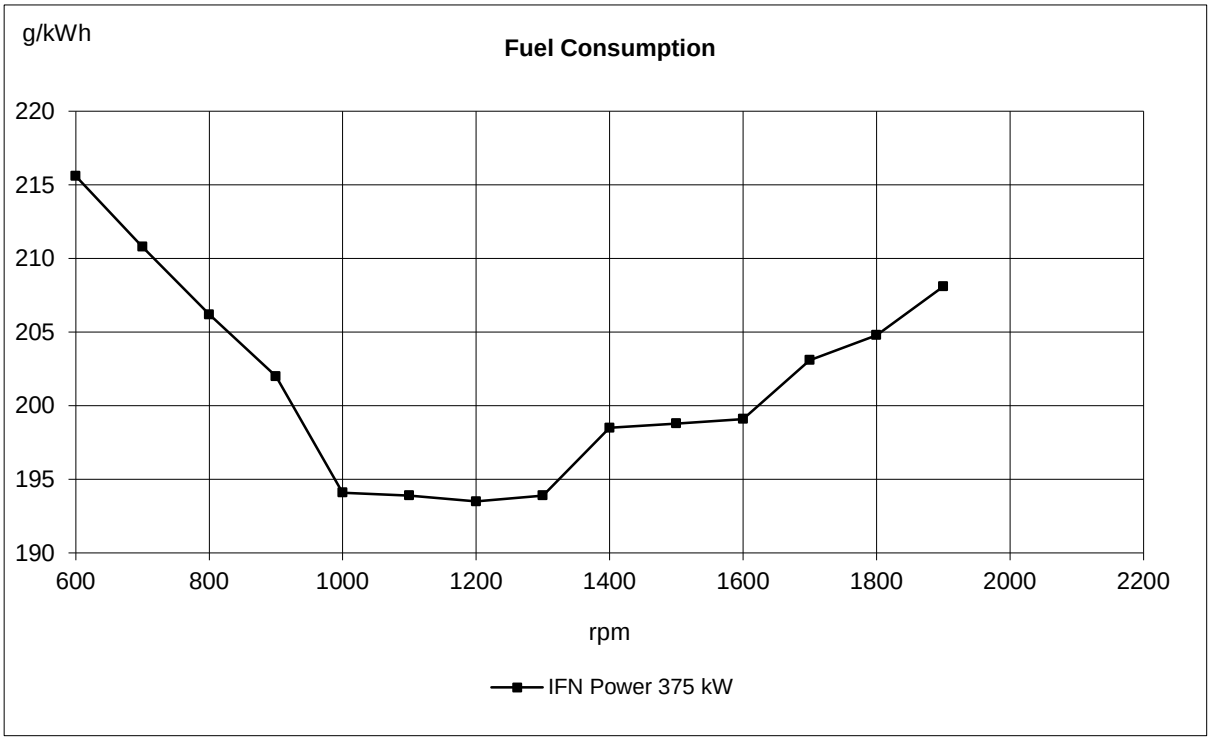

kW
Power
400
350
300
250
200
150
100
50
0
0
500
1000
1500
2000
2500
rpm
IFN Power 375 kW

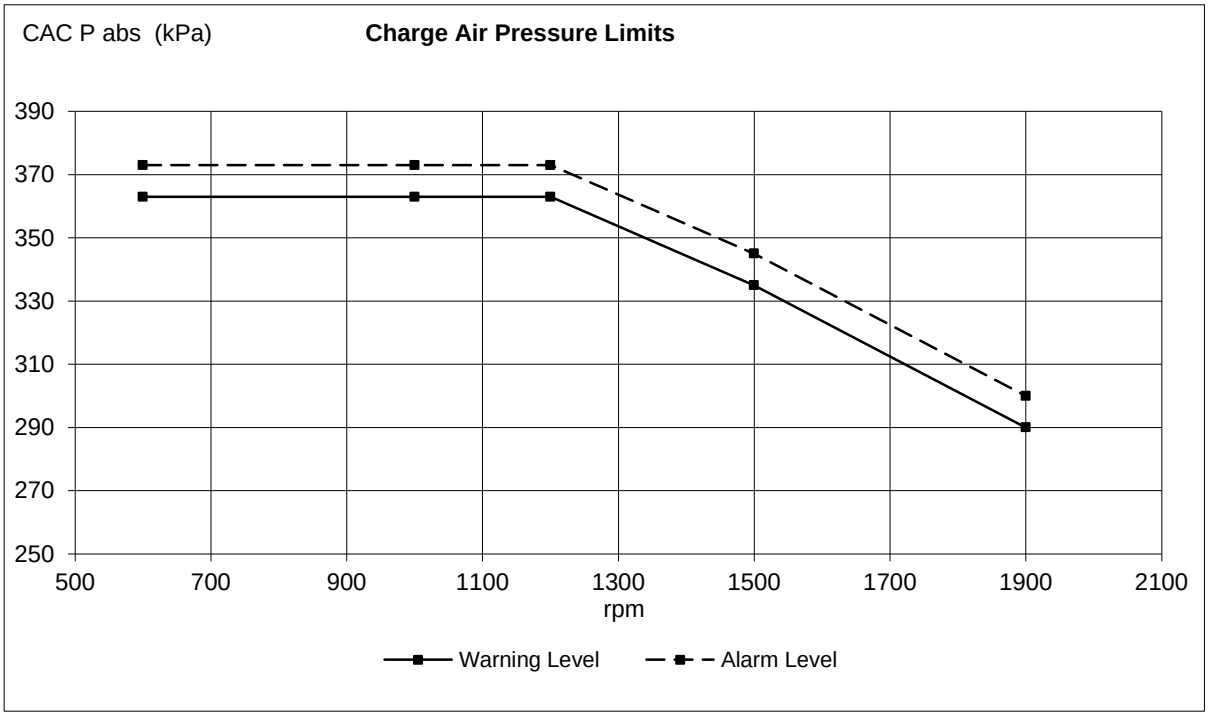

Nm
Torque
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
IFN Power 375 kW

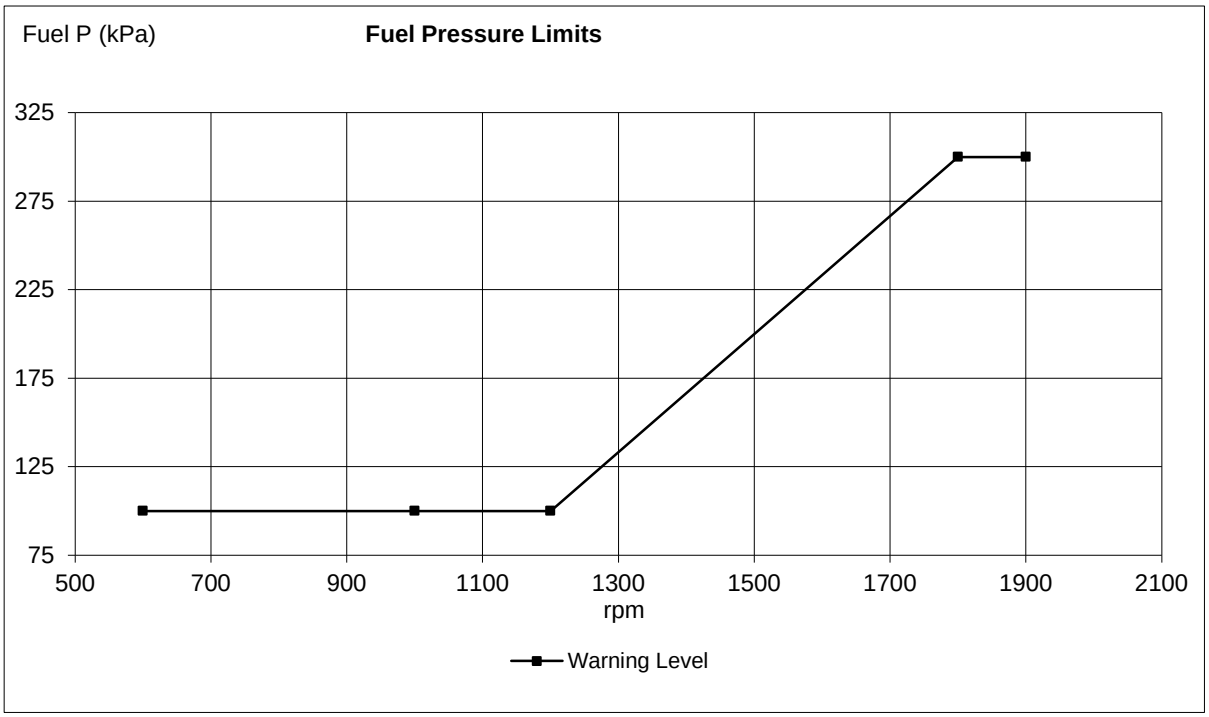

Nm
Altitude derated Torque IFN Power 375
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
0m
1000m
1700m
2500m
3500m

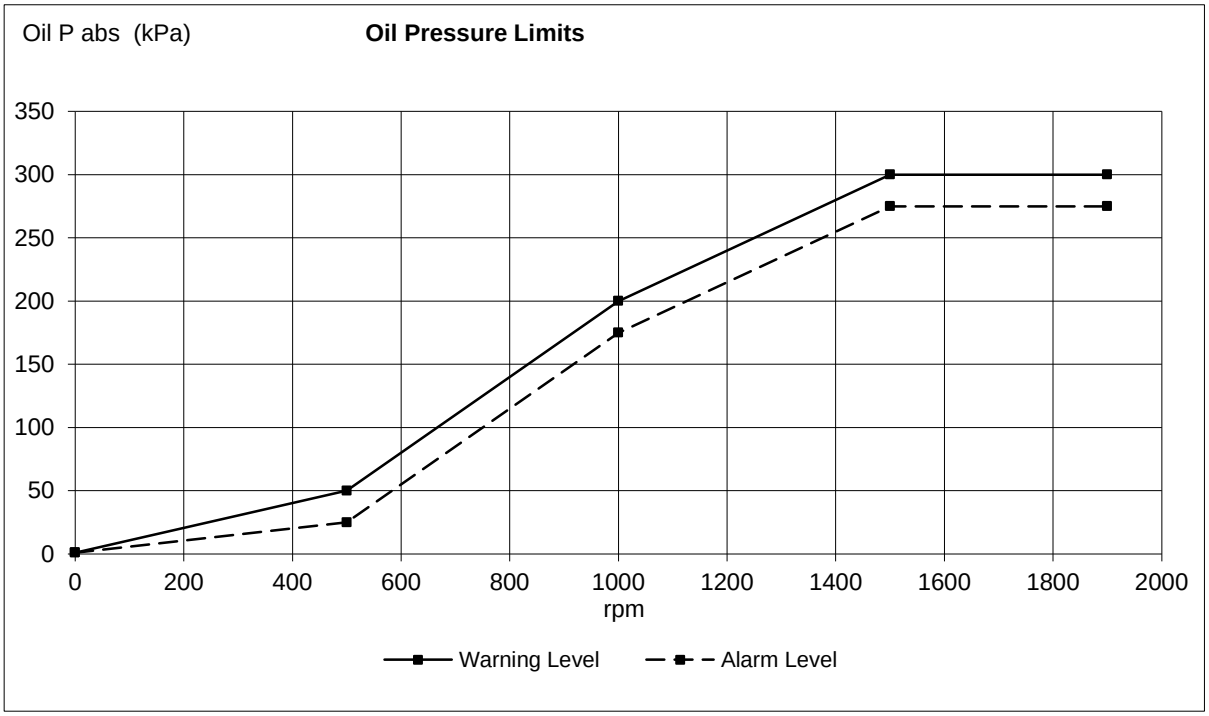

Nm
Engine protection map
1000
900
800
700
600
500
400
300
200
100
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
rpm
Max Torque Engine Protection Map R2

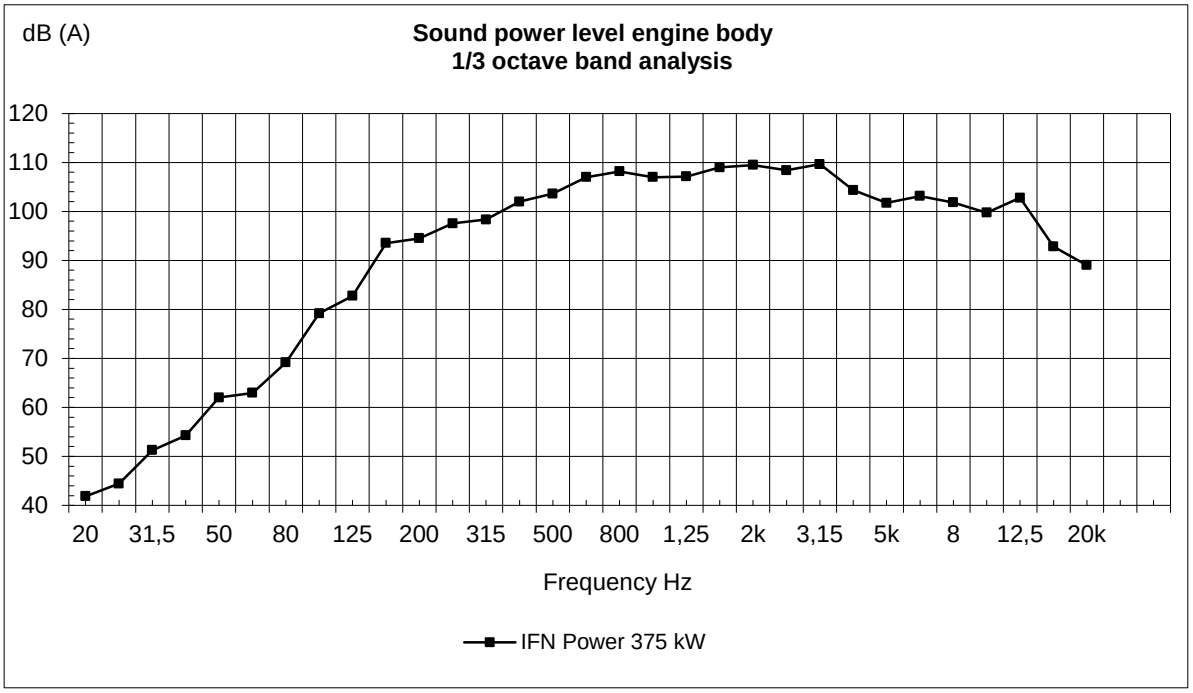

Smoke emission
g/kWh
0,5
0,45
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
600
800
1000
1200
1400
1600
1800
2000
2200
rpm
IFN Power 375 kW

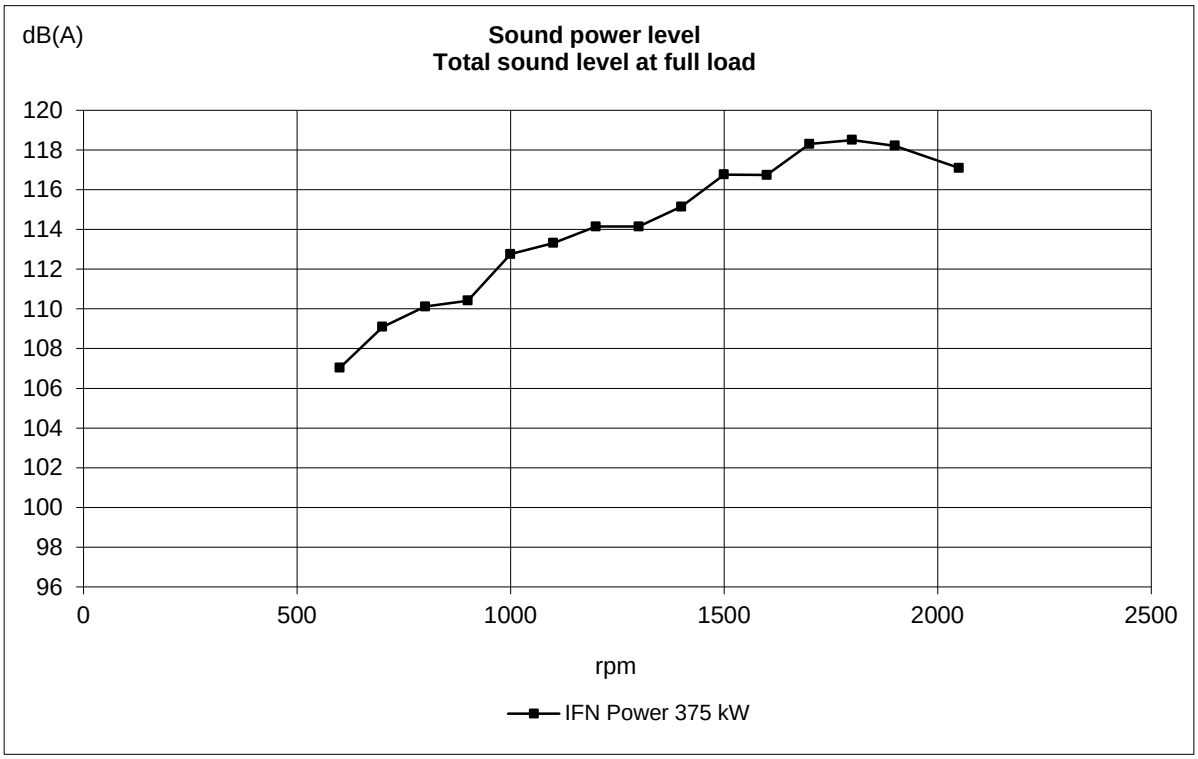

Fuel Consumption
g/kWh
220
215
210
205
200
195
190
600
800
1000
1200
1400
1600
1800
2000
2200
rpm
IFN Power 375 kW

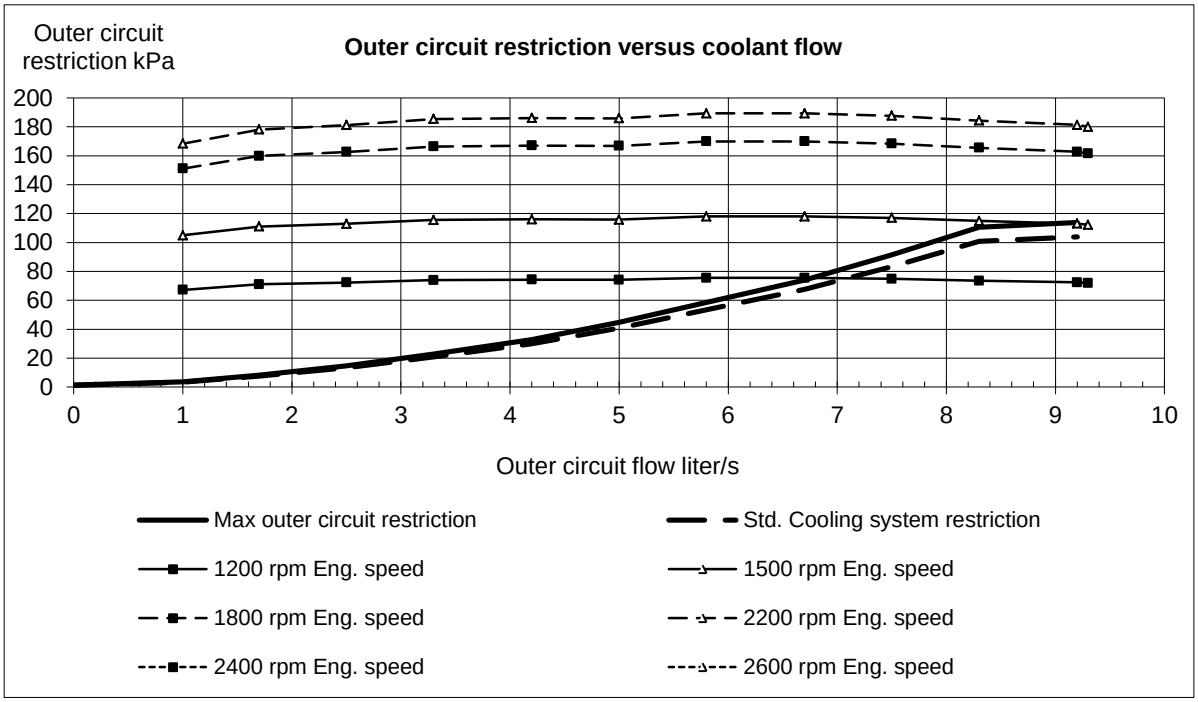

CAC P abs (kPa)
Charge Air Pressure Limits
390
370
350
330
310
290
270
250
500
700
900
1100
1300
1500
1700
1900
2100
rpm
Warning Level
Alarm Level

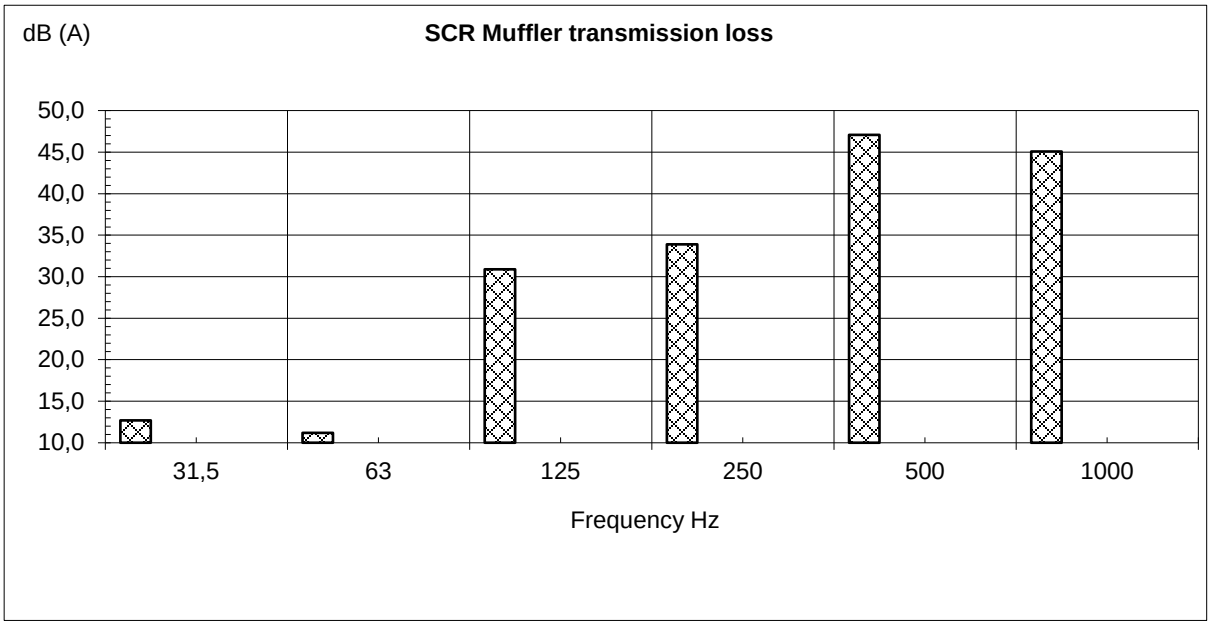

Fuel P (kPa)
Fuel Pressure Limits
325
275
225
175
125
75
500
700
900
1100
1300
1500
1700
1900
2100
rpm
Warning Level

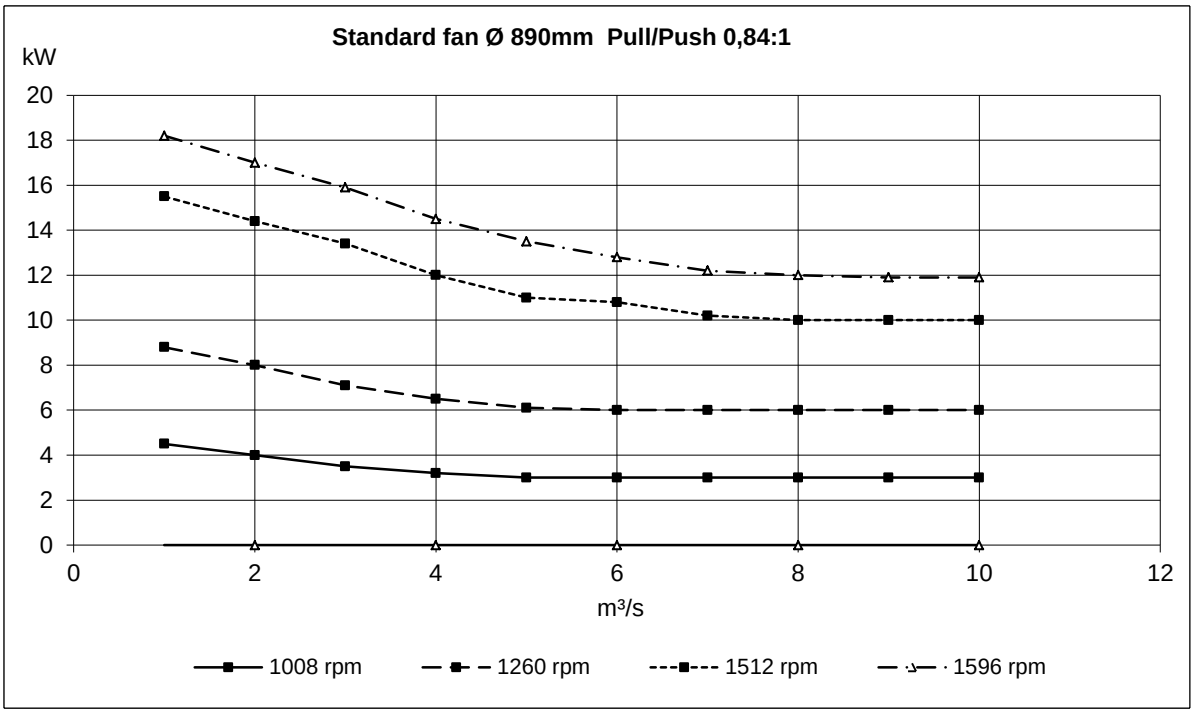

Oil P abs (kPa)
Oil Pressure Limits
350
300
250
200
150
100
50
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
rpm
Warning Level
Alarm Level

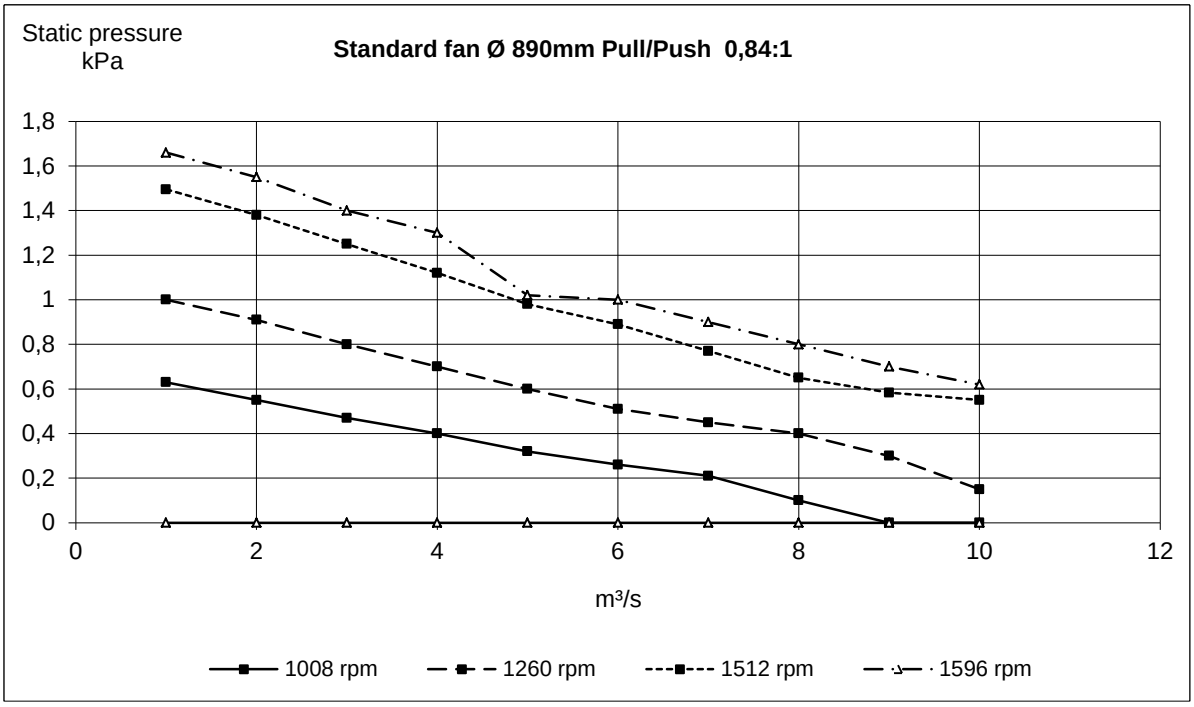

dB (A)
Sound power level engine body
1/3 octave band analysis
120
110
100
90
80
70
60
50
40
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
IFN Power 375 kW


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 375 kW

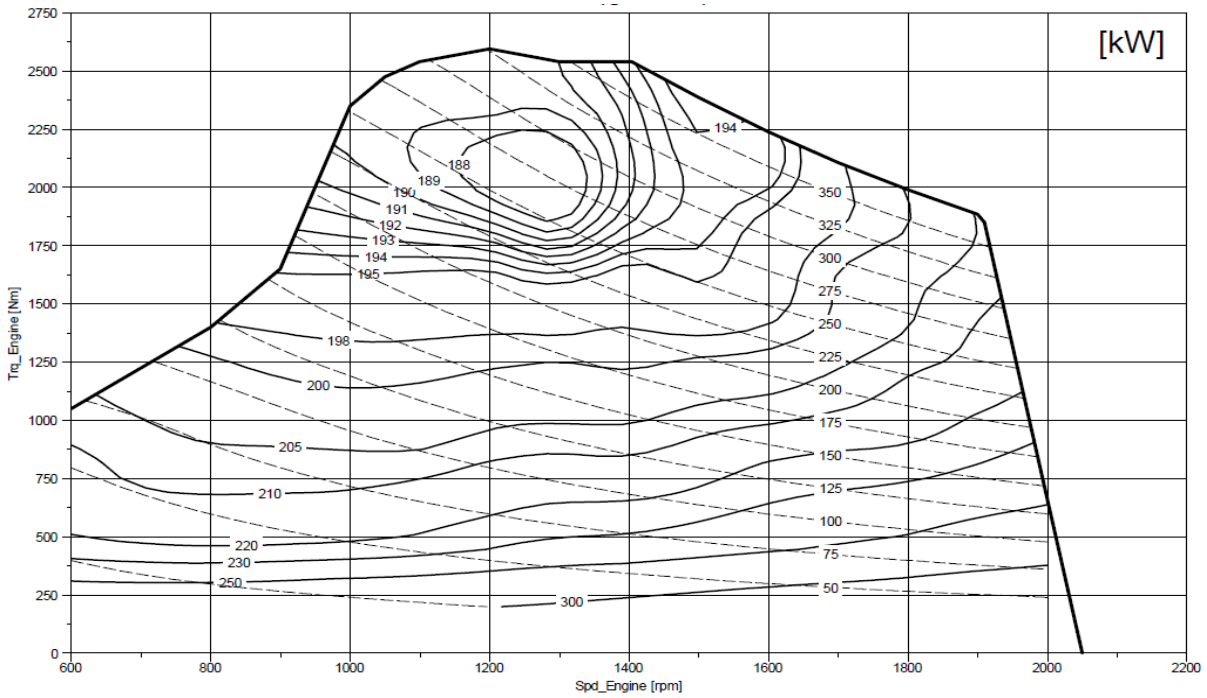

Outer circuit restriction kPa
Outer circuit restriction versus coolant flow
200
180
160
140
120
100
80
60
40
20
0
0
1
2
3
4
5
6
7
8
9
10
Outer circuit flow liter/s
Max outer circuit restriction
Std. Cooling system restriction
1200 rpm Eng. speed
1500 rpm Eng. speed
1800 rpm Eng. speed
2200 rpm Eng. speed
2400 rpm Eng. speed
2600 rpm Eng. speed


dB (A)
SCR Muffler transmission loss
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


Standard fan Ø 890mm Pull/Push 0,84:1
kW
20
18
16
14
12
10
8
6
4
2
0
0
2
4
6
8
10
12
m³/s
1008 rpm
1260 rpm
1512 rpm
1596 rpm


Static pressure
kPa
Standard fan Ø 890mm Pull/Push 0,84:1
1,8
1,6
1,4
1,2
1
0,8
0,6
0,4
0,2
0
0
2
4
6
8
10
12
m³/s
1008 rpm
1260 rpm
1512 rpm
1596 rpm

BSFC [g/kWh]



Fuel consumption [l/h]