


<b>VOLVO PENTA</b> TAD1371VE	Document No	Issue Index
	<b>22323788</b>	<b>09</b>

### 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	
ICFN Power	285 kW	without fan		kW	247	285	285	285
				hp	336	388	388	388
		with fan ratio=1:1.07 890 mm		kW	239	273	265	261
				hp	325	371	360	355
Torque at:		ICFN Power		Nm	1965	1814	1512	1432
				lbf ft	1449	1338	1115	1056
Max torque at engine speed		rpm	1200 rpm	Nm	1965			
				lbf ft	1449			
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:		ICFN Power		MPa	1,93	1,78	1,49	1,41
				psi	280	259	216	204
Max combustion pressure at:		ICFN Power		MPa	14	15,3	14,4	13,8
				psi	2030	2219	2088	2001
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**

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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

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**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	16,5	
	psi	2,4	
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%	4,5	
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
Charge air consumption at: (+25°C and 100kPa)	ICFN Power	m³/min	18,0	24,0	26	27
		cfm	636	848	918	954
 <b>See front page for important information</b>		kPa	6			
Max allowable air intake restriction including piping		psi	0,9			
Heat rejection to exhaust at:	ICFN Power	kW	168	195	223	229
		BTU/min	9554	11089	12682	13023
Exhaust gas temperature after turbine at:	ICFN Power	°C	428	379	385	405
		°F	802	714	725	761
 <b>See front page for important information</b>						
Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm		kPa	10	15	17	18
		psi	1,5	2,2	2,5	2,6
 <b>See front page for important information</b>						
Max allowable temperature drop between turbine and SCR muffler inlet.		Δ°C	10	10	10	10
		Δ°F	18	18	18	18
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)		kPa	7	8	9	10
		psi	1,0	1,2	1,3	1,5
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	ICFN Power	m³/min	41,0	49,0	53	54
		cfm	1448	1730	1872	1907

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Cooling system		rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	ICFN Power	kW	6,5	5,3	5,9	6,2
		BTU/min	370	301	336	353
Heat rejection to coolant at:	ICFN Power	kW	105	118	135	141
		BTU/min	5971	6711	7677	8019
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			

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Charge air cooler system		rpm	1200	1500	1800	1900
Heat rejection to charge air cooler	ICFN Power	kW	40	58	62	60
		BTU/min	2275	3298	3526	3412
Charge air mass flow	ICFN Power	kg/s	0,36	0,48	0,52	0,52
Charge air inlet temp. (Charge air temp after turbo compressor)	ICFN Power	°C	151	168	168	164
		°F	304	334	334	327
⚠ See front page for important information Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	39	47	50	50
		°F	102	117	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 (After charge air cooler)		kPa	167	195	176	163
		psi	24,22	28,28	25,53	23,64
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	285 388	64	147	6,2	219,0	310	0,045
		66	151	6,7	236,6	175	0,025
		68	154	7,3	257,8	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 0,84	285 388	64	147	6	211,9	380	0,055
		66	151	6,6	233,1	200	0,029
		68	154	7,2	254,3	0	

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**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	kPa	80	55,0	Shut down	Shut down.
	Rated speed	kPa	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	kPa	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 high peaks	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

Derate parameters	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after 5 sec	Forced shut down after 0 sec
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

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**Electrical system**

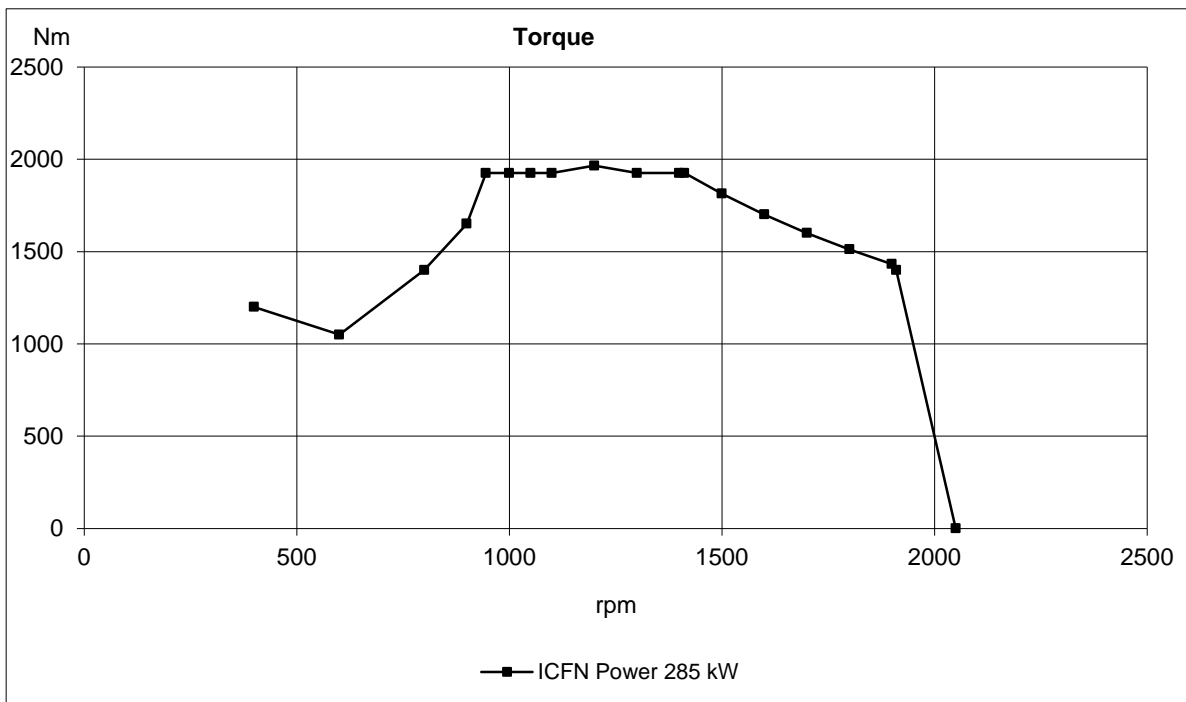
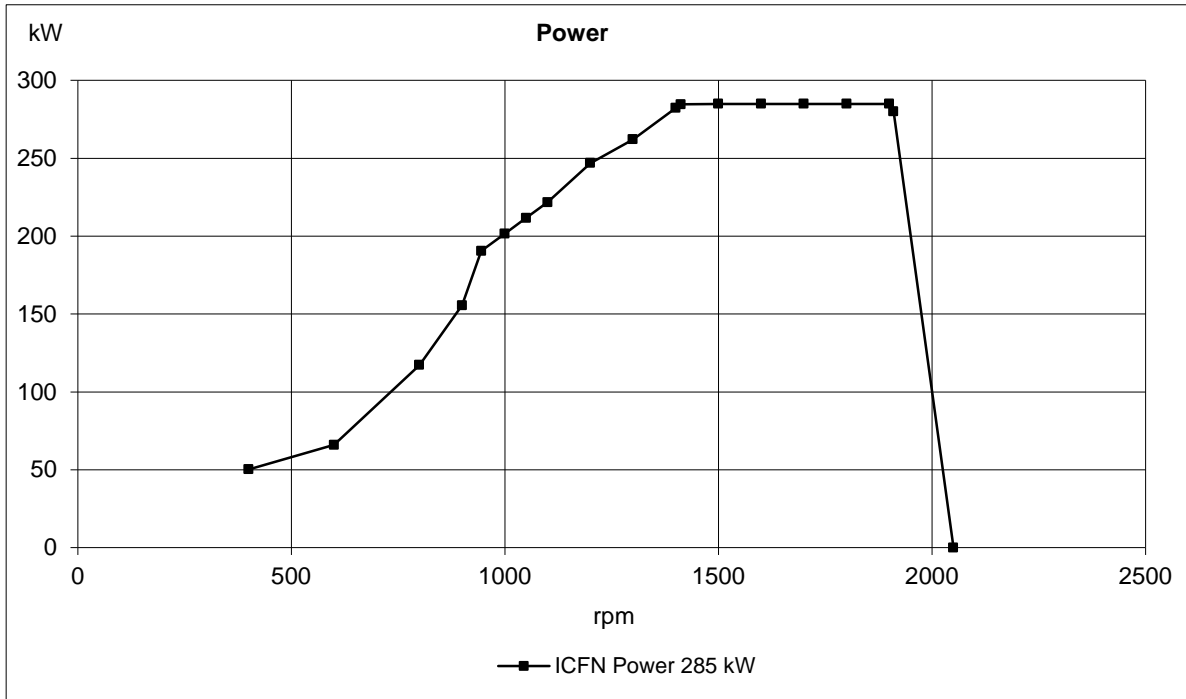
Voltage and type		24V			
Alternator:	output	A	110/150		
	tacho output	Hz/alternator rev.	6		
	drive ratio		5,25		
Starter motor:	type	105P70 / (105P70 ISS för start/stop)			
	output	kW	7		
		hp	9,5		
Number of teeth on:	flywheel	153			
	starter motor	12			
Inlet manifold heater (at 20 V)		kW	3		
Power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

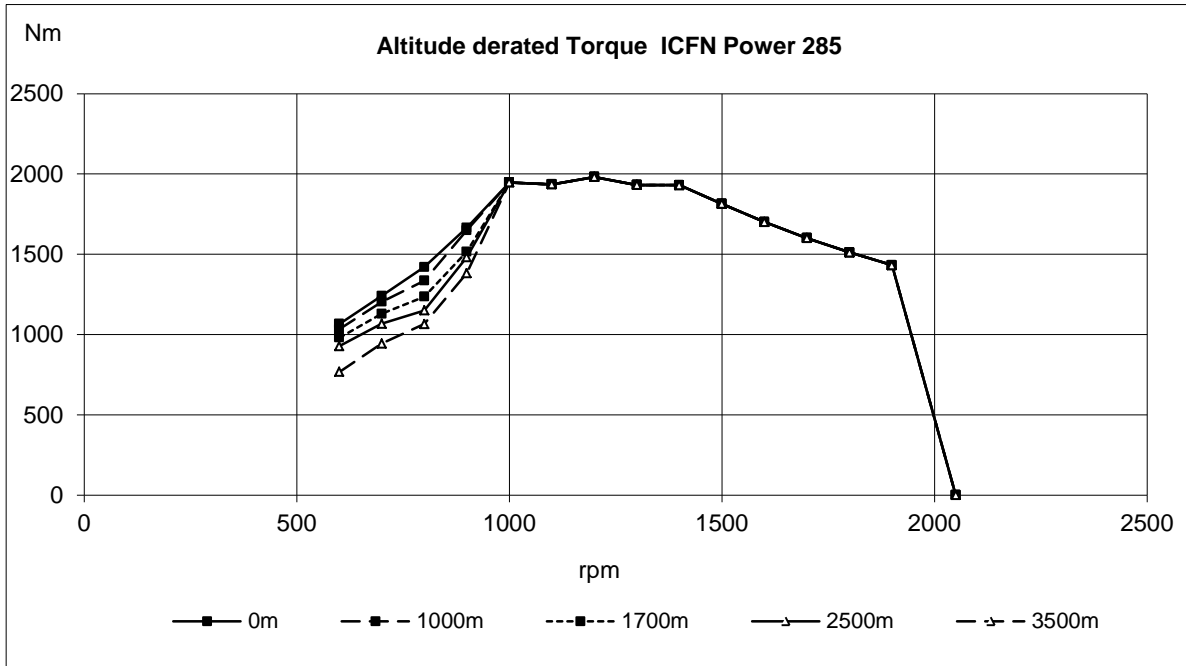
<b>Power take off</b>	<b>rpm</b>	<b>1200</b>	<b>1500</b>	<b>1800</b>	<b>1900</b>	
Front end in line with crank shaft max:*	Nm	1960	1810	1510	1430	
(with a total added mass moment of inertia, J (mR2)≤0,05 kgm²)	lbf ft	1446	1335	1114	1055	
Front end belt pulley load. Direction of load viewed from flywheel 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				
Continuous torque on timing gear at rear PTO : *, **	Nm	650 / 1000				
DIN 5462 spline	lbf ft	479 / 739				
Continuous torque on timing gear at rear PTO : *	Nm	600				
	lbf ft	442				
SAE B spline						
Speed ratio direction of rotation viewed from flywheel side ( all rear PTO,s )		1,26:1/ccw				
Continuoua torque. Timing gear at compressor PTO max:*	Nm	300				
PTO SAE B	lbf ft	221				
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				

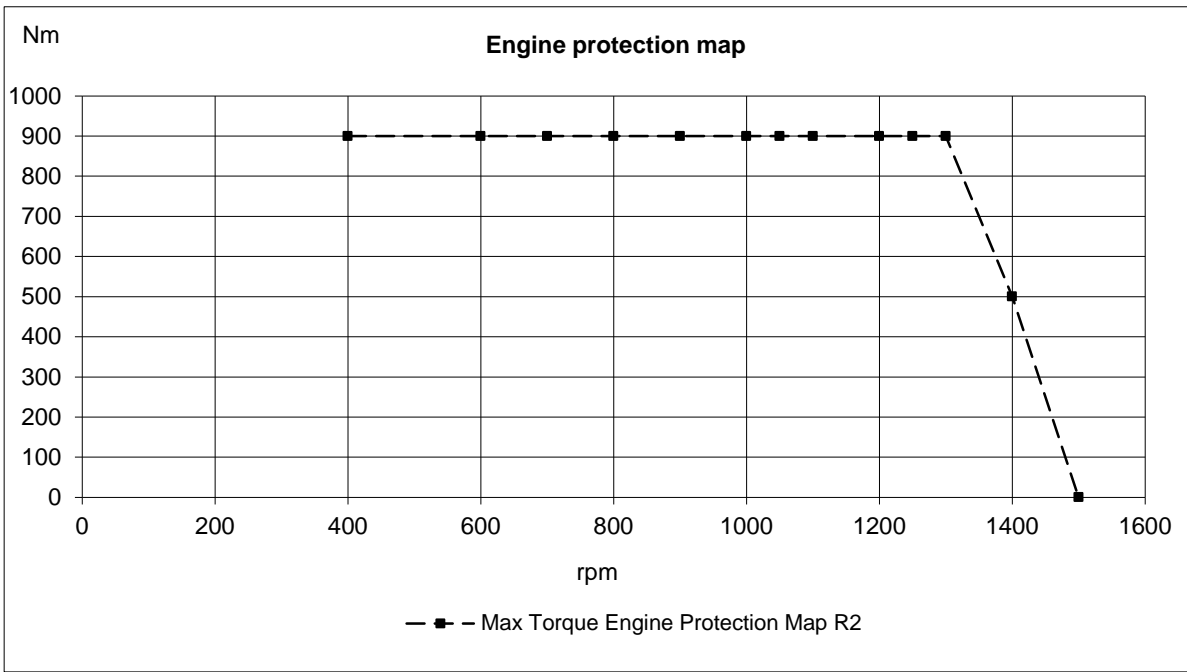
\* **Maximum allowed torque at individual PTO´s.**

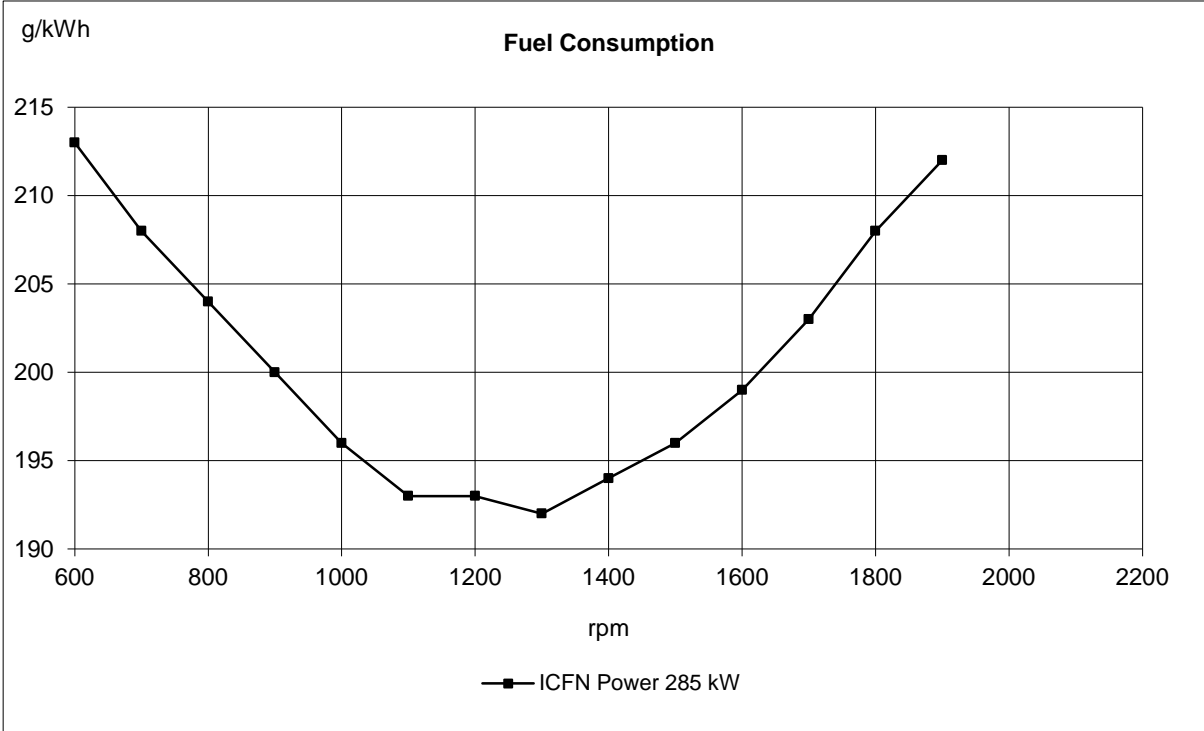
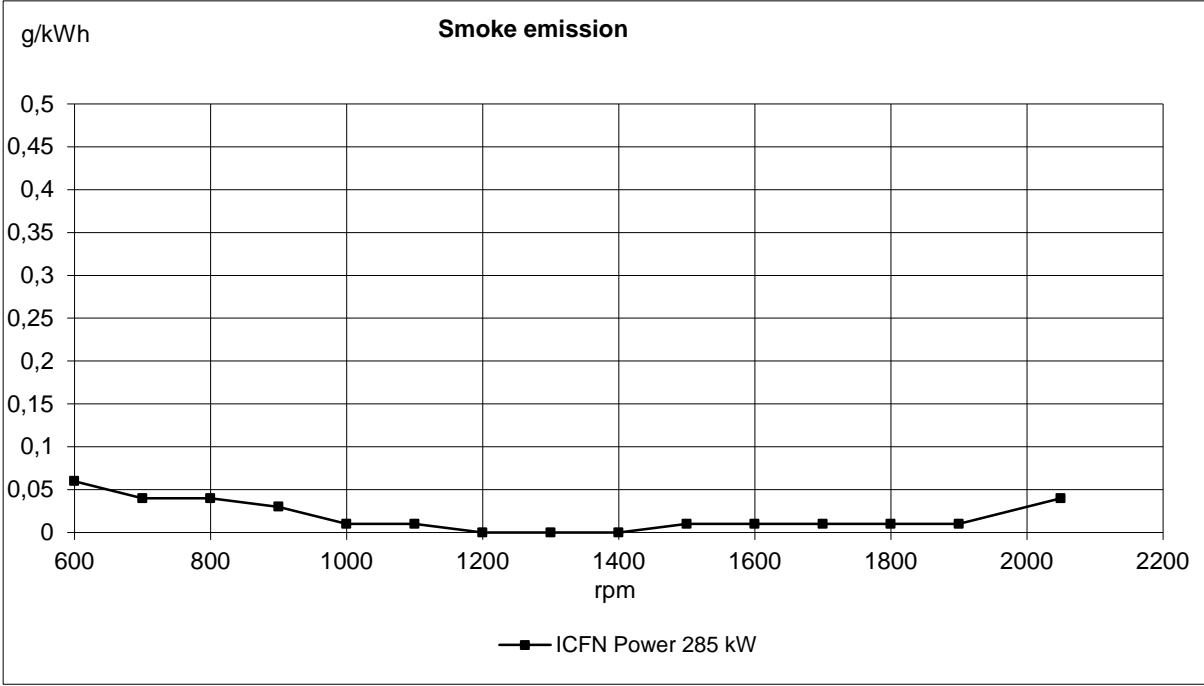
**If more than one PTO output is used simultaneously, calculations needs to be performed to determine maximum available torque depending on application inertia.**

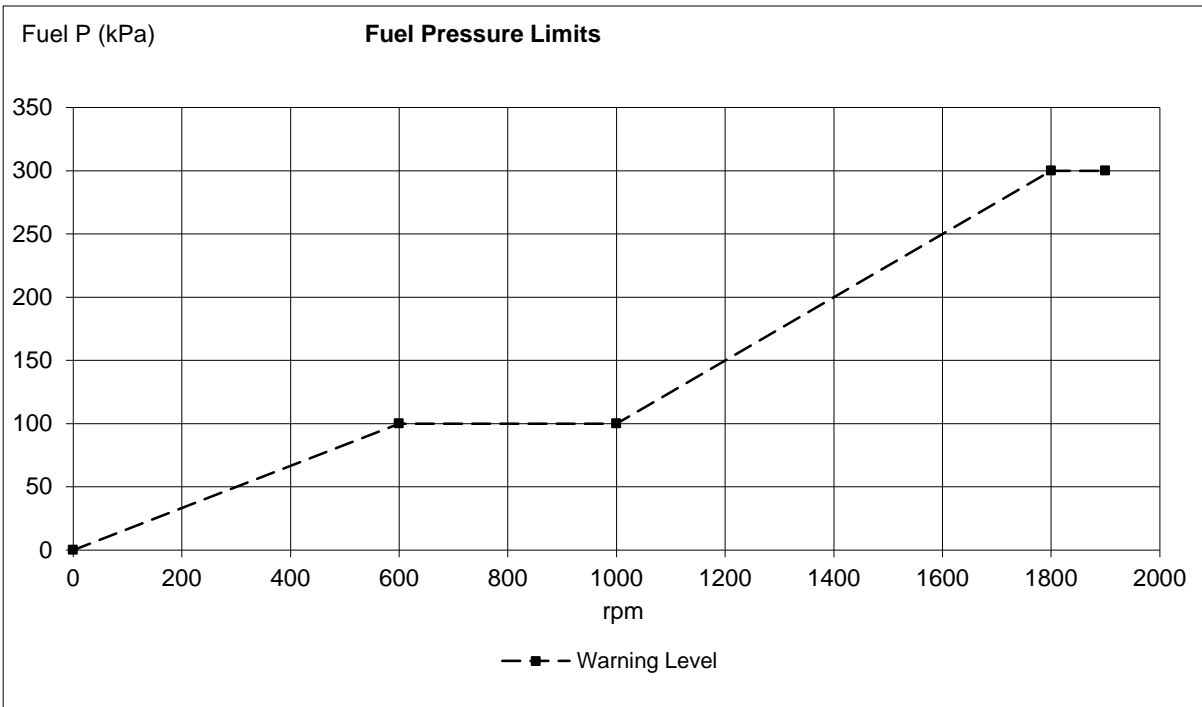
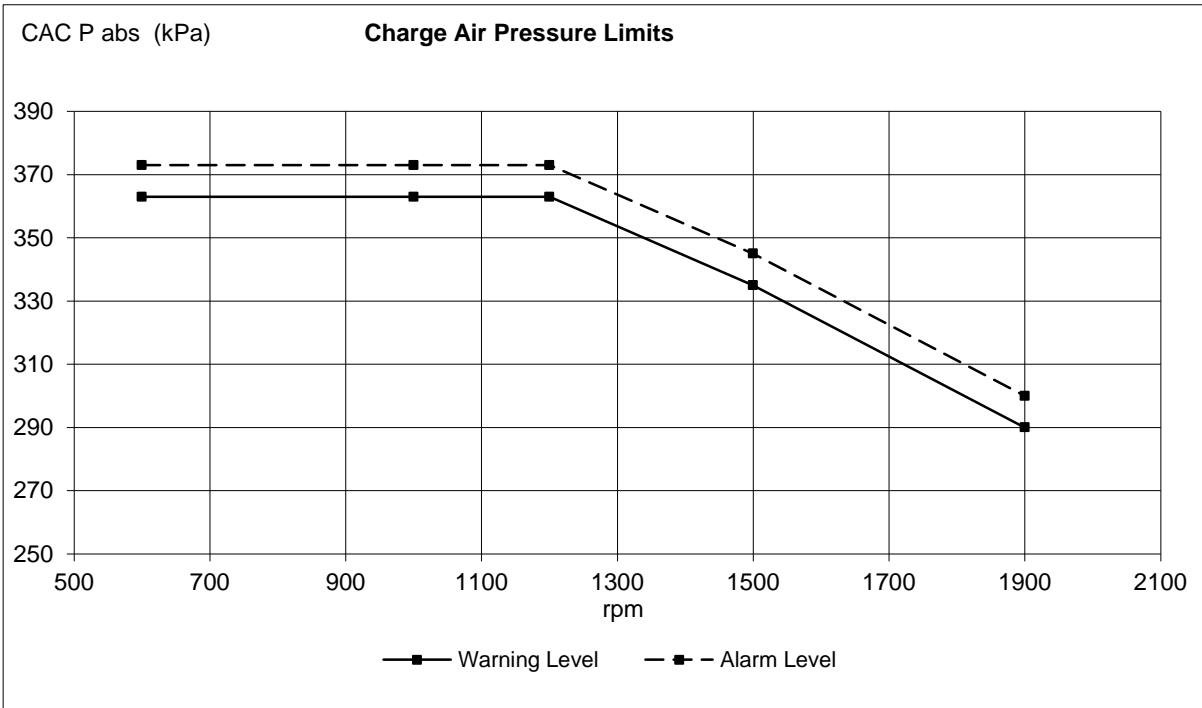
\*\* **Standard 650 option 1000 Nm**

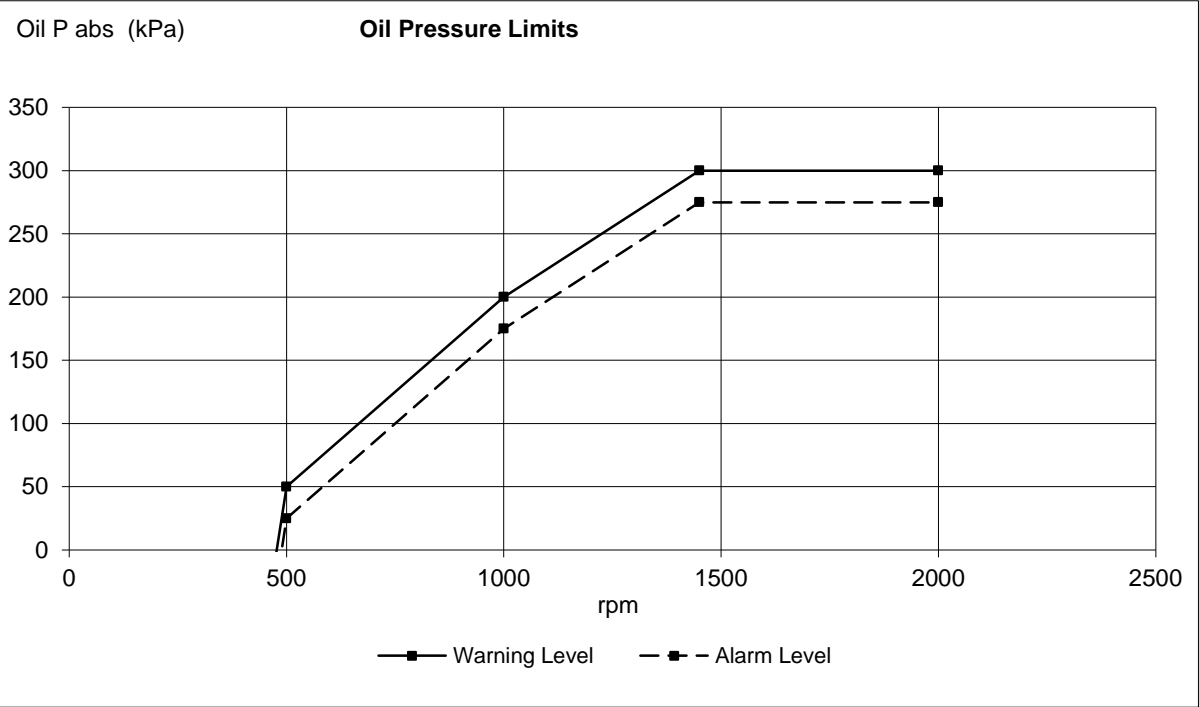


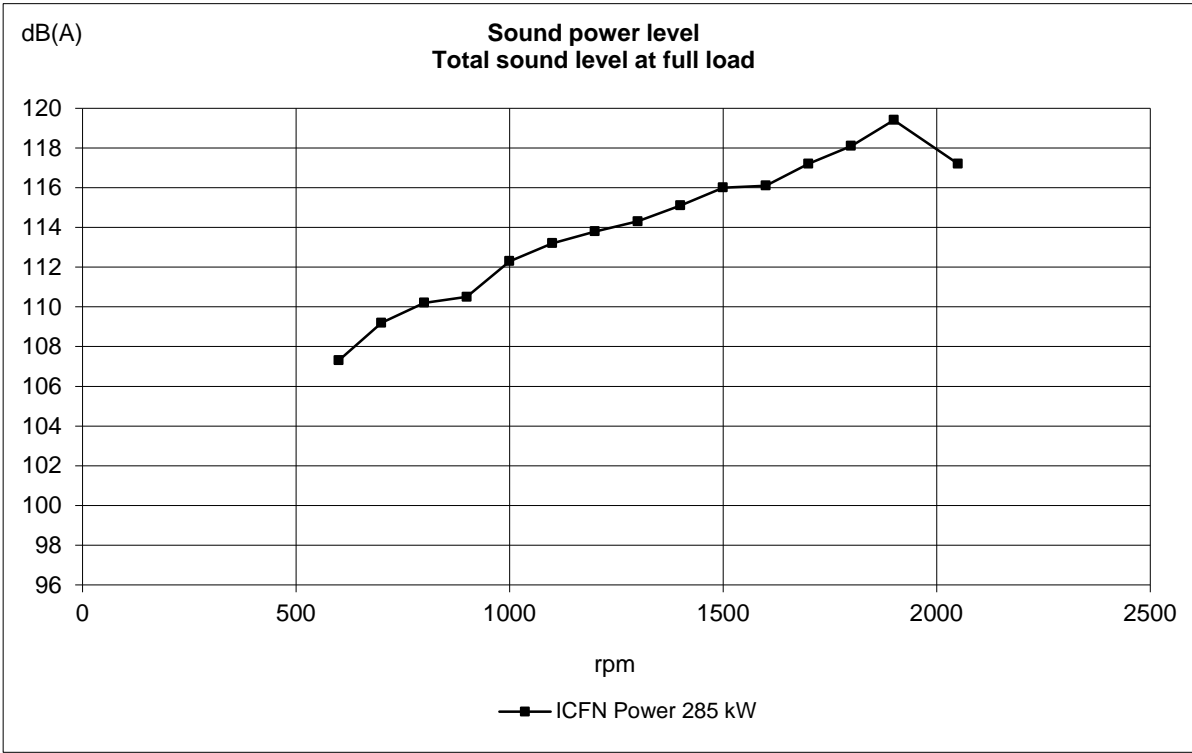
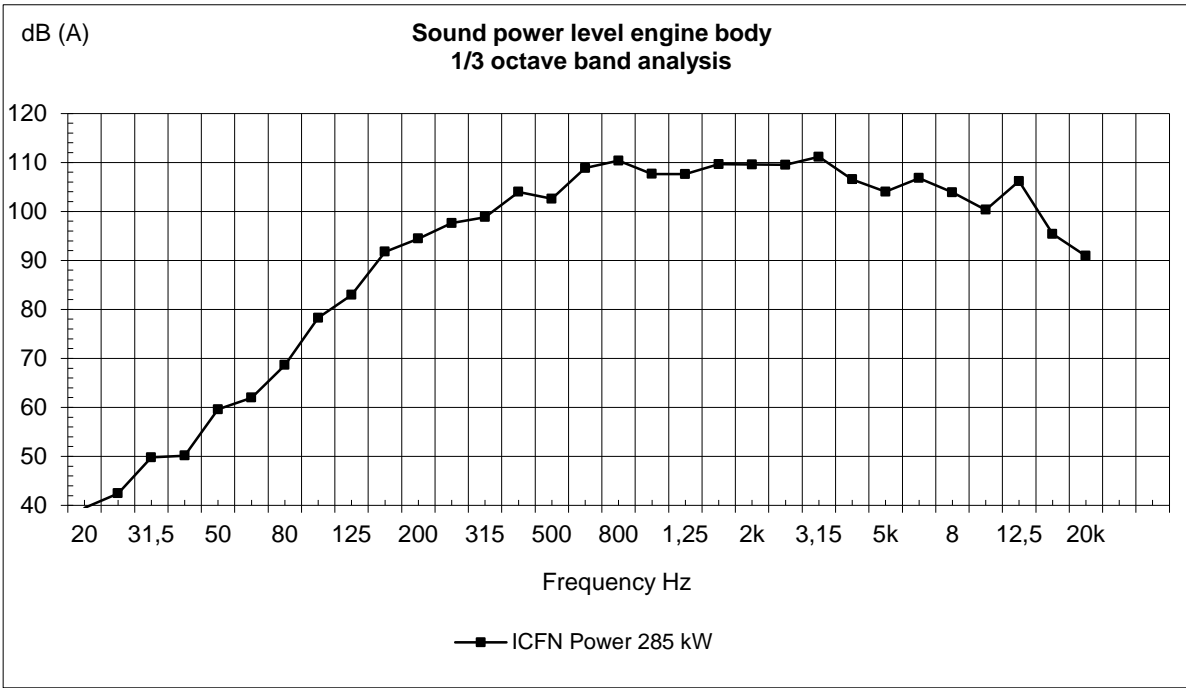


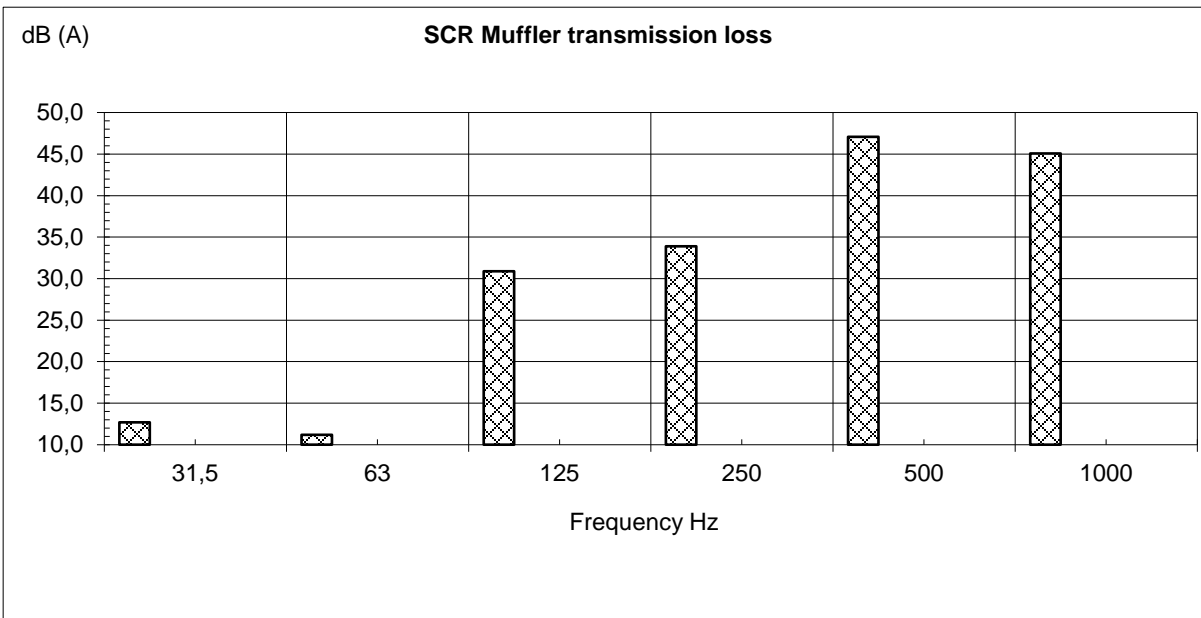
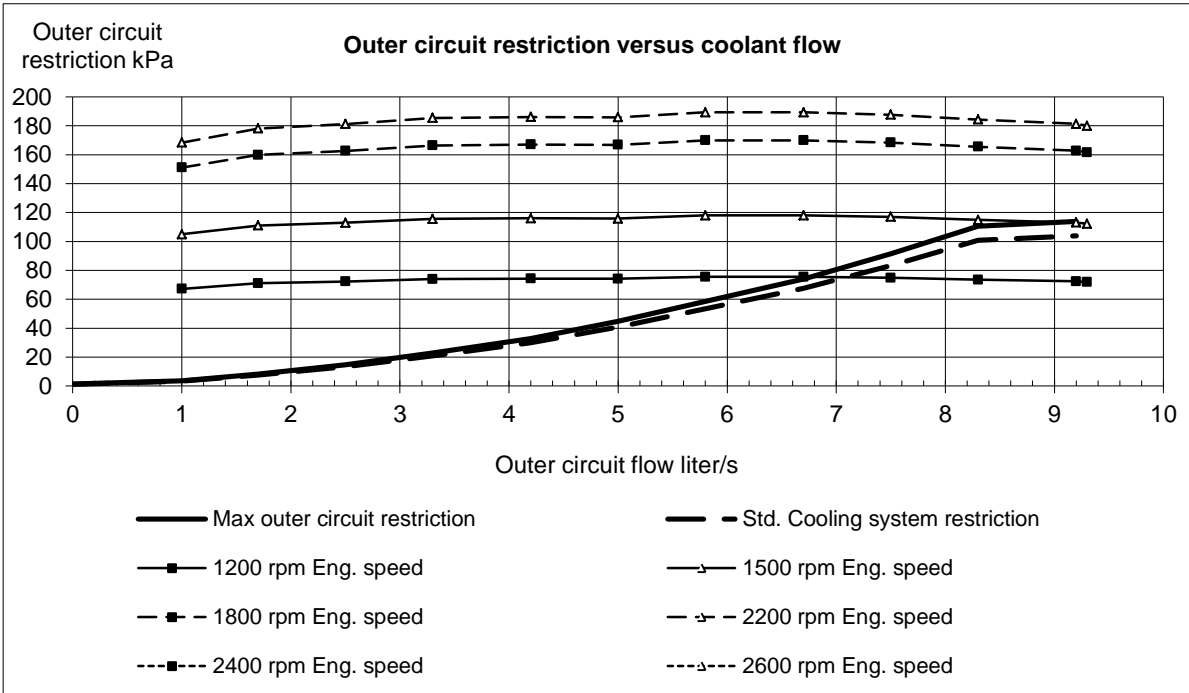


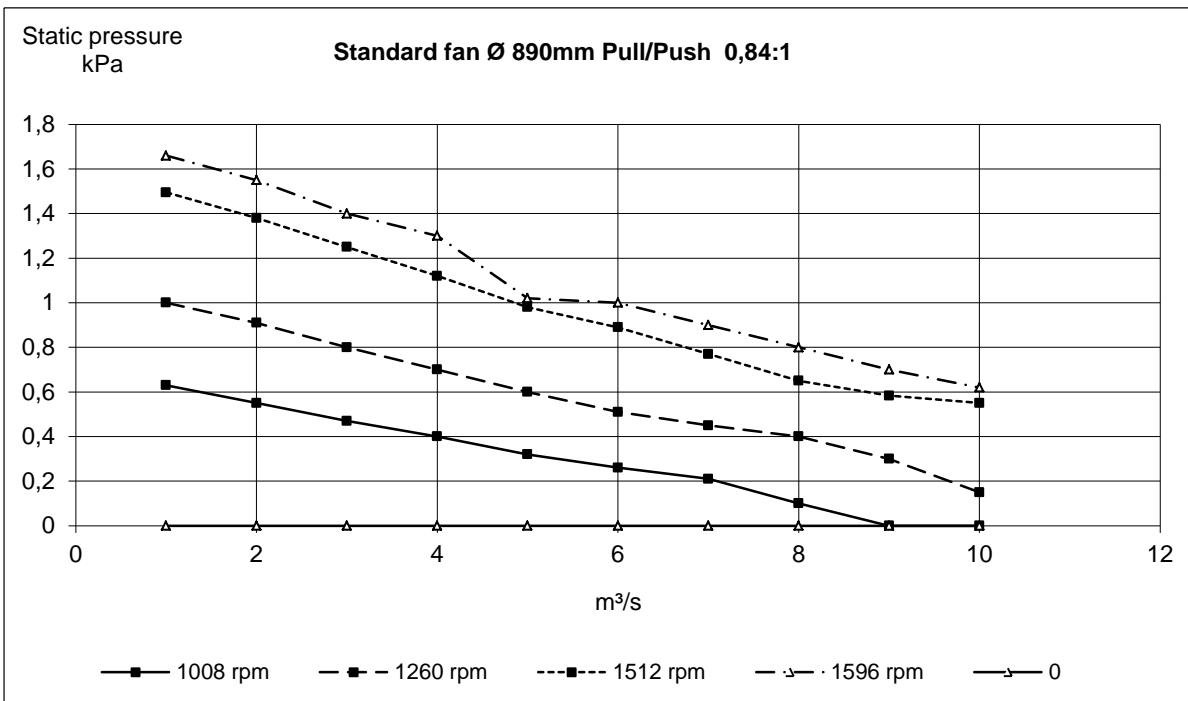
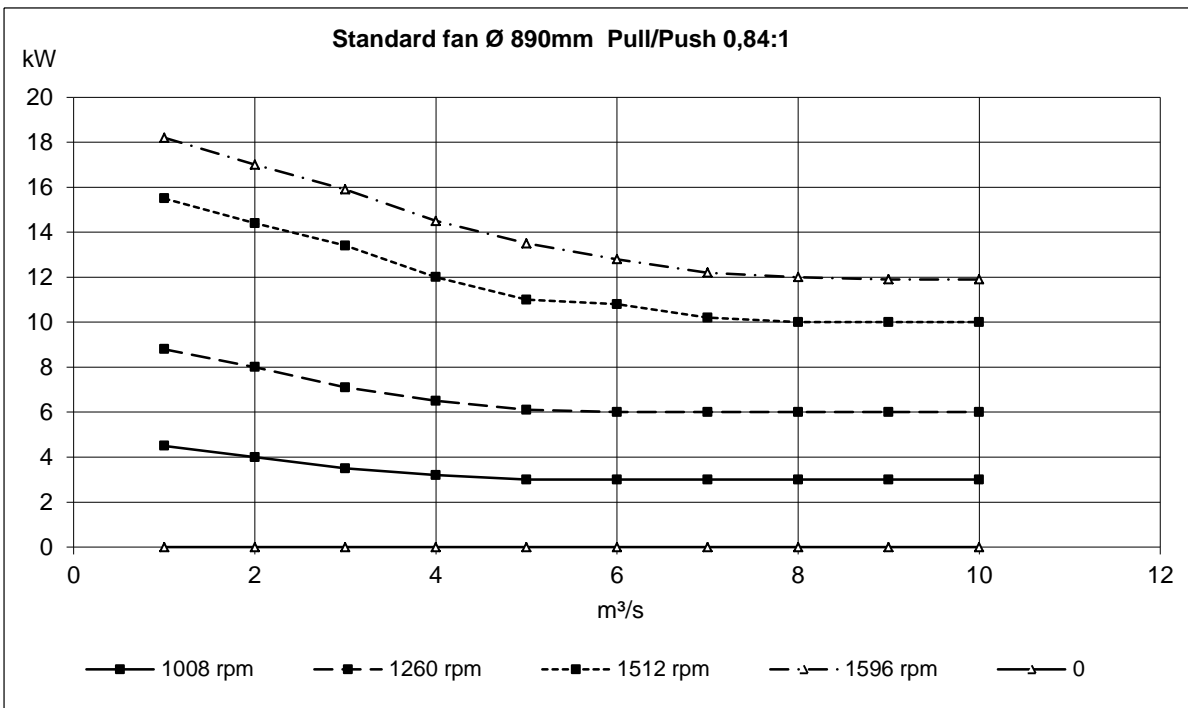




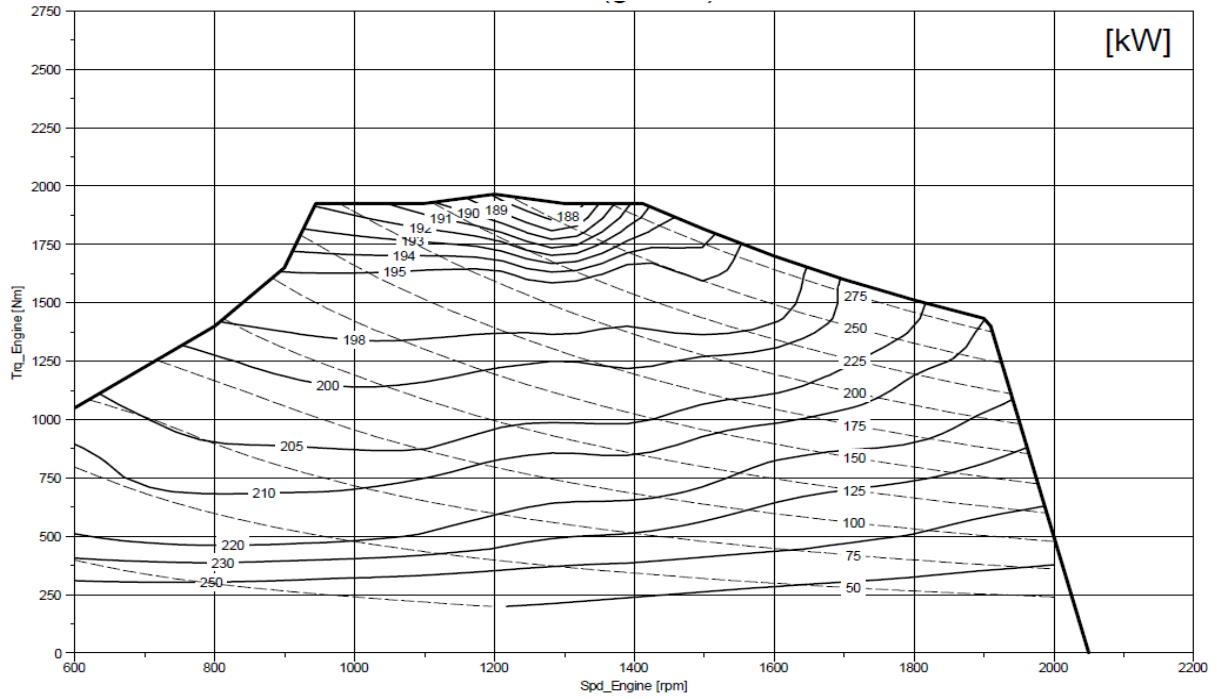








BSFC [g/kWh]



Fuel consumption [l/h]

