VOLVO PENTA **TAD1351VE**	Document No **22494040**	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	12,78 780
Firing order			1-5-3-6-2-4
Bore		mm in	131 5,16
Stroke		mm in	158 6,22
Compression ratio			17,8:1
Wet weight	Engine only (Estimated) (excl after treatment comp.)	kg lb	1325 2921
	Power pac	kg lb	1790 3946

Performance				**rpm**	**1200**	**1500**	**1800**	**1900**
IFN Power	285 kW	without fan		kW hp	247 336	285 388	285 388	285 388
		with fan 890 mm		kW hp	237 323	270 367	266 361	265 360
Torque at:		IFN Power		Nm lbf ft	1965 1449	1814 1338	1512 1115	1432 1056
Max torque at engine speed		rpm	1200 rpm	Nm lbf ft	1965 1449			
Power tolerance				%	±2			
Mean piston speed				m/s ft/sec	6,3 20,7	7,9 25,9	9,5 31,1	10,0 32,8
Effective mean pressure at:		IFN Power		MPa psi	1,93 280	1,78 259	1,49 216	1,41 204
Max combustion pressure at:		IFN Power		MPa psi	13,3 1929	14,5 2103	14,8 2146	14,6 2117
Total mass moment of inertia, J (mR^2) (not including flywheel)				kgm^2 $lbft^2$	1,143 27,1			
Friction Power				kW hp	23 31	33 45	47 64	52 71
Derating see Technical Diagrams								

Engine brake performance (only engines with VCB)		rpm	1200	1500	1800	1900
Brake power:	without fan	kW hp	N/A	N/A	N/A	N/A
Brake torque:	without fan	Nm lbf ft				
Engine speed range for VCB activation:		rpm	N/A			
Min engine speed with VCB still active:		rpm	N/A			
Min oil temperature for VCB activation:		°C	N/A			

Cold start performance

*Cold start limit temperature	without starting aid	°C °F	-15 5	
	with manifold heater 3 kW	°C °F	-25 -13	
	with manifold heater 3 kW and block heater	°C °F	-30 -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)			liter/h	0,02
Oil system capacity including filters			liter US gal	Std sump 36 / Aluminium sump 52 Std sump 9,51 / Aluminium sump 13,74
Plastc Oil pan capacity (Std):		Max	liter US gal	30 7,93
		Min	liter US gal	19 5,02
Aluminium Oil pan capacity:		Max	liter US gal	46 12,15
		Min	liter US gal	36 9,51
Oil change intervals/specifications	VDS3		h	500
	VDS4		h	500
Engine angularity limits:		front up	°	Std sump 11 / Aluminium sump 35
		front down	°	Std sump 11 / Aluminium sump 35
		side tilt	°	Std sump 11 / Aluminium sump 35
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	
Fuel to conform to			Fuel corresponding to EN590:1999 or ASTM D 975-No or JIS KK2204:2004

Intake and exhaust system		**rpm**	**1200**	**1500**	**1800**	**1900**
Charge air consumption at: (+25°C and 100kPa)	IFN Power	m³/min cfm	18,0 636	23,0 812	26 918	26 918
⚠ **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	183 10407	203 11544	214 12170	231 13137
Exhaust gas temperature after turbine at:	IFN Power	°C °F	473 883	429 804	402 756	420 788
⚠ **See front page for important information** Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm		kPa psi	8 1,2	11 1,6	13 1,9	15 2,2
⚠ ıst gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power	m³/min cfm	45,0 1589	51,0 1801	55 1942	57 2013

Cooling system			rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:		IFN Power	kW	8,4	7,1	6,5	7,7
			BTU/min	478	404	370	438
Heat rejection to coolant at:		IFN Power	kW	129	142	153	186
			BTU/min	7336	8075	8701	10578
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	9,5	15,0	19,5	20,5
			hp	13	20	27	28
Fan drive ratio	fan Ø890			0,99:1 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	44	57	65	66
		BTU/min	2502	3242	3696	3753
Charge air mass flow	IFN Power	kg/s	0,36	0,44	0,50	0,52
Charge air inlet temp.	IFN Power	°C	164	175	179	179
(Charge air temp after turbo compressor)		°F	327	347	354	354
⚠ **See front page for important information** Max allowable Charge air outlet temp.		°C	41	46	50	51
(Charge air temp after charge air cooler)		°F	106	115	122	124
⚠ **See front page for important information** Maximum pressure drop over charge air cooler incl. piping		kPa	12			
		psi	1,74			
Charge air pressure		kPa	189	214	217	214
(Relative, after charge air cooler)		psi	27,41	31,04	31,47	31,04
Standard charge air cooler core area		m²	0,8			
		foot²	8,61			

Cooling performance: 0.8 m² radiator and pull 890 fixed fan standard drive ratio 0.99

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	kg/s	lb/s	Pa	psi
1900	285	68	155	10,2	22,4	0	
	388	67	153	9,7	21,3	150	0,022
		66	150	9,1	20,2	300	0,044
		64	147	8,6	18,9	450	0,065

Cooling performance: 0,8 m² radiator and pull 890 Visco fan standard drive ratio 0.84

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	kg/s	lb/s	Pa	psi
1900	285	62	144	7,8	17,2	0	
	388	59	138	7,0	15,4	150	0,022
		55	130	6,1	13,5	300	0,044
		48	118	5,1	11,3	450	0,065

Cooling performance: 0.8 m² radiator and push 890 fixed fan standard drive ratio 0.99
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	
rpm	hp	°C	°F	kg/s	lb/s	Pa	psi
1900	285	69	156	10,9	24,0	0	
	388	68	154	10,4	23,0	150	0,022
		67	152	10,0	22,0	300	0,044
		66	150	9,5	21,0	450	0,065

Cooling performance: 0,8 m² radiator and push 890 Visco fan standard drive ratio 0.84
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 kW	Air on temp		Air flow		External restriction	
rpm	hp	°C	°F	kg/s	lb/s	Pa	psi
1900	285	64	147	8,5	18,6	0	
	388	62	143	7,8	17,2	150	0,022
		59	138	7,1	15,7	300	0,044
		55	132	6,4	14,0	450	0,065

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		Ignition off stop engine		
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, ON/OFF*
Air filter pressure drop				5		
Altitude, above sea		m				Automatic derating, see section derating
Charge air temp		°C	85	80		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	114% 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	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

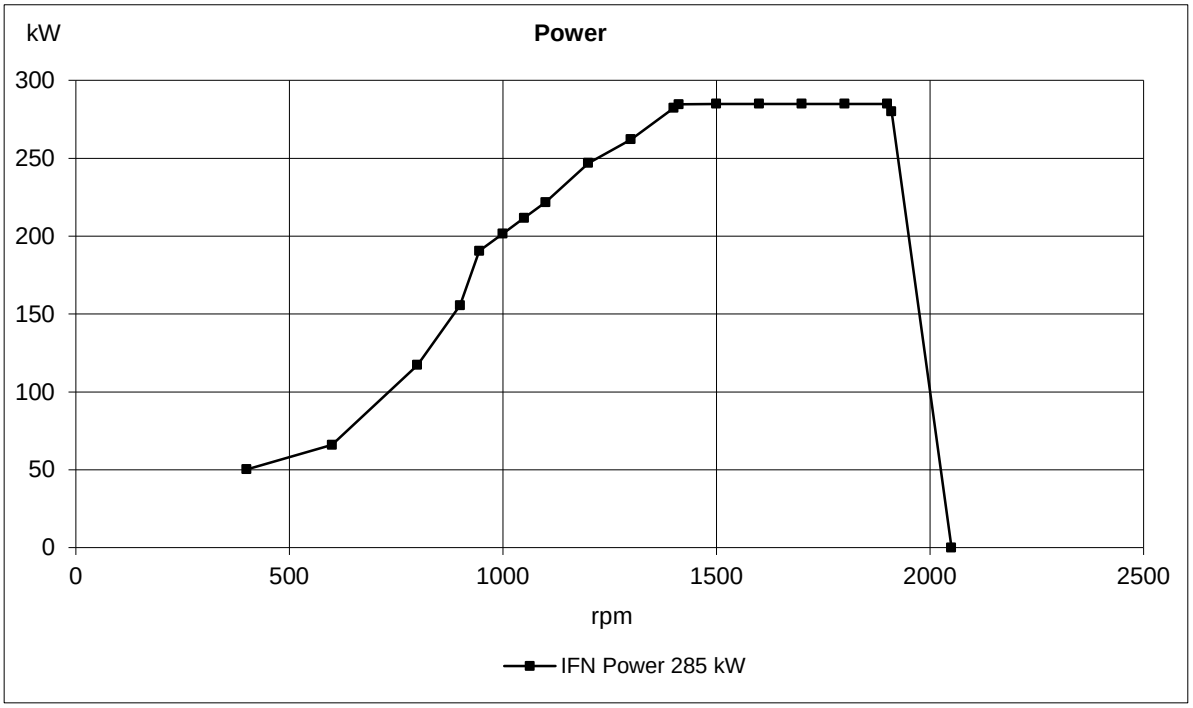
Electrical system

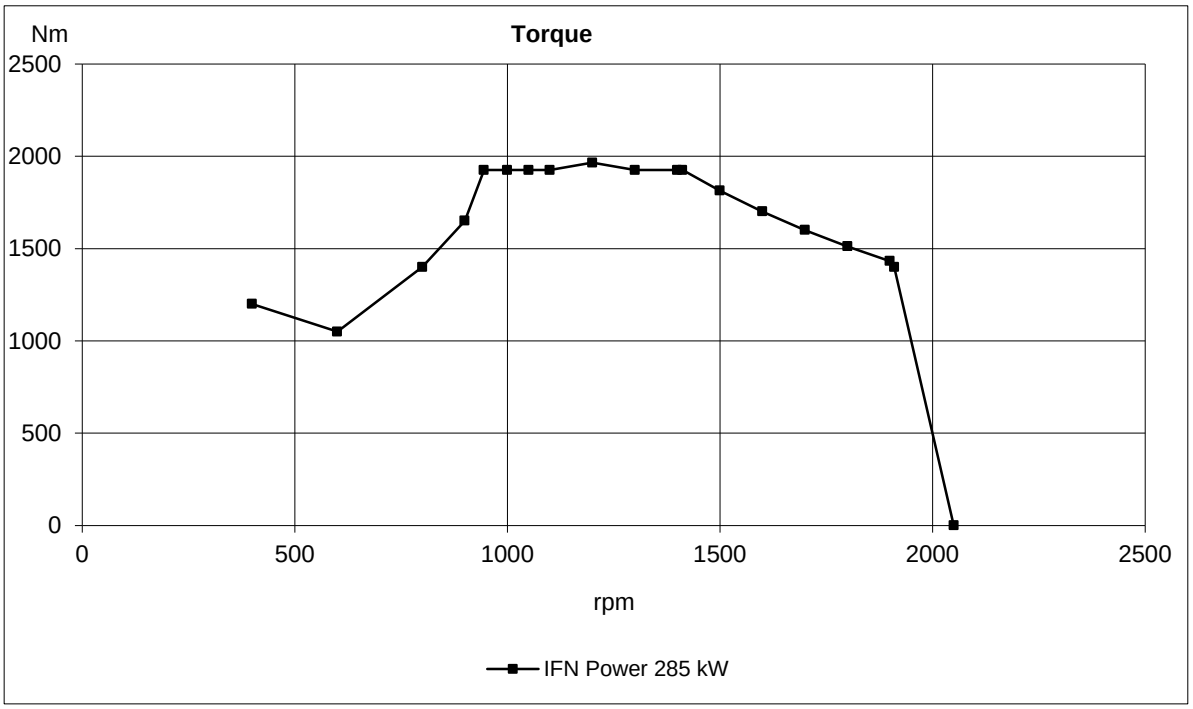
Voltage and type				24V
Alternator:	output	A		110/150
	tacho output	Hz/alternator rev.		6
	drive ratio			5,25
Starter motor:		type		105P70 / (105P70 ISS för start/stop)
		output	kW	7
			hp	9,5
Number of teeth on:		flywheel		153
		starter motor		12
Inlet manifold heater (at 20 V)			kW	3
Power relay for the manifold heater			A	1

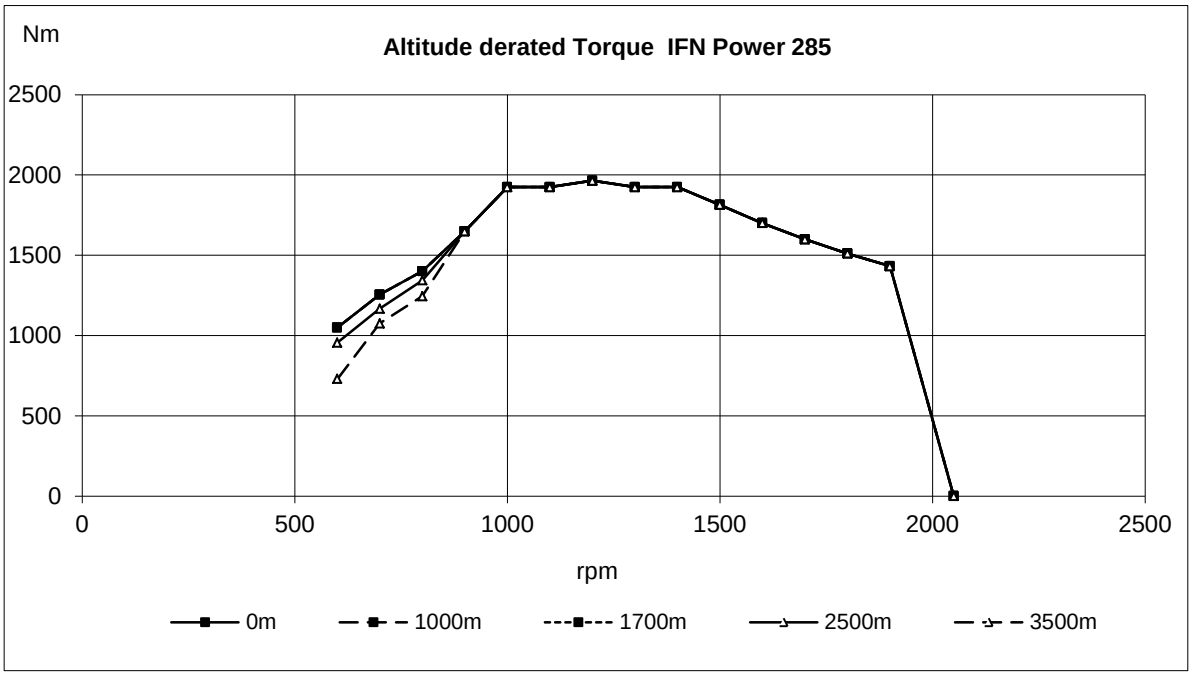
Conditions:	**Temperature**	**°C**		**25**	**0**	**-15**
(4 mΩ main circuit resistance@	**Battery**	**Ah / CCA**		**235 / 1300**	**145 / 1050**	**145 / 1050**
Crank speed		rpm		171	118	98
Crank current		A		290	400	480
Starter input power during crank		kW		6,2	7,5	7,7
Battery power during crank		kW		6,5	8,1	8,5
Min battery		Ah / CCA		120 / 700	140 / 800	145 / 1050

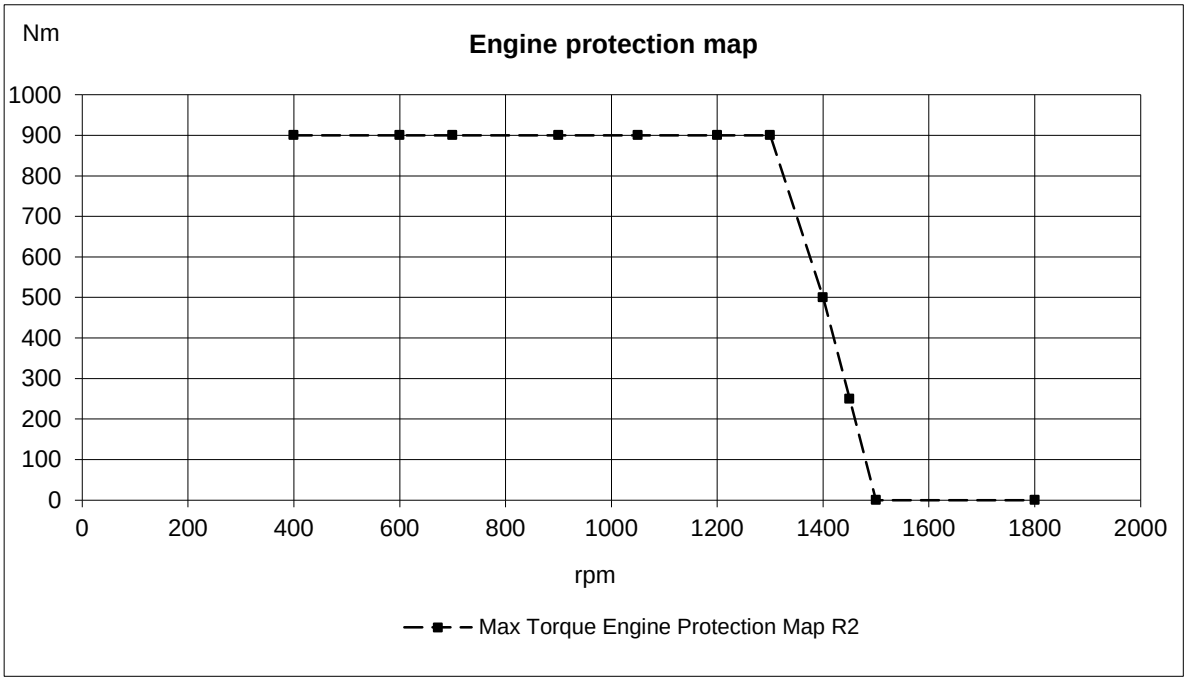
Power take off		**rpm**	**1200**	**1500**	**1800**	**1900**
Front end in line with crank shaft max:*		Nm	1965	1814	1512	1432
(with a total added mass moment of inertia, J (mR2)≤ 0,05 kgm²)		lbf ft	1449	1338	1115	1056
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	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			1,75:1/ccw			
Maximum torque on timing gear at rear PTO : *		Nm	1000			
		lbf ft	738			
Speed ratio direction of rotation viewed from flywheel side			1,26:1/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			

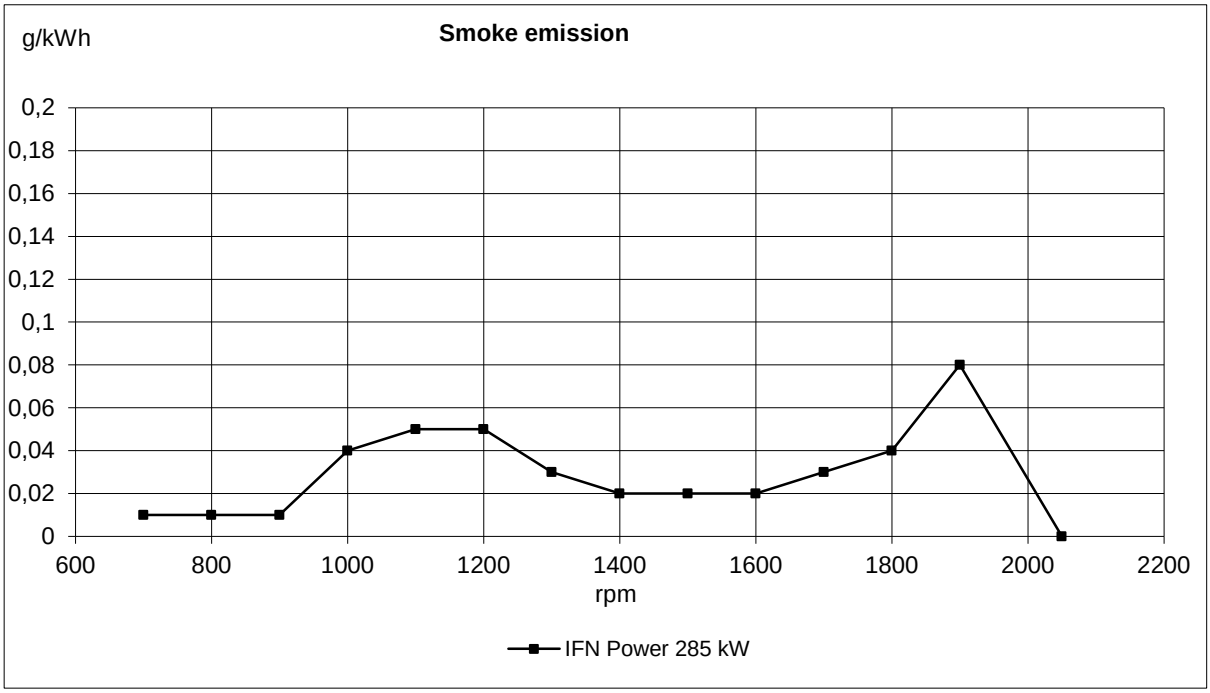
**** Maximum allowed torque at individual PTO´s.***
If more then one PTO output is used simultaniusly, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

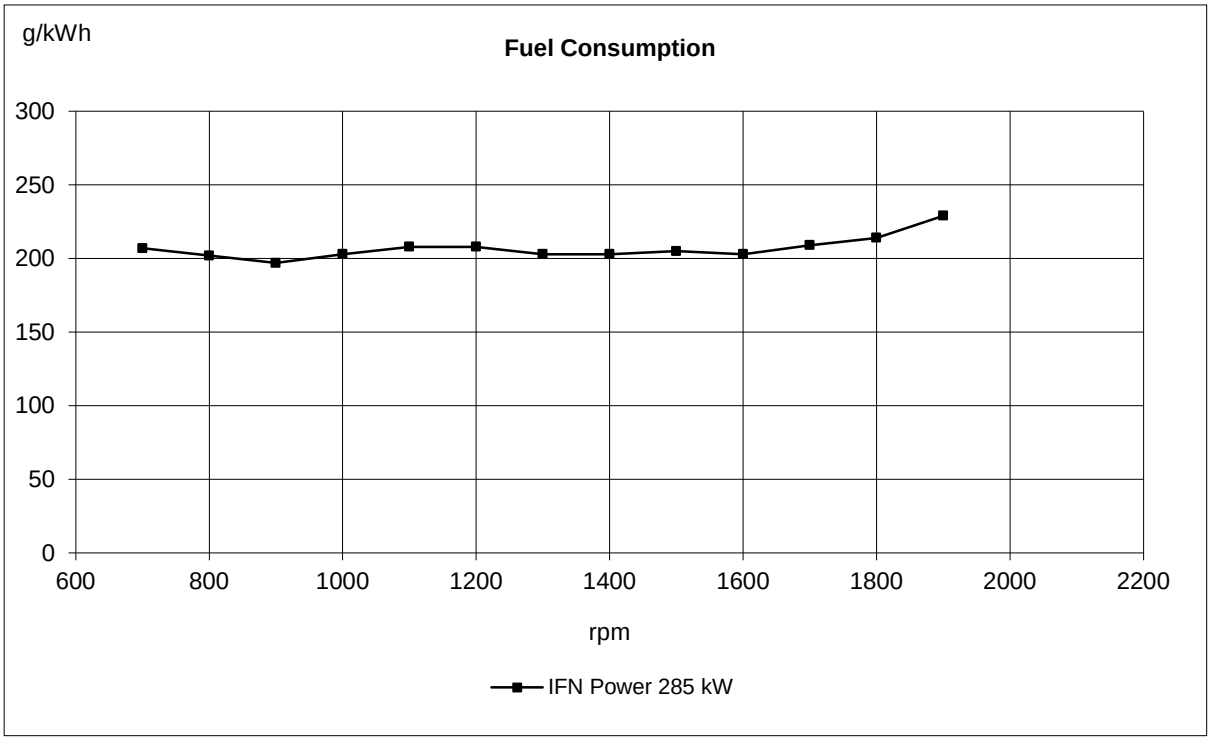

kW
Power
300
250
200
150
100
50
0
0
500
1000
1500
2000
2500
rpm
IFN Power 285 kW

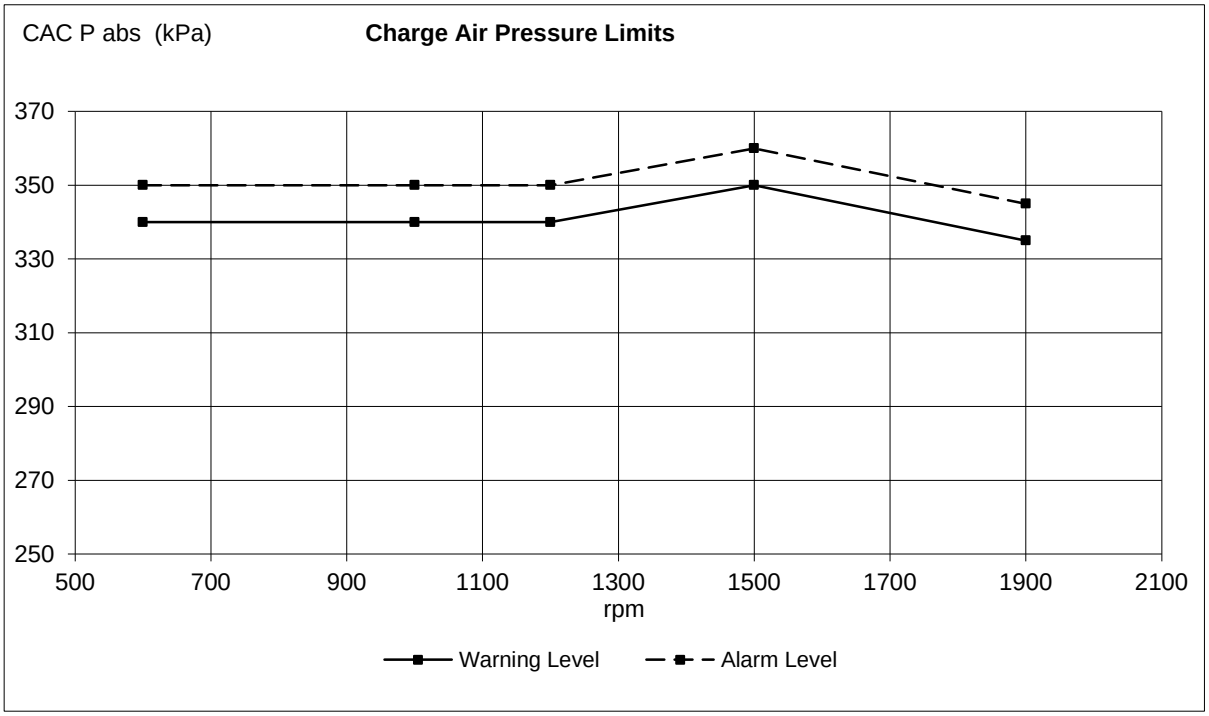

Nm
Torque
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
IFN Power 285 kW

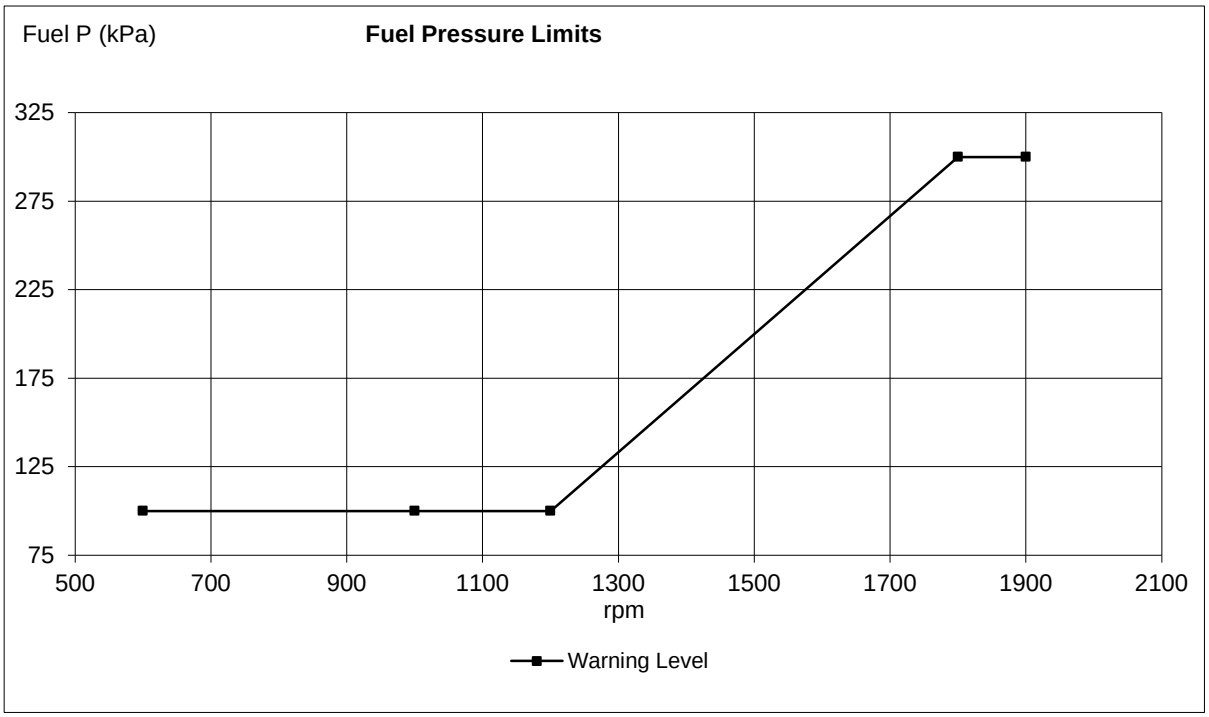

Nm
Altitude derated Torque IFN Power 285
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
0m
1000m
1700m
2500m
3500m

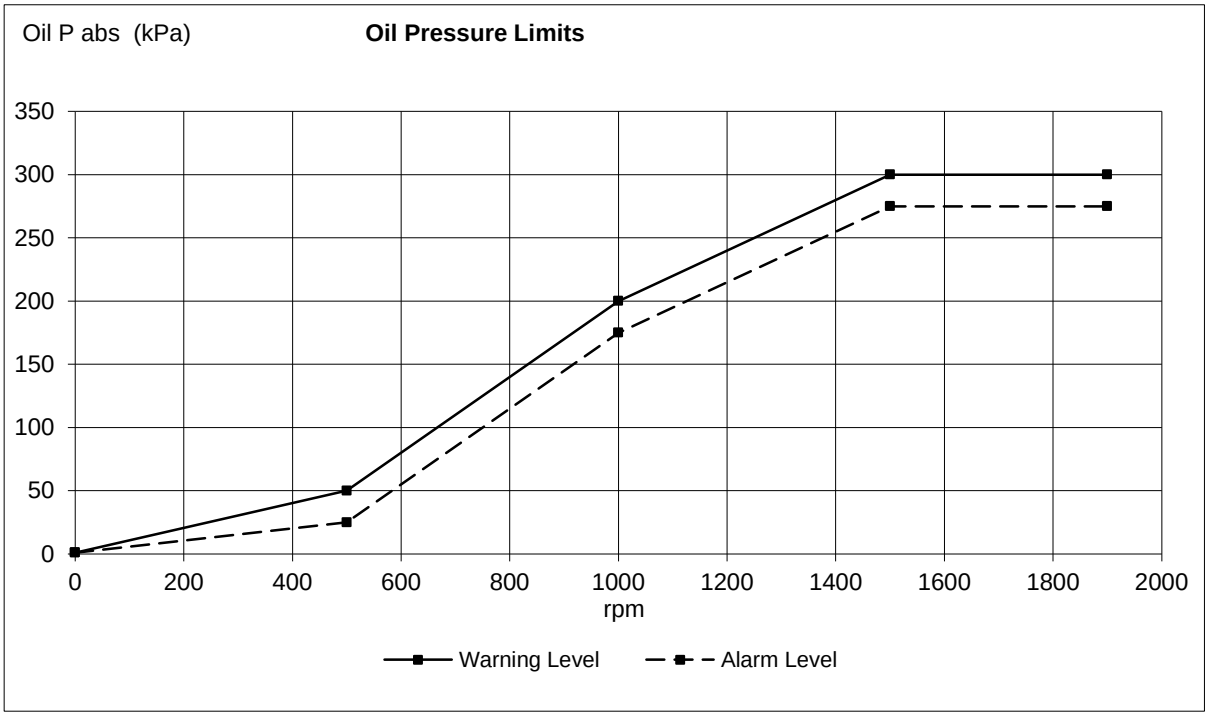

Nm
Engine protection map
1000
900
800
700
600
500
400
300
200
100
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
rpm
Max Torque Engine Protection Map R2

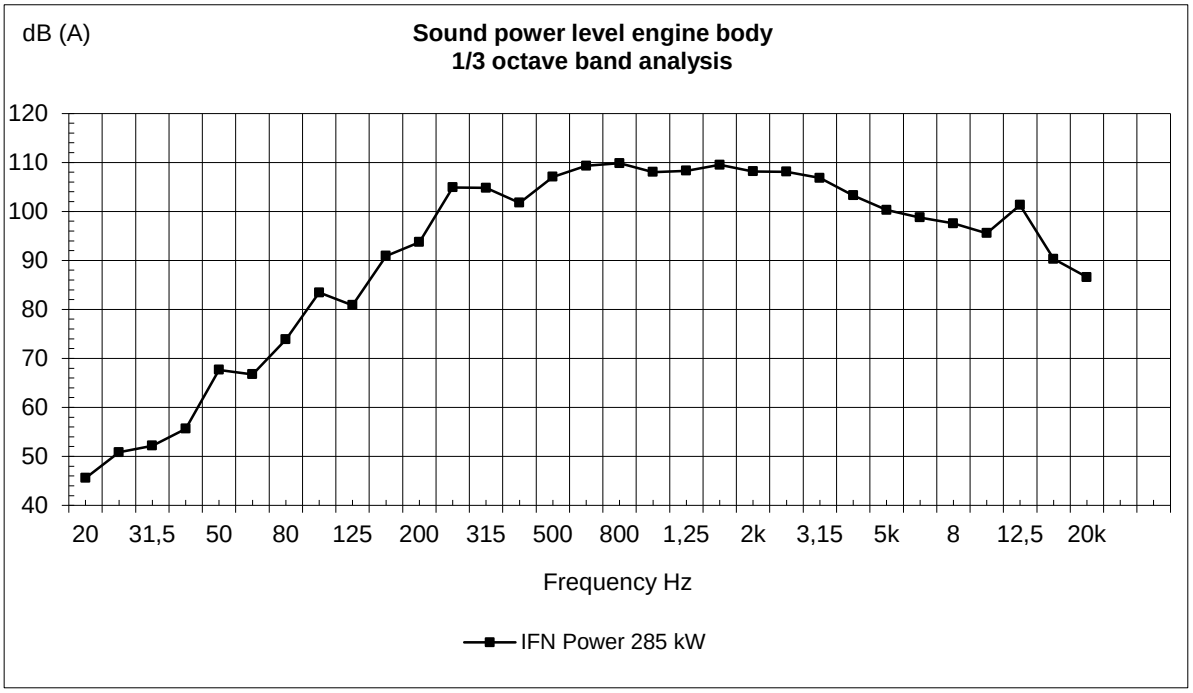

Smoke emission
g/kWh
0,2
0,18
0,16
0,14
0,12
0,1
0,08
0,06
0,04
0,02
0
600
800
1000
1200
1400
1600
1800
2000
2200
rpm
IFN Power 285 kW

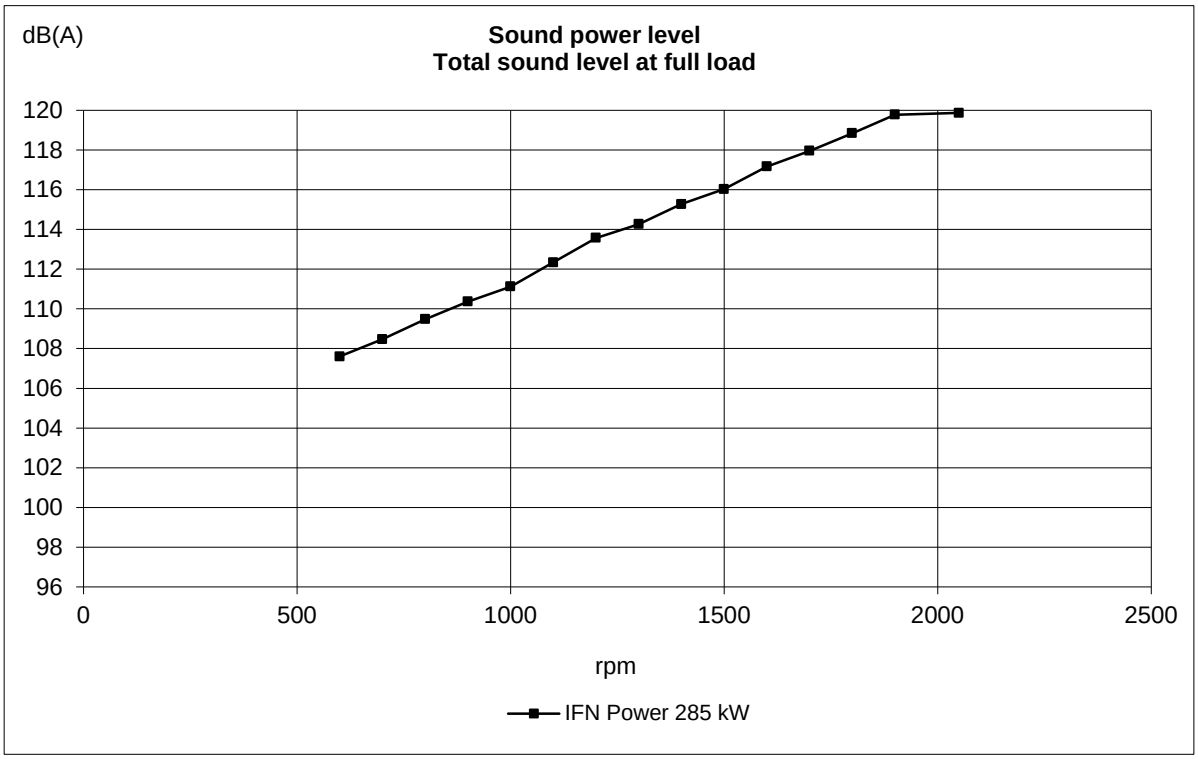

g/kWh
Fuel Consumption
300
250
200
150
100
50
0
600
800
1000
1200
1400
1600
1800
2000
2200
rpm
IFN Power 285 kW

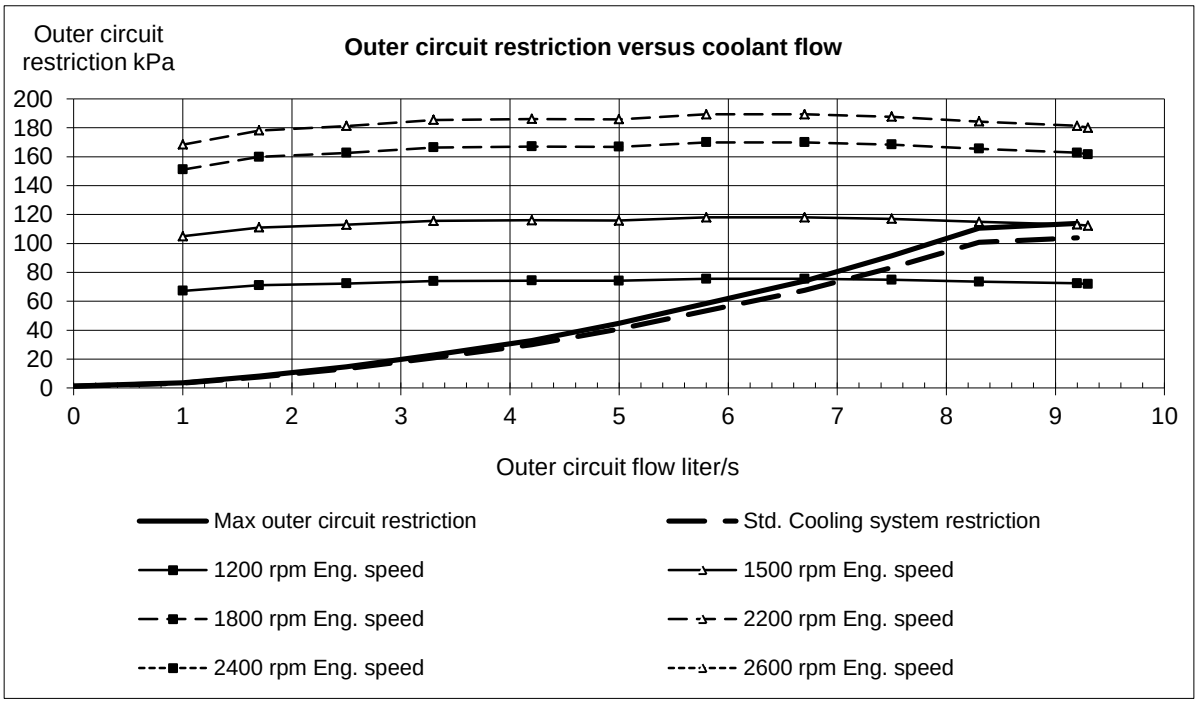

CAC P abs (kPa)
Charge Air Pressure Limits
370
350
330
310
290
270
250
500
700
900
1100
1300
1500
1700
1900
2100
rpm
Warning Level
Alarm Level

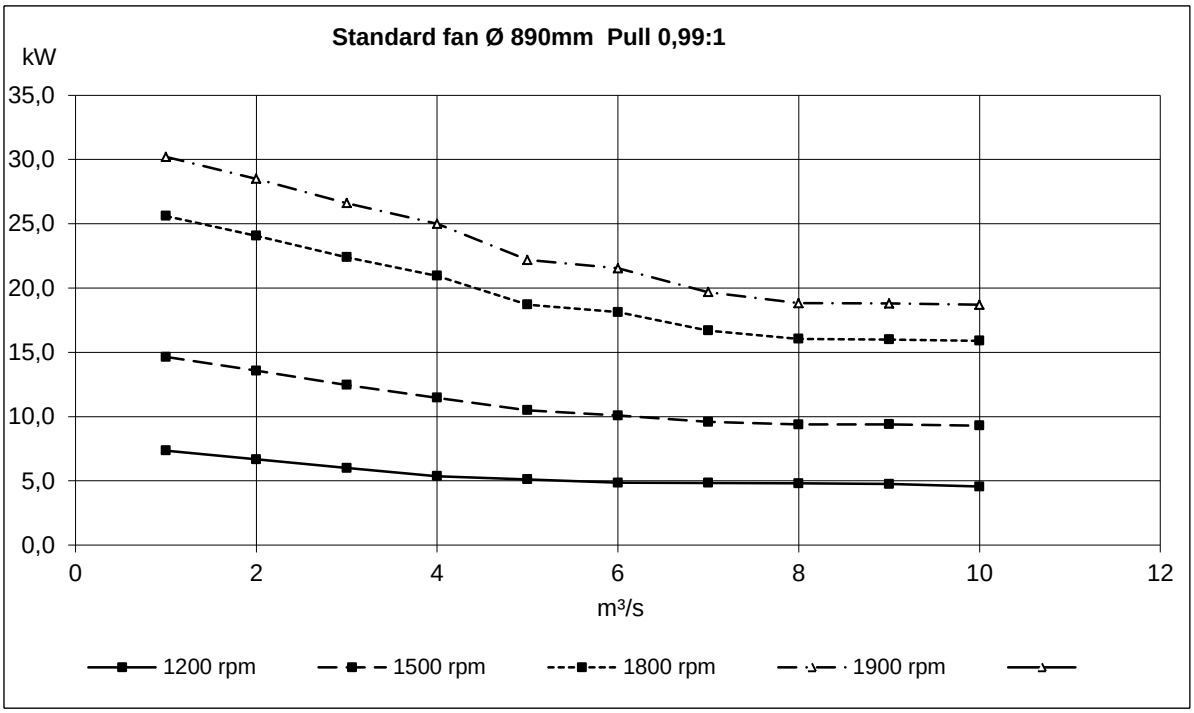

Fuel P (kPa)
Fuel Pressure Limits
325
275
225
175
125
75
500
700
900
1100
1300
1500
1700
1900
2100
rpm
Warning Level

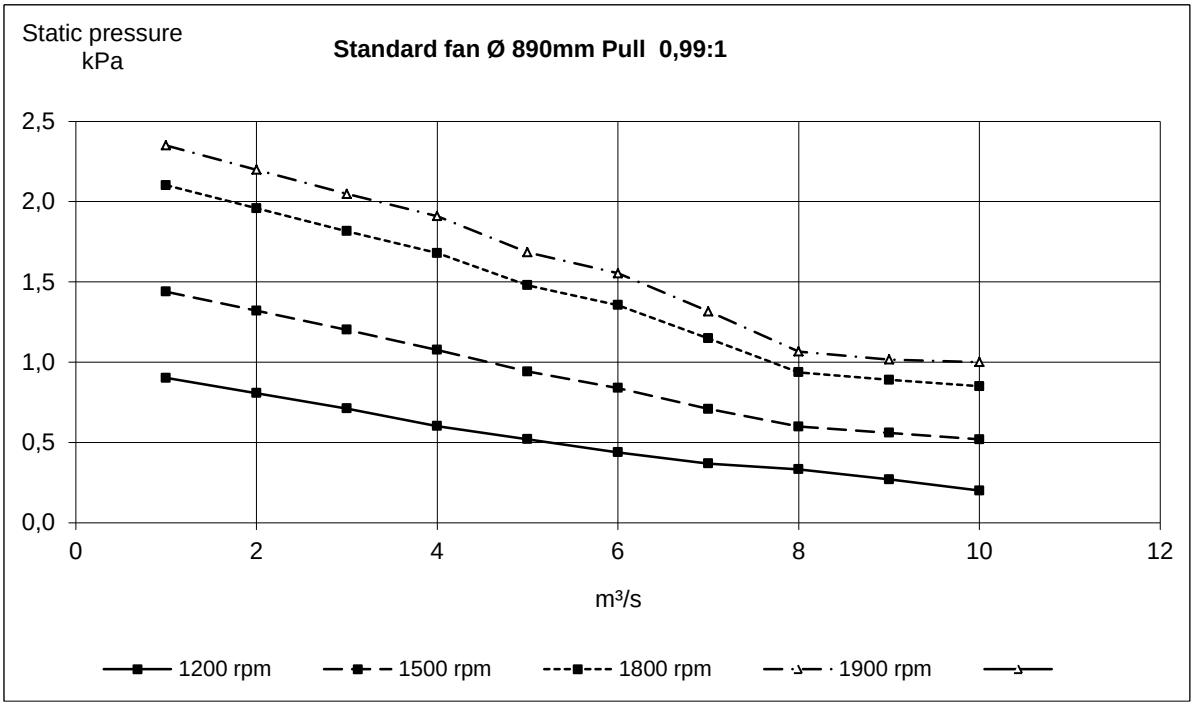

Oil P abs (kPa)
Oil Pressure Limits
350
300
250
200
150
100
50
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
rpm
Warning Level
Alarm Level

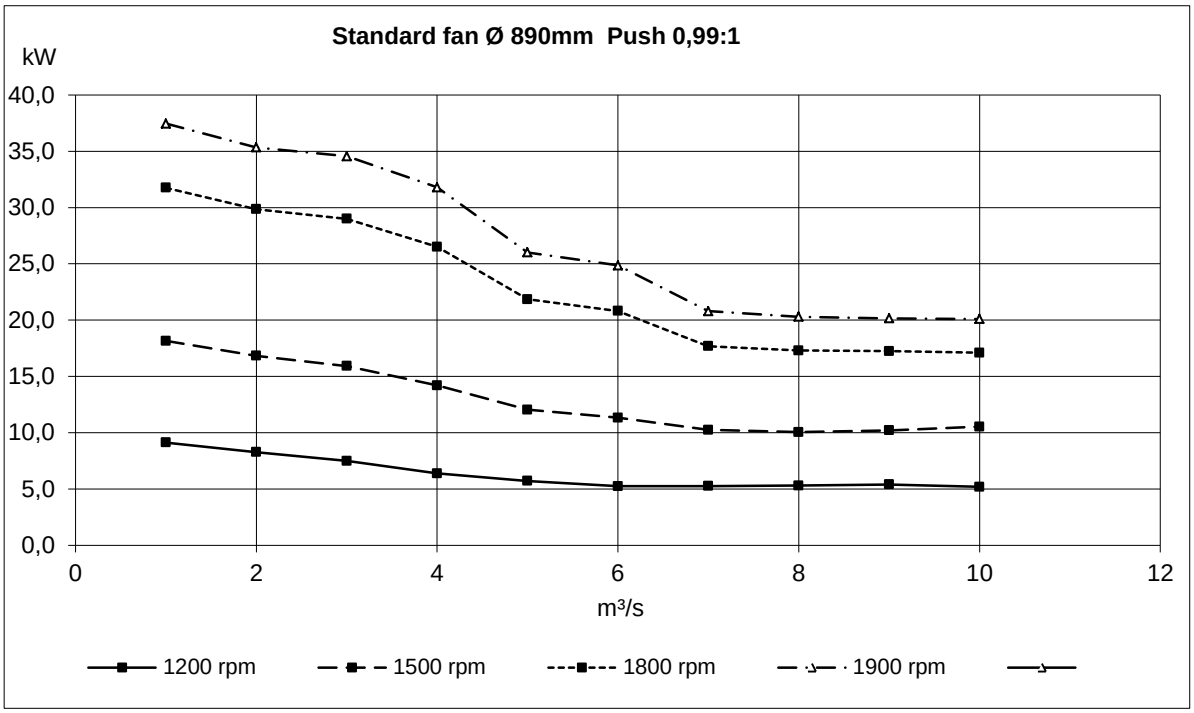

dB (A)
Sound power level engine body
1/3 octave band analysis
120
110
100
90
80
70
60
50
40
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
IFN Power 285 kW

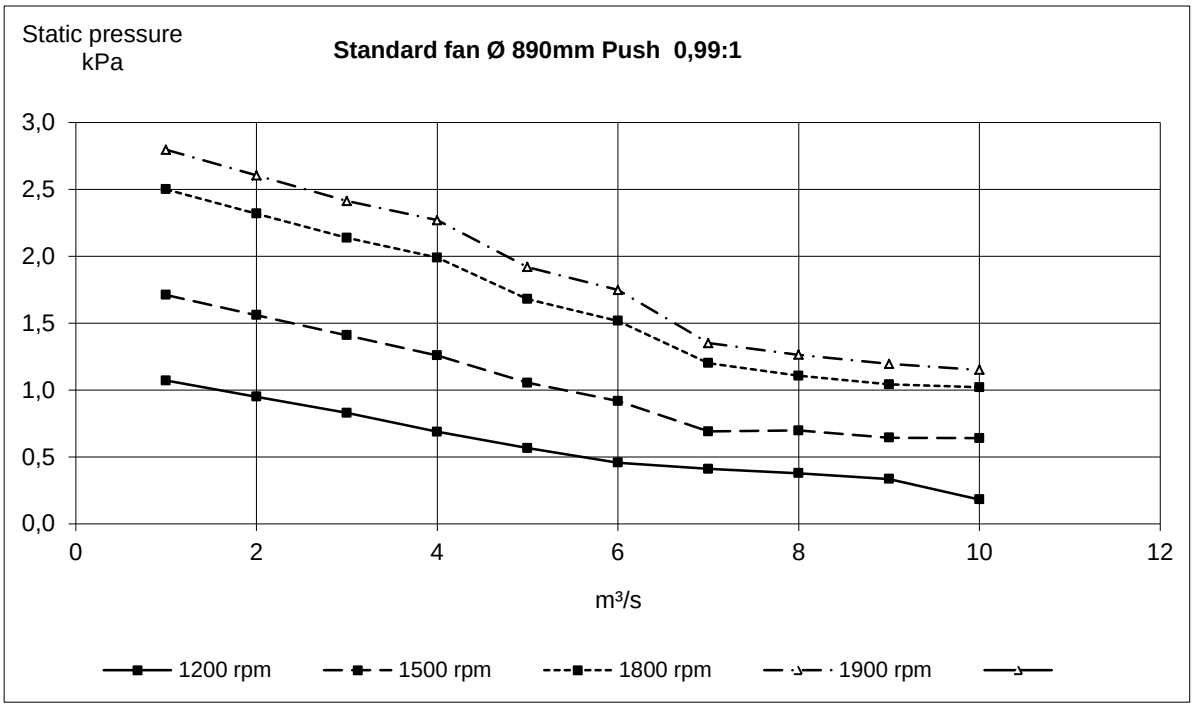

dB(A)
Sound power level
Total sound level at full load
120
118
116
114
112
110
108
106
104
102
100
98
96
0
500
1000
1500
2000
2500
rpm
IFN Power 285 kW


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


Standard fan Ø 890mm Pull 0,99:1
kW
35,0
30,0
25,0
20,0
15,0
10,0
5,0
0,0
0
2
4
6
8
10
12
m³/s
1200 rpm
1500 rpm
1800 rpm
1900 rpm


Static pressure
kPa
Standard fan Ø 890mm Pull 0,99:1
2,5
2,0
1,5
1,0
0,5
0,0
0
2
4
6
8
10
12
m³/s
1200 rpm
1500 rpm
1800 rpm
1900 rpm


Standard fan Ø 890mm Push 0,99:1
kW
40,0
35,0
30,0
25,0
20,0
15,0
10,0
5,0
0,0
0
2
4
6
8
10
12
m³/s
1200 rpm
1500 rpm
1800 rpm
1900 rpm


Static pressure
kPa
Standard fan Ø 890mm Push 0,99:1
3,0
2,5
2,0
1,5
1,0
0,5
0,0
0
2
4
6
8
10
12
m³/s
1200 rpm
1500 rpm
1800 rpm
1900 rpm

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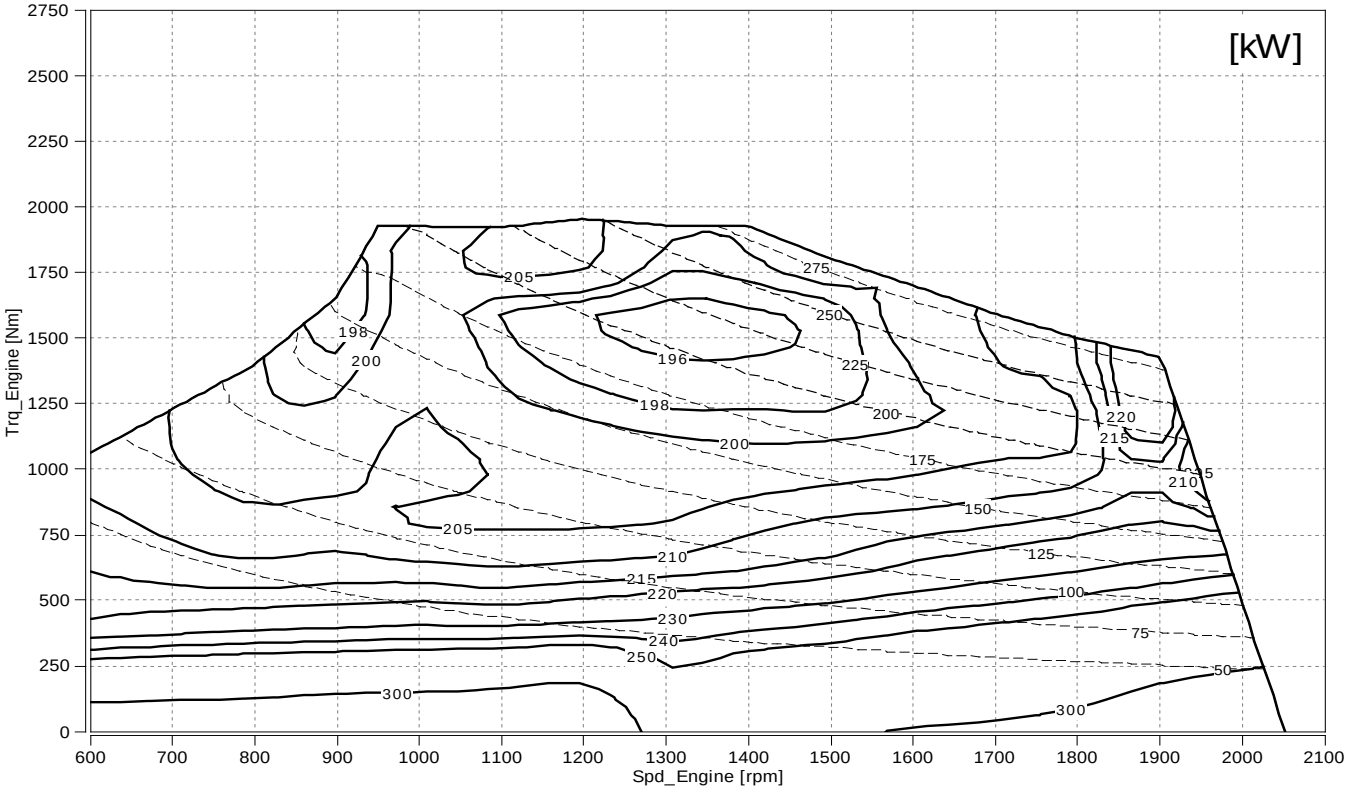
BSFC [g/kWh]



Fuel consumption [l/h]