


**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 penalties 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 <sup>3</sup>		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 ratio 1:1,07 890 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 <sup>2</sup> ) (not including flywheel)				kgm <sup>2</sup>	1,143			
				lbft <sup>2</sup>	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	Plastic sump 36 / Aluminium sump 52 Plastic sump 9,51 / Aluminium sump 13,74		
Plastic Oil pan capacity:	Max	liter	30		
		US gal	7,93		
	Min	liter	19		
		US gal	5,02		
Aluminium Oil pan capacity:	Max	liter	46		
		US gal	12,15		
	Min	liter	36		
		US gal	9,51		
Oil change intervals/specifications	VDS3	h	1000		
	VDS4	h	1000		
Engine angularity limits:	front up	°	Plastic sump 11 / Aluminium sump 35		
	front down	°	Plastic sump 11 / Aluminium sump 35		
	side tilt	°	Plastic 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	130		
		°F	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	130
		US gal/h	34,3
Fuel supply line max. restriction (measured at fuel inlet connection)		kPa	30
		psi	4,4
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection)		kPa	165
		psi	23,9
Fuel supply line min. pressure, during engine stand still (measured at fuel inlet connection)		kPa	-125
		psi	-18,1
System return flow at max. Speed		liter/h	30,0
		US gal/h	7,9
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 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
	<b>See front page for important information</b>					
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
	<b>See front page for important information</b>					
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
	<b>See front page for important information</b>					
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

<b>Cooling system</b>		<b>rpm</b>	<b>1200</b>	<b>1500</b>	<b>1800</b>	<b>1900</b>
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		m <sup>2</sup>	0,8			
		foot <sup>2</sup>	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	1:0,84 ccw				
Coolant capacity:	engine	liter	20			
		US gal	5,3			
	std. 0,8m <sup>2</sup> 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. (Charge air temp after turbo compressor)	IFN Power	°C	190	185	177	178
		°F	374	365	351	352
 <b>See front page for important information</b> Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	46	49	50	50
		°F	115	120	122	122
 <b>See front page for important information</b> Maximum pressure drop over charge air cooler incl. piping		kPa	12			
		psi	1,74			
Charge air pressure (After charge air cooler)		kPa	232	205	175	168
		psi	33,65	29,73	25,38	24,37
Standard charge air cooler core area		m <sup>2</sup>	0,8			
		foot <sup>2</sup>	8,61			

**Cooling performance: 0.8 m<sup>2</sup> 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 rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
1900 0,84	345 469	52	126	5,9	208,4	300	0,044
		54	129	6,3	222,5	190	0,028
		57	135	6,9	243,7	0	

**Cooling performance: 0.8 m<sup>2</sup> 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 rpm	Engine power kW hp	Air on temp		Air flow		External restriction	
		°C	°F	m <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
1900 0,99	375 510	60	140	7,6	268,4		
		61	142	7,9	279,0		
		62	144	8,3	293,1		

**Engine management system**

Functionality	Alternatives			Default setting
Governor mode	Droop	Isochronous		Isochronous
Governor droop	10	127	Nm/rpm	
Governor response	Adjustable PI constants			
Idle speed	600	900	rpm	700
Preheating function	Ignition	Request	Request + temp	If preheat is available, preheat will be active at ignition on if temp low or demanded by driver.
Ignition off stops engine	Yes	No		No

**Engine sensors and switch settings**

**Engine protection action**

Parameter	Unit	Warning setting (Yellow)	Alarm setting (Red)	Default	Optional (Module or conversion kit)
Oil temp	°C	125	130	Derate	Shut down.
Oil pressure	Low idle	80	55,0	Shut down	Shut down.
	Rated speed	300	275	Shut down	Shut down.
Oil level		Low level	N/A	Fault code only	Fault code only
Piston cooling pressure >1000 rpm	kPa	Not available on this engine			
Coolant temp	°C	105	107	Derate	Shut down.
Coolant level		N/A	Low level	Derate	Shut down.
Fuel feed pressure	Low idle	See Fuel pressure limits	N/A	Fault code only	Fault code only
	Rated speed		N/A	Fault code only	Fault code only
Water in fuel		Alarm when closed	N/A	Fault code only	Fault code only
EGR temp	°C	N/A	N/A	N/A	N/A
Air filter pressure drop	kPa	5	N/A	Fault code only	Fault code only
Altitude, above sea	m	N/A	N/A	Automatic derating, see section derating	Automatic derating, see section derating
Crank case pressure		N/A	Alarm at	Shut down	Shut down.
Charge air temp	°C	120	125	Derate	Shut down.
Charge air pressure	kPa	See Charge air pressure limits		Derate	Shut down.
SCR temp	°C	N/A	N/A	Automatic derating	Automatic derating
Engine overspeed	rpm	2400	N/A	Fault code only	Fault code only
<b>Derate parameters</b>		<b>Derated 0% to engine protection map</b>	<b>Derated 100% to engine protection map</b>	<b>Forced idle after 5 sec</b>	<b>Forced shut down after 0 sec</b>
Oil temp		130°C	132°C	N/A	N/A
Coolant temp		107°C	108°C	N/A	N/A
Charge air temp		125°C	126°C	N/A	N/A
EGR temp		N/A	N/A	N/A	N/A
Low oil pressure		See Oil pressure limits		N/A	At alarm
Charge air pressure		See Charge air pressure limits		N/A	N/A

**Electrical system**

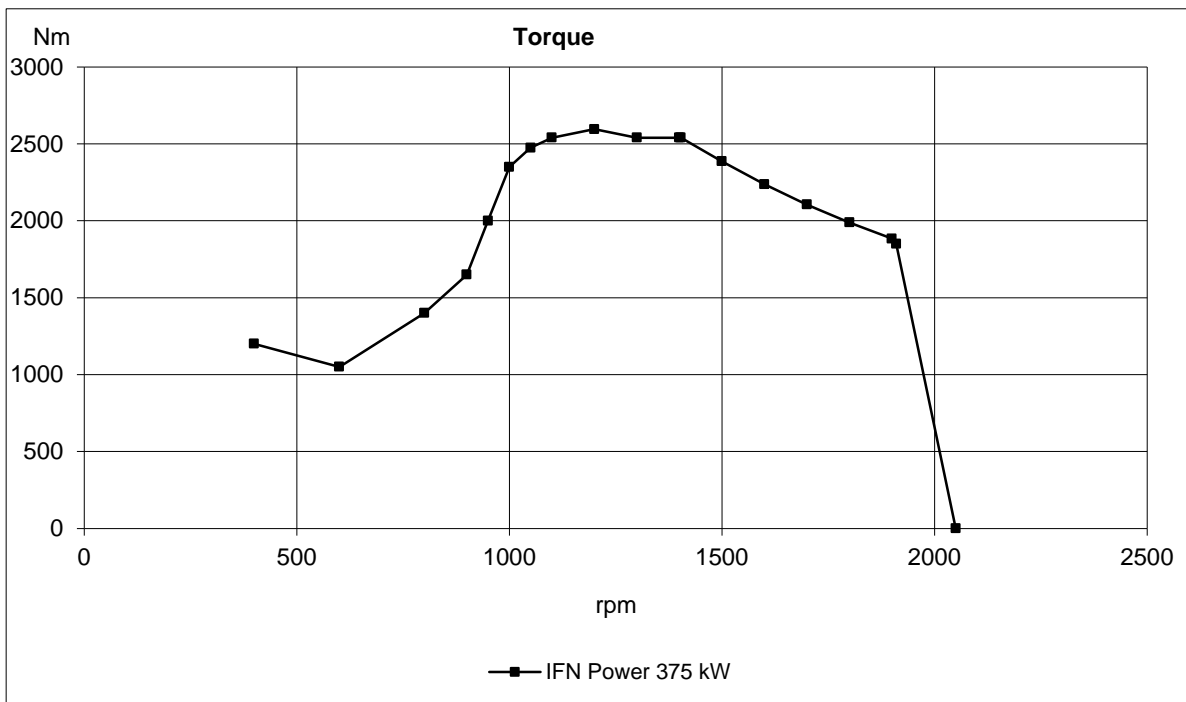
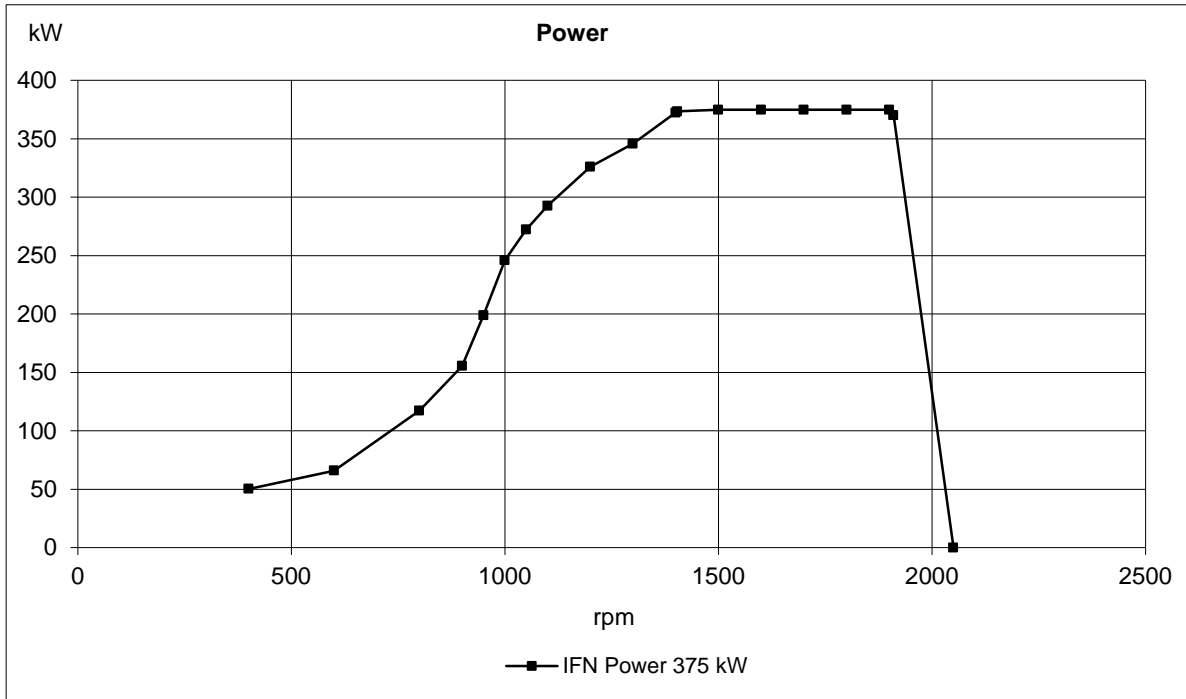
Voltage and type				24V		
Alternator:	output	A		110/150		
	tacho output	Hz/alternator rev.		6		
	drive ratio			5,25		
Starter motor:	type			105P70 / (105P70 ISS för start/stop)		
	output	kW		7		
		hp		9,5		
Number of teeth on:	flywheel			153		
	starter motor			12		
Inlet manifold heater (at 20 V)		kW		3		
Power relay for the manifold heater		A		1		
<b>Conditions:</b>		<b>Temperature</b>	<b>°C</b>	<b>25</b>	<b>0</b>	<b>-15</b>
(4 mΩ main circuit resistance@	<b>Battery</b>	<b>Ah / CCA</b>		<b>140 / 800</b>	<b>140 / 800</b>	<b>145 / 1050</b>
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**

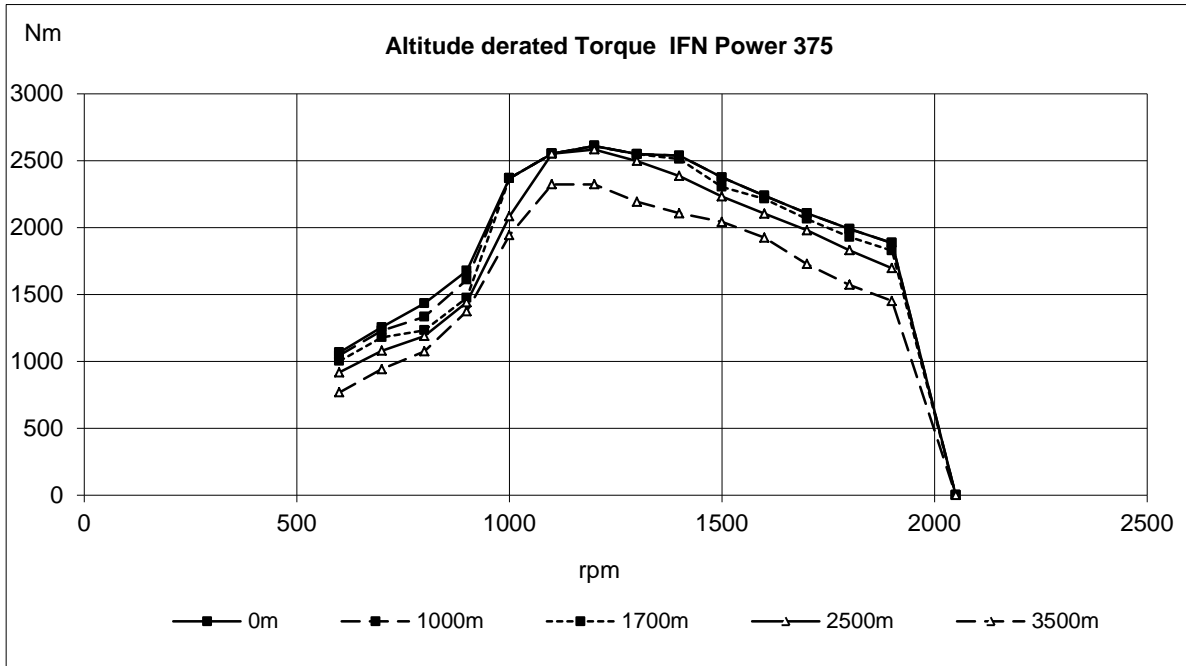
	rpm	1200	1500	1800	1900	
Front end in line with crank shaft max:*	Nm	2590	2240	1560	1670	
(with a total added mass moment of inertia, J (mR2) ≤ 0,05 kgm²)	lbf ft	1910	1652	1151	1232	
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	42	53	62	68
		hp	57	72	84	92
	max 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		1,75:1/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				

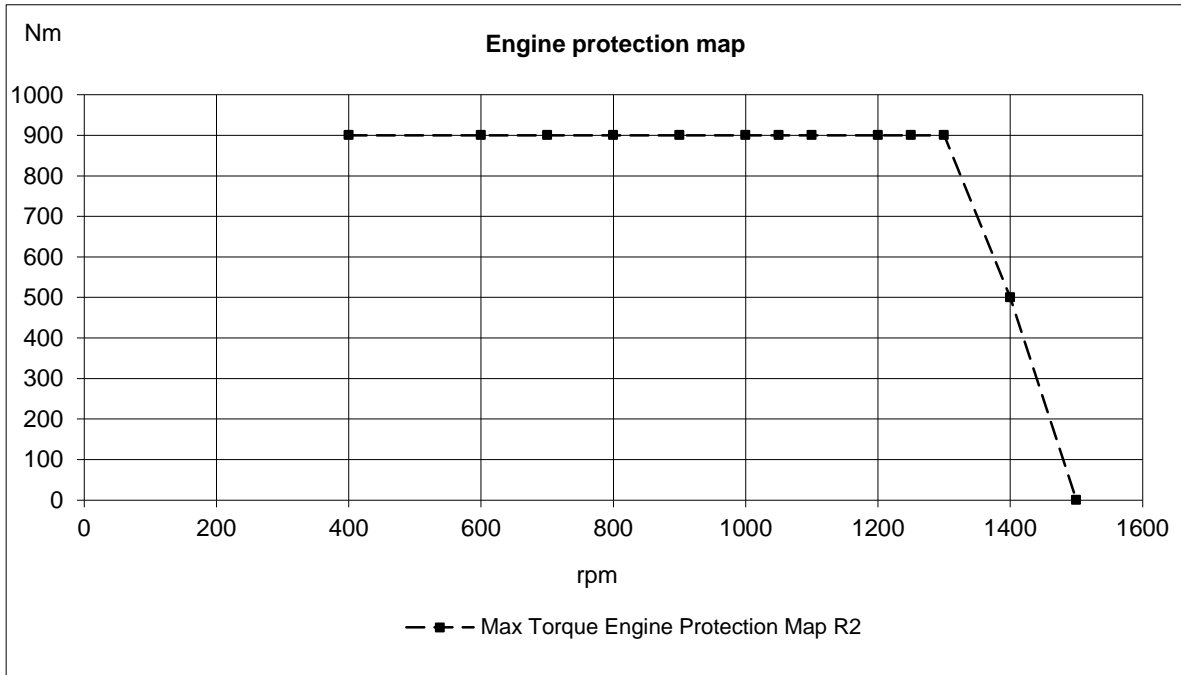
\* Maximum allowed torque at individual PTO's.

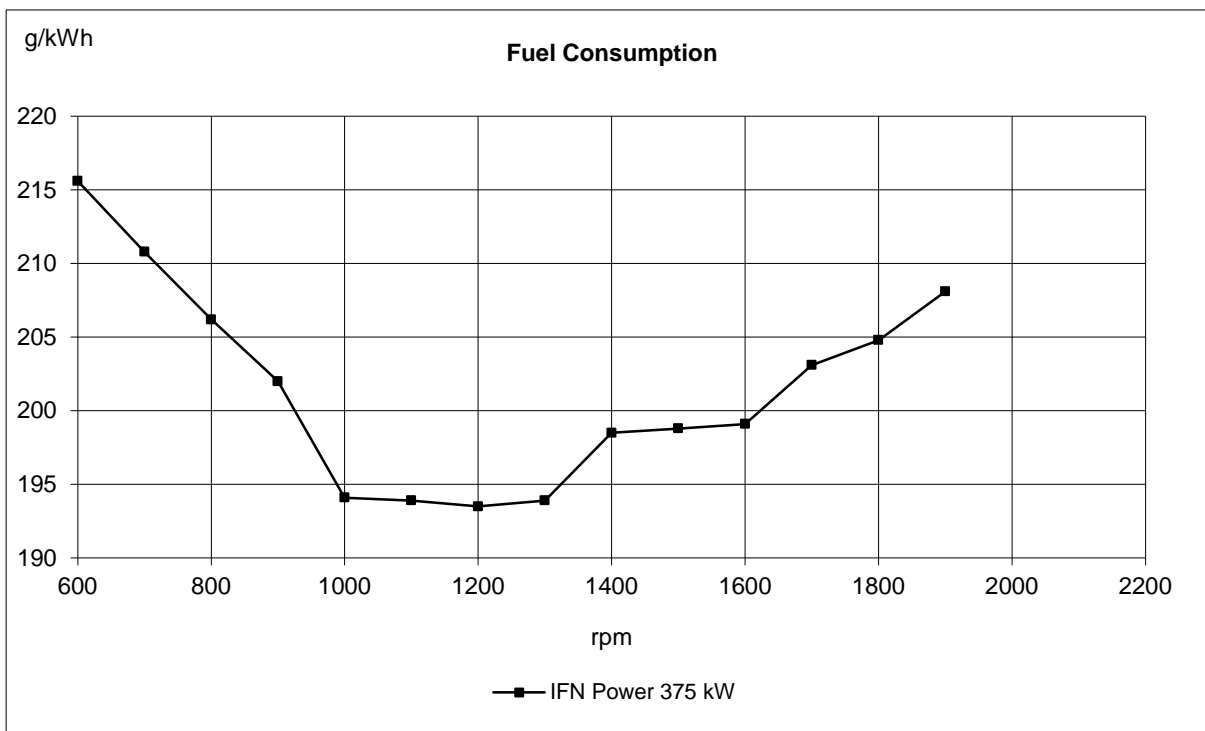
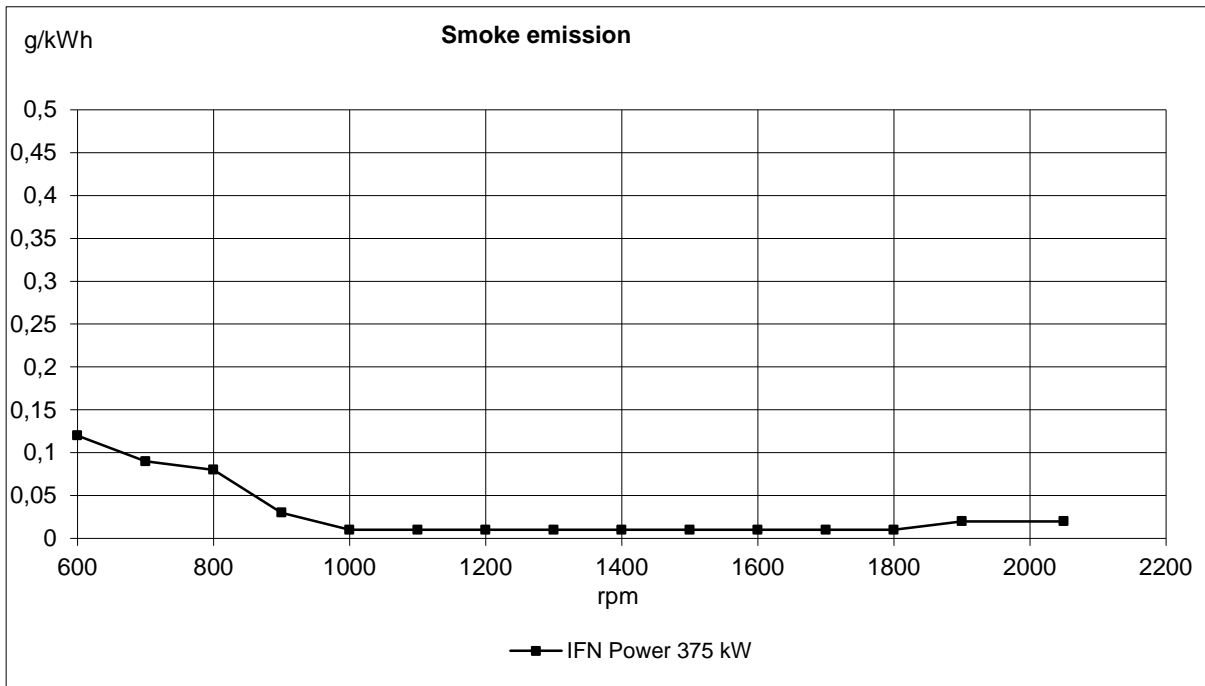
If more than one PTO output is used simultaneously, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

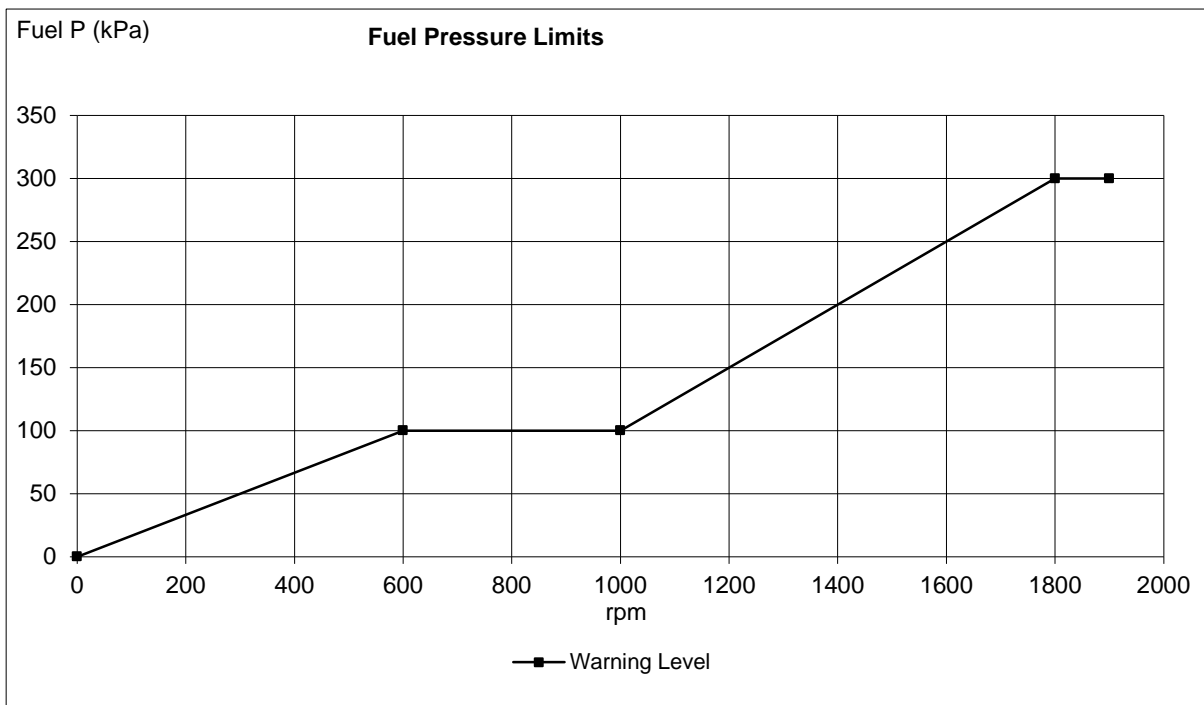
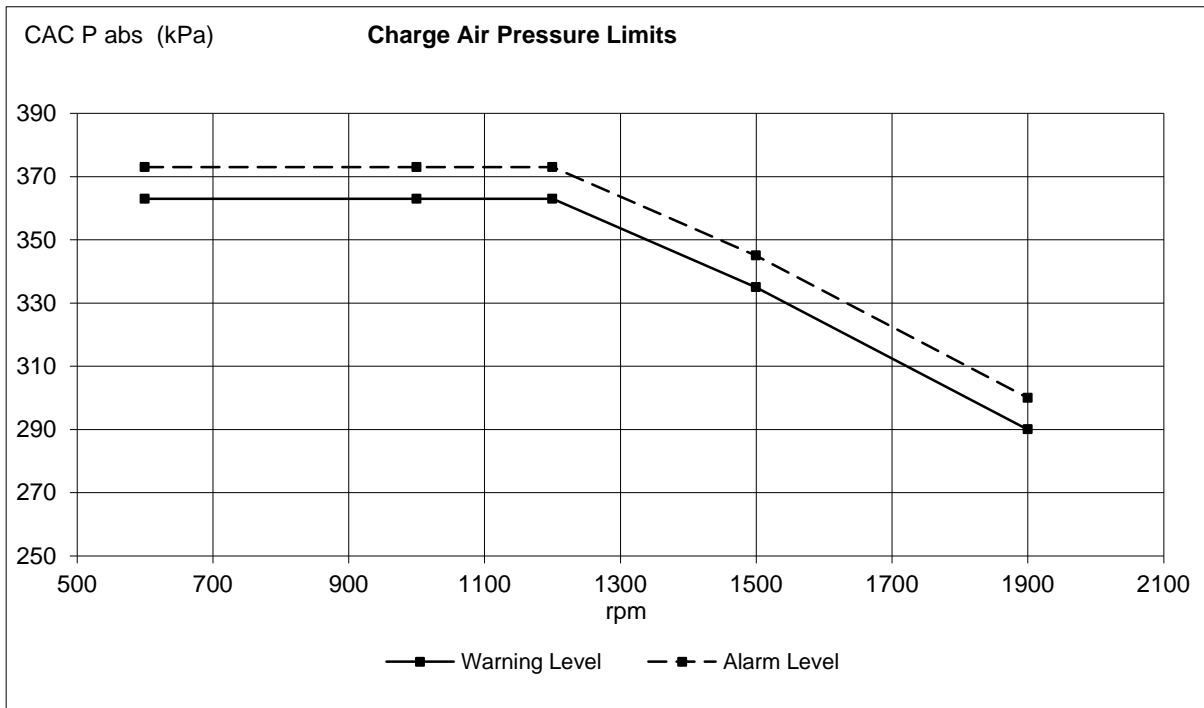


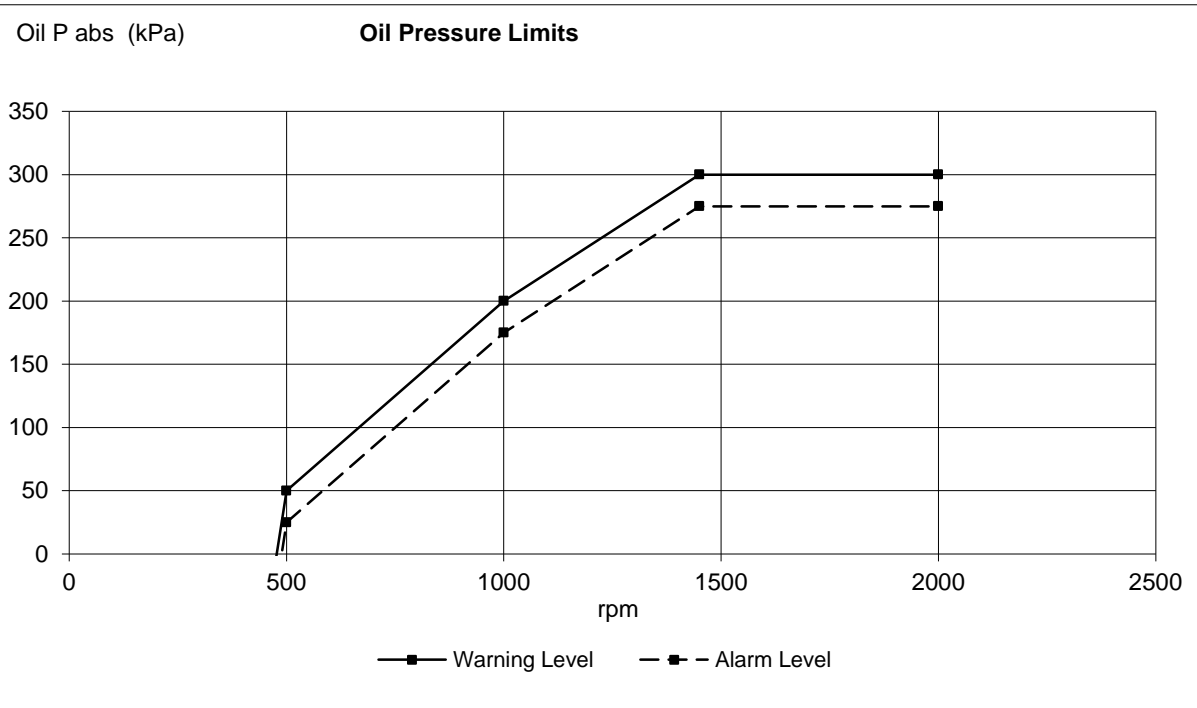


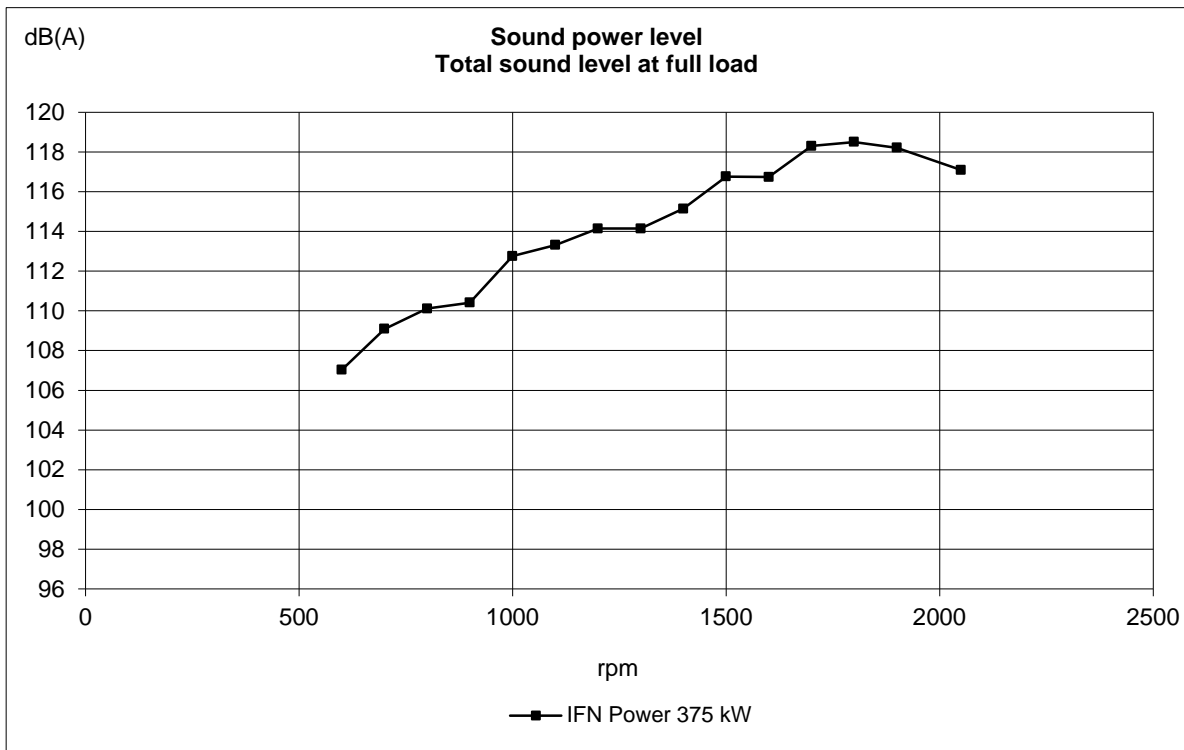
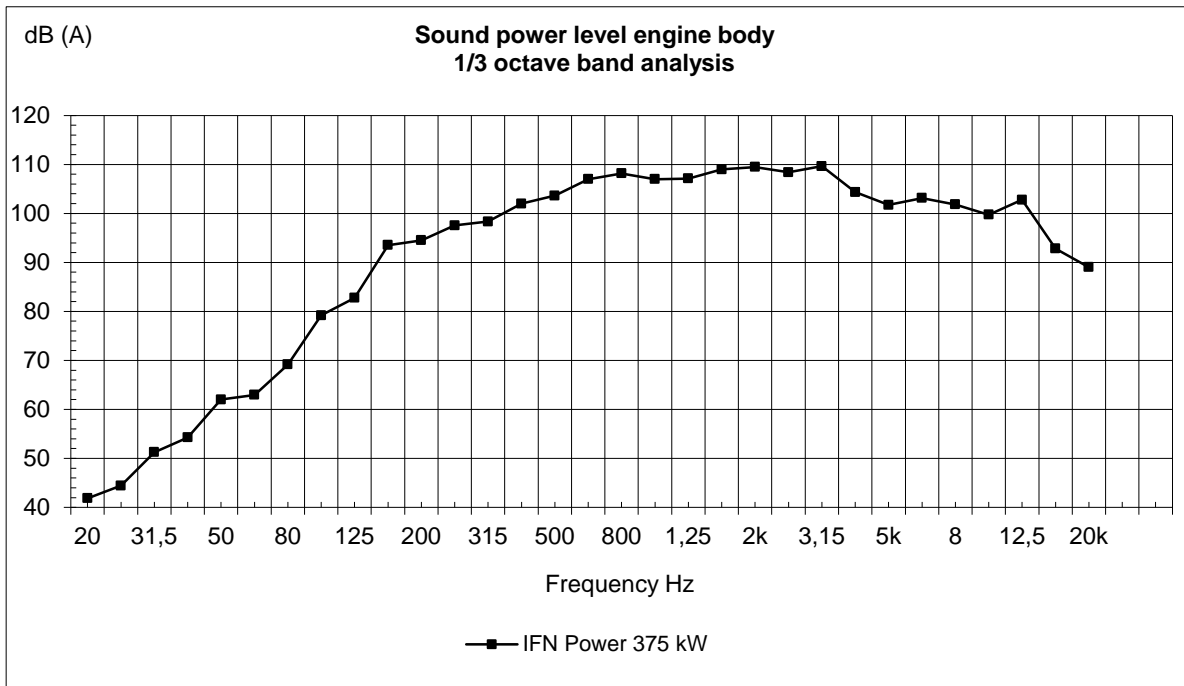


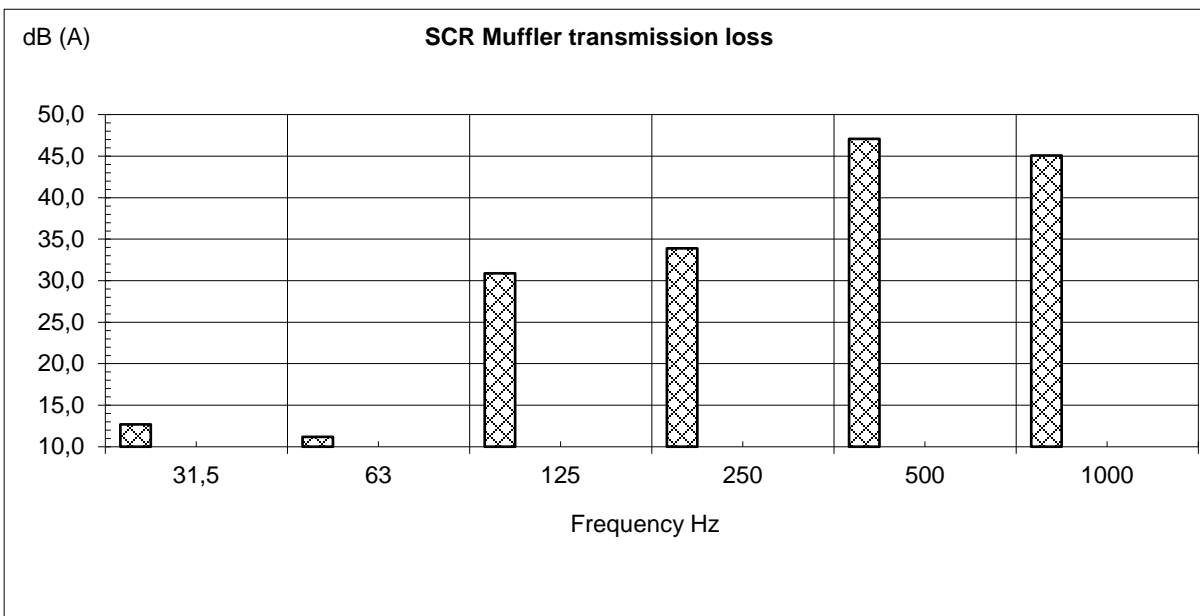
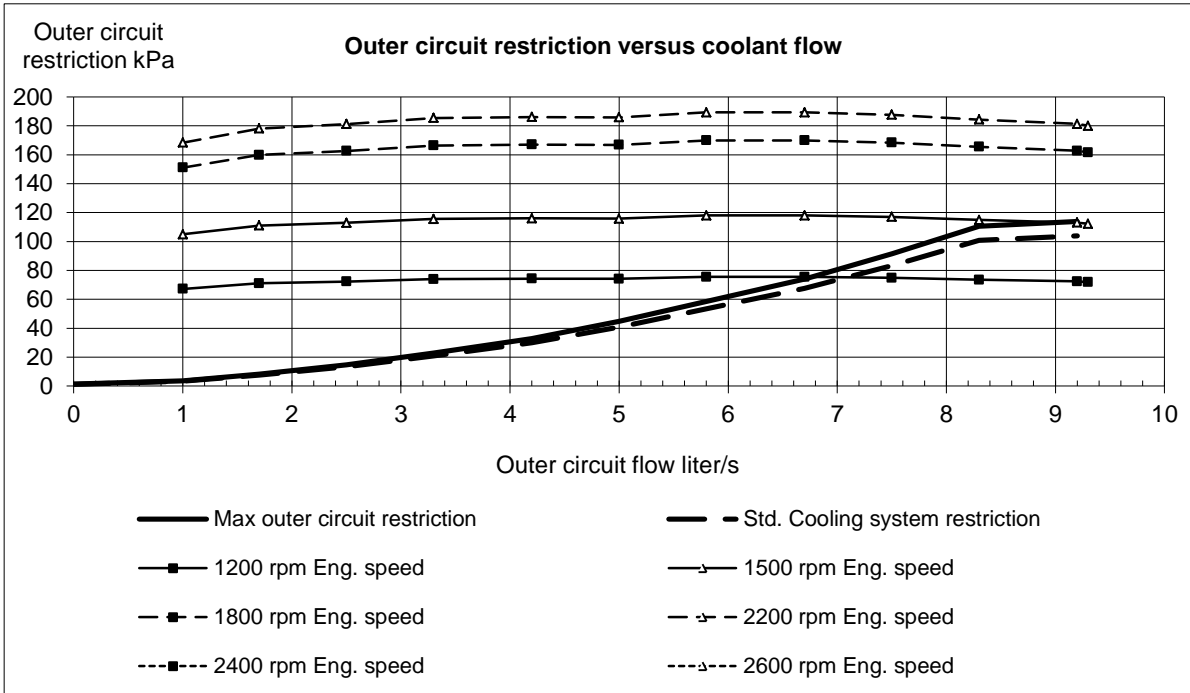


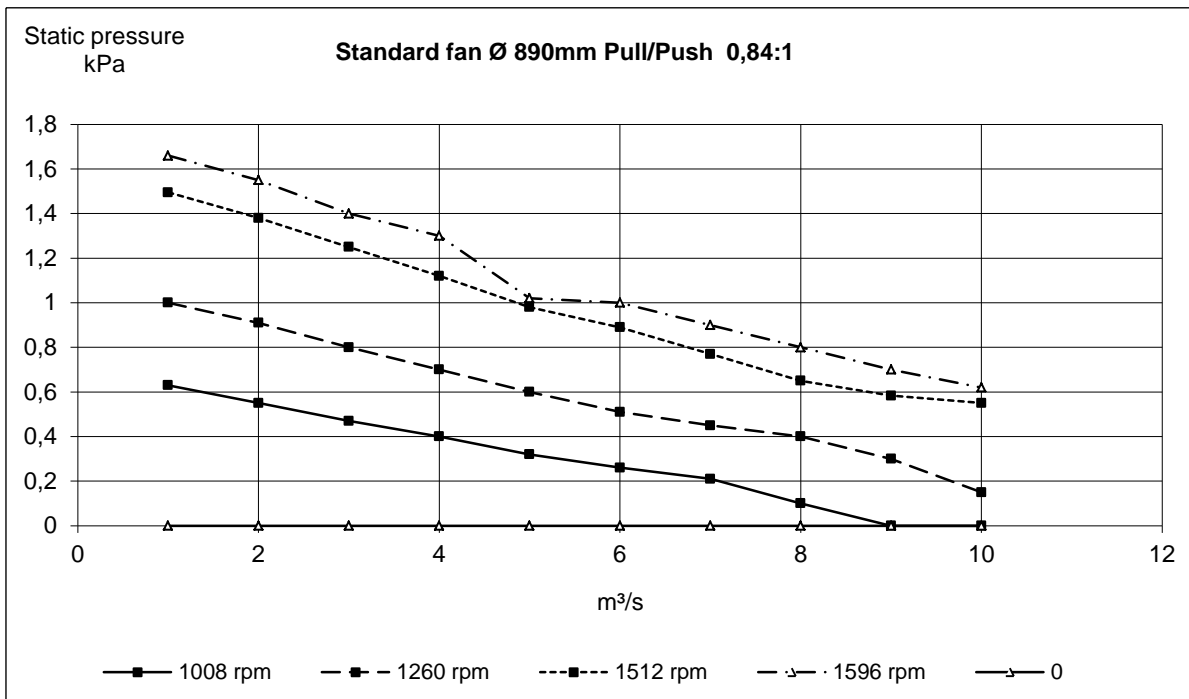
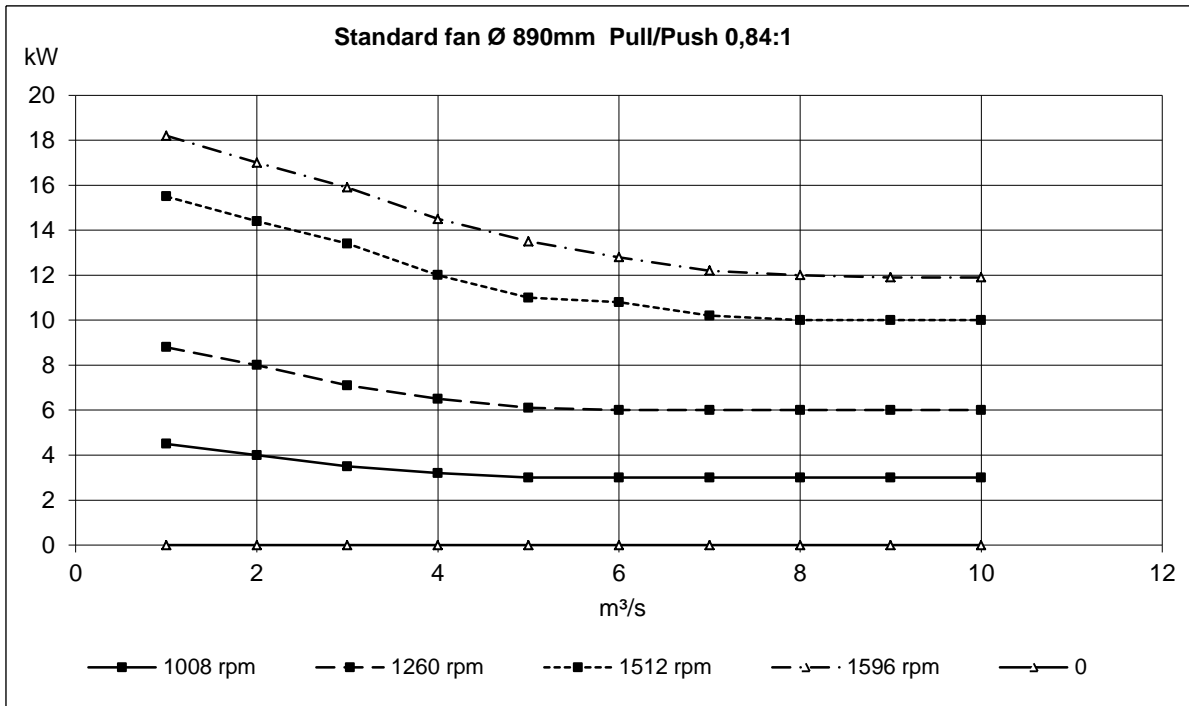






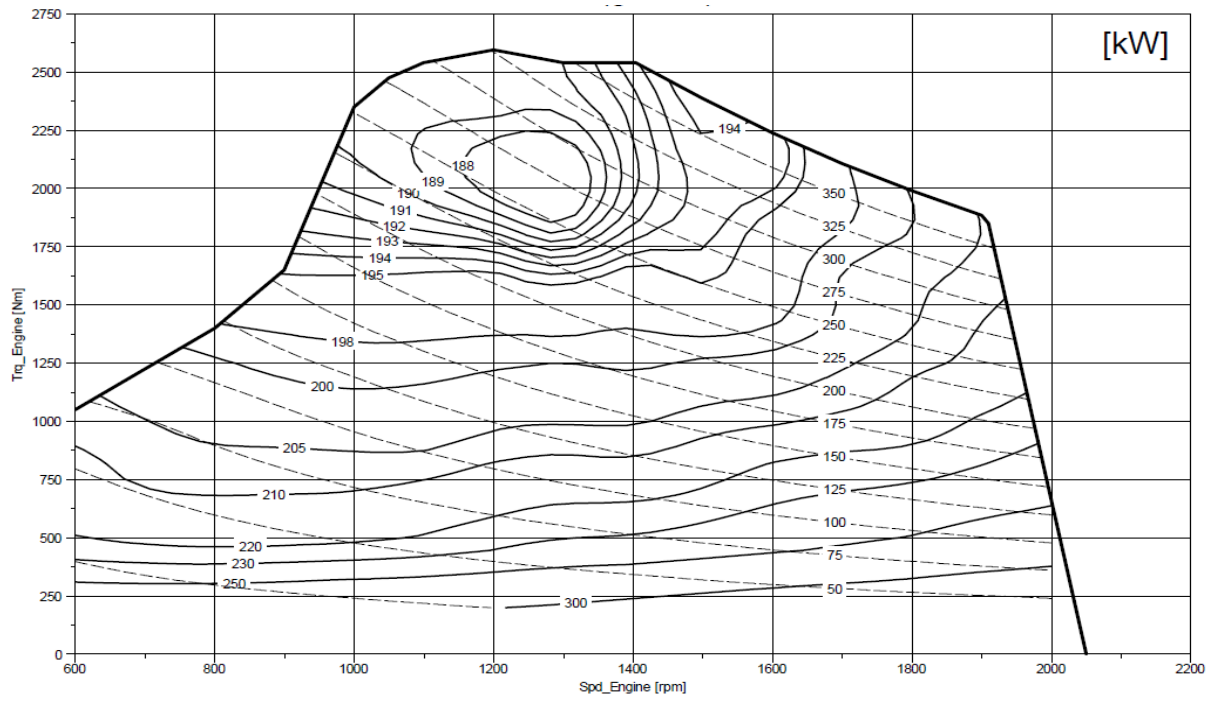








BSFC [g/kWh]



Fuel consumption [l/h]

