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, 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		kW	401	488	503	482
		890 mm		hp	545	664	684	655
ICFN Power		without fan		kW	See diagram for fan power consumption			
				hp				
		with fan		kW	See diagram for fan power consumption			
		890 mm		hp				
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)				kgm²	4,1			
				lbft²	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	165
	US gal/h	43,6
Fuel supply line max. restriction (Measured at fuel inlet connection)	kPa	10
	psi	1,5
Fuel supply line max. pressure, during engine stand still (meassured at fuel inlet connection)	kPa	16,5
	psi	2,4
System return flow at max. speed	liter/h	25,0
	US gal/h	6,6
Fuel return line max. restriction (Measured at fuel return connection)	kPa	20
	psi	2,9
Max. allowable inlet fuel temp (Measured at fuel inlet connection)	°C	60
	°F	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	26,8	34,0	35,3	36
			cfm	946	1201	1247	1271
⚠ **See front page for important information** Max allowable air intake restriction including piping			kPa			5	
			psi			0,7	
Heat rejection to exhaust at:	IFN Power 515 kW		kW	293	374	423	437
			BTU/min	16663	21269	24056	24852
Exhaust gas temperature after turbine at:	IFN Power 515 kW		°C	496	501	544	550
			°F	925	934	1011	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	9	13	15	15
			psi	1,3	1,9	2,2	2,2
Min allowable back pressure in exhaust line (after flow restrictor).			kPa			7	
			psi			1,0	
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power 515 kW		m³/min	70,1	84,7	90,4	92,1
			cfm	2476	2991	3192	3253
			m³/min				
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			m²	1,42			
			foot²	15,28			
HD radiator core area			m²	0,87			
			foot²	9,36			
Fan diameter	890 mm		mm	890			
			in	35,04			
	890 mm		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 US gal	37 9,8			
	STD. 1,42m² radiator with hoses Puller syst. Core thickness 41mm		liter US gal	30 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	4,2	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	2			
			US gal				

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		m²	1,3			
		foot²	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	
rpm	kW	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1800	515		52	126	6,7	236,6	300	0,044
	700		54	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	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1800	515	54	129	7	247,2	295	0,043
	700	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	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1800	515	65	149	9,9	349,3	450	0,065
	700	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	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1800	515	63	145	9,0	319,2	450	0,065
	700	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	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1800	515	61	142	8,0	281,8	450	0,065
	700	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	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1800	515	58	136	7,2	253,6	450	0,065
	700	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	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1800	515	57	134	7,0	247,6	450	0,065
	700	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*

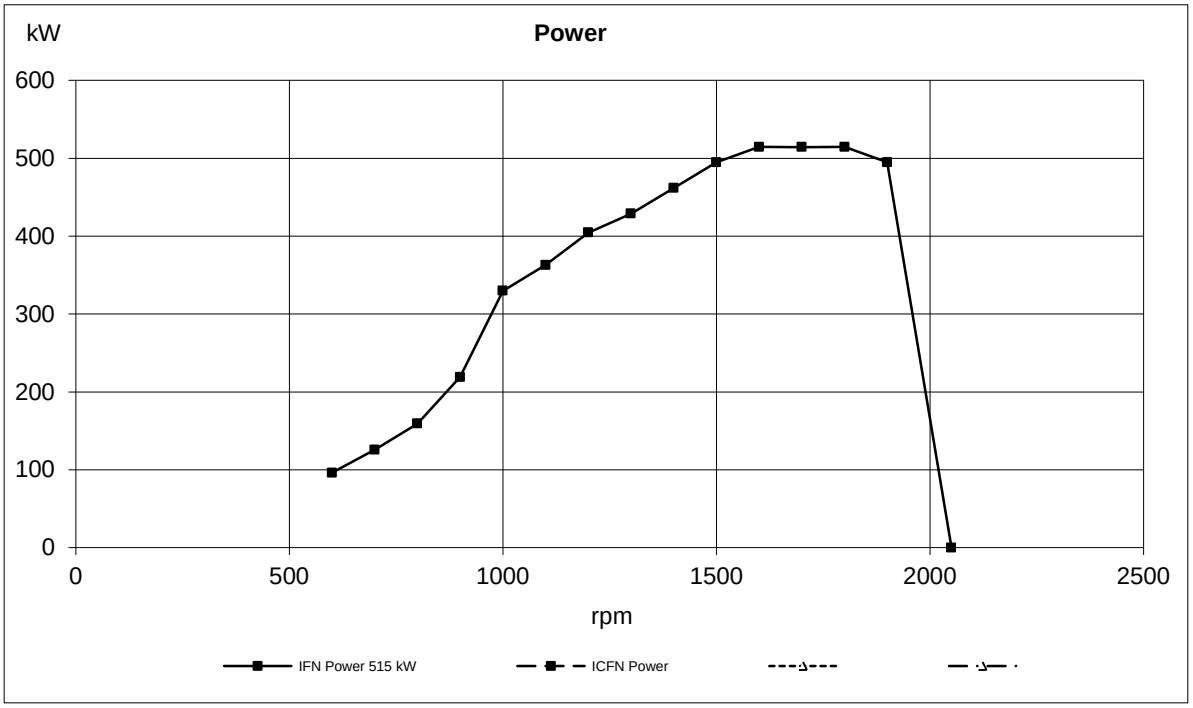
* Off means no shut down, alarm only

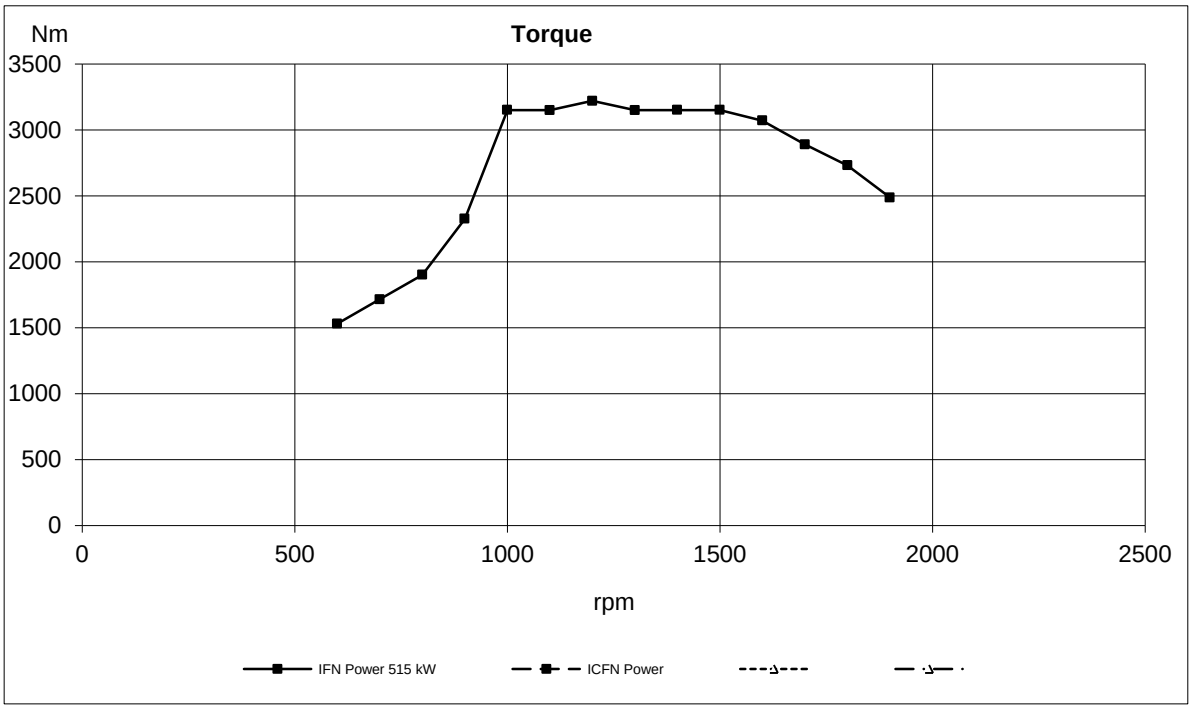
Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Fill in forced idle value	Fill in forced shut down value
Coolant temp	105°C	107°C	107°C	108°C	N/A	N/A
Oil temp	125°C	127°C	127°C	130°C	N/A	N/A
Low oil pressure	Warning	Alarm	N/A	N/A	N/A	Alarm map value
High 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

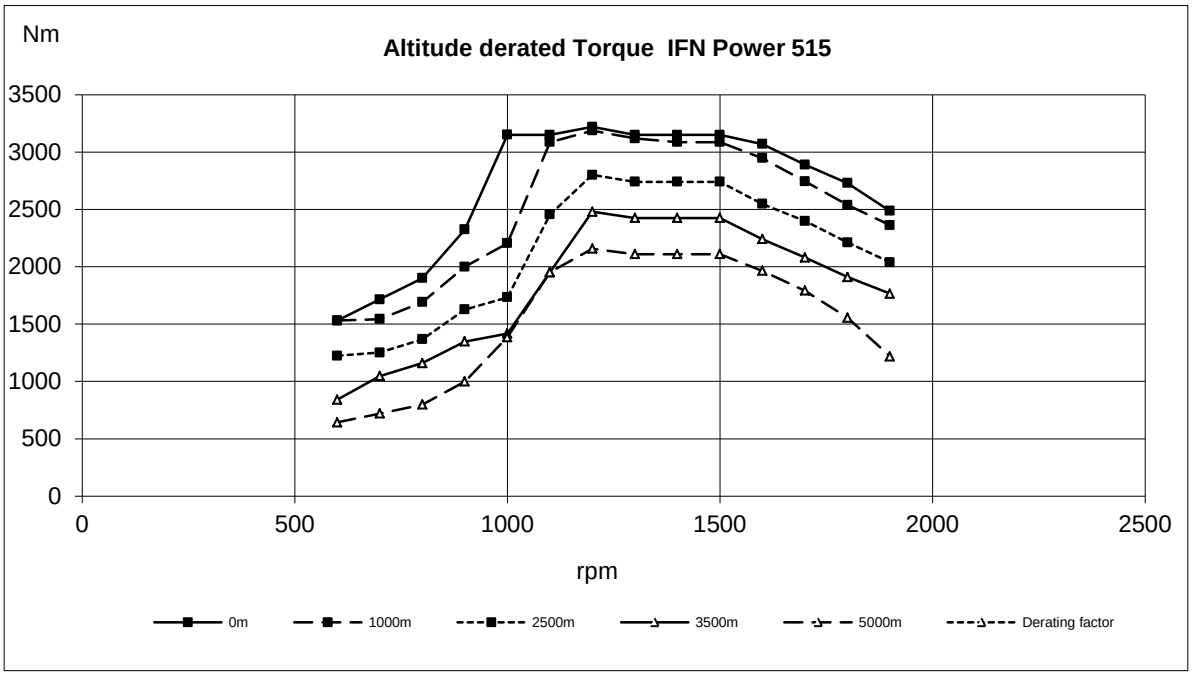
Electrical system

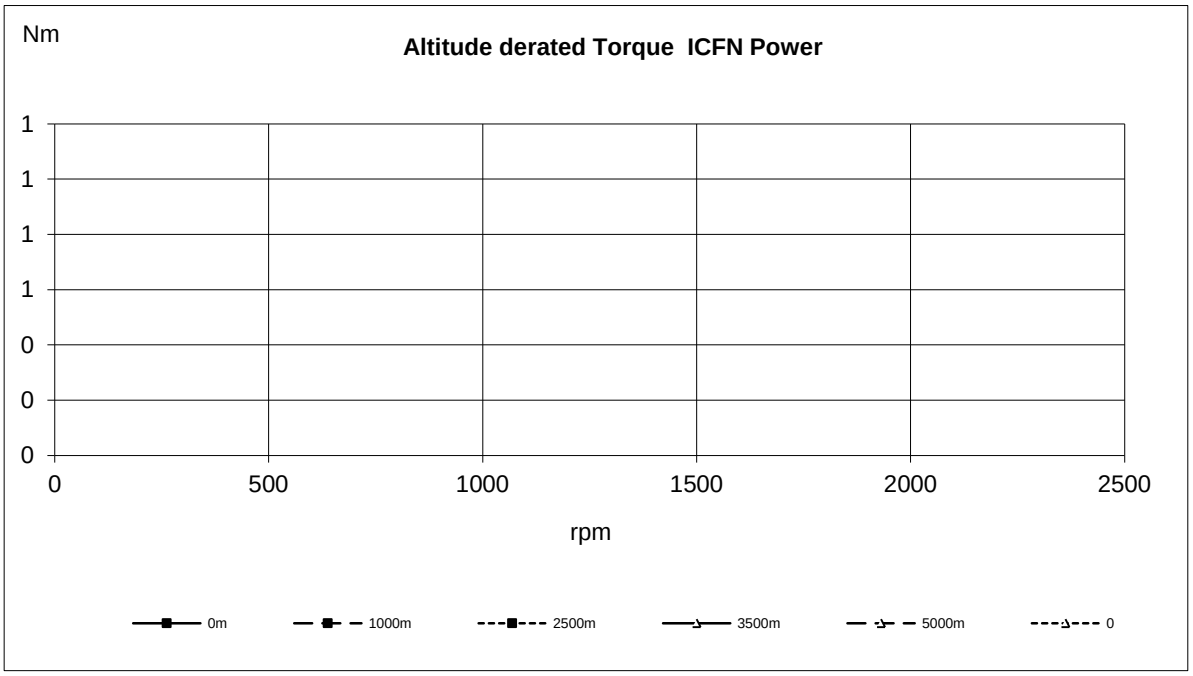
Voltage and type				24 V
Alternator:	make			Bosch
	output	A		80
	tacho output	Hz/alternator rev.		6
	drive ratio			3.9:1
Starter motor:		make		Melco
		type		105P70
		output	kW	7
			hp	9,5
Number of teeth on:		flywheel		153
		starter motor		12
Max wiring resistance main circuit			mΩ	2
Cranking current 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

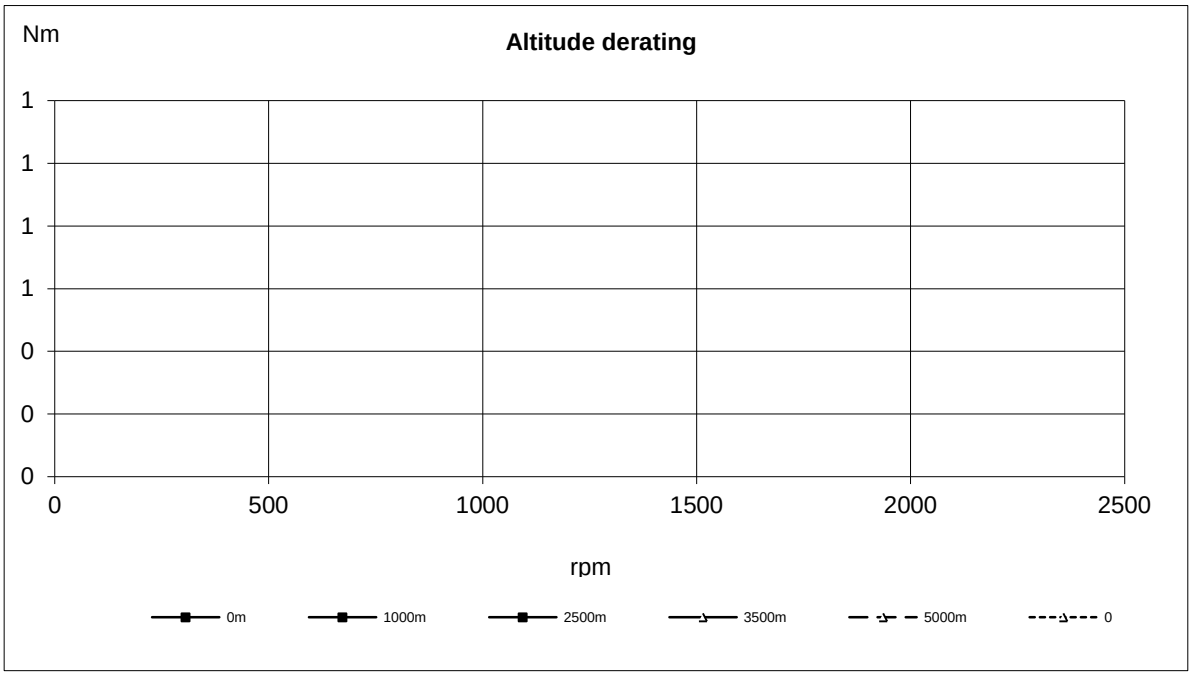
Power take off		**rpm**	**1200**	**1500**	**1800**	**1900**
Front end in line with crank shaft max:		Nm	TBD			
		lbf ft				
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	26	33	40	
		hp	35	45	54	
	max down	kW	60	75	90	
		hp	82	102	122	
	max right	kW	26	33	40	
		hp	35	45	54	
Timing gear at compressor PTO max:		Nm	300			
		lbf ft	221			
Speed ratio direction of rotation viewed from flywheel side			1,31:1 / ccw			
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			
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	15000			
		lbf ft	11063			
Max. rear main bearing load		N	5000			
		lbf	1124,0			

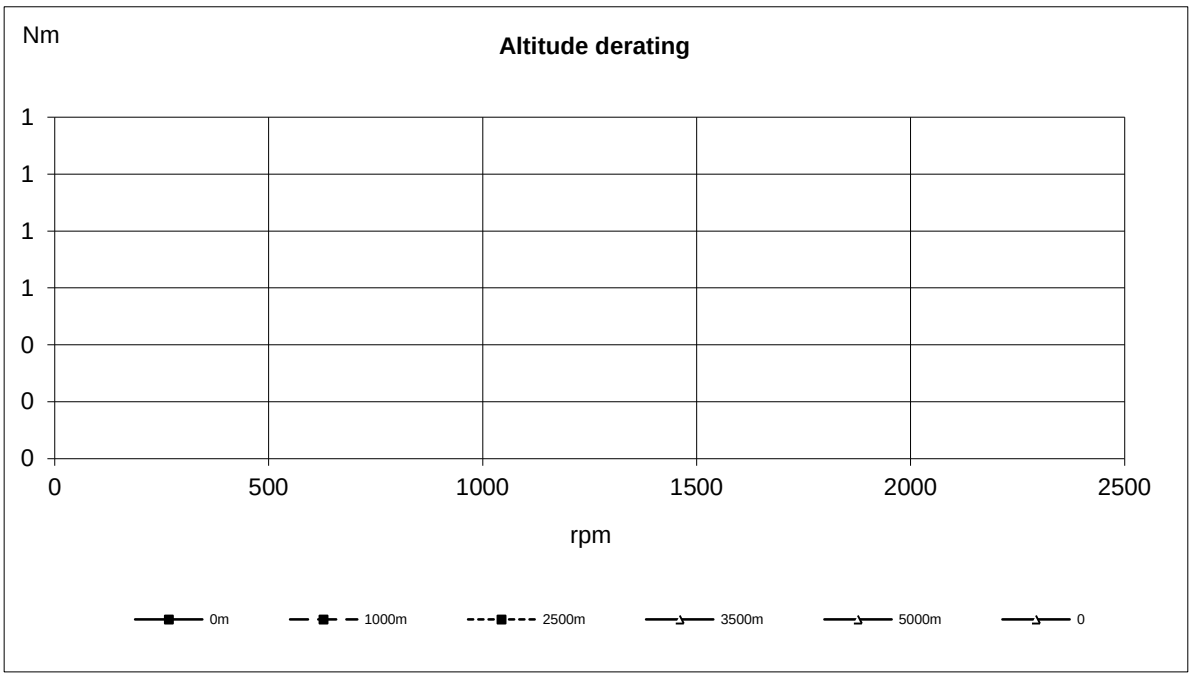

kW
Power
600
500
400
300
200
100
0
0
500
1000
1500
2000
2500
rpm
IFN Power 515 kW
ICFN Power

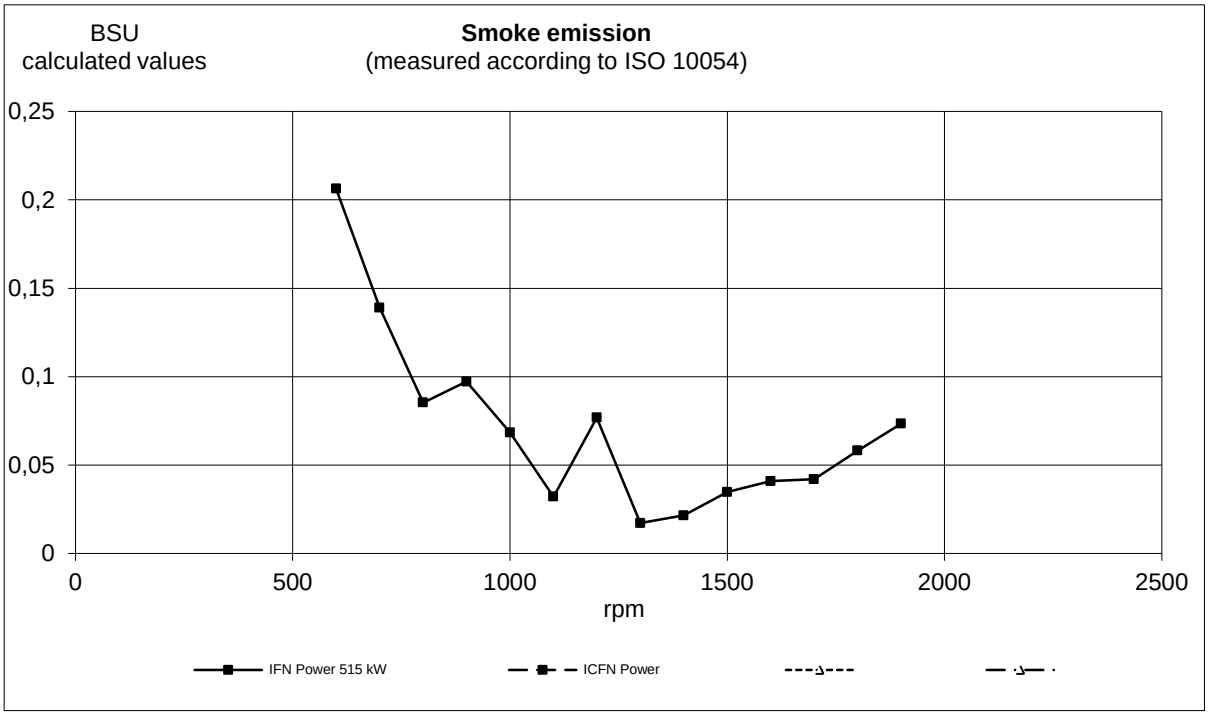

Nm
Torque
3500
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
IFN Power 515 kW
ICFN Power

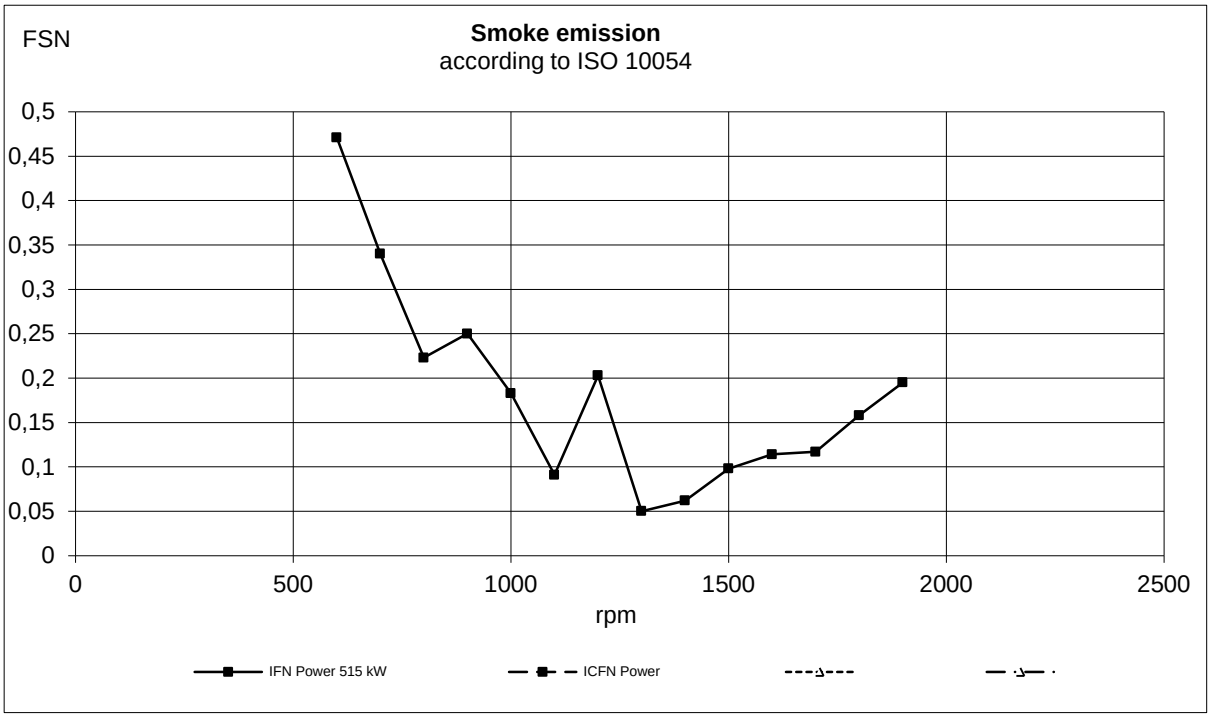

Nm
Altitude derated Torque IFN Power 515
3500
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
0m
1000m
2500m
3500m
5000m
Derating factor

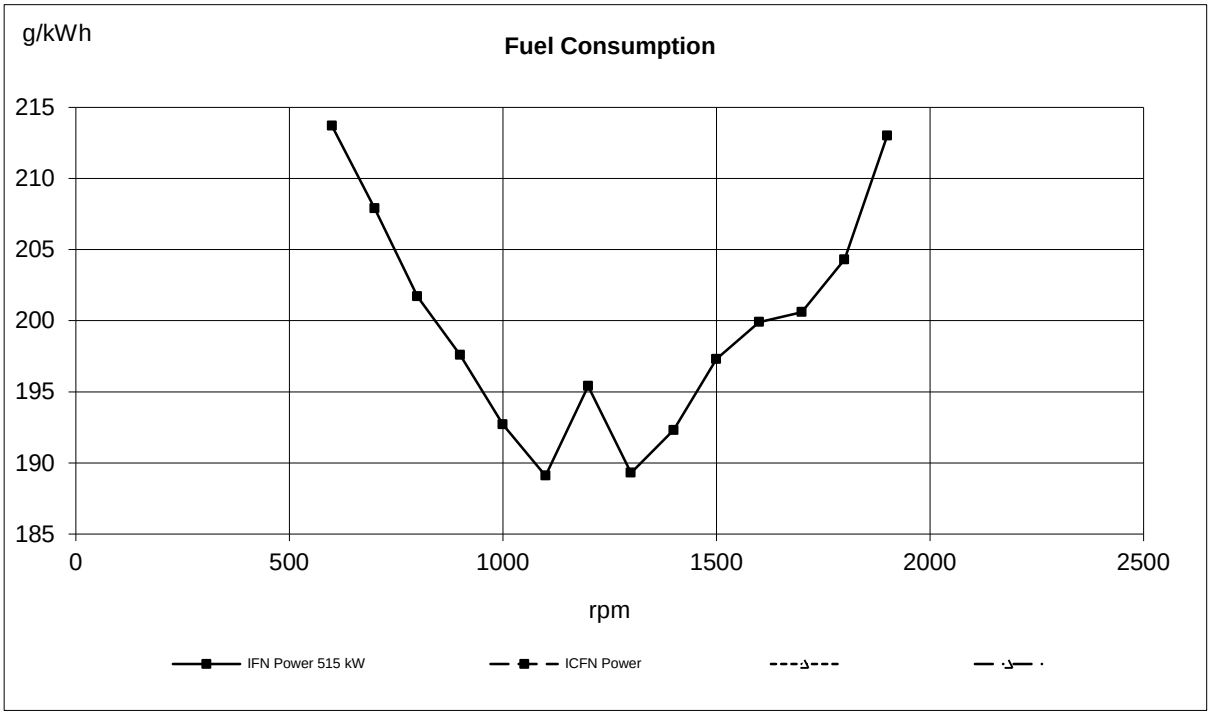

Nm
Altitude derated Torque ICFN Power
1
1
1
1
0
0
0
0
500
1000
1500
2000
2500
rpm
0m
1000m
2500m
3500m
5000m
0

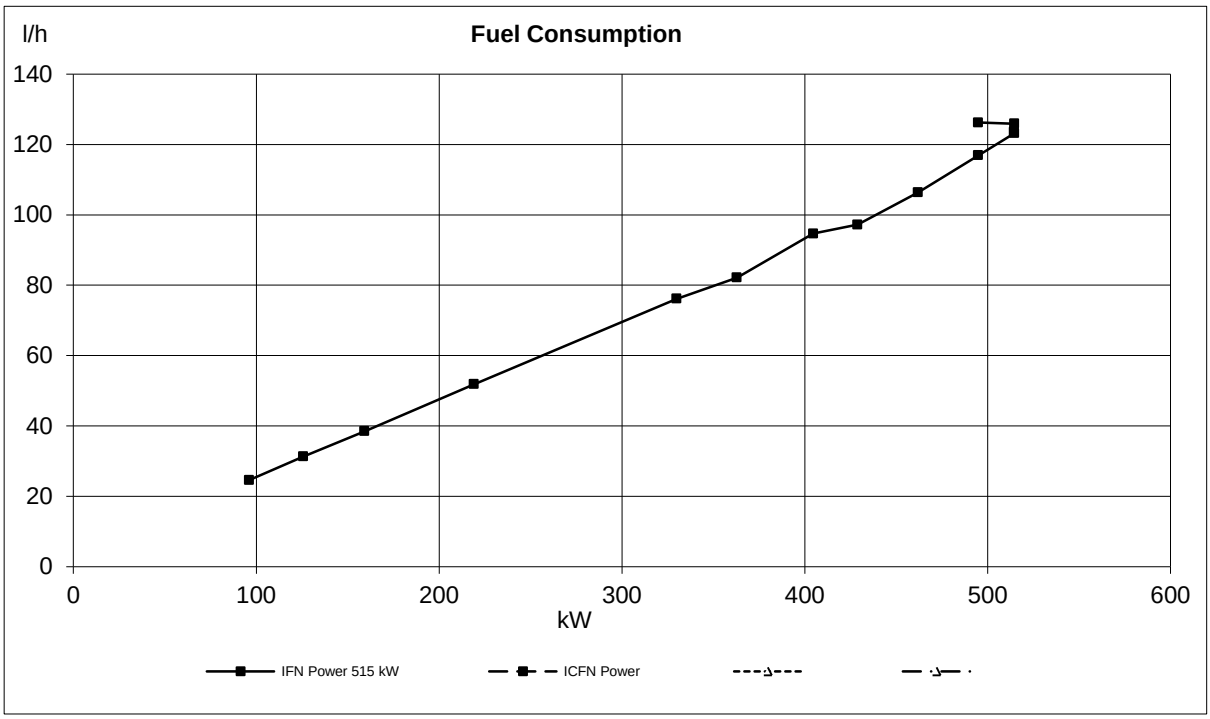

Nm
Altitude derating
1
1
1
1
0
0
0
0
500
1000
1500
2000
2500
rpm
0m
1000m
2500m
3500m
5000m
0

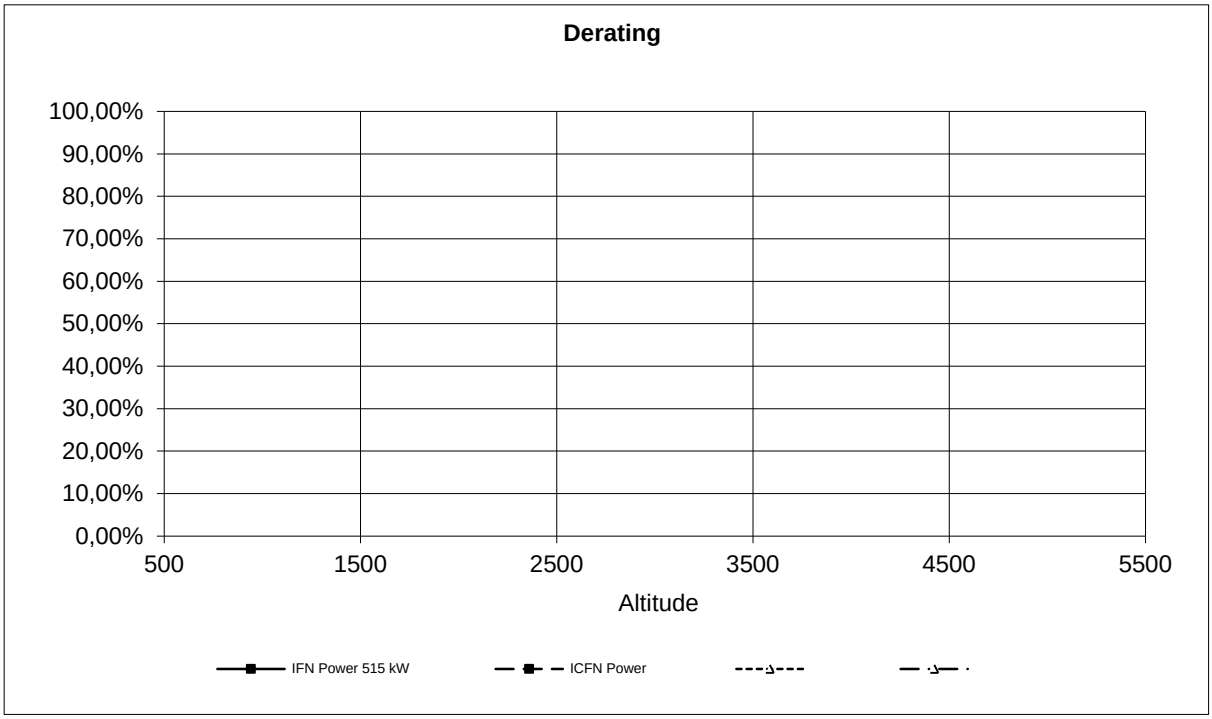

Nm
Altitude derating
1
1
1
1
0
0
0
0
500
1000
1500
2000
2500
rpm
0m
1000m
2500m
3500m
5000m
0

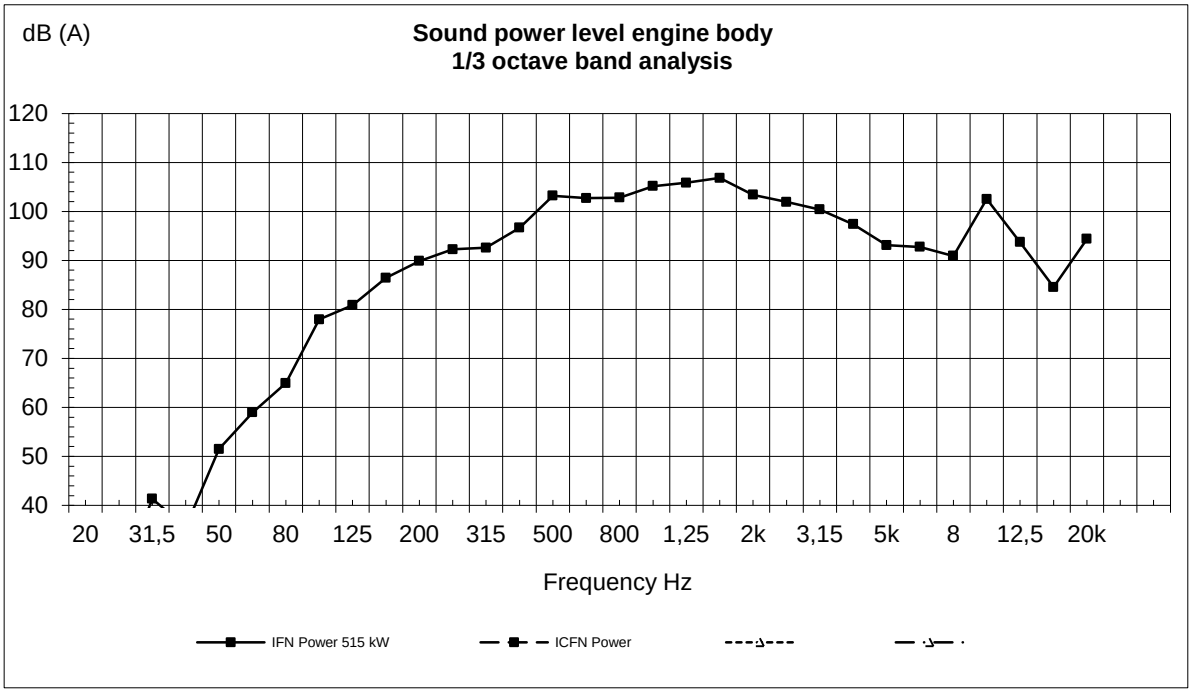

BSU
calculated values
Smoke emission
(measured according to ISO 10054)
0,25
0,2
0,15
0,1
0,05
0
0
500
1000
1500
2000
2500
rpm
IFN Power 515 kW
ICFN Power

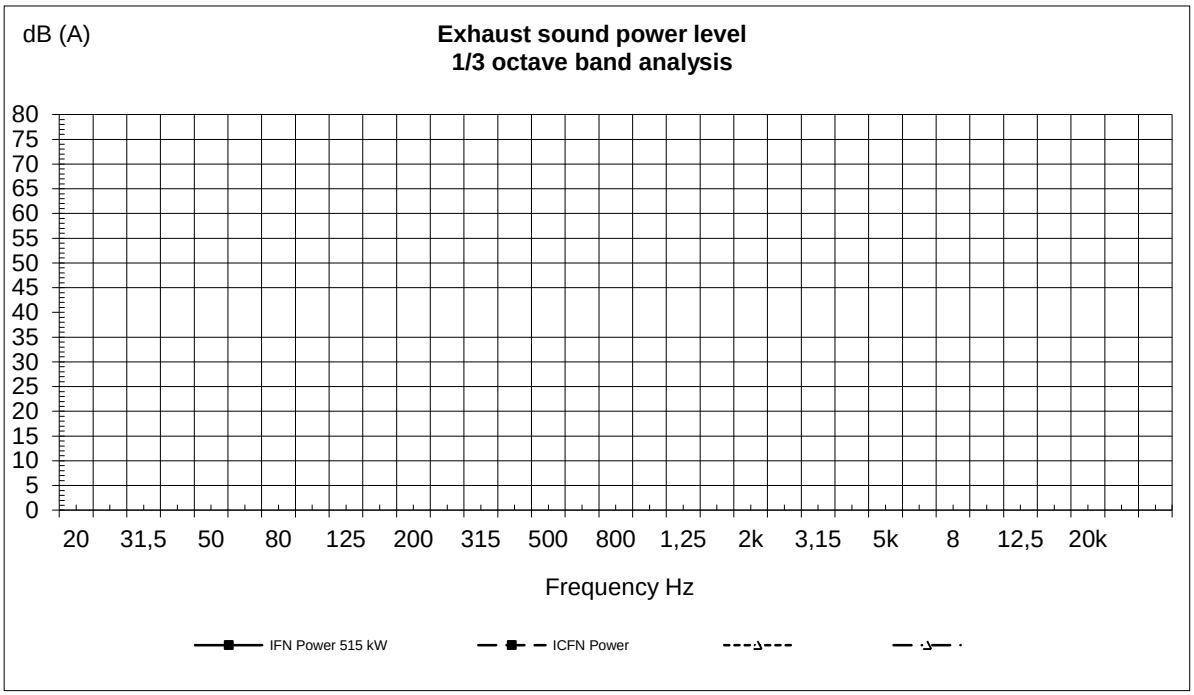

FSN
Smoke emission
according to ISO 10054
0,5
0,45
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
0
500
1000
1500
2000
2500
rpm
IFN Power 515 kW
ICFN Power

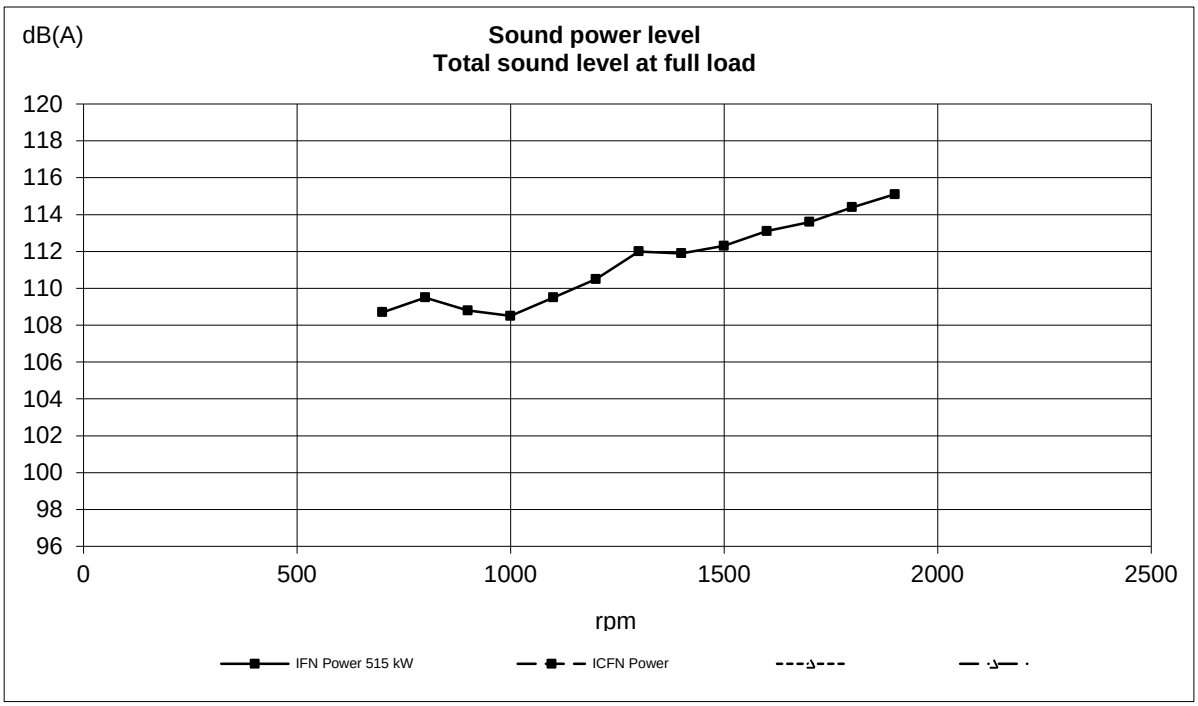

g/kWh
Fuel Consumption
215
210
205
200
195
190
185
0
500
1000
1500
2000
2500
rpm
IFN Power 515 kW
ICFN Power

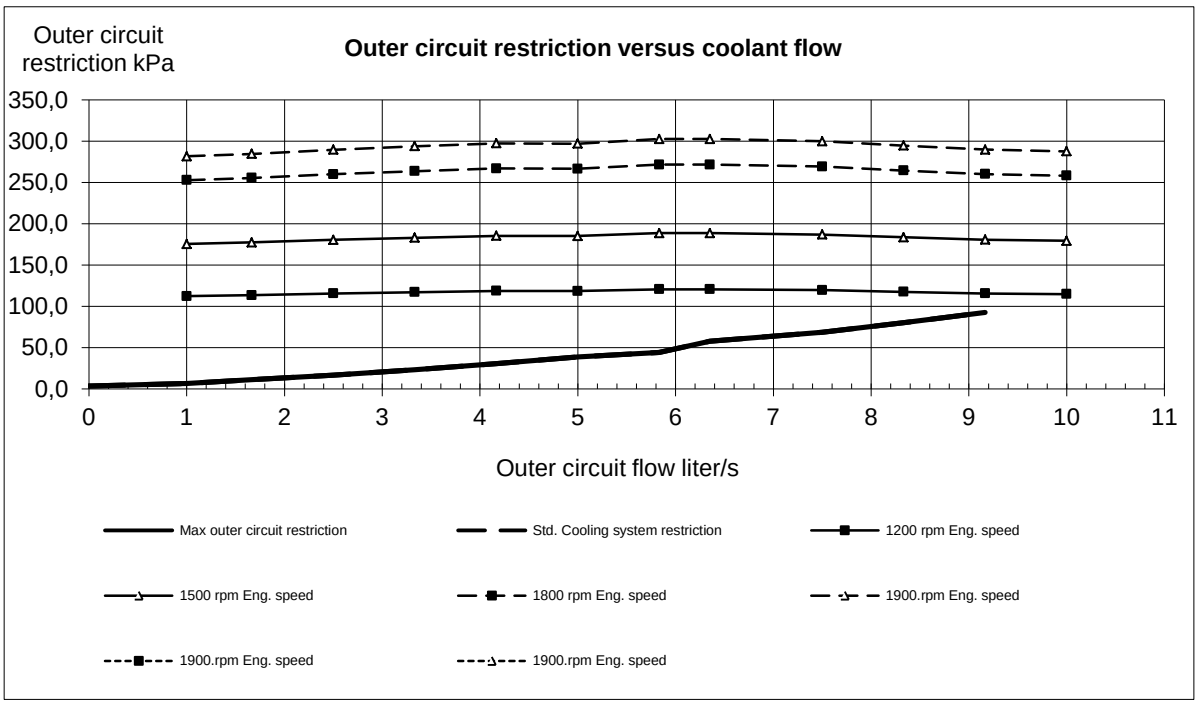

l/h
Fuel Consumption
140
120
100
80
60
40
20
0
0
100
200
300
400
500
600
kW
IFN Power 515 kW
ICFN Power

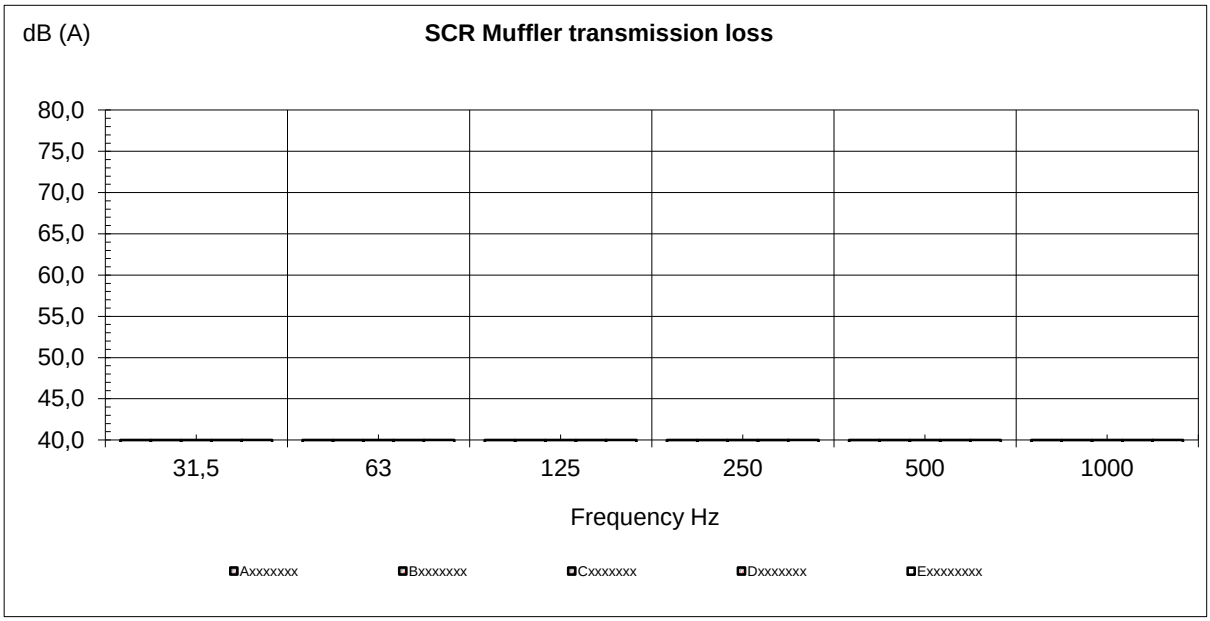

Derating
100,00%
90,00%
80,00%
70,00%
60,00%
50,00%
40,00%
30,00%
20,00%
10,00%
0,00%
500
1500
2500
3500
4500
5500
Altitude
IFN Power 515 kW
ICFN Power


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 515 kW
ICFN Power

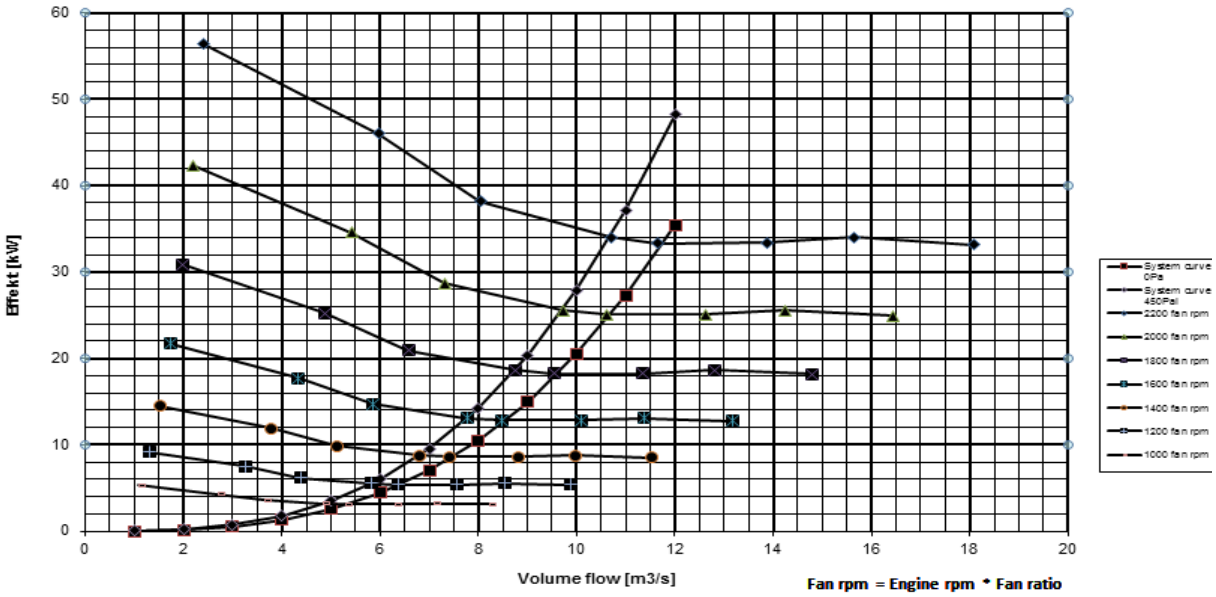

dB (A)
Exhaust sound power level
1/3 octave band analysis
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
IFN Power 515 kW
ICFN Power


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 515 kW
ICFN Power

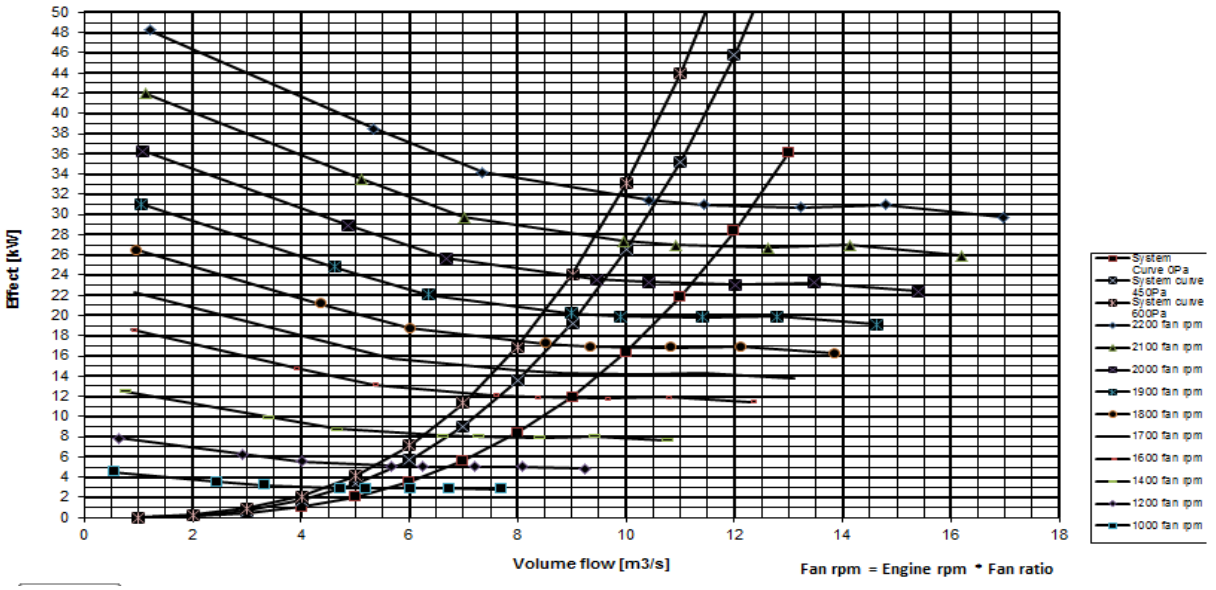

Outer circuit restriction kPa
Outer circuit restriction versus coolant flow
350,0
300,0
250,0
200,0
150,0
100,0
50,0
0,0
0
1
2
3
4
5
6
7
8
9
10
11
Outer circuit flow liter/s
Max outer circuit restriction
Std. Cooling system restriction
1200 rpm Eng. speed
1500 rpm Eng. speed
1800 rpm Eng. speed
1900.rpm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

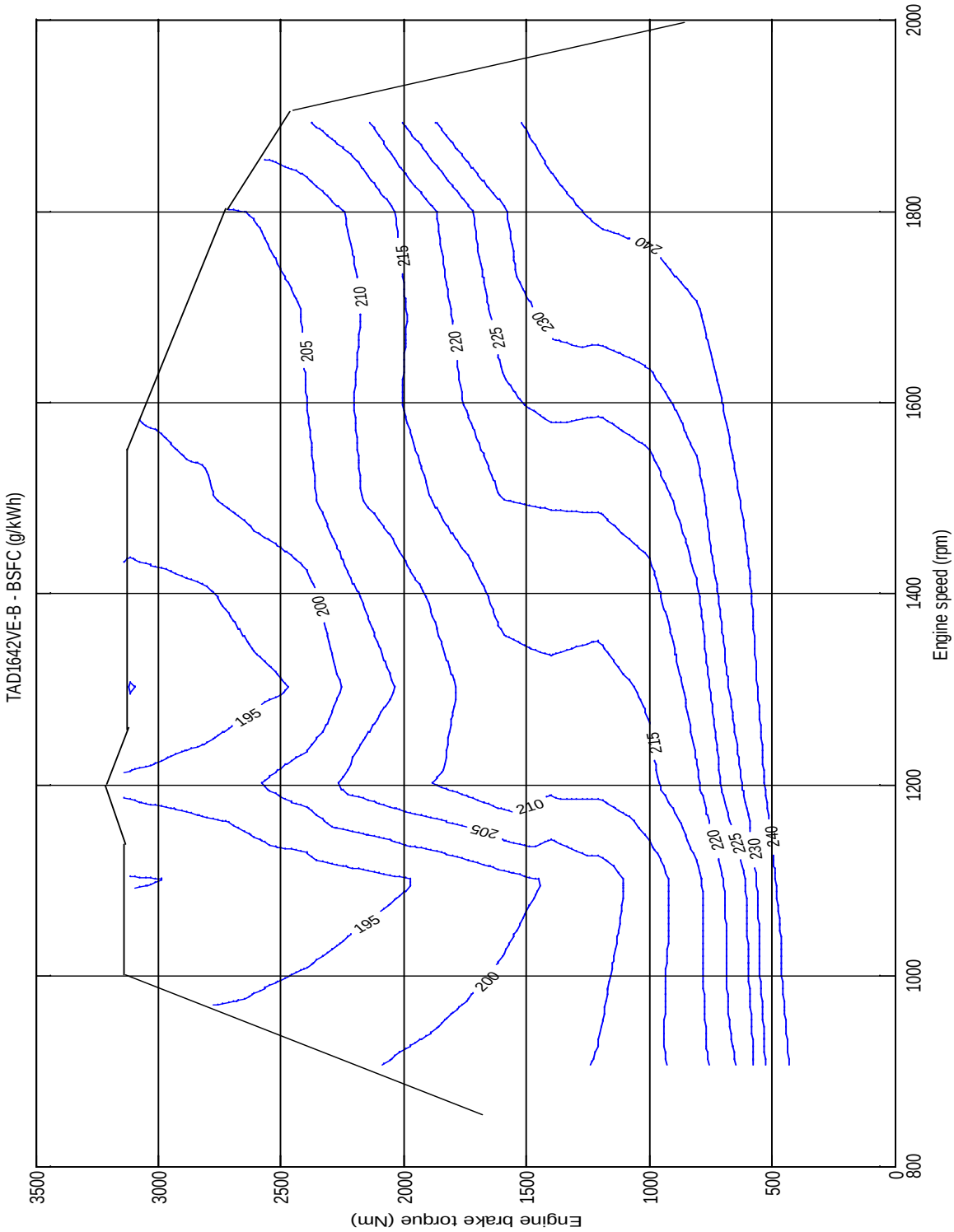

dB (A)
SCR Muffler transmission loss
80,0
75,0
70,0
65,0
60,0
55,0
50,0
45,0
40,0
31,5
63
125
250
500
1000
Frequency Hz
Axxxxxxx
Bxxxxxxx
Cxxxxxxx
Dxxxxxxx
Exxxxxxxx

Fan power 890mm Pusher fan



Fan power 890mm Puller fan




TAD1642VE-B - BSFC (g/kWh)
Engine brake torque (Nm)
Engine speed (rpm)
3500
3000
2500
2000
1500
1000
500
0
2000
1800
1600
1400
1200
1000
800
240
215
210
205
220
225
230
200
195