

VOLVO PENTA

TAD872VE 210kW/2200rpm


Document No

22341445

Issue Index

15**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			6
Displacement, total	liters		7,70
		in ³	470
Firing order			1-4-2-6-3-5
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	737
		lb	1625
	Power pac	kg	947
		lb	2088

Performance

				rpm	1500	1800	2000	2200
IFN Power	210 kW	without fan	kW	192	210	210	210	
			hp	261	286	286	286	
		with fan 650 mm pull	kW	185	199	199	199	
			hp	251	271	271	271	
Torque at:	IFN Power 210 kW		Nm	1225	1115	1003	912	
			lbf ft	903	822	740	673	
Max torque at engine speed	IFN Power	1350 rpm	Nm	1235				
			lbf ft	911				
Power tolerance			%	±3				
Mean piston speed			m/s	6,8	8,1	9,0	9,9	
			ft/sec	22,1	26,6	29,5	32,5	
Effective mean pressure at:	IFN Power 210 kW		MPa	2,00	1,82	1,64	1,49	
			psi	289	264	237	216	
Total mass moment of inertia, J (mR ²) (not including flywheel)			kgm ²	0,398				
			lbft ²	9,4				
Friction Power			kW	17	23	29	35	
			hp	23	31	39	48	

Derating see Technical Diagrams

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Engine brake performance (only engines with engine brake)		rpm	1500	2200	2500	2800
Brake power:	without fan	kW	70	121	145	170
		hp	95	165	197	231
Brake torque:	without fan	Nm	448	524	555	580
		lbf ft	330	386	409	428
Engine speed range for engine brake activation:		rpm	900-2800			
Min engine speed with engine brake still active:		rpm	900			
Min oil temperature for engine brake activation:		°C	55			

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	27
		US gal	7,13
Oil pan capacity:	Max	liter	24
		US gal	6,34
	Min	liter	19
		US gal	5,02
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

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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	122 32,2
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 HP4



Intake and exhaust system

		Inlet air temp	rpm	1500	1800	2000	2200
Charge air consumption at: (+25°C and 100kPa)	IFN Power 210 kW	25°C	m³/min	12,2	13,9	15,5	16,5
		77°F	cfm	431	491	547	583
 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 210 kW		kW BTU/min	97 5516	115 6540	126,7 7205	140,2 7973
Exhaust gas temperature after turbine at:	IFN Power 210 kW		°C °F	378 712	392 738	390 734	404 759
 See front page for important information							
Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 102 mm			kPa psi	16 2,3	19 2,8	22 3,2	23 3,3
 See front page for important information							
Max allowable temperature drop between turbine and SCR muffler inlet.			Δ°C Δ°F	15 27			
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)			kPa psi	10 1,5	11 1,6	14 2,0	15 2,2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power 210 kW		m³/min	24,7	28,1	30,3	32,5
			cfm	872	992	1070	1148

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Cooling system		rpm	1500	1800	2000	2200
Heat rejection radiation from engine at:	IFN Power 210 kW	kW	6	6	5,9	6,5
		BTU/min	324	336	336	370
Heat rejection to coolant at:	IFN Power 210 kW	kW	119	132	132,9	137,9
		BTU/min	6756	7507	7558	7842
Radiator cooling system type			Closed circuit			
Standard radiator core area	IFN Power 210 kW	m ²	0,6			
		foot ²	6,46			
Fan diameter	650 mm	IFN Power 210 kW	650			
			25,59			
Maximum fan power consumption	650 mm pull	kW	7,2	10,8	10,8	10,8
		hp	10	15	15	15
Fan drive ratio	fan Ø650		1:1.4			
	fan position high		1:1.1			
Coolant capacity:	engine	liter	17			
		US gal	4,5			
	engine + standard radiator, hoses and expansion tank	liter	51			
		US gal	13,5			
Coolant pump		drive/ratio	belt/1,40:1			
Coolant flow with standard system		l/s	5,4	6,5	7,2	8,0
		US gal/s	1,4	1,7	1,9	2,1
Minimum coolant flow		l/s				6,0
		US gal/s				1,6
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			

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Charge air cooler system		rpm	1500	1800	2000	2200
Heat rejection to charge air cooler	IFN Power 210 kW	kW	32,6	35,4	39,1	41,7
		BTU/min	1854	2013	2224	2371
Charge air mass flow	IFN Power 210 kW	kg/s	0,239	0,274	0,305	0,324
Charge air inlet temp. (Charge air temp after turbo compressor)	IFN Power 210 kW	°C	183	176	176	177
		°F	361	349	349	351
 See front page for important information Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	48	48	49	50
		°F	118	118	120	122
 See front page for important information Maximum pressure drop over charge air cooler incl. piping		kPa	7	9	10	12
		psi	1,02	1,31	1,45	1,74
Charge air pressure (relative) (After charge air cooler)		kPa	213	201	194	181
		psi	30,89	29,15	28,14	26,25
Standard charge air cooler core area		m ²	0,5			
		foot ²	5,38			

Cooling performance: 0,6 m² radiator and 650mm 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.

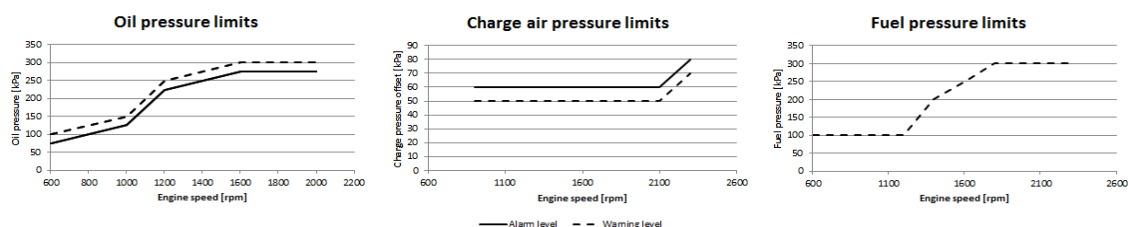
Engine speed	Engine power	IFN Power 210 kW					
		Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1500	192 261	59	137	7,4	261,3	0	
		57	135	7,2	254,3	100	0,015
		55	131	6,7	236,6	200	0,029
		51	123	6,1	215,4	300	0,044
2200	210 286	63	145	9,6	339,0	0	
		62	144	9,6	339,0	100	0,015
		61	143	9,2	324,9	200	0,029
		60	140	8,8	310,8	300	0,044

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	800	rpm	600
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		



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Electrical system

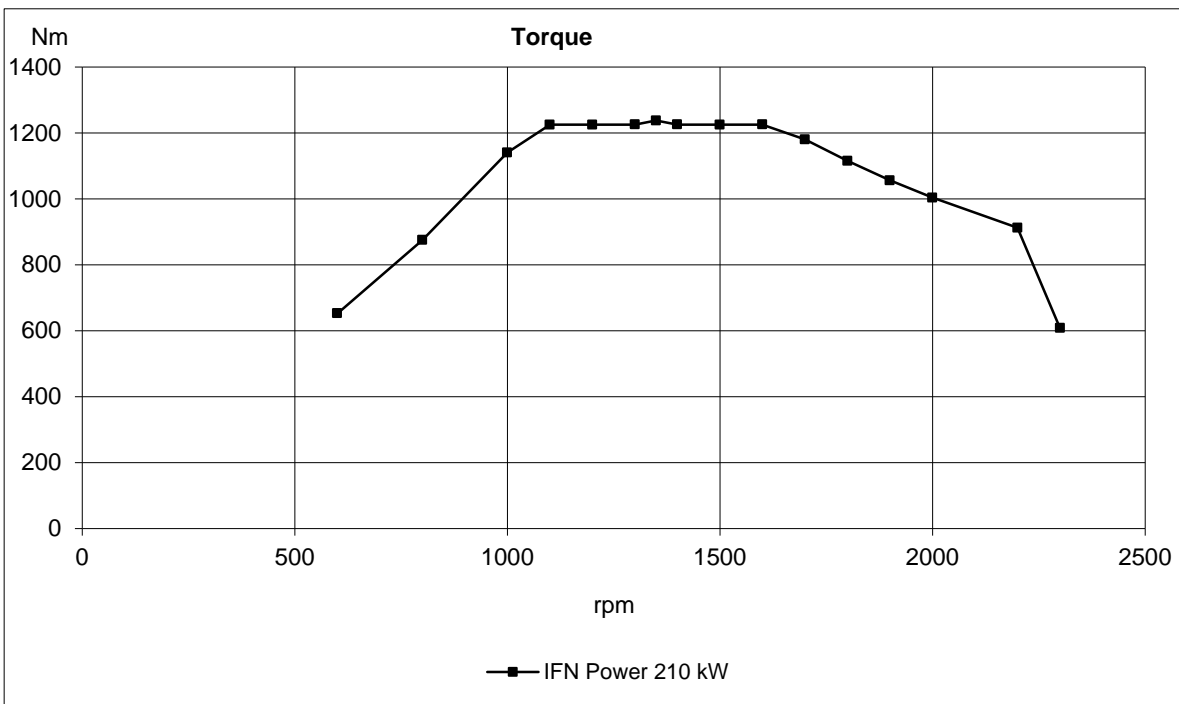
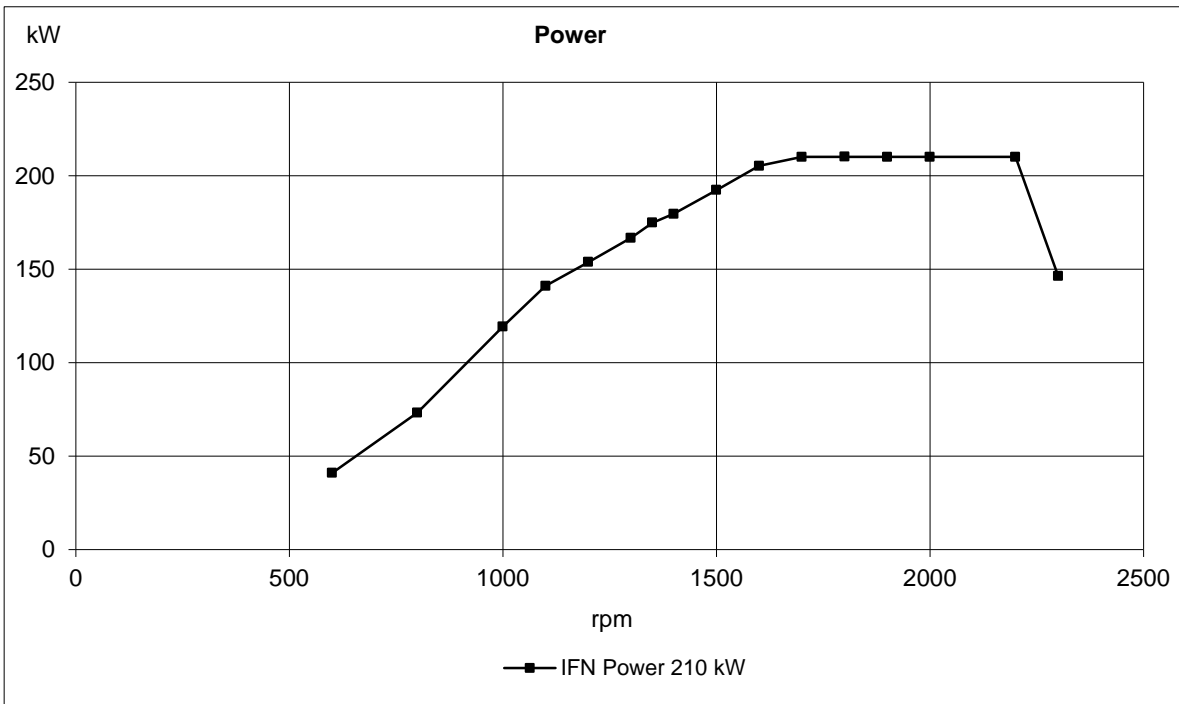
Voltage and type		24V	
Alternator:	make	MELCO	
	output	A	110/130
	tacho output	Hz/alternator rev.	
	drive ratio		
Starter motor:	make	MELCO	
	type	85P50/90P55	
	output	kW	5 / 5.5
		hp	6.8 / 7.5
Number of teeth on:	flywheel	137	
	starter motor	10 / 12 teeth	
Inlet manifold heater (at 20 V)		kW	4
Power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

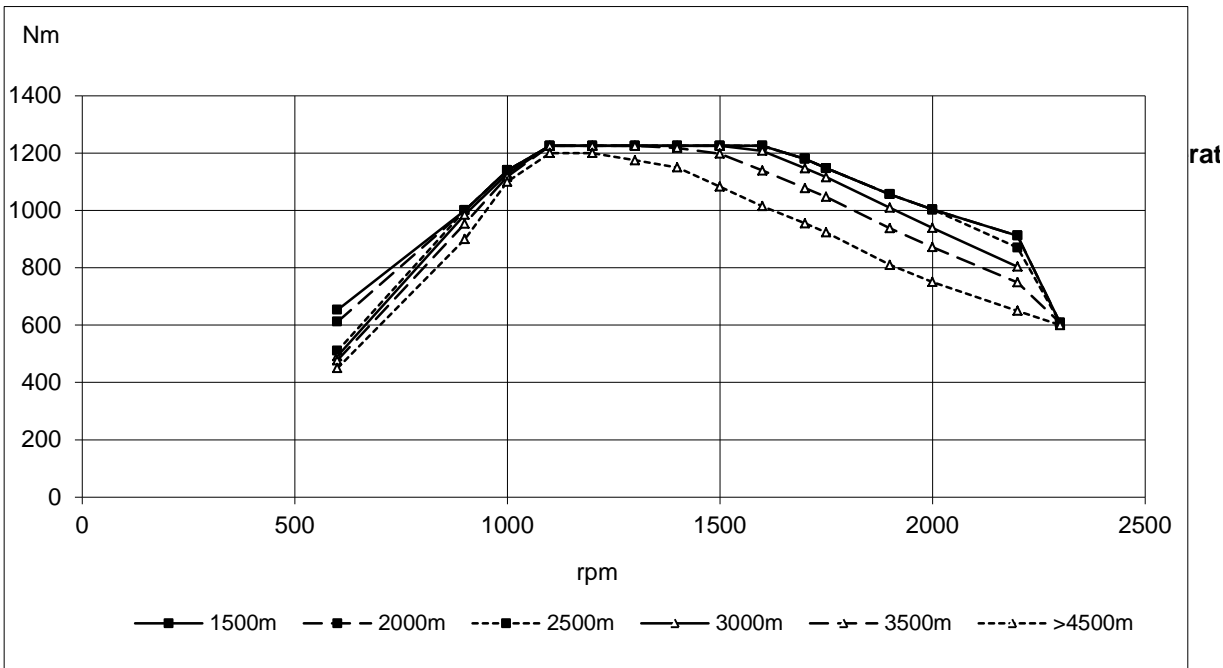
Conditions: (5 mΩ main circuit resistance@ 20°C)	Temperature	°C	25	0	-15
	Battery	Ah / CCA	140/800	140/800	140/800
Crank speed	rpm		185	160	120
Crank current	A		220	300	470
Starter input power during crank	kW		4,91	5,90	6,94
Battery power during crank	kW		5,15	6,31	7,50
Min battery @ 0°C	Ah / CCA		100/700		

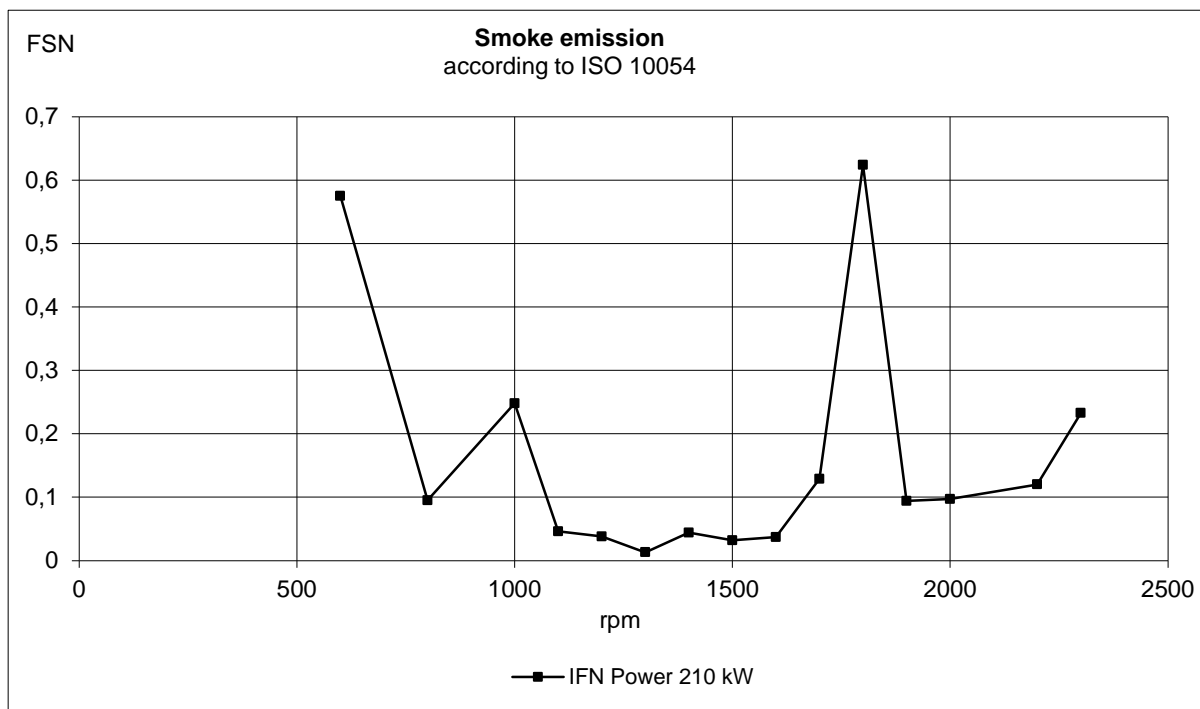
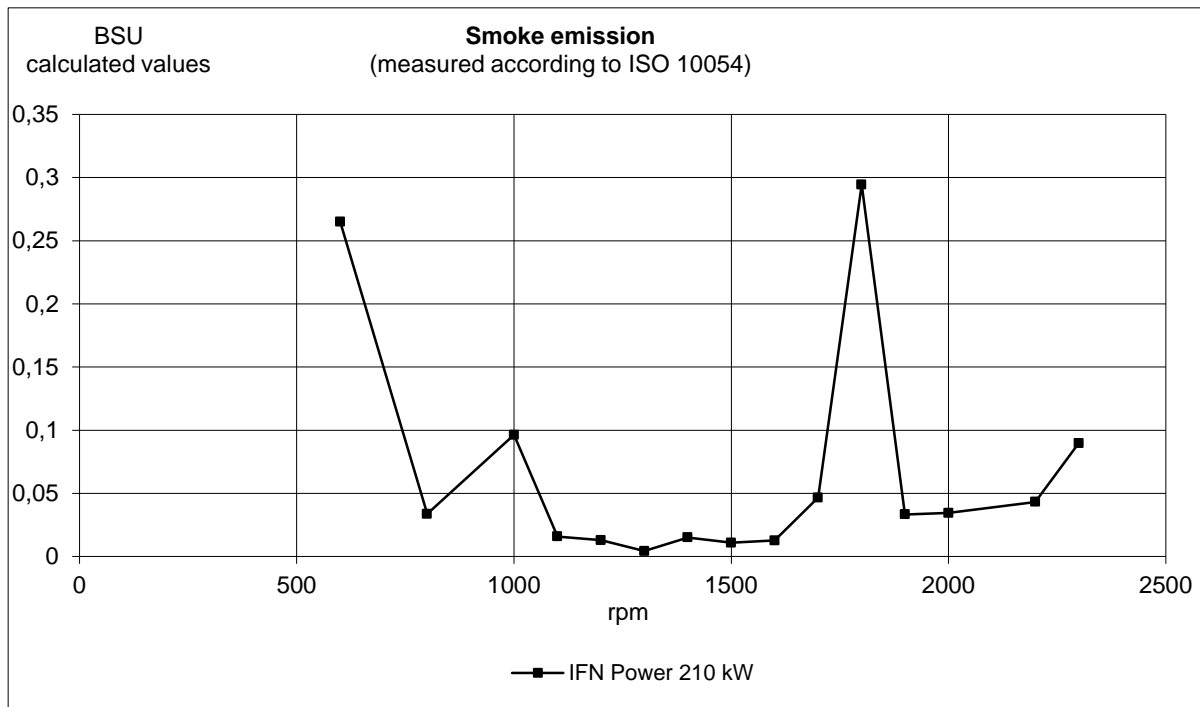
Power take off		rpm	1400	1800	2000	2200
Front end in line with crank shaft max:*	0.02 kgm ²	Nm	1064,0	743,0	740	833
		lbf ft	785	548	546	614
Flywheel SAE 2, STD 10" & 11,5", 1.303 kgm ²	0.03 kgm ²	Nm	1030,0	706,0	697	786
		lbf ft	760	521	514	580
	0.04 kgm ²	Nm	996,0	663,0	654	729
		lbf ft	735	489	482	538
Front end belt pulley load.	Max up (above or equal to horizontal line)	kW	12,5	16	18,8	19,6
		hp	17,0	21,8	25,6	26,7
	Max down (below horizontal line)	kW	26,6	34,2	38	41,8
		hp	36,2	46,5	51,7	56,8
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	4250			
		lbf	955,4			

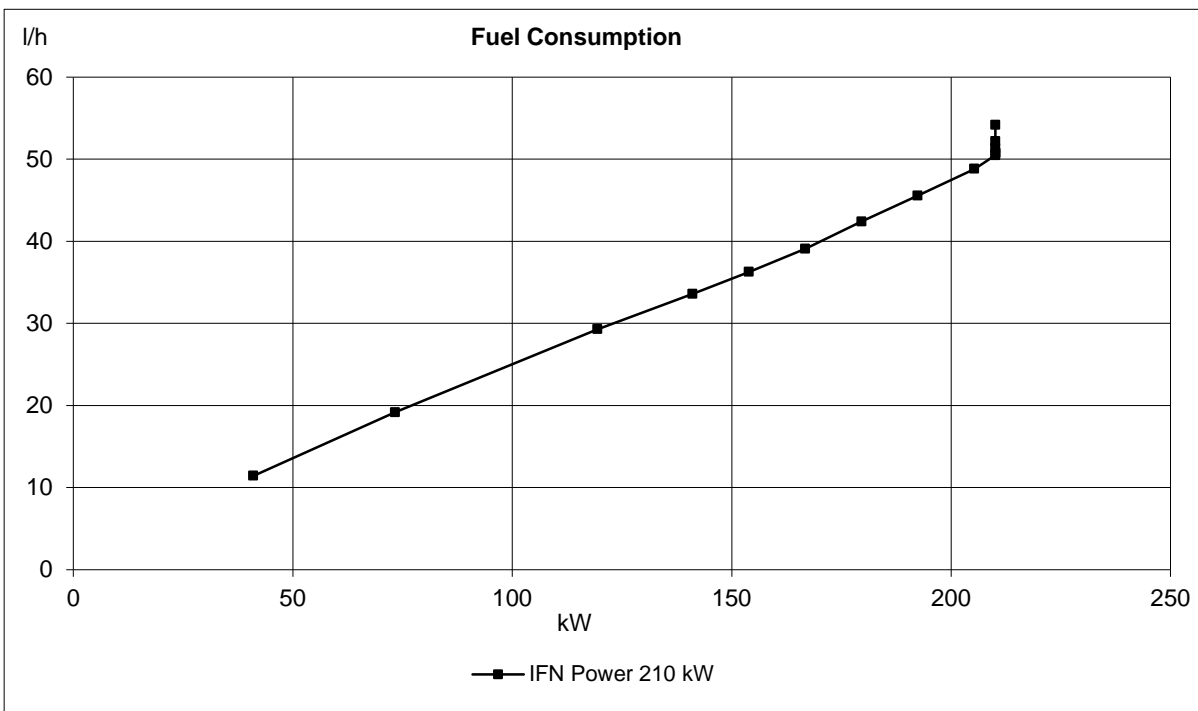
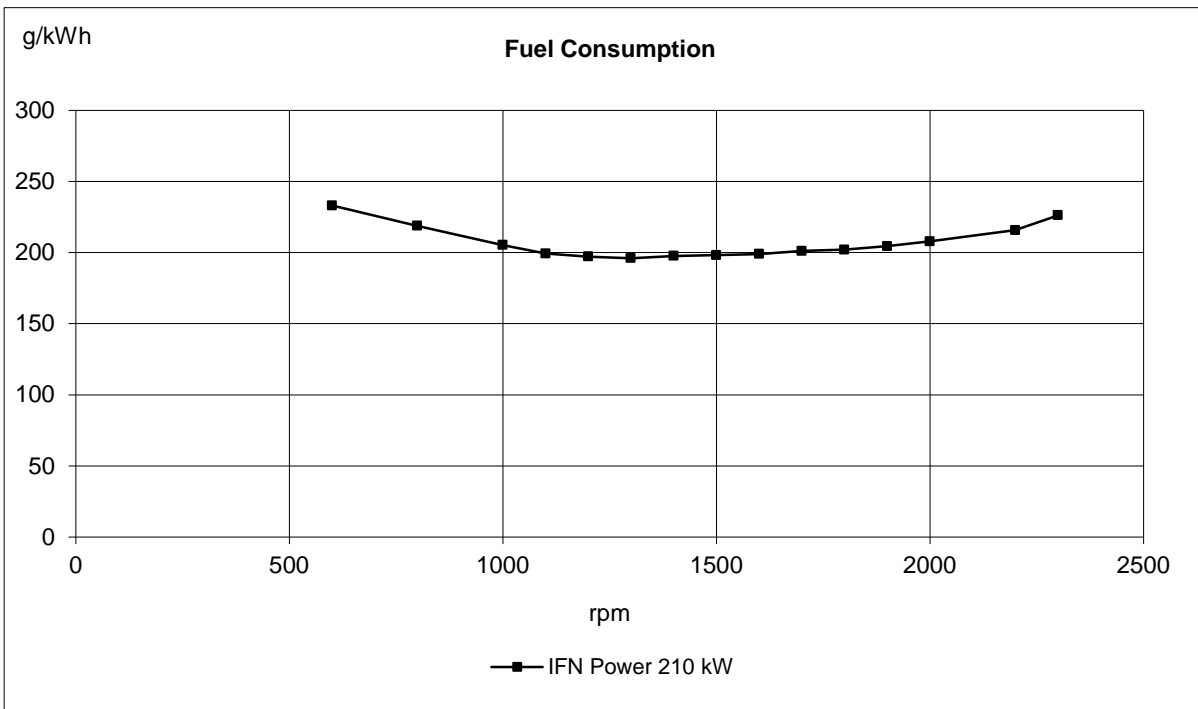
* Maximum allowed torque at individual PTO's.

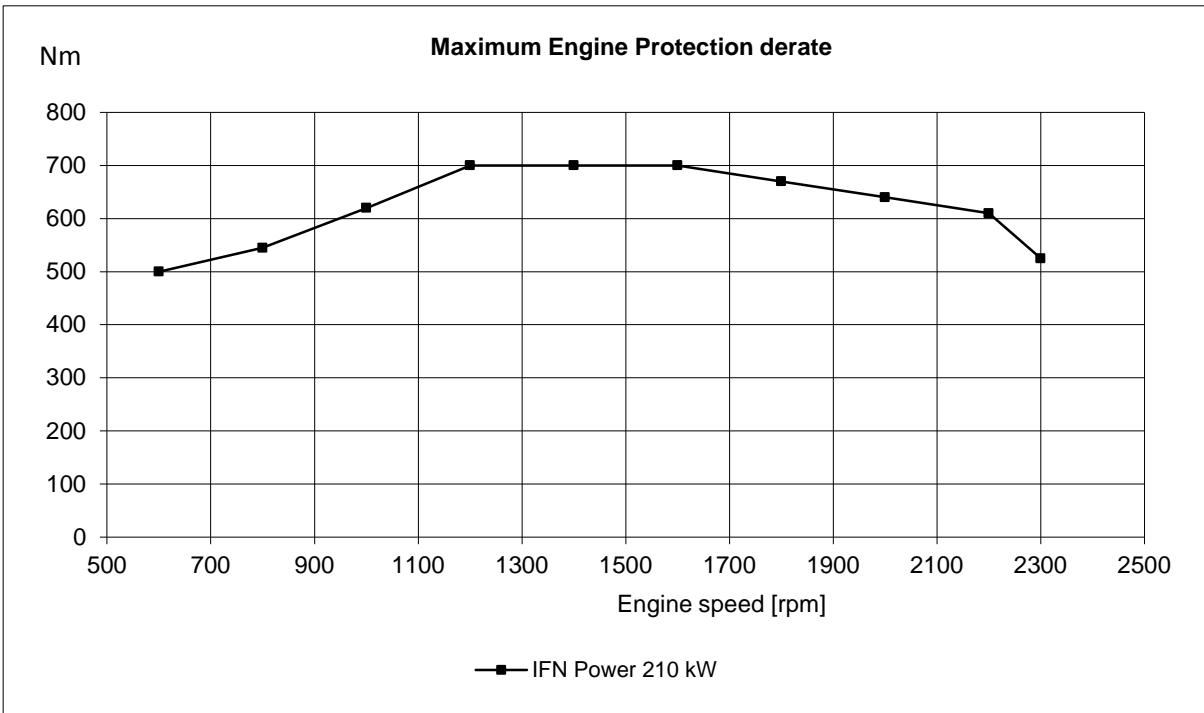
If more then one PTO output is used simultaniously, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

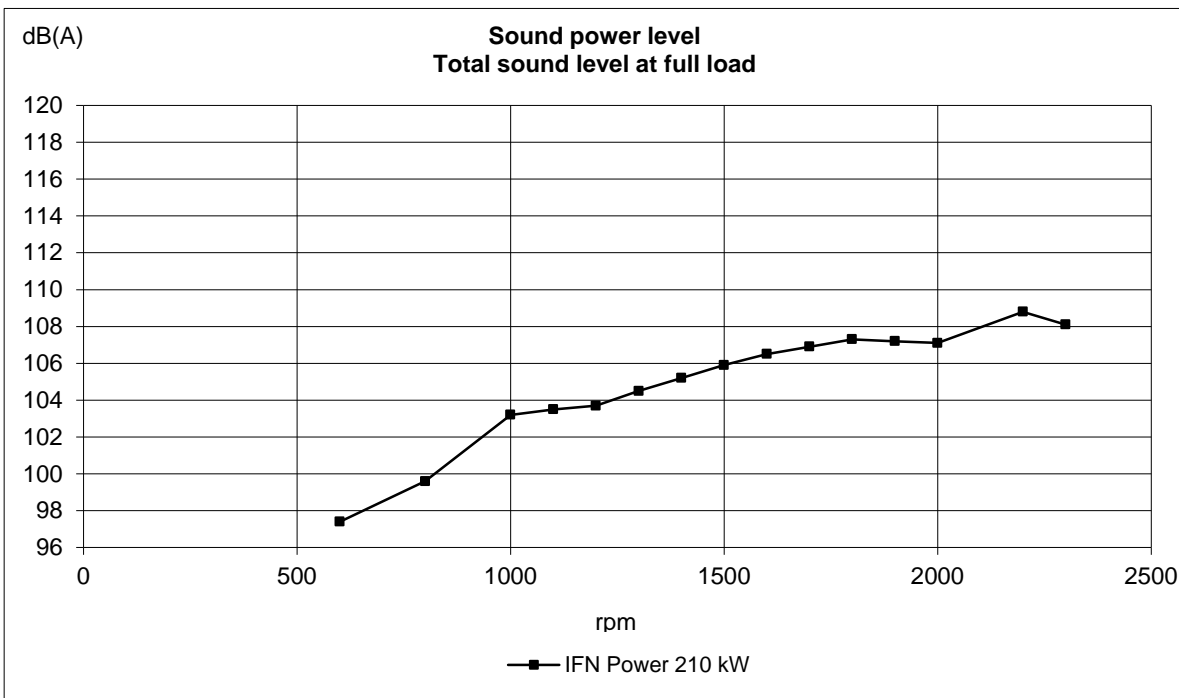
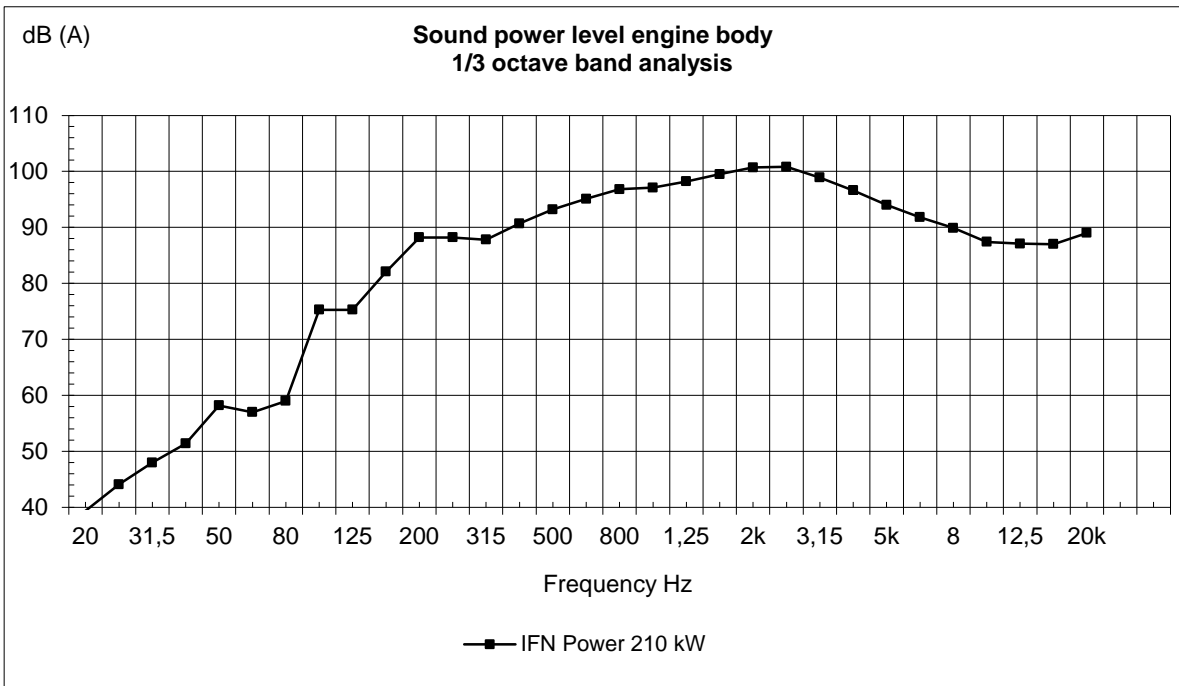


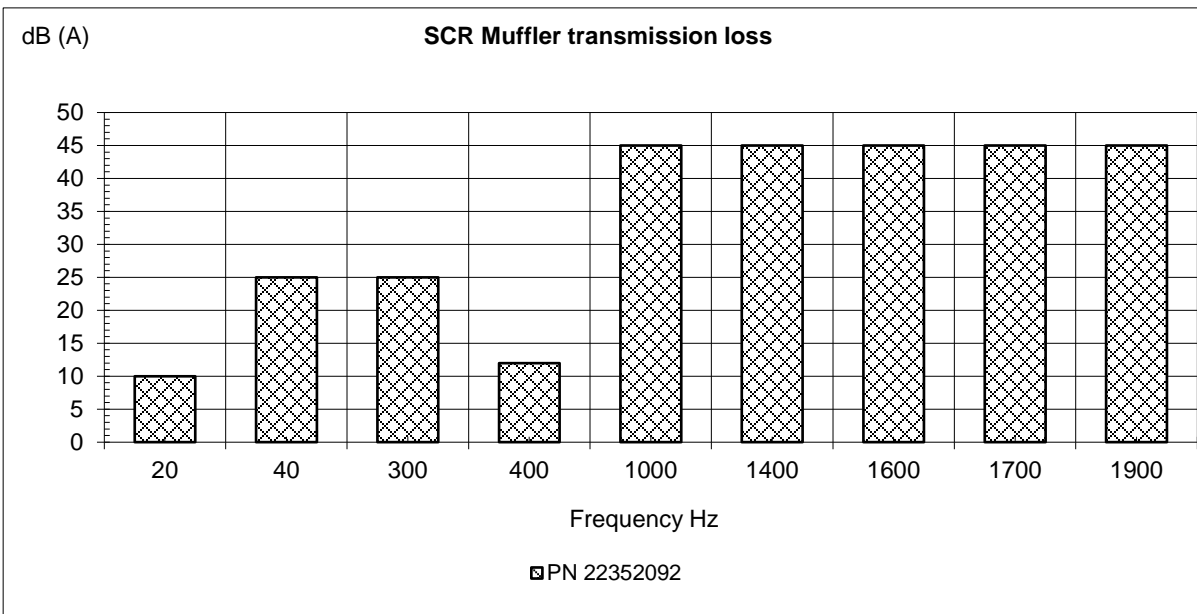


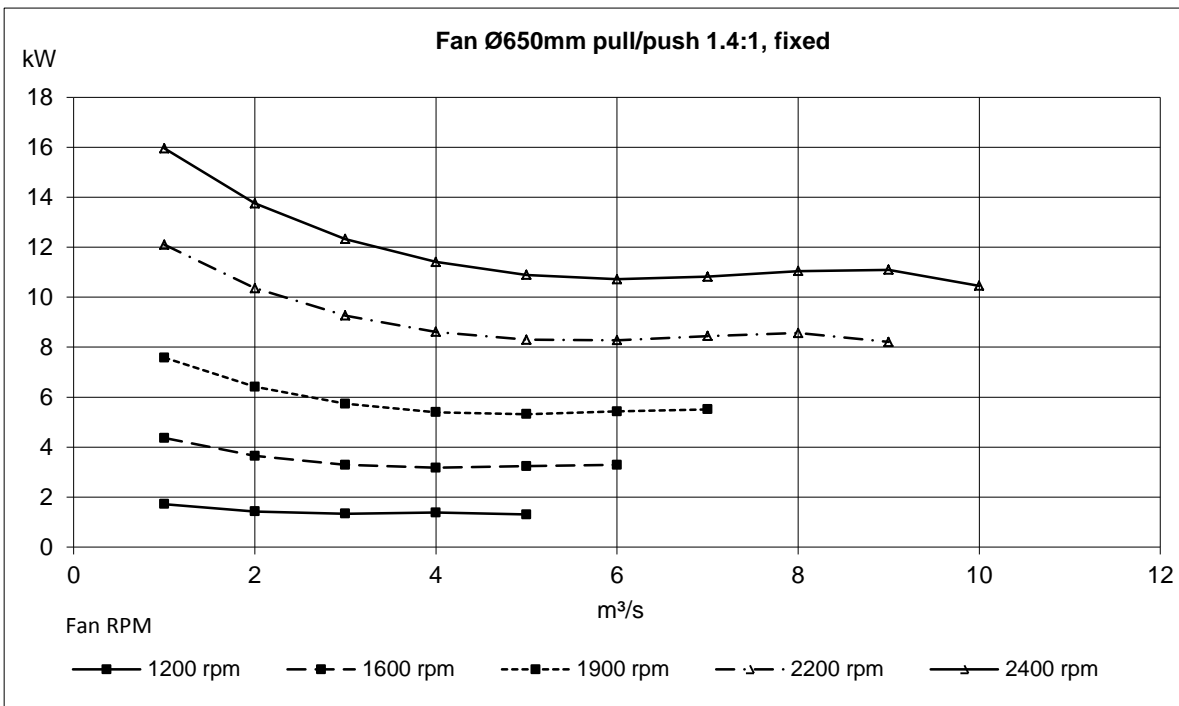




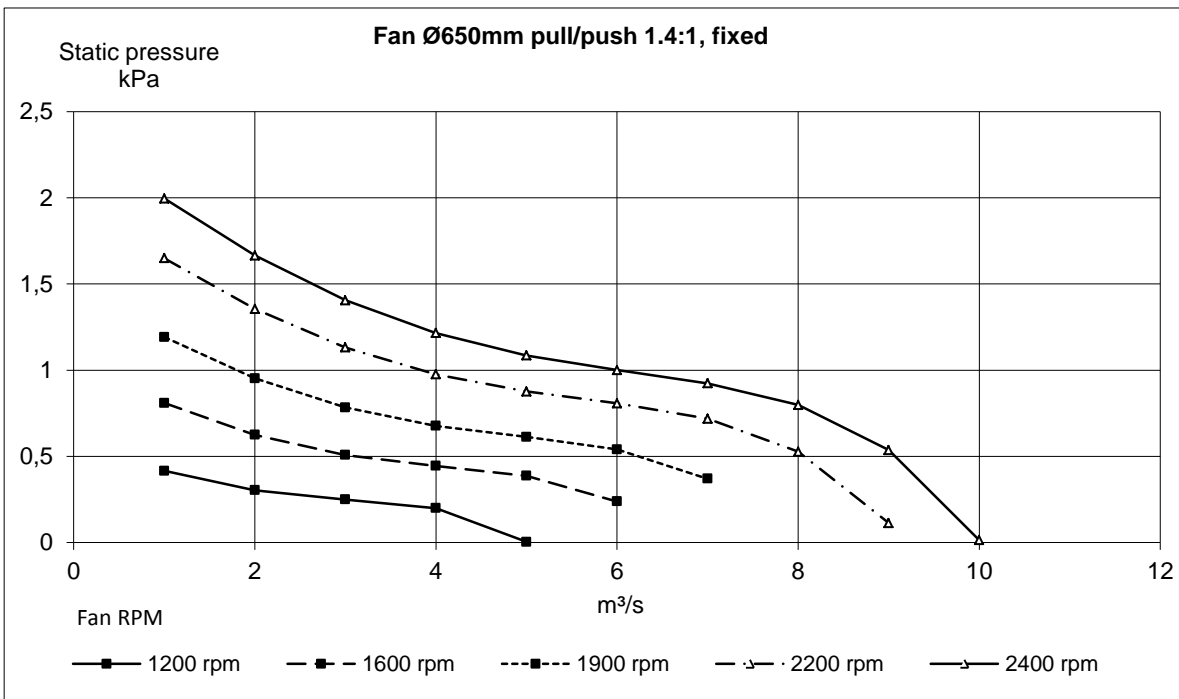








Maximum fan speed with visco clutch: 2400rpm



Maximum fan speed with visco clutch: 2400rpm

