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			4
Displacement, total		liters in^3	5,13 313
Firing order			1-3-4-2
Bore		mm in	110 4,33
Stroke		mm in	135 5,31
Compression ratio			17.5:1
Wet weight (Not including after treatment system)	Engine only	kg lb	557 1228
	Power pac	kg lb	854 1883
	Power pac, compact cooling package	kg lb	776 1711

Performance				**rpm**	**1500**	**1800**	**2000**	**2200**
IFN Power 160 kW		without fan		kW hp	141 192	160 218	160 218	160 218
		with fan 600 mm		kW hp	136 185	153 208	153 208	153 208
Torque at:		IFN Power 160 kW		Nm lbf ft	900 664	849 626	764 563	695 513
Max torque at engine speed	IFN Power		1450 rpm	Nm lbf ft	910 671			
Power tolerance				%	±5			
Mean piston speed				m/s ft/sec	6,8 22,1	8,1 26,6	9,0 29,5	9,9 32,5
Effective mean pressure at:		IFN Power 160 kW		MPa psi	2,20 319	2,08 301	1,87 271	1,70 247
Max combustion pressure at:		IFN Power 160 kW		MPa psi	16,2 2349	15,8 2291	14,9 2161	14,5 2103
Total mass moment of inertia, J (mR^2) (not including flywheel)				kgm^2 $lbft^2$	0,261 6,2			
Friction Power				kW hp	13 18	18 24	23 31	29 39
Derating see Technical Diagrams								

Cold start performance

*Cold start limit temperature	without starting aid	°C °F	-15 5	
	with manifold heater 4 kW	°C °F	-25 -13	
	with manifold heater 4 kW and block heater	°C °F	-35 -31	
*Specify oil quality	Above -15°C; 15W40 Above -25°C; 10W30 Below -25°C; 5W30			
Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo	1,5		

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption (average)			Vol%	0,05
Oil system capacity including filters			liter US gal	16 4,23
Oil sump capacity:		Max	liter US gal	14 3,57
		Min	liter US gal	10 2,51
Oil change intervals/specifications	VDS3, VDS4.5		h	500
	VDS3 with oil analysis		h	1000
Engine angularity limits:		front up	°	32
		front down	°	32
		side tilt	°	32
Oil pressure at rated speed			kPa psi	420 61

Lubrication system

Lubrication oil temperature in sump:	max	°C °F	125 257
Oil filtration efficiency (in accordance with ISO 4548-12)	97%	µ	36
	50%	µ	14

Fuel system		rpm	1500	1800	2000	2200
Fuel to conform to			EU EN590 US D975, 1-D and 2-D (Max 3000ppm sulphur and 7% FAME) For further information, see service bulletin 18-8-8			
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	9 1,3			
Fuel supply line max. pressure, during engine stand still (meassured at fuel inlet connection)		kPa psi	20 2,9			
System return flow at max. speed		liter/h US gal/h	111,0 29,3			
Fuel return line max. restriction (Measured at fuel return connection)		kPa psi	10 1,5			
Max. allowable inlet fuel temp (Measured at fuel inlet connection)		°C °F	80 176			
Prefilter / Water separator filtration efficiency	99%	µ	30			
Main fuel filter filtration efficiency (in accordance with ISO 19438)	98%	µ	5			
	96%	µ	4			
Governor type/make, standard		Volvo / EMS 2.3				
Injection pump type/make		Denso HP3				

Intake and exhaust system		Inlet air temp	rpm	1500	1800	2000	2200
Charge air consumption at: (+25°C and 100kPa)	IFN Power 160 kW	25°C 77°F	m³/min cfm	10,5 371	12,0 424	12,6 445	13 459
⚠ **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 160 kW		kW BTU/min	118 6711	142 8070	147 8377	157 8911
Exhaust gas temperature after turbine at:	IFN Power 160 kW		°C °F	510 950	535 995	531 988	545 1013
⚠ **See front page for important information** Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 127 mm			kPa psi	10 1,5	13 1,9	14 2,0	15 2,2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power 160 kW		m³/min cfm	28,2 996	32,5 1148	33,5 1183	34,9 1232

Cooling system			rpm	1500	1800	2000	2200
Heat rejection radiation from engine at:		IFN Power 160 kW	kW	11	11	11,1	11,5
			BTU/min	603	648	631	654
Heat rejection to coolant at:		IFN Power 160 kW	kW	75	84	86,4	92,3
			BTU/min	4242	4794	4913	5249
Radiator cooling system type				Closed circuit			
Standard radiator core area		IFN Power 160 kW	m²	0,6			
			foot²	6,46			
Compact cooling package radiator core area		IFN Power 160 kW	m²	0,28			
			foot²	3,01			
Fan diameter	600 mm	IFN Power 160 kW	mm	600			
			in	23,62			
Maximum fan power consumption	600 mm pull		kW	5,1	7,2	7,2	7,2
			hp	7	10	10	10
Fan drive ratio	fan Ø600			1:1.4			
	fan position high			1:1.1			
Coolant capacity:	engine		liter	13			
			US gal	3,4			
	engine + standard radiator with hoses and expansion tank		liter	47			
			US gal	12,4			
	engine + compact cooling package radiator with hoses and expansion tank		liter	31			
			US gal	8,2			
Coolant pump			drive/ratio	belt/1,4:1			
Coolant flow with standard system			l/s	5,4	6,5	7,2	8
			US gal/s	1,4	1,7	1,9	2,1
Minimum coolant flow			l/s				4,5
			US gal/s				1,2
Maximum outer circuit restriction incl. piping			kPa	40,0			
			psi	5,8			
Thermostat:		start to open	°C	85			
			°F	185			
		fully open	°C	95			
			°F	203			
Maximum static pressure head (expansion tank height + pressure cap setting)			kPa	110			
			psi	16,0			
Minimum static pressure head (expansion tank height + pressure cap setting)			kPa	85			
			psi	12,3			
Standard pressure cap setting			kPa	100			
			psi	14,5			
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	1500	1800	2000	2200
Heat rejection to charge air cooler	IFN Power 160 kW	kW	33,5	38,3	38,4	38
		BTU/min	1905	2178	2184	2161
Charge air mass flow	IFN Power 160 kW	kg/s	0,209	0,239	0,25	0,258
Charge air inlet temp.	IFN Power 160 kW	°C	207	209	202	196
(Charge air temp after turbo compressor)		°F	405	408	396	385
⚠ **See front page for important information** Max allowable Charge air outlet temp.		°C	48	51	50	50
(Charge air temp after charge air cooler)		°F	118	124	122	122
⚠ **See front page for important information** Maximum pressure drop over charge air cooler incl. piping		kPa	8	9	11	12
		psi	1,2	1,3	1,6	1,7
Charge air pressure		kPa	242	241	223	204
(After charge air cooler)		psi	35,10	34,95	32,34	29,59
Standard charge air cooler core area		m²	0,5			
		foot²	5,38			
Compact charge air cooler core area		m²	0,22			
		foot²	2,37			

Cooling performance: 0,6 m² radiator and 600mm fan, pull

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.

		IFN Power 160 kW					
Engine speed	Engine power kW	Air on temp		Air flow		External restriction	
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
2200	160	72,3	162	7,3	257,8	0	
	218	71,7	161	7,2	254,3	100	0,015
		70,9	160	7	247,2	200	0,029
		69,2	157	6,6	233,1	300	0,044

Cooling performance: 0,28 m² radiator and 600mm fan, pull

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.

		IFN Power 160 kW					
Engine speed	Engine power kW	Air on temp		Air flow		External restriction	
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
2200	160	47,5	118	4,6	162,4	0	
	218	43,5	110	4,3	151,9	150	0,022
		38,2	101	4	141,3	300	0,044
		33,6	92	3,7	130,7	450	0,065

Cooling performance: 0,28 m² radiator and 600mm fan, push

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.

				IFN Power 160 kW			
Engine speed	Engine power	*Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
2200	160	55,8	132	5,3	187,2	0	
	218	49,8	122	4,7	166,0	150	0,022
		42,8	109	4,3	151,9	300	0,044
		37,7	100	3,8	134,2	450	0,065

* AOT-temperatures are based upon simulations.

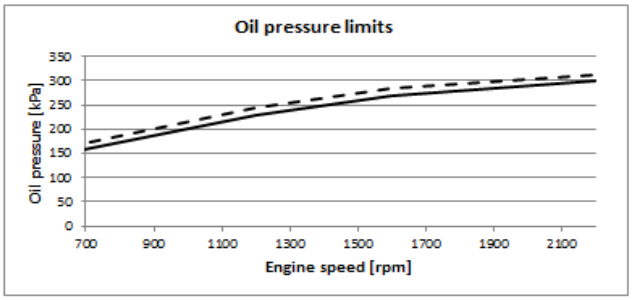
Engine management system

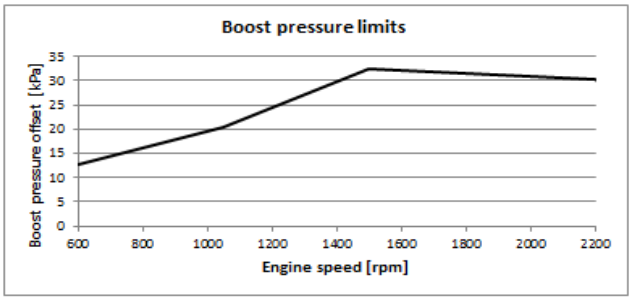
Functionality	Alternatives			Default setting
Governor mode	Droop	Isochronous		Isochronous
Governor droop	10	125	Nm/rpm	
Governor response	Adjustable PI constants			
Idle speed	600	900	rpm	700
Stop function				Replaced by "Ignition of stop engine"
Preheating function	Ignition	Request	Request + temp	If preheat is available, preheat will be active at ignition on if temp low or demanded by driver.
Lamp test				No lamp test, not used any longer
Ignition of stop engine	Yes	No		No

Engine sensors and switch settings			Alarm level		Engine protection	
Parameter		Unit	Setting range	Default setting	Level	Action. Default/Alternative
Oil temp		°C		125	125	Derate
Oil pressure	Low idle	kPa		150,0	150	Shut down
	Rated speed	kPa		300	300	Shut down
Coolant temp		°C		107	107	Derate
Coolant level				On	Low level	Derate
Water in fuel			On if closed circuit			
Air filter pressure drop				5kPa		
Altitude, above sea		m				Automatic derating, see section derating
Charge air temp		°C		80	80	Derate
Charge air pressure		kPa		See map		Derate
Engine speed		rpm				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 0 sec	Forced shut down after 0 sec
Coolant temp	103°C	107°C	107°C	110°C		
Oil temp	122°C	125°C	125°C	130°C		
Low oil pressure	Warning map value	Alarm map value		Alarm map value		
High charge air temp	77°C	80°C	80°C	100°C		
High charge air pressure		Alarm map value	Alarm map value			


Oil pressure limits
Oil pressure [kPa]
350
300
250
200
150
100
50
0
700
900
1100
1300
1500
1700
1900
2100
Engine speed [rpm]


Boost pressure limits
Boost pressure offset [kPa]
35
30
25
20
15
10
5
0
600
800
1000
1200
1400
1600
1800
2000
2200
Engine speed [rpm]

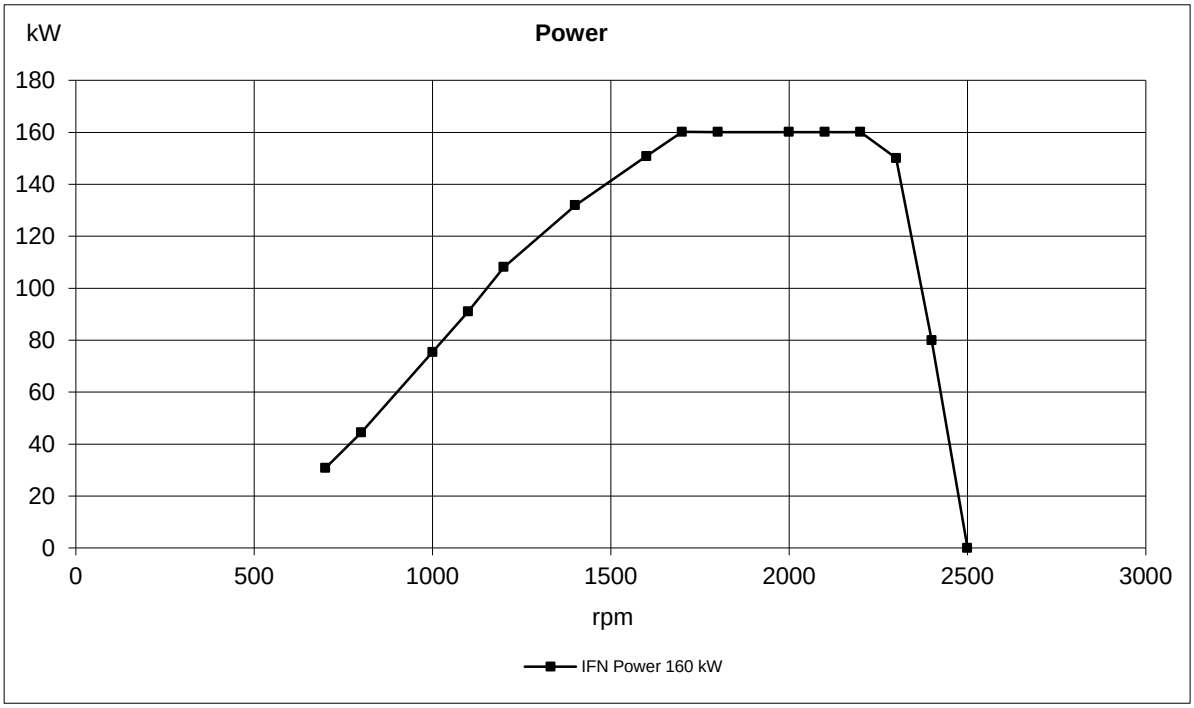
Electrical system

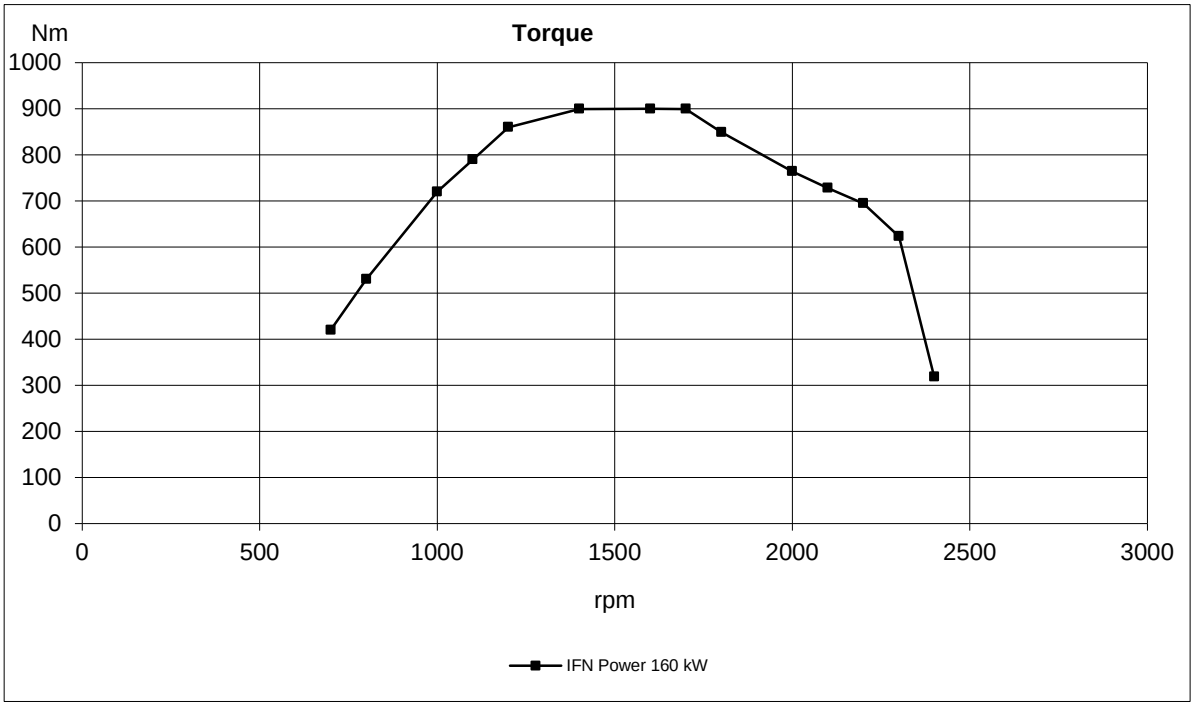
Voltage and type				24V
Alternator:	make			MELCO
	output	A		110/130
	tacho output	Hz/alternator rev.		
	drive ratio			
Starter motor:	make			MELCO
	type			85P50 / 90P55
	output		kW	5 / 5.5
			hp	6.8 / 7.5
Number of teeth on:	flywheel			137
	starter motor			10 / 12 teeth
Inlet manifold heater (at 20 V)			kW	4
Power relay for the manifold heater			A	200

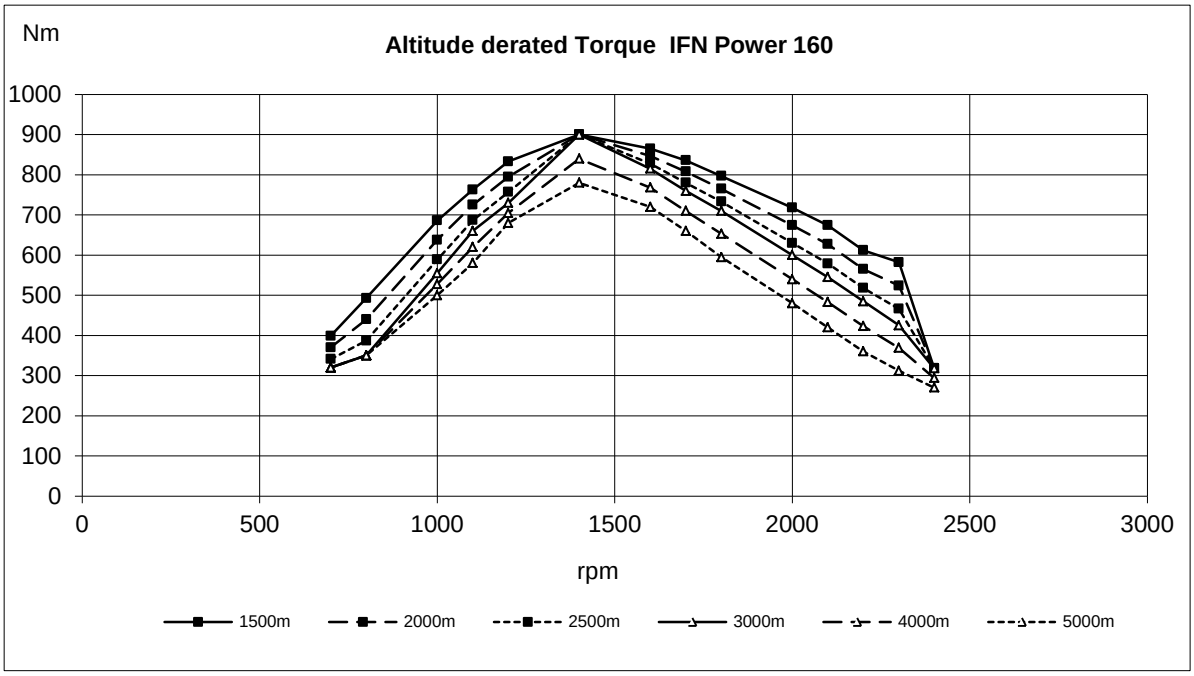
Conditions:	**Temperature**	**°C**		**25**	**0**	**-15**
(5 mΩ main circuit resistance@	**Battery**	**Ah / CCA**		**100/700**	**100/700**	**100/700**
Crank speed		rpm		197	150	123
Crank current		A		173	265	320
Starter input power during crank		kW		3,90	4,70	5,20
Battery power during crank		kW		4,00	5,10	5,70
Min battery @ 0°C		Ah / CCA		100/700		

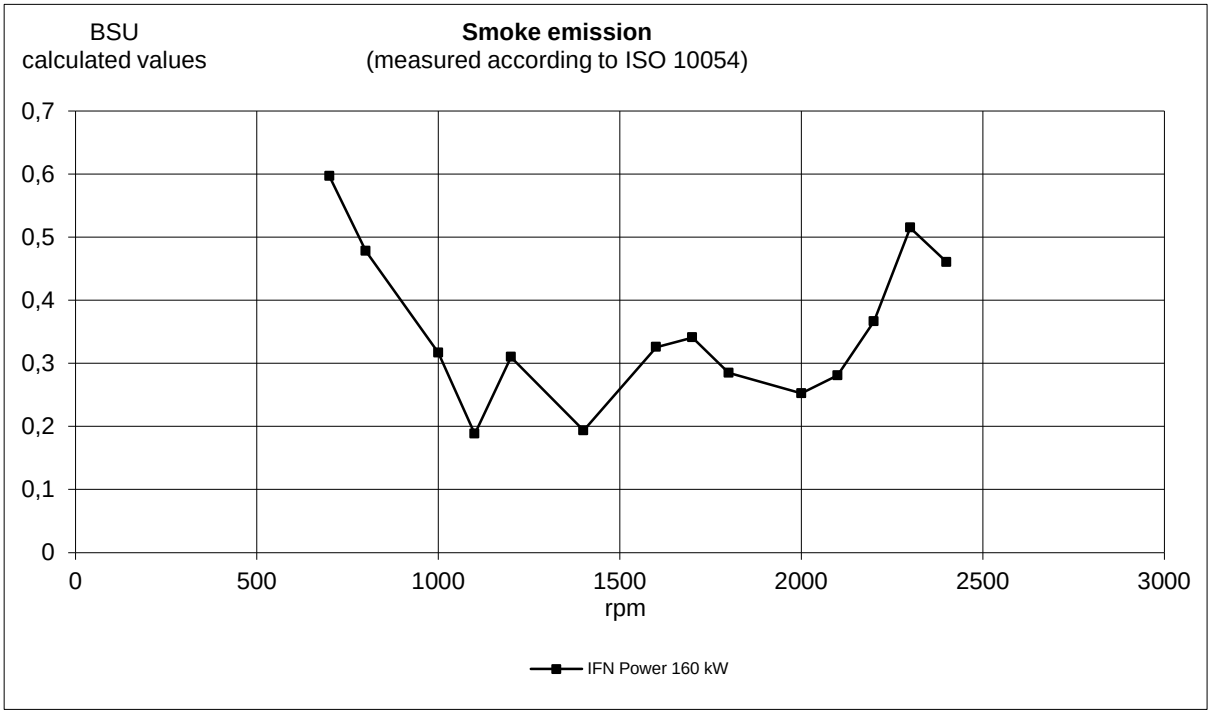
Power take off			**rpm**	**1400**	**1800**	**2000**	**2200**
Front end in line with crank shaft max:*		0.02 kgm^2	Nm	866	817	750	610
Flywheel			lbf ft	639	603	553	450
SAE 2, STD 10" & 11,5 ", 1.303 kgm2		0.03 kgm^2	Nm	866	748	711	457
			lbf ft	639	552	524	337
		0.04 kgm^2	Nm	866	695	645	399
			lbf ft	639	513	476	294
Front end belt pulley load.	Max up (above or equal to horizontal line)		kW	3,4	4,1	4,5	5,0
			hp	4,6	5,6	6,1	6,8
	Max down (below horizontal line)		kW	28,4	34,0	37,8	41,6
			hp	38,6	46,2	51,4	56,6
Maximum power on Rear PTO on top of flywheel housing (REPTO):*			kW	75			
			hp	102			
Speed ratio direction of rotation viewed from flywheel side				1:1 Counter clockwise			
Maximum torque on PTO at compressor position:*			Nm	200			
			lbf ft	148			
Speed ratio direction of rotation viewed from flywheel side				1.026:1 Counter clockwise			
Timing gear at hydraulic pump PTO max:*			Nm	80			
			lbf ft	59			
Speed ratio direction of rotation viewed from flywheel side				1.3:1 Clockwise			
Max allowed bending moment in flywheel housing	SAE2		Nm	4600			
			lbf ft	3393			
Max. rear main bearing load			N				
			lbf				

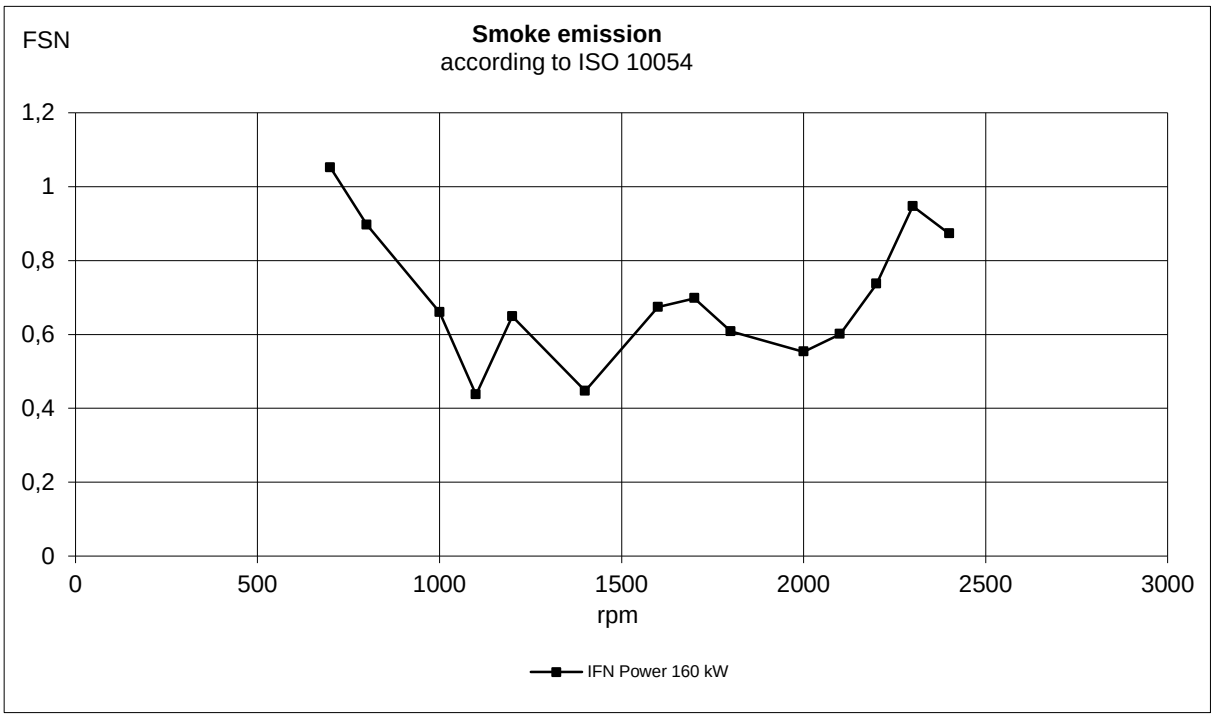
**** Maximum allowed torque at individual PTO´s.***
If more then one PTO output is used simultaniusly, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

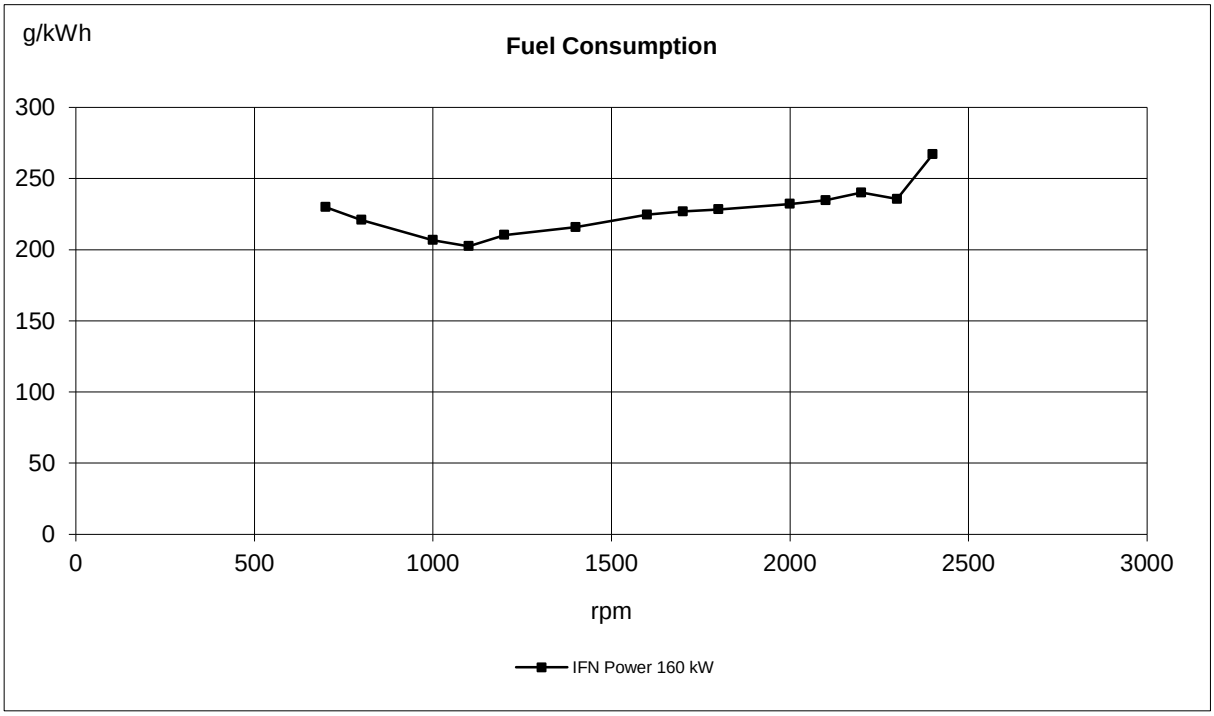

kW
Power
180
160
140
120
100
80
60
40
20
0
0
500
1000
1500
2000
2500
3000
rpm
IFN Power 160 kW

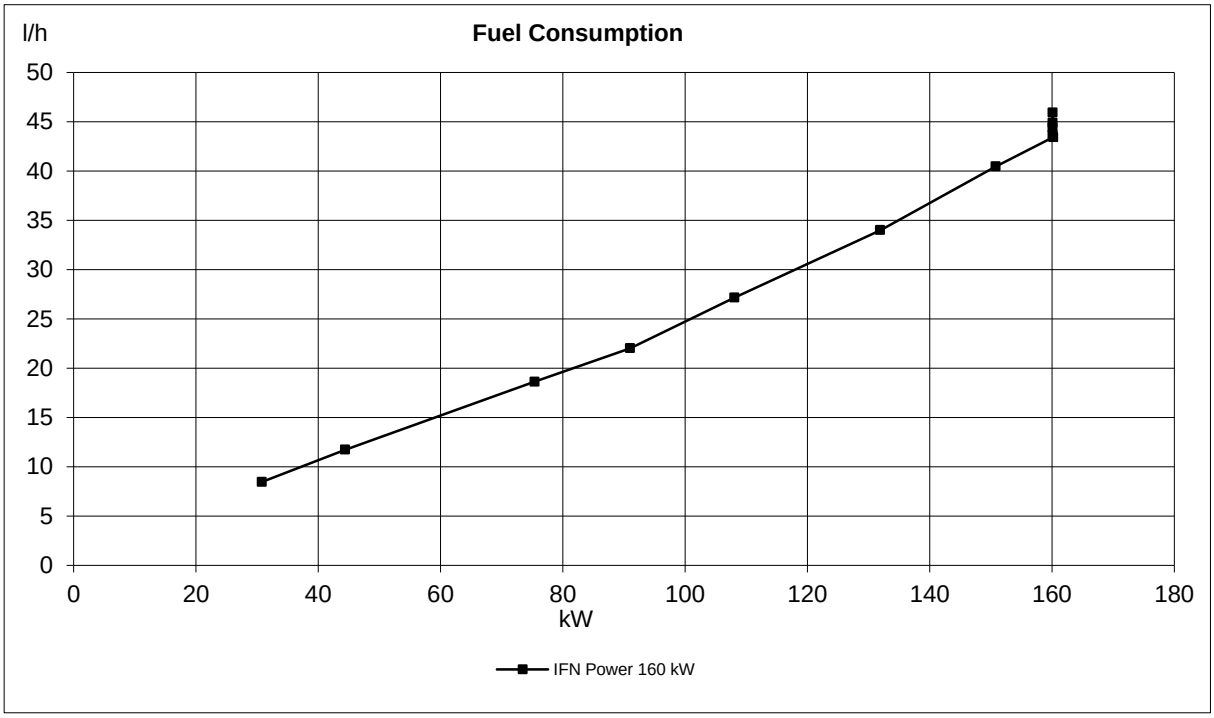

Nm
Torque
1000
900
800
700
600
500
400
300
200
100
0
0
500
1000
1500
2000
2500
3000
rpm
IFN Power 160 kW

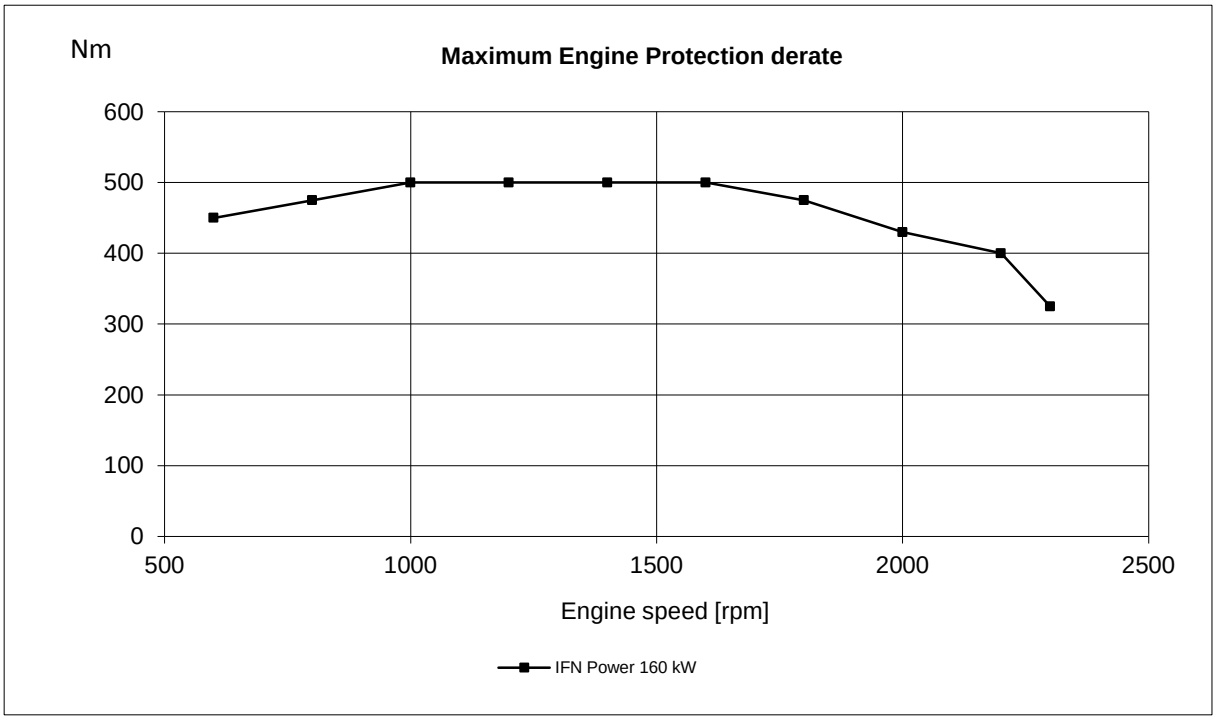

Nm
Altitude derated Torque IFN Power 160
1000
900
800
700
600
500
400
300
200
100
0
0
500
1000
1500
2000
2500
3000
rpm
1500m
2000m
2500m
3000m
4000m
5000m

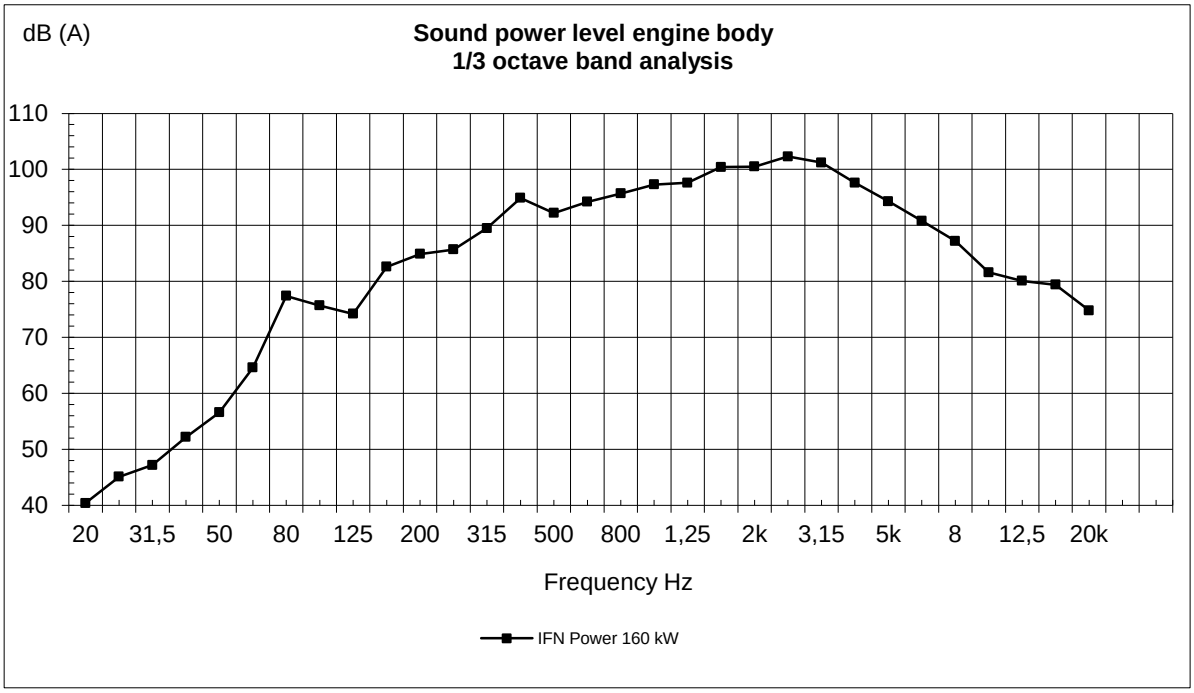

BSU
calculated values
Smoke emission
(measured according to ISO 10054)
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
0
500
1000
1500
2000
2500
3000
rpm
IFN Power 160 kW

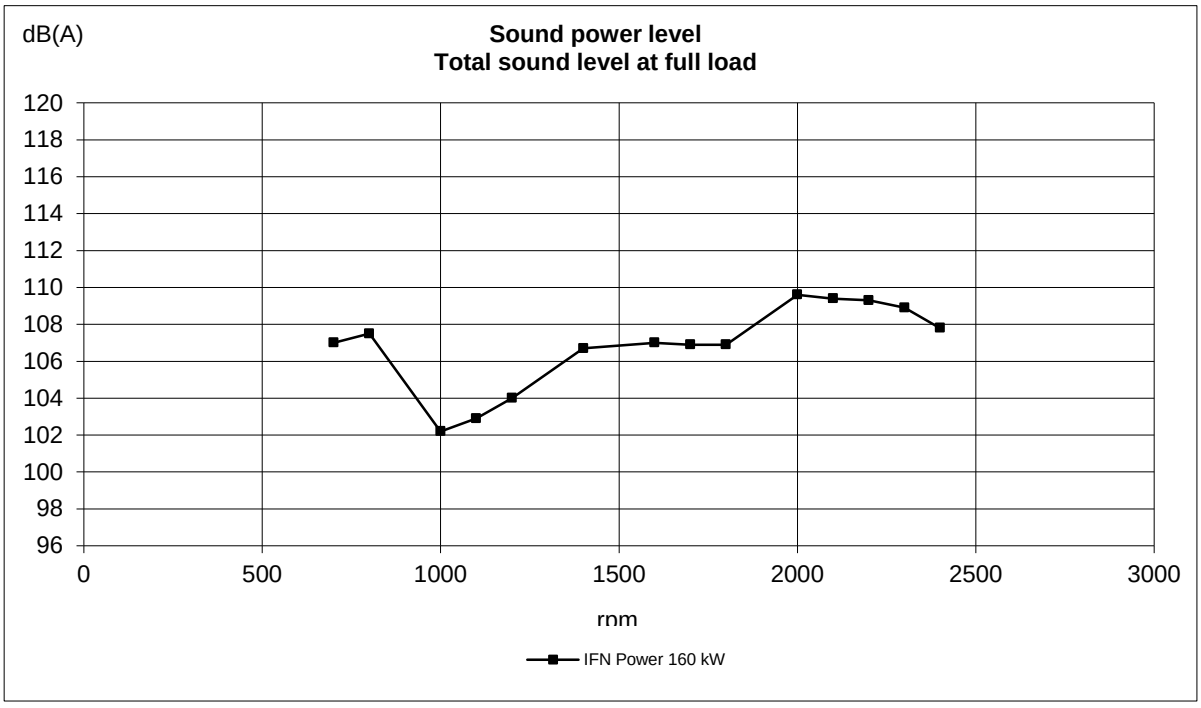

FSN
Smoke emission
according to ISO 10054
1,2
1
0,8
0,6
0,4
0,2
0
0
500
1000
1500
2000
2500
3000
rpm
IFN Power 160 kW

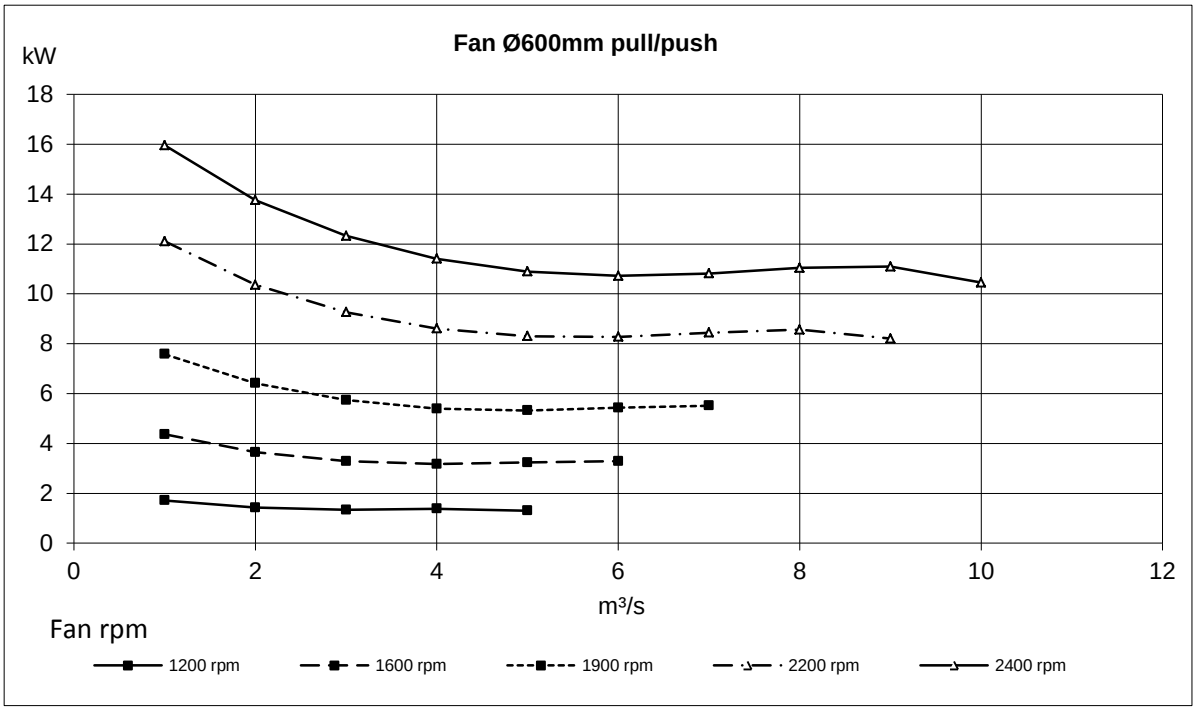

g/kWh
Fuel Consumption
300
250
200
150
100
50
0
0
500
1000
1500
2000
2500
3000
rpm
IFN Power 160 kW


l/h
Fuel Consumption
50
45
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
kW
IFN Power 160 kW

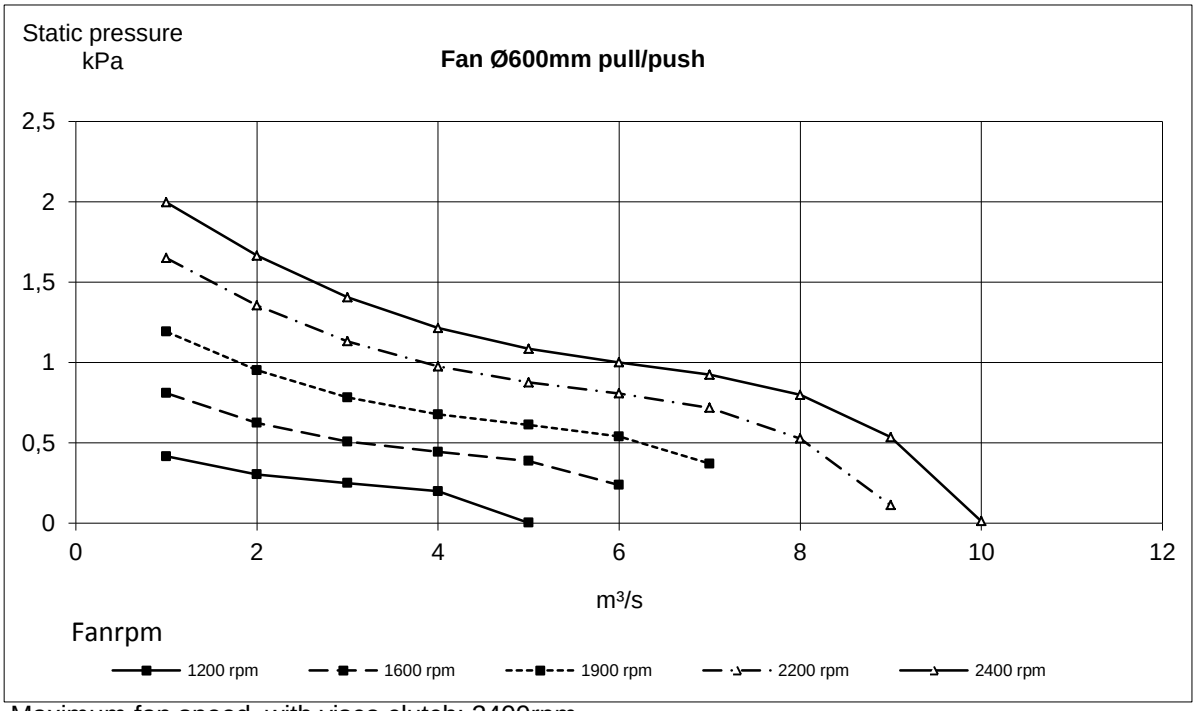

Nm
Maximum Engine Protection derate
600
500
400
300
200
100
0
500
1000
1500
2000
2500
Engine speed [rpm]
IFN Power 160 kW


dB (A)
Sound power level engine body
1/3 octave band analysis
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 160 kW

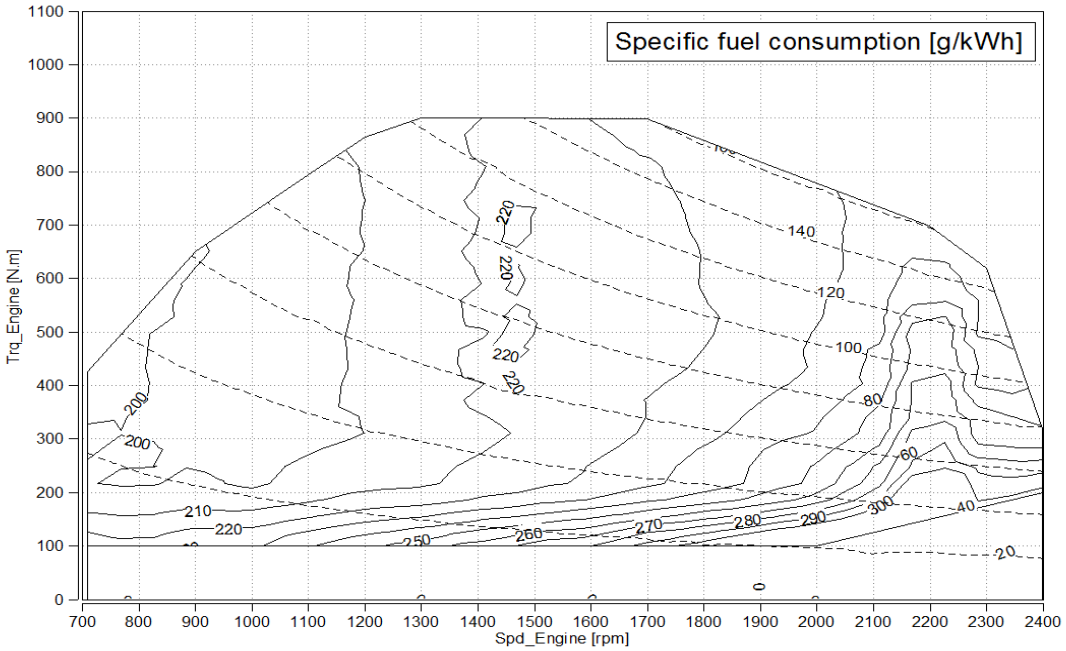

dB(A)
Sound power level
Total sound level at full load
120
118
116
114
112
110
108
106
104
102
100
98
96
0
500
1000
1500
2000
2500
3000
rpm
IFN Power 160 kW

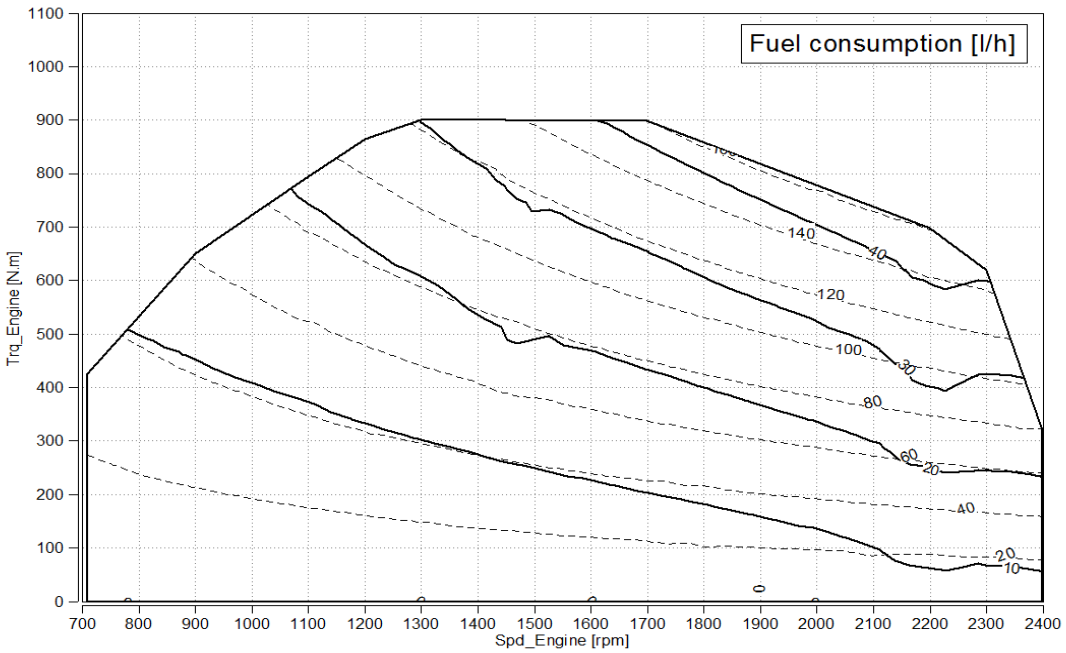


Maximum fan speed with visco clutch: 2400rpm



Maximum fan speed with visco clutch: 2400rpm


Specific fuel consumption [g/kWh]
Trq_Engine [N.m]
Spd_Engine [rpm]
1100
1000
900
800
700
600
500
400
300
200
100
0
700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400
140
120
100
80
60
40
20
0
200
210
220
250
260
270
280
290
300


Fuel consumption [l/h]
Trq_Engine [N.m]
Spd_Engine [rpm]
1100
1000
900
800
700
600
500
400
300
200
100
0
700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400
140
120
100
80
60
40
30
20
10
0