


### 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, anti-clockwise viewed towards flywheel

Number of cylinders			4
Displacement, total	liters		5,13
	in <sup>3</sup>		313
Firing order			1-3-4-2
Bore	mm		110
	in		4,33
Stroke	mm		135
	in		5,31
Compression ratio			17.5:1
Wet weight (Not including after treatment system)	Engine only	kg	583
		lb	1285
	Power pac	kg	877
		lb	1933
	Power pac, compact cooling package	kg	802
		lb	1768

Performance				rpm	1500	1800	2000	2300
ICFN Power	105 kW	without fan	kW	104	105	105	105	
			hp	141	143	143	143	
		with fan 600 mm pull	kW	99	98	98	98	
			hp	135	133	133	133	
Torque at:	ICFN Power 105 kW	Nm	660	557	502	436		
		lbf ft	487	411	370	322		
Max torque at engine speed	ICFN Power	1200 rpm	Nm	710				
			lbf ft	524				
Power tolerance			%	±3				
Mean piston speed			m/s	6,8	8,1	9,0	10,4	
			ft/sec	22,1	26,6	29,5	34,0	
Effective mean pressure at:	ICFN Power 105 kW		MPa	1,62	1,36	1,23	1,07	
			psi	235	198	178	155	
Total mass moment of inertia, J (mR <sup>2</sup> ) (not including flywheel)			kgm <sup>2</sup>	0,253				
			lbft <sup>2</sup>	6,0				
Friction Power			kW	12	16	20	26	
			hp	16	22	27	35	

**Derating see Technical Diagrams**

**Cold start performance**

*Cold start limit temperature	without starting aid	°C	-15	
		°F	5	
	with manifold heater 4 kW	°C	-30	
		°F	-22	
	with manifold heater 4 kW and block heater	°C	-35	
		°F	-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	16
		US gal	4,23
Oil pan capacity:	Max	liter	13,5
		US gal	3,57
	Min	liter	9,5
		US gal	2,51
Oil change intervals/specifications	VDS4, VDS4.5	h	500
		h	
Engine angularity limits:	front up	°	40
	front down	°	45
	side tilt	°	40
Oil pressure at rated power		kPa	425
		psi	62




**Lubrication system**

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



**Fuel system**

Urea consumption (vol% of diesel consumption)	vol%	7%
Fuel to conform to		EU EN590 US D975, 1-D and 2-D (Max 15ppm sulphur and 7% FAME)
System supply flow at max. speed	liter/h US gal/h	102 26,9
Fuel supply line max. restriction (Measured at fuel inlet connection)	kPa psi	25 3,6
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection)	kPa psi	20 2,9
System return flow at max. speed	liter/h US gal/h	60,0 15,9
Fuel return line max. restriction (Measured at fuel return connection)	kPa psi	15 2,2
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	2300
Charge air consumption at: (+25°C and 100kPa)	ICFN Power 105 kW	25°C	m³/min	8,0	9,4	9,5	10,7
		77°F	cfm	283	332	335	378
 <b>See front page for important information</b>							
Max allowable air intake restriction including piping			kPa psi		5,5 0,8		
Heat rejection to exhaust at:	ICFN Power 105 kW		kW BTU/min	58 3293	59 3355	59,7 3395	68,4 3890
Exhaust gas temperature after turbine at:	ICFN Power 105 kW		°C °F	357 675	316 601	315 599	322 612
 <b>See front page for important information</b>							
Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 102 mm			kPa psi	10 1,5	11 1,6	12 1,7	12 1,7
 <b>See front page for important information</b>							
Max allowable temperature drop between turbine and SCR muffler inlet (in average over a typical customer cycle (not stationary points)).			Δ°C Δ°F		15 27		
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)			kPa psi	5 0,7	5 0,7	6 0,9	6 0,9
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	ICFN Power 105 kW		m³/min	16,3	17,5	17,7	19,7
			cfm	576	618	625	696

<b>Cooling system</b>		<b>rpm</b>	<b>1500</b>	<b>1800</b>	<b>2000</b>	<b>2300</b>
Heat rejection radiation from engine at:	ICFN Power 105 kW	kW	5	3	2,8	3
		BTU/min	262	171	159	171
Heat rejection to coolant at:	ICFN Power 105 kW	kW	62	66	73,1	78,4
		BTU/min	3520	3742	4157	4459
Radiator cooling system type			Closed circuit			
Standard radiator core area	ICFN Power 105 kW	m <sup>2</sup>	0,6			
		foot <sup>2</sup>	6,46			
Compact cooling package radiator core area	ICFN Power 105 kW	m <sup>2</sup>	0,28			
		foot <sup>2</sup>	3,01			
Fan diameter	600 mm	ICFN Power 105 kW	600			
			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/1,40:1			
Coolant flow with standard system		l/s	5,4	6,5	7,2	8,2
		US gal/s	1,4	1,7	1,9	2,2
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			

<b>Charge air cooler system</b>		<b>rpm</b>	<b>1500</b>	<b>1800</b>	<b>2000</b>	<b>2300</b>
Heat rejection to charge air cooler	ICFN Power 105 kW	kW	18,3	21,3	20,9	23
		BTU/min	1041	1211	1189	1308
Charge air mass flow	ICFN Power 105 kW	kg/s	0,155	0,182	0,185	0,208
Charge air inlet temp. (Charge air temp after turbo compressor)	ICFN Power 105 kW	°C	165	165	161	160
		°F	329	329	322	320
 <b>See front page for important information</b> Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	49	49	49	50
		°F	120	120	120	122
 <b>See front page for important information</b> Maximum pressure drop over charge air cooler incl. piping		kPa	7	8	9	11
		psi	1,02	1,16	1,31	1,60
Charge air pressure (relative) (After charge air cooler)		kPa	175	178	170	159
		psi	25,38	25,82	24,66	23,06
Standard charge air cooler core area		m <sup>2</sup>	0,5			
		foot <sup>2</sup>	5,38			
Compact charge air cooler core area		m <sup>2</sup>	0,22			
		foot <sup>2</sup>	2,37			

**Cooling performance: 0,6 m<sup>2</sup> radiator and 600mm fan, pull**

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and std coolant. Valid at 1 atm.

Engine speed	Engine power	ICFN Power 105 kW					
		Air on temp		Air flow		External restriction	
		°C	°F	m <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
1500	104	80	176	6,2	219,0	0	
	141	79	174	5,9	208,4	100	0,015
		79	174	5,8	204,8	200	0,029
		77	171	5,3	187,2	300	0,044
2300	105	79	174	7,6	268,4	0	
	143	78	173	7,4	261,3	100	0,015
		78	172	7,2	254,3	200	0,029
		77	171	7,1	250,7	300	0,044

**Cooling performance: 0,28 m<sup>2</sup> 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.

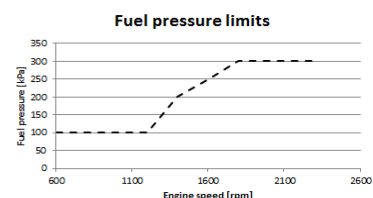
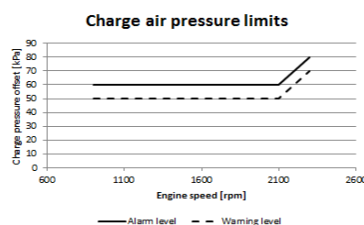
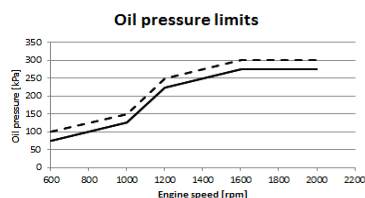
Engine speed	Engine power	ICFN Power 105 kW					
		Air on temp		Air flow		External restriction	
		°C	°F	m <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
1500	104	62	144	6,0	211,9	0	
	141	61	142	5,8	204,8	100	0,015
		59	137	5,4	190,7	200	0,029
		54	129	4,9	173,0	300	0,044
2300	105	61	142	7,0	247,2	0	
	143	60	141	6,9	243,7	100	0,015
		59	138	6,6	233,1	200	0,029

**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	Default setting	Engine protection	
Parameter	Unit	Setting range	Default setting	Level	Action. Default/Alternative
Oil temp	°C		125	125	Derate/Shut down
Oil pressure	Low idle	kPa	75,0	75	Shut down.
	Rated speed	kPa	275	275	Shut down.
Oil level			Low level		
Coolant temp	°C		107	107	Derate/Shut down
Coolant level		See cooling system	On	Low level	Derate/Shut down
Fuel feed pressure	Low idle	kPa	100		
	Rated speed		300		
Water in fuel			Alarm when closed		
EGR temp	°C		210	210	Derate/Shut down
Air filter pressure drop			5kPa		
Altitude, above sea	m			700	Automatic derating, see section derating
Charge air temp	°C		120	120	Derate/Shut down
Charge air pressure	kPa		Alarm map value	Alarm map value	Derate/Shut down
SCR temp	°C		515	515	Derate

Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after 5 sec	Forced shut down after 0 sec
Coolant temp	102°C	107°C	107°C	112°C		
Oil temp	120°C	125°C	125°C	130°C		
Low oil pressure	Warning map value	Alarm map value				Alarm map value
High charge air temp	115°C	120°C	120°C	140°C		
High charge air pressure	Warning map value	Alarm map value		Alarm map value		
EGR temp	200°C	210°C	210°C	220°C		



**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		<b>85P50/90P55</b>
	output	kW hp	5 / 5.5 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

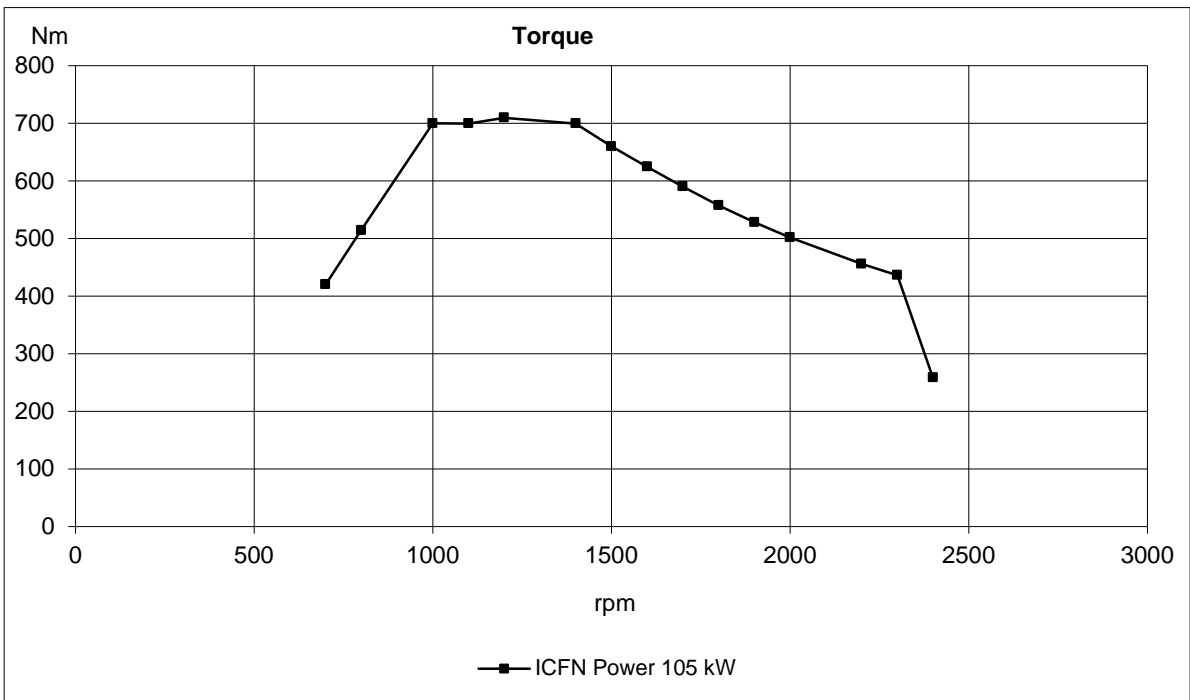
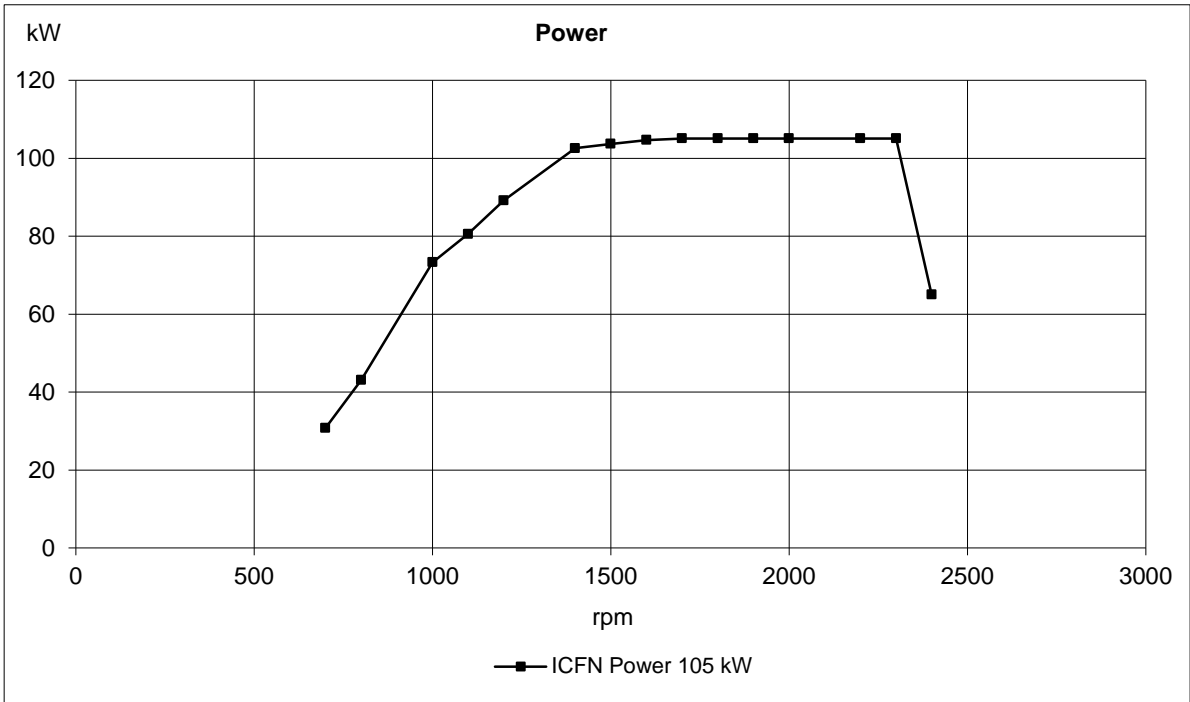
Conditions: (5 mΩ main circuit resistance@ 20°C)	Temperature	°C	25	0	-15
	Battery	Ah / CCA	100/700	100/700	100/700
Crank speed		rpm	197	150	123
Crank current		A	173	265	320
Starter input power during crank		kW	3,90	4,70	5,20
Battery power during crank		kW	4,00	5,10	5,70
Min battery @ 0°C		Ah / CCA	100/700		

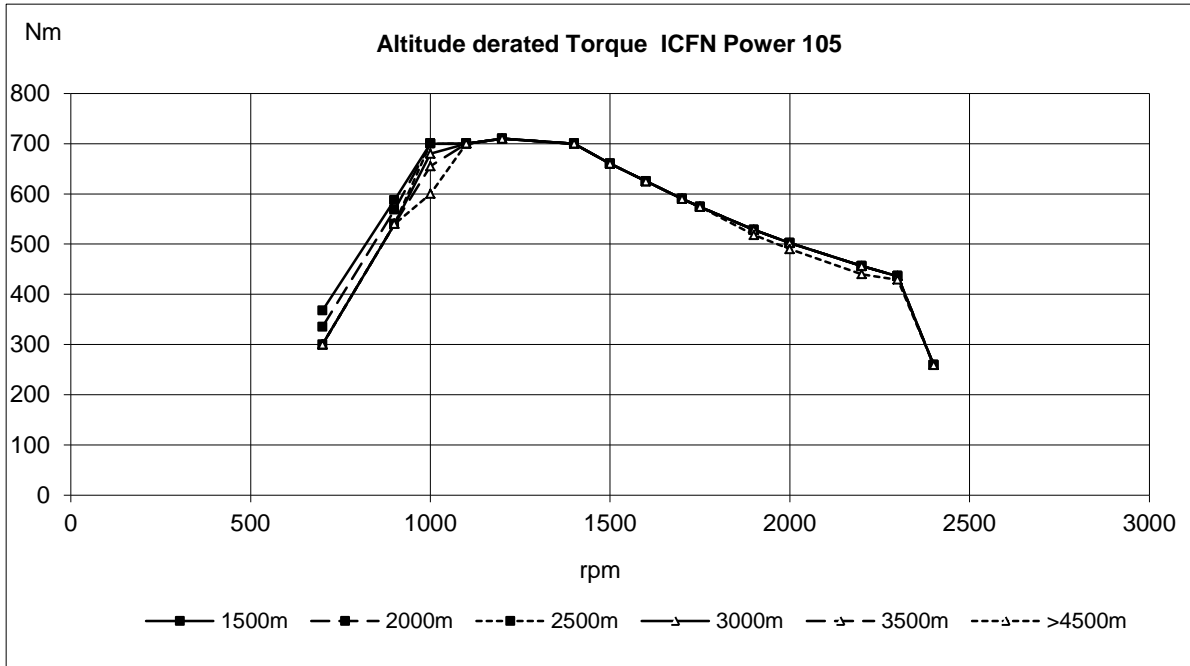
**Power take off**

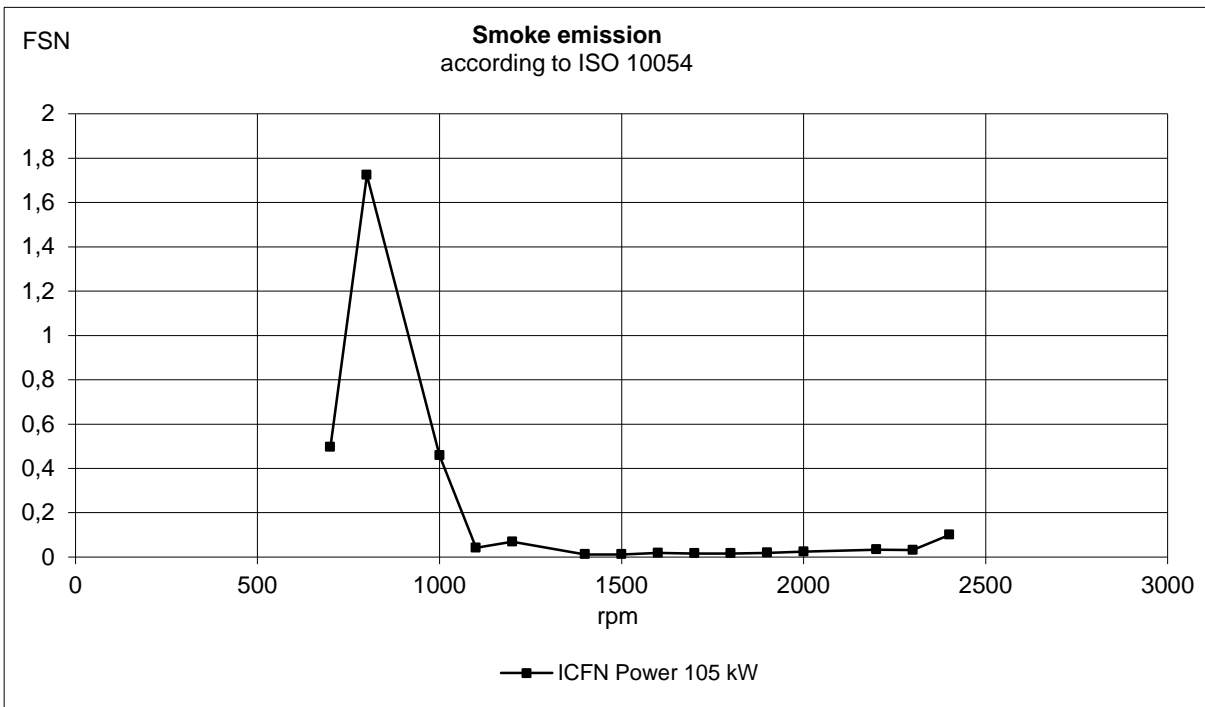
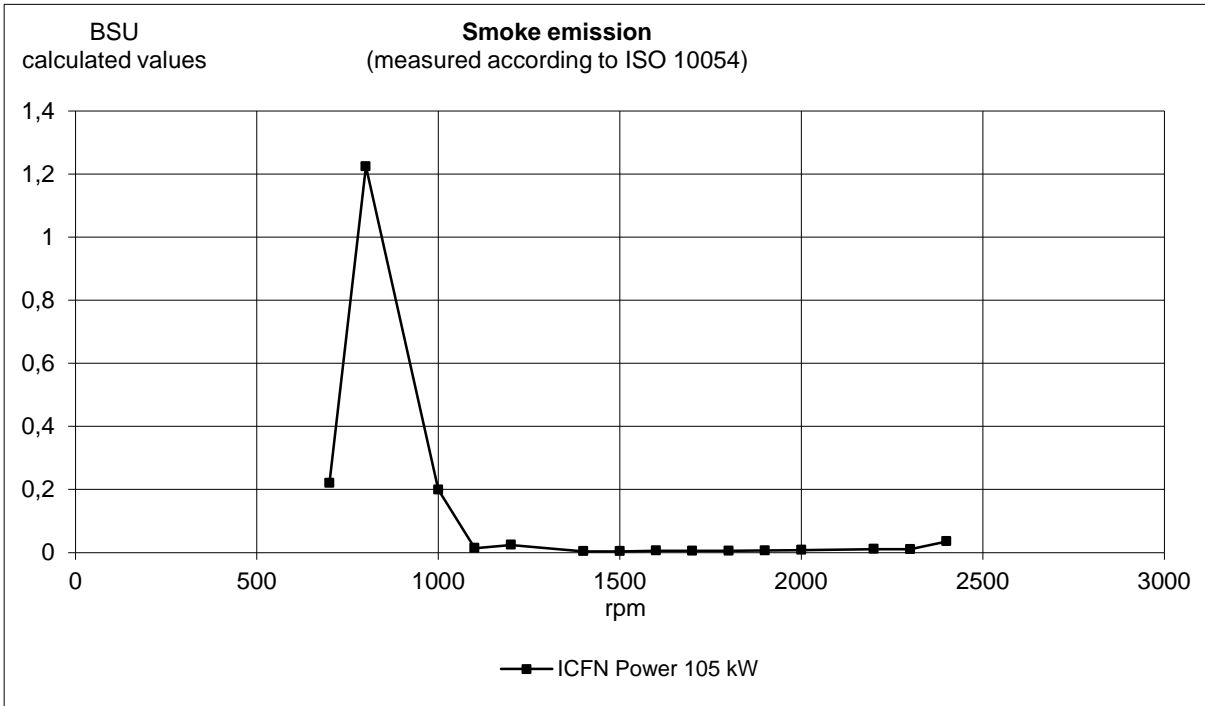
		rpm	1400	1800	2000	2300	
Front end in line with crank shaft max:*	0.02 kgm <sup>2</sup>	Nm lbf ft	866 639	817 603	750 553	610 450	
	SAE 2, STD 10" & 11,5 ", 1.303 kgm <sup>2</sup>	0.03 kgm <sup>2</sup>	Nm lbf ft	866 639	748 552	711 524	457 337
		0.04 kgm <sup>2</sup>	Nm lbf ft	866 639	695 513	645 476	399 294
Front end belt pulley load.	Max up (above or equal to horizontal line)	kW hp	3,4 4,6	4,1 5,6	4,5 6,1	5,2 7,1	
	Max down (below horizontal line)	kW hp	28,4 38,6	34,0 46,2	37,8 51,4	43,5 59,2	
Maximum power on Rear PTO on top of flywheel housing(REPTO):*		kW hp	75 102				
Speed ratio direction of rotation viewed from flywheel side			1:1 Counter clockwise				
Maximum torque on PTO at compressor position:*		Nm lbf ft	200 148				
Speed ratio direction of rotation viewed from flywheel side			1.026:1 Counter clockwise				
Timing gear at hydraulic pump PTO max:*		Nm lbf ft	80 59				
Speed ratio direction of rotation viewed from flywheel side			1.3:1 Clockwise				
Max allowed bending moment in flywheel housing SAE2		Nm lbf ft	4600 3393				
Max. rear main bearing load		N lbf	5000 1124,0				

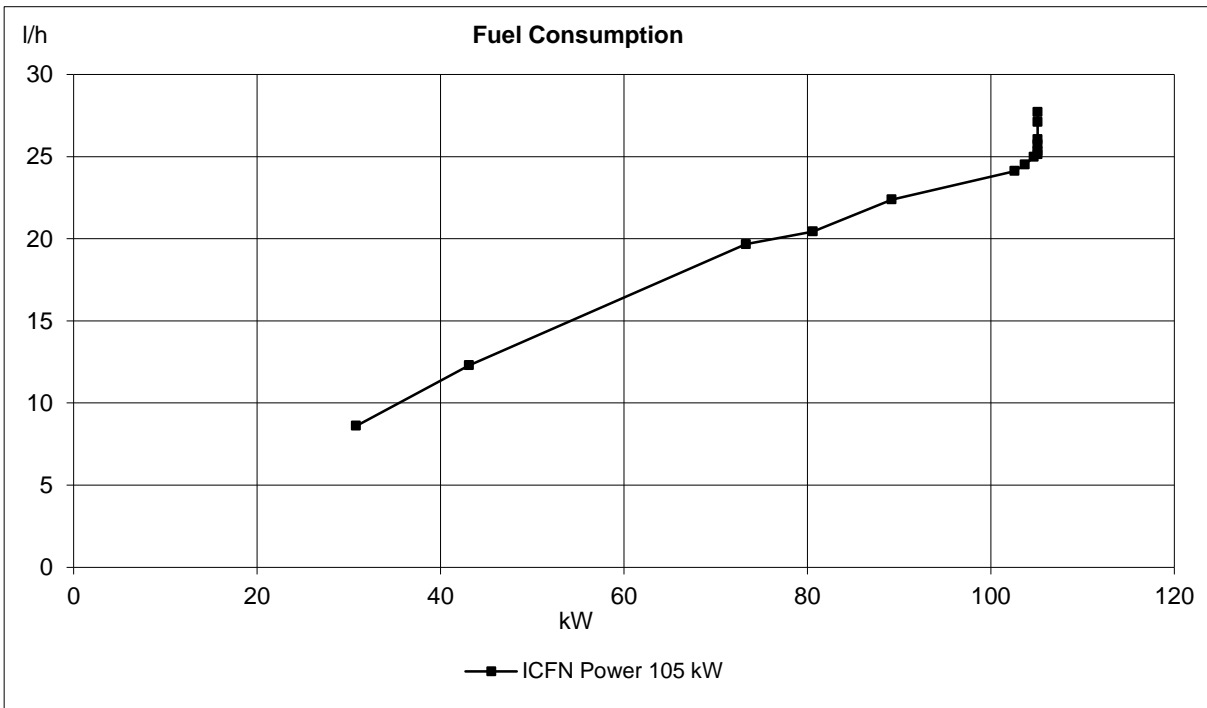
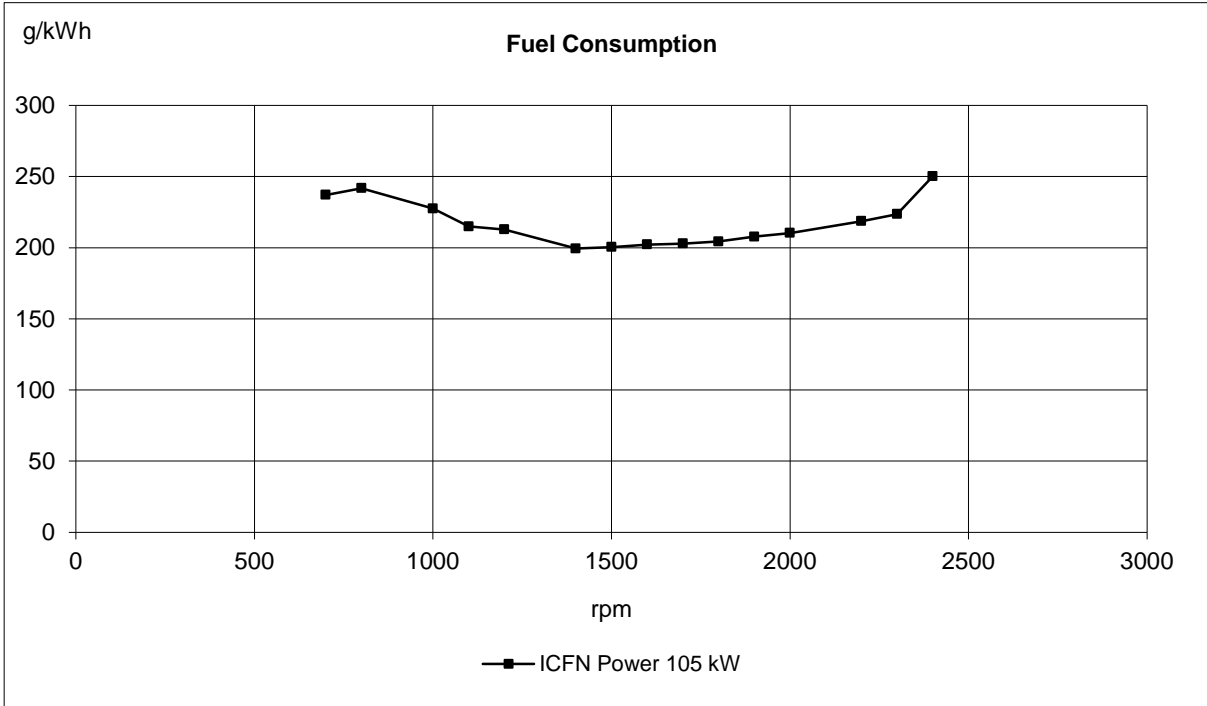
\* Maximum allowed torque at individual PTO's.

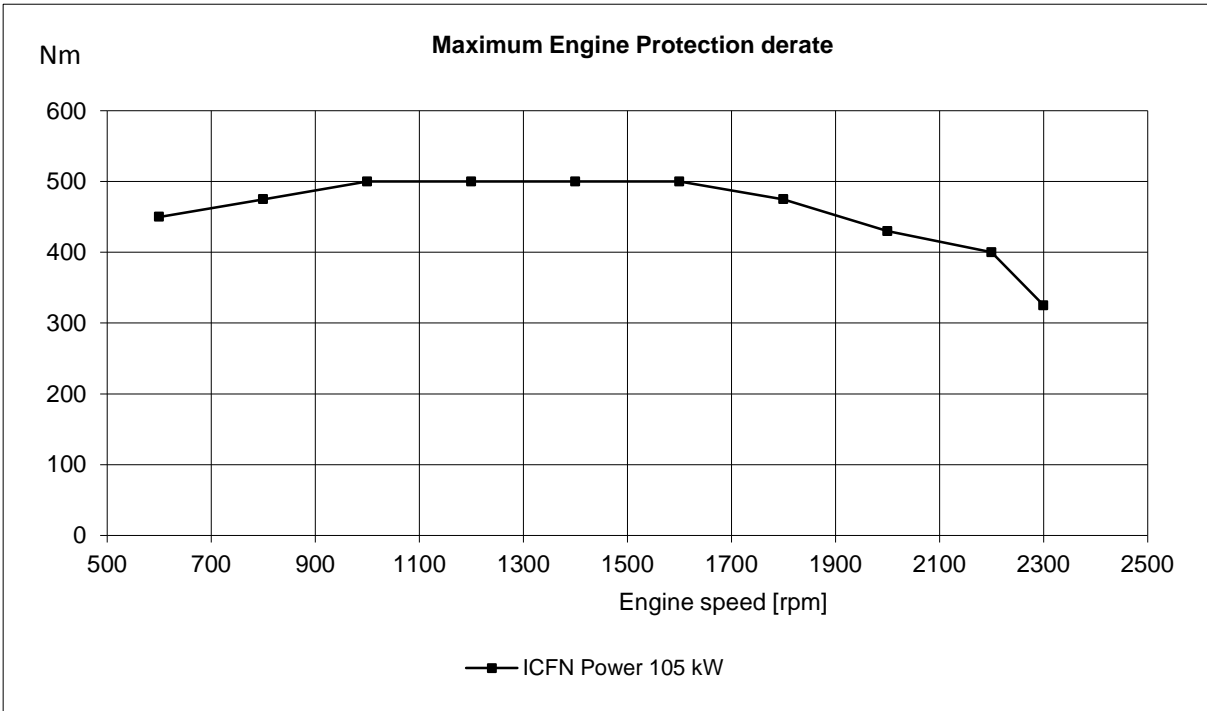
If more than one PTO output is used simultaneously, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

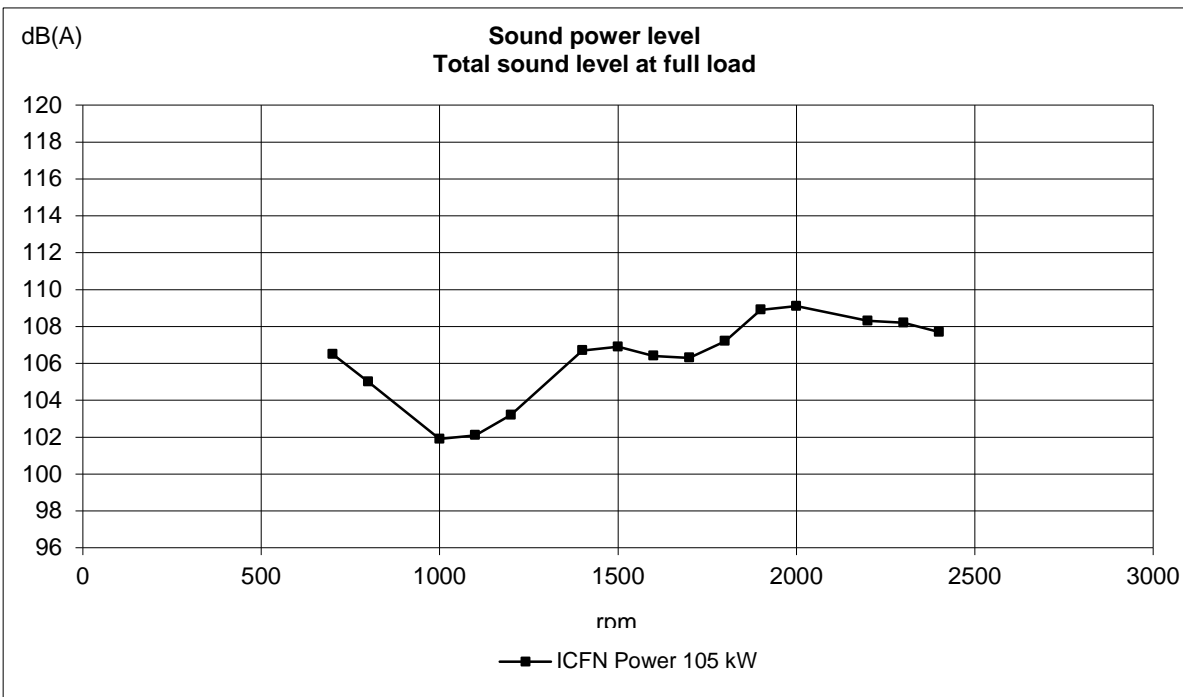
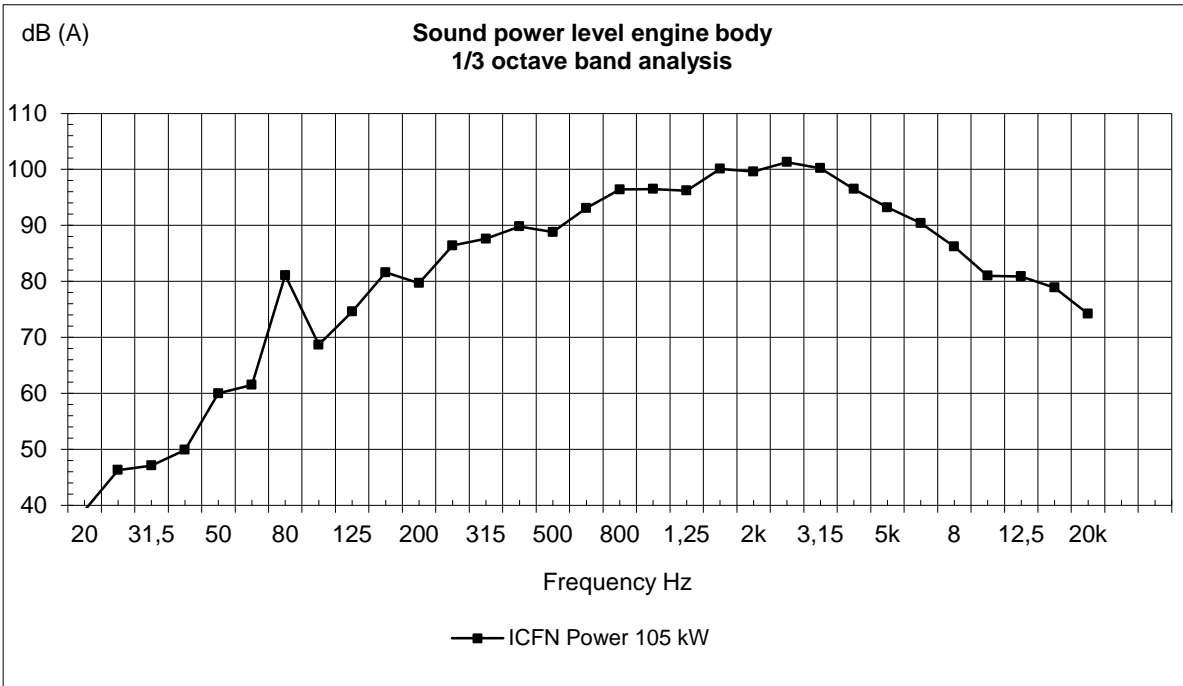


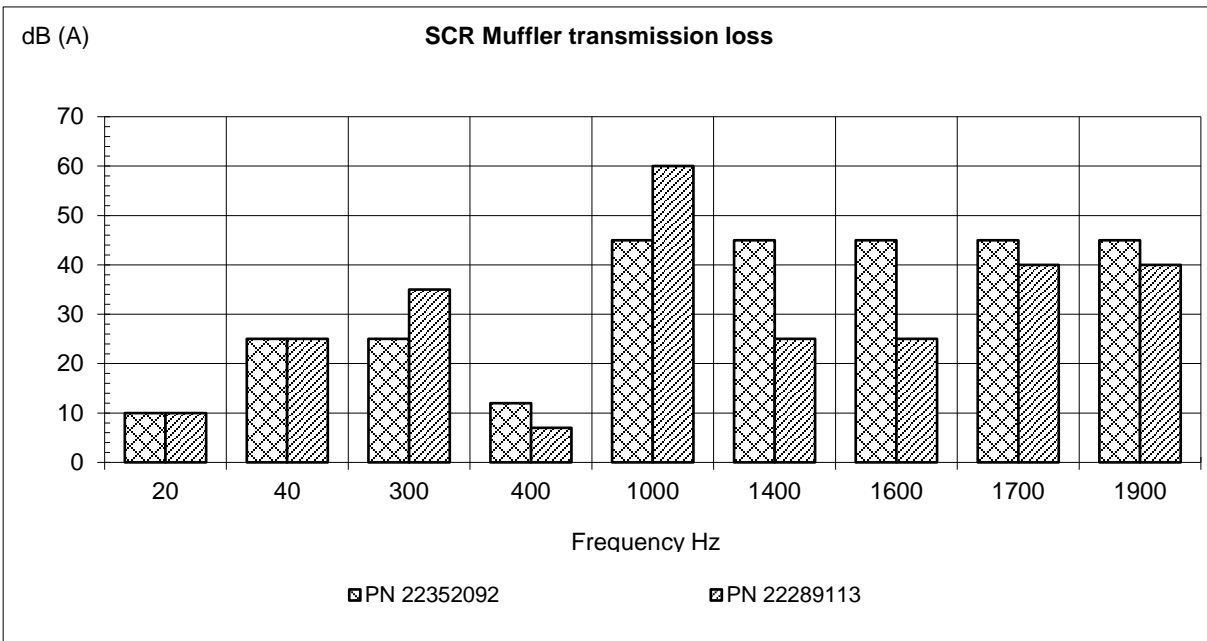


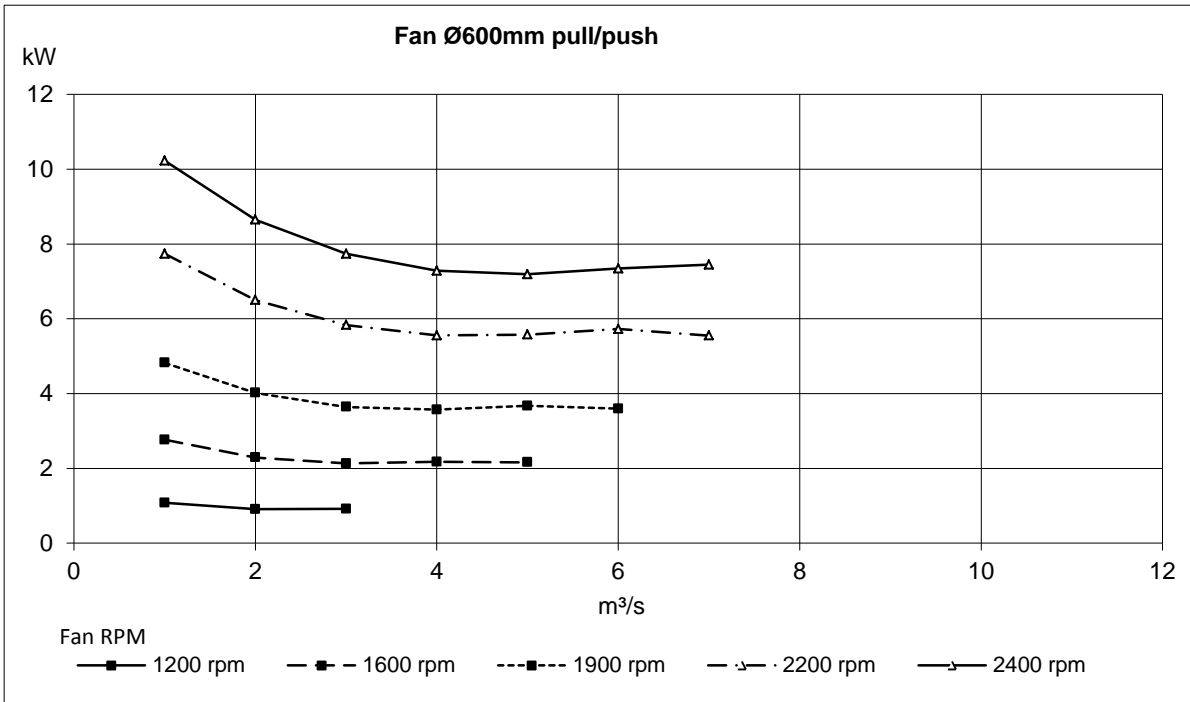




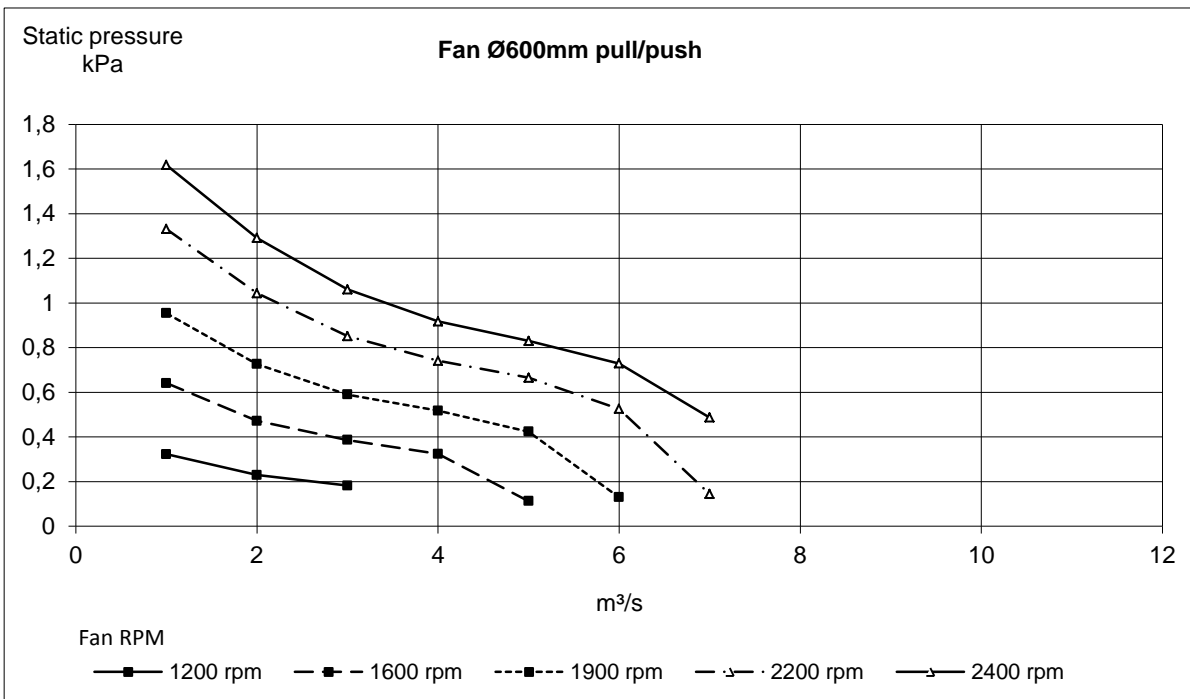








Maximum fan speed with visco clutch: 2400rpm



Maximum fan speed with visco clutch: 2400rpm

