Important

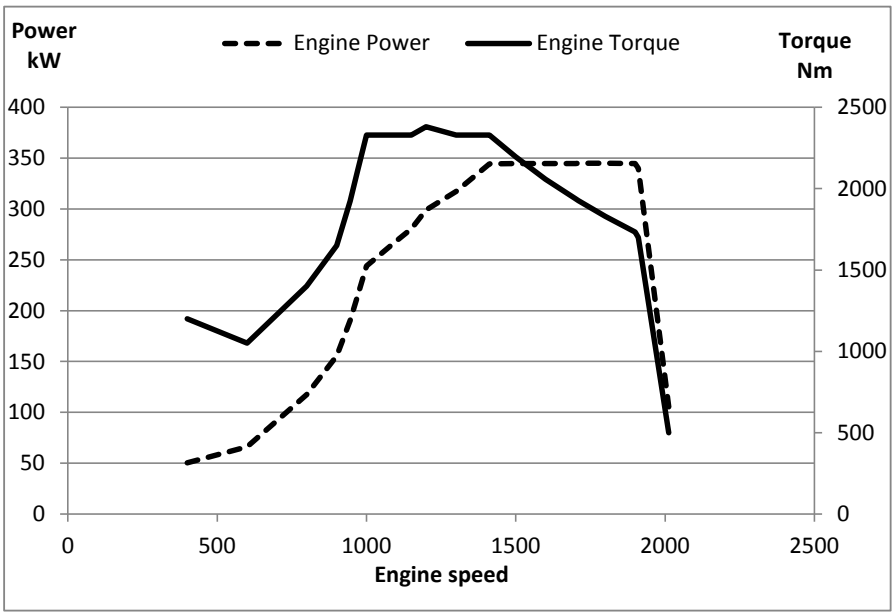
This Technical Data Sheet and the corresponding Installation Instructions provide important information to ensure the installed engine will operate according to the design specification in the Volvo Penta application for certification.

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.

In-line four stroke diesel engine with common rail direct injection. Rotation direction counterclockwise viewed towards flywheel.

Peak Power		kW	345
		hp	469
		rpm	1900
Peak Torque		Nm	2380
		rpm	1200
Dimensions	L	mm	1251
	W	mm	923
	H	mm	1200



Consumption data

		rpm	1200	1500	1800	1900
Specific fuel consumption at:	25%	g/kWh	209	223	249	261
		lb/hph	0,34	0,36	0,40	0,42
	50%	g/kWh	195	201	216	223
		lb/hph	0,32	0,33	0,35	0,36
	75%	g/kWh	192	195	207	212
		lb/hph	0,31	0,32	0,34	0,34
	100%	g/kWh	192	196	205	208
		lb/hph	0,31	0,32	0,33	0,34

Specific AdBlue®/DEF consumption of diesel consumption, NRTC	Vol%	6,30

CO_2 emission declaration

Carbon dioxide (CO_2) emissions determined during the EU type approval process and recorded in EU type approval certificate, NRTC.	g/kWh	679,5

General

Number of cylinders			6
Displacement, total		liters in^3	12,78 780
Firing order			1-5-3-6-2-4
Bore		mm in	131 5,16
Stroke		mm in	158 6,22
Compression ratio			16,8:1
Wet weight	Engine only	kg lb	1267 2793
	The weight includes: The engine is weighed with components that consist of the minimum running weight including standard flywheel and excluding cooling package, hoses and air filters. For a clearer description, contact your regional application engineer		
	Power pack	kg lb	N/A N/A
	The weight includes: N/A		

Performance

Rated power	kW	345
	rpm	1900
IFN Power	kW	345
ICFN Power	kW	285

For ICFN please see Techincal data for	TAD1381VE

The engine performance corresponds to ISO 3046.

			rpm	1200	1500	1800	1900
Power	without fan		kW	299	345	345	345
			hp	407	469	469	469
For performance with fan see options technical data for the desired module.							
Torque (IFN)	without fan		Nm	2380	2195	1830	1733
			lbf ft	1755	1619	1350	1278
Max torque at engine speed	1200	rpm	Nm	2380			
			lbf ft	1755			
Power tolerance			%	±3%			
Total mass moment of inertia, J (mR2) for two mass calculations			kgm²	1,075			
(not including flywheel)			lbft²	25,5			
Total mass moment of inertia, J (mR^2) for transient load response calculations (not including flywheel)			kgm²	1,075			
			lbft²	25,5			
Friction Power warm engine			kW	20	30	43	48
			hp	27	40	58	65

Engine brake performance option		rpm	1200	1500	1900	2200
Brake power:	without fan	kW	149	183	244	297
		hp	203	249	332	403
Brake torque:	without fan	Nm	1190	1168	1229	1288
		lbf ft	877	861	906	950
Engine speed range for engine brake activation:		rpm	890			
Engine brake automatically deactivates at:		rpm	≤880			
Min oil temperature for engine brake activation:		°C	55			

Cold start performance

Cold start limit temperature	Preheater required @	°C	-15
	Preheater 4 kW	°F	5
	Preheater + block heater req @ Blockheater: Volvo 21694291 1500W/230V	°C °F	-30 -22
Cold start oil specification	T>-20°C VDS4.5 10W/30 T<-20°C VDS4.5 5W/30		
Cold start fuel specification	EN590 98/70/EC (For details see Volvo Penta Industrial fuel bulletin)		

Lubrication system

Lubricating oil consumption of diesel consumption (average)		Vol %	0,014
Oil change intervals/specifications	VDS4.5	h	1000
		h	
Oil pressure at rated speed	Max	kPa	560
		psi	81
Oil pressure at rated speed	Min	kPa	260
		psi	38
Lubrication oil temperature in oil pan:	Max	°C	128
		°F	262
Oil filter filtration efficiency (in accordance with ISO 4548-12)	90%	µ	38
	50%	µ	14

For oil system capacity and angularity limits see technical data per options

Fuel system

Suction line fuel flow at maximum output (Measured at fuel inlet connection)		liter/h	180
		US gal/h	47,6
Fuel supply line max. restriction (measured at fuel inlet connection)		kPa	10,0
		psi	1,45
Fuel supply line max. pressure, during engine running		kPa	16,5
(measured at fuel inlet connection @ engine)		psi	2,39
Fuel supply line max. pressure, during engine stand still		kPa	16,5
(measured at fuel inlet connection @ engine)		psi	2,39
Fuel supply line min. pressure, during engine stand still		kPa	-12,5
(measured at fuel inlet connection @ engine)		psi	-1,81
Maximum system return flow		liter/h	60
		US gal/h	15,9
Fuel return line max. restriction (measured at fuel return connection)		kPa	20,0
		psi	2,90
Max. allowable inlet fuel temp (Measured at fuel inlet connection)		°C	60
		°F	140
Prefilter / Water separator filtration efficiency	99%	µ	30
	0%	µ	N/A
Fuel filter filtration efficiency	98%	µ	5
	96%	µ	4
Injector type		F2	
Fuel to conform to		EN590 98/70/EC (For details see Volvo Penta Industrial fuel bulletin.)	

Intake system	**rpm**	**1200**	**1500**	**1800**	**1900**
Air consumption at: (+25°C and 100kPa)	m³/min	19,5	24,9	26,4	27,1
	cfm	688	879	931	956
⚠ **See front page for important information**	kPa	6			
Max allowable air intake restriction including piping, with clean air filters	psi	0,9			

Exhaust system	rpm	1200	1500	1800	1900
Heat rejection to exhaust:	kW	209	254	278	280
	BTU/min	11874	14434	15791	15897
Exhaust gas temperature after turbine at:	°C	473	468	478	467
	°F	884	874	893	873
⚠ **See front page for important information** Max allowable back pressure in exhaust line at full load (after turbine)	kPa	45	45	45	45
	psi	6,5	6,5	6,5	6,5
⚠ **See front page for important information** Max allowable temperature drop between turbine and muffler 1 inlet at exhaust temperature 480° C and exhaust gas flow 0.58 kg/s.	Δ°C	10	10	10	10
	Δ°F	18	18	18	18
⚠ **See front page for important information** Max allowable temperature drop between muffler 1 and muffler 2 at exhaust temperature 480° C and exhaust gas flow 0.58 kg/s.	Δ°C	N/A	N/A	N/A	N/A
	Δ°F	N/A	N/A	N/A	N/A
Muffler 1 pressure drop	kPa	17	22	24	25
(at exhaust gas flow and exhaust temp specified in this table)	psi	2,4	3,2	3,5	3,6
Muffler 2 pressure drop	kPa	N/A	N/A	N/A	N/A
(at exhaust gas flow and exhaust temp specified in this table)	psi	N/A	N/A	N/A	N/A
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	m³/min	42,2	49,3	51,6	52,2
	cfm	1489	1742	1823	1844
⚠ **See front page for important information** Engine speed during stand still regeneration	rpm	1400 ± 100			
⚠ **See front page for important information**	Nm	1000			
Max allowed load during stand still regeneration	lb ft	738			

Cooling system		rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:		kW	10	10	10	12
		BTU/min	596	555	561	671
Heat rejection to coolant at:		kW	136	154	171	176
		BTU/min	7724	8748	9711	10022
Coolant		Volvo Penta Coolant VCS (Yellow) Ready Mix 40/60 or Mix 40% Volvo Penta Coolant VCS (Yellow) + 60% tap Water*. * Tap water most fulfill Volvo quality standard VOLVO STD: 1285, 1				
Coolant capacity:	Engine only	liter	20			
For coolant capacity for engine and cooling packages see Technical data for the specific option.		US gal	5,3			
Coolant pump *(Engine is reference =1)*		drive/ratio	belt/1,41:1 cw			
Coolant pump curve see graphs at end						
Nominal engine coolant pressure before engine circuit coolant pump		kPa	27	26	26	27
		psi	4,0	3,8	3,7	3,9
Coolant pressure drop over complete engine circuit		kPa	21	32	41	46
(at coolant flow below)		psi	3,0	4,6	6,0	6,6
Coolant flow		l/s	4,18	5,26	6,31	6,67
		US gal/s	1,103	1,390	1,668	1,763
Minimum coolant flow		l/s	3,20	4,20	5,50	5,50
At fully opened thermostat		US gal/s	0,845	1,110	1,453	1,453
Maximum outer circuit restriction incl. piping		kPa	65			
		psi	9,4			
Thermostat:	start to open	°C	82			
		°F	180			
	fully open	°C	92			
		°F	197,6			
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			
Maximum top tank temperature		°C	107			
		°F	224,6			
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 functioning		liter	2,0			
		US gal	0,528			

Charge air cooler system	**rpm**	**1200**	**1500**	**1800**	**1900**
Heat rejection to charge air cooler	kW	51	66	66	68
	BTU/min	2888	3780	3754	3872
Charge air mass flow	kg/s	0,38	0,49	0,52	0,53
Charge air inlet temp @ 25 °C (Charge air temp after turbo compressor)	°C	165	172	166	168
	°F	329	342	330	334
⚠ **See front page for important information** Max allowable Charge air outlet temp @ 25 °C ambient temperature (Charge air temp after charge air cooler)	°C	50	50	50	50
	°F	122	122	122	122
⚠ **See front page for important information** Maximum pressure drop over charge air cooler incl. piping	kPa	12	12	12	12
	psi	1,7	1,7	1,7	1,7
Charge air pressure - relative pressure at sea level (After charge air cooler)	kPa	193	206	177	174
	psi	28,0	29,8	25,7	25,2

Electrical system

Engine Management System				EMS2.4		
Voltage and type				24V DC		
Battery and cable resistance Recommendations:	Temperature	°C		25	0	-15
		°F		77	32	5
	Maximum main circuit resistance @ 20°C	mΩ		5	4	3
	Minimum battery size	Ah (20h) / CCA (EN)		120/700	140/800	145/1050

Power take off

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.

Front end in line with crankshaft	**rpm**	**1200**	**1500**	**1800**	**1900**
With a total added mass moment of inertia	J (mR2)	≤ 0.05kgm2			
Max torque at continous load:	Nm	2300	2140	1560	1620
	lbt ft	1696	1578	1151	1195
PTO at flywheel					
Max allowed bending moment in flywheel housing	Nm	15000			
	lbf ft	11063			
Max load on rear main bearing	N	4000			
	lbf	899			

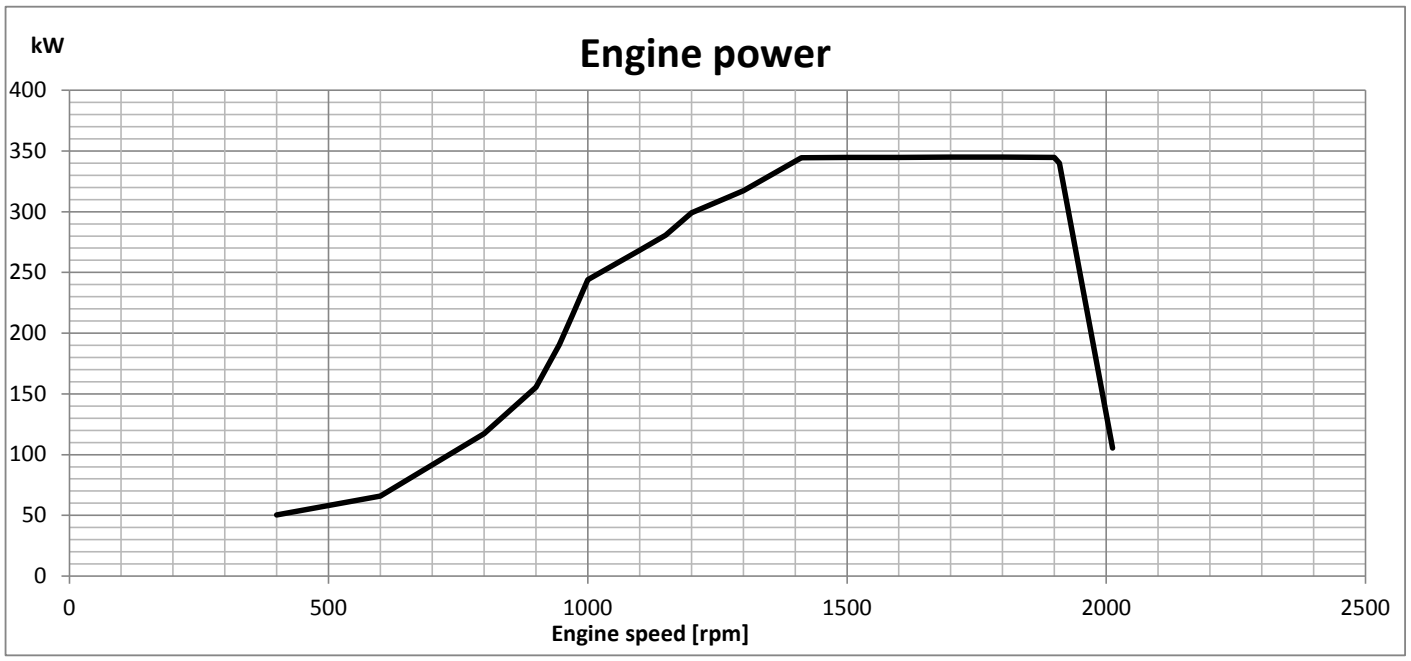
Engine Protection

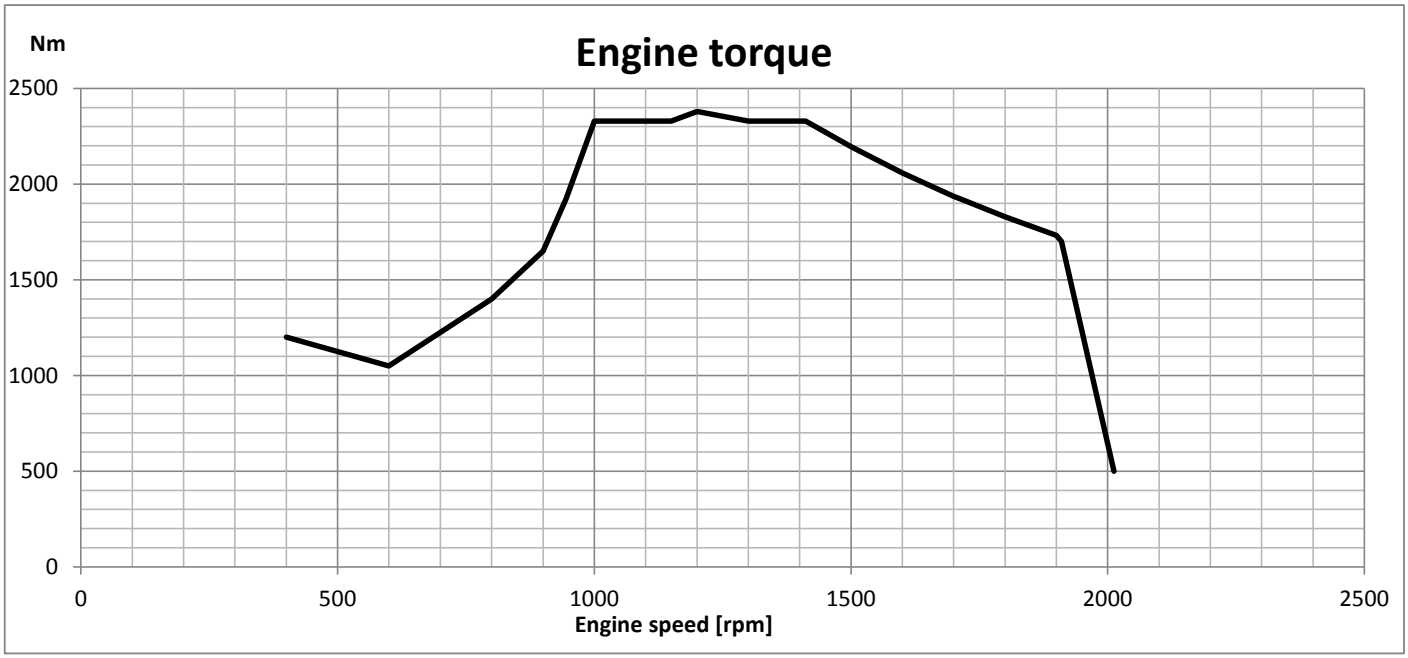
Warning implies that a Indication message is sent. Derate means an engine power derate.

Engine sensors				**Engine protection action**		
	Unit	**Warning level (Yellow)**	**Alarm level (Red)**	**Default**	Max derate, acc engine protection map	**Optional (Module or conversion kit)**
Fuel temperature[1]	°C	Not installed	Not installed	Not installed	Not installed	Not installed
Oil temperature	°C	125	130	Derate	132	Shut down
Coolant temperature	°C	105	107	Derate	108	Shut down
Charge Air Temperature (Boost temp)	°C	120	125	Derate	126	Shut down
Air filter temperature[1]	°C	Not installed	Not installed	Not installed	Not installed	Not installed
Exhaust gas temperature	°C	535	550	Shut down	550	Shut down
EGR temperature[1]	°C	Not installed	Not installed	Not installed	Not installed	Not installed
ECU temperature	°C	90	N/A	N/A	N/A	N/A
Fuel feed pressure[1]	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
Fuel rail pressure[1]	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
Oil Pressure	kPa	See below	See below	Shut down	See below	Shut down
Δ Piston Cooling Pressure	kPa	See below	See below	Shut down	See below	Shut down
Δ Charge Air Press (Δ Boost pres)	kPa	See below	See below	Derate	See below	Shut down
Air filter pressure[1]	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
EGR pressure[1]	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
Crankcase pressure increase[1]	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
DPF Differential Pressure	kPa	31	33	Derate	34	Shut down
Oil level[1]	Digital Switch	Not installed	Not installed	Not installed	Not installed	Not installed
Coolant level	Digital Switch	N/A	Low Level	Derate	Low Level	Shut down
DEF Injector Status	Digital Switch	N/A	Error Flag	Derate	Error Flag	Shut down
EATS System - Soot Regen Status	Status Flag	Warning	Stop Request	Derate	Stop Request	Shut down
Water in fuel[1]	Digital Switch	Not installed	Not installed	Not installed	Not installed	Not installed

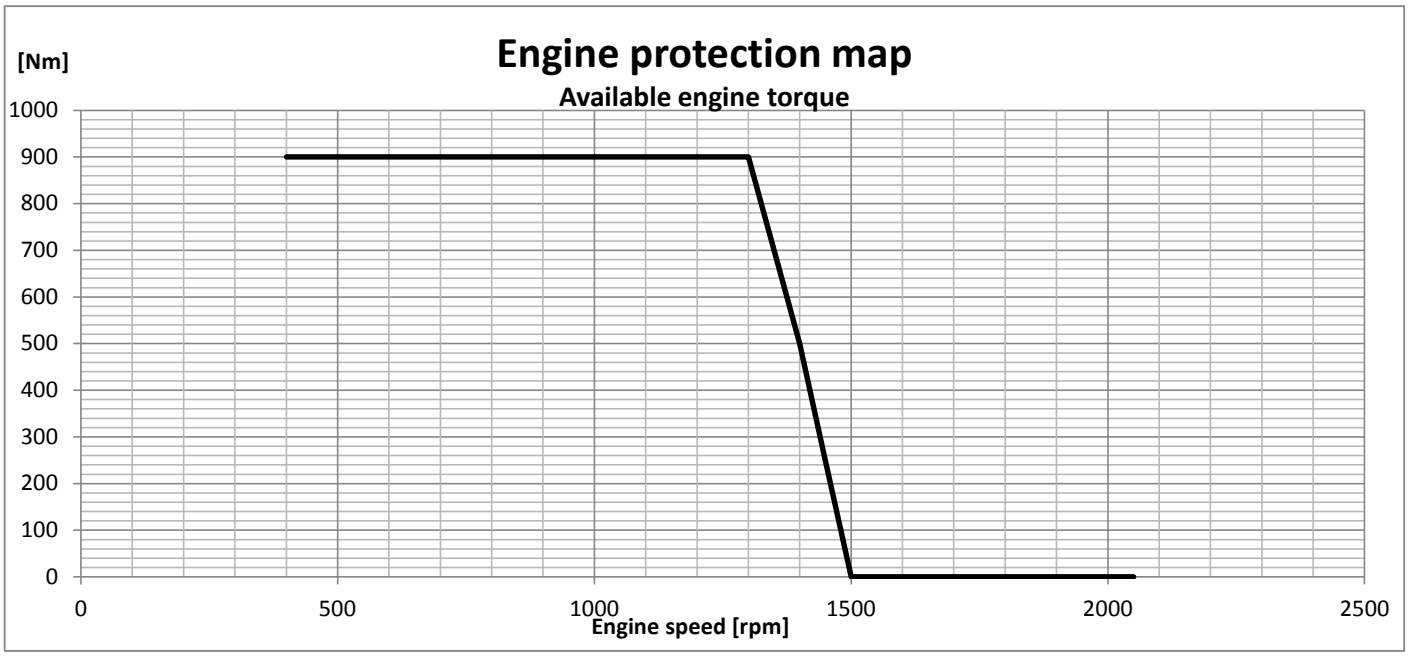
[1] Sensor not installed for this engine type

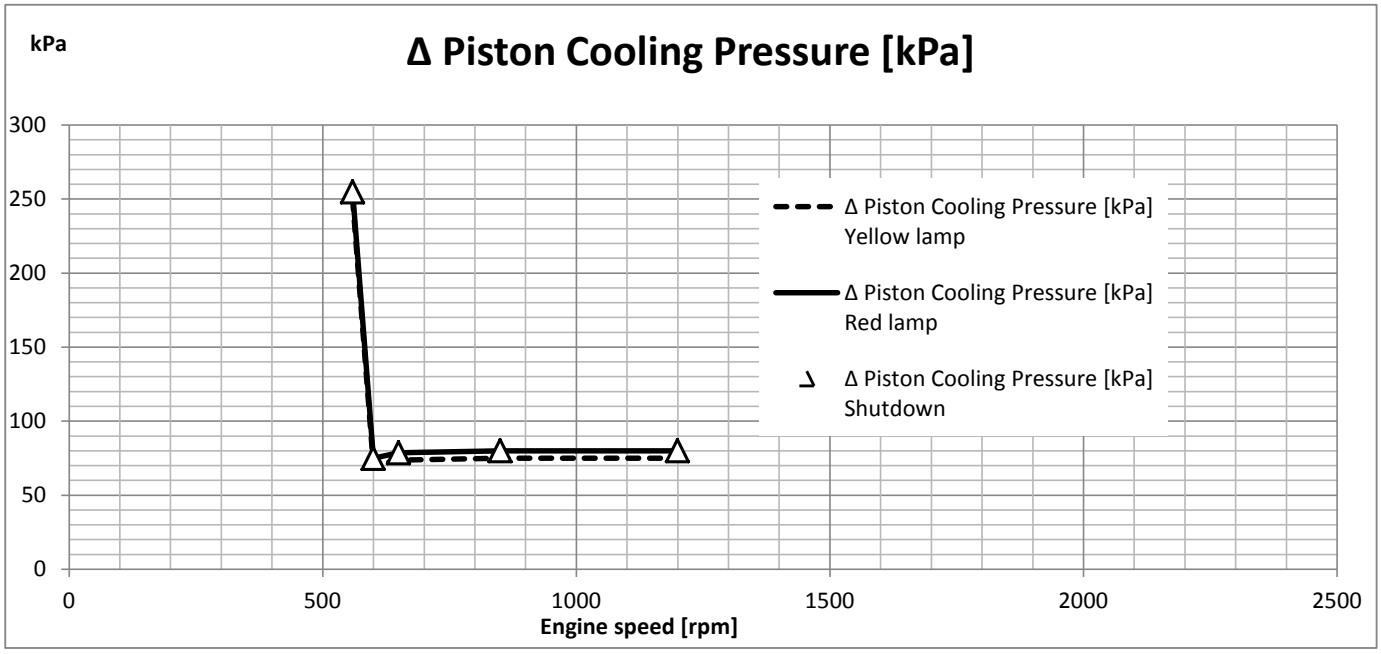
Graphs

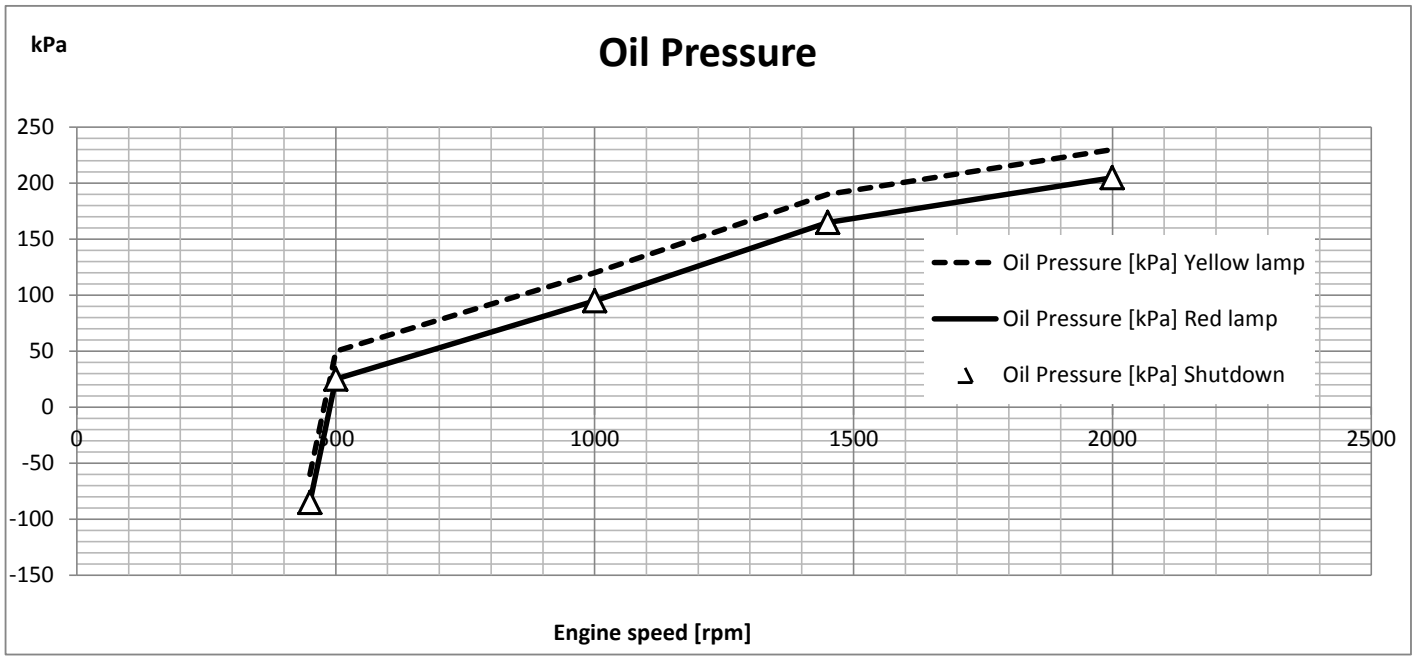

Engine power
kW
400
350
300
250
200
150
100
50
0
0
500
1000
1500
2000
2500
Engine speed [rpm]


Engine torque
Nm
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
Engine speed [rpm]

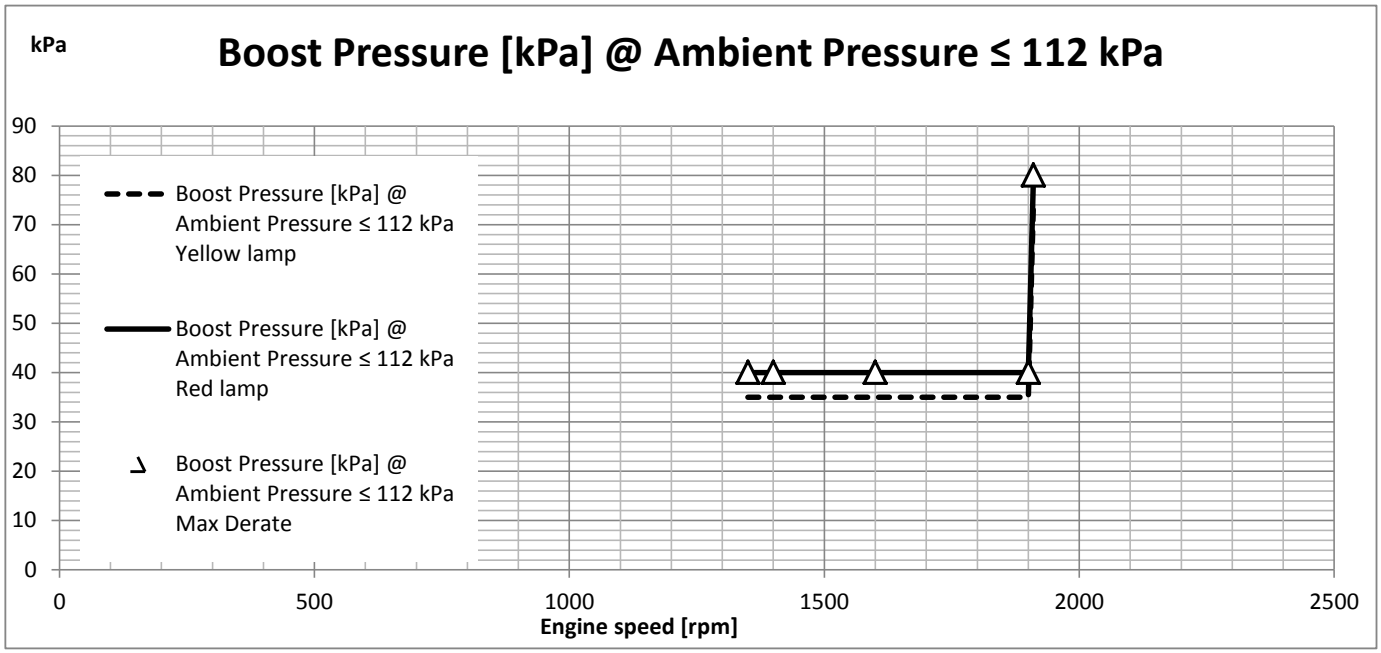
Warning and derate maps

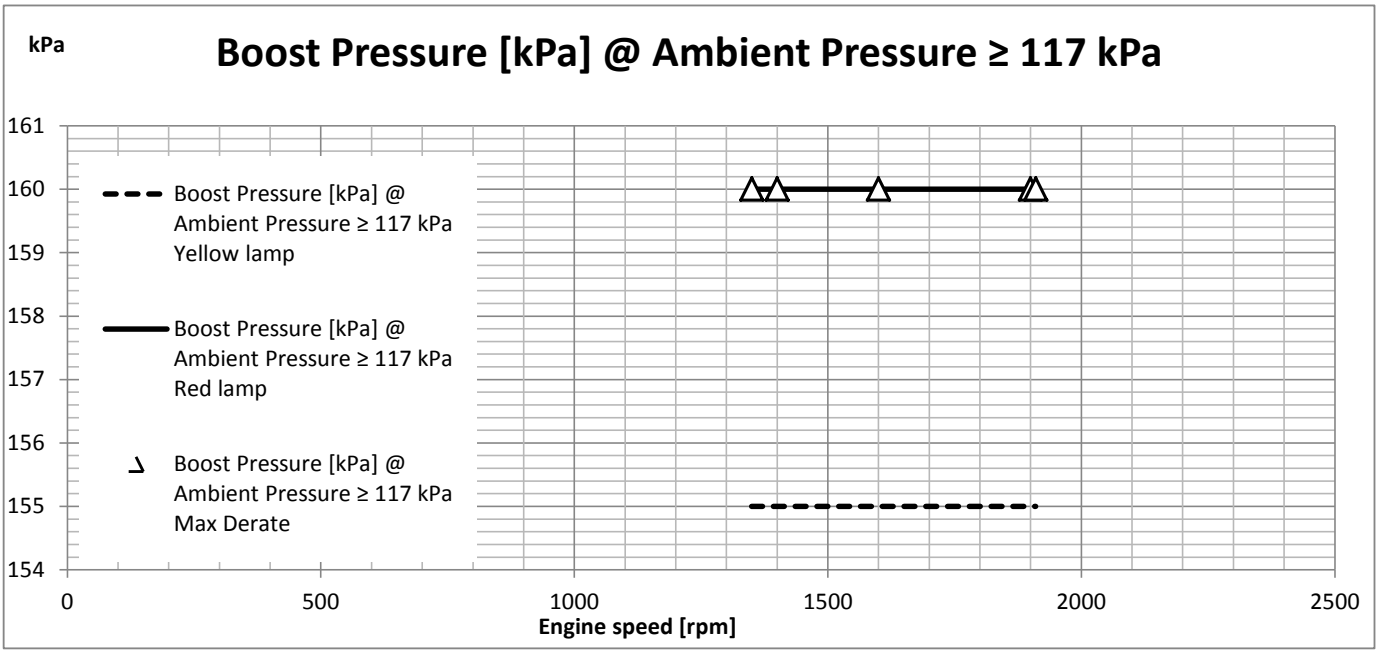


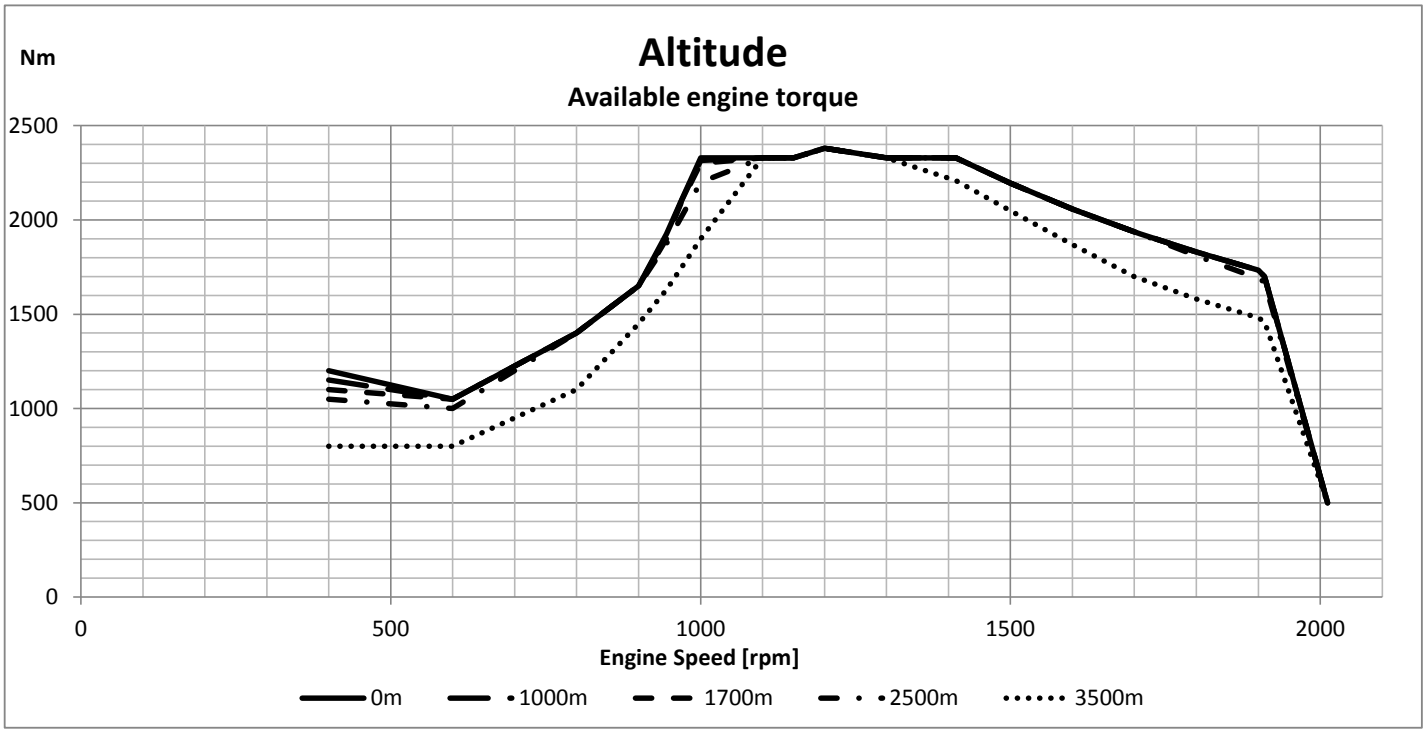

Δ Piston Cooling Pressure [kPa]
kPa
300
250
200
150
100
50
0
0
500
1000
1500
2000
2500
Engine speed [rpm]
Δ Piston Cooling Pressure [kPa] Yellow lamp
Δ Piston Cooling Pressure [kPa] Red lamp
Δ Piston Cooling Pressure [kPa] Shutdown

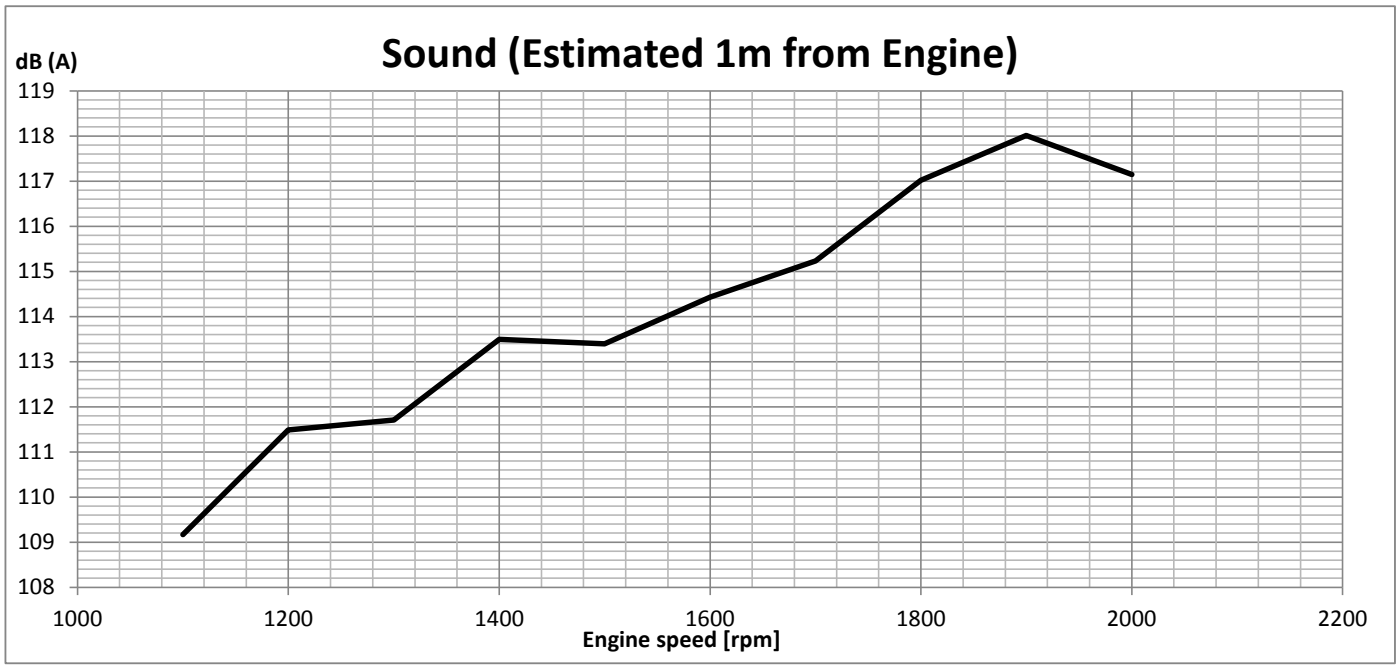

Oil Pressure
kPa
250
200
150
100
50
0
-50
-100
-150
0
500
1000
1500
2000
2500
Engine speed [rpm]
Oil Pressure [kPa] Yellow lamp
Oil Pressure [kPa] Red lamp
Oil Pressure [kPa] Shutdown

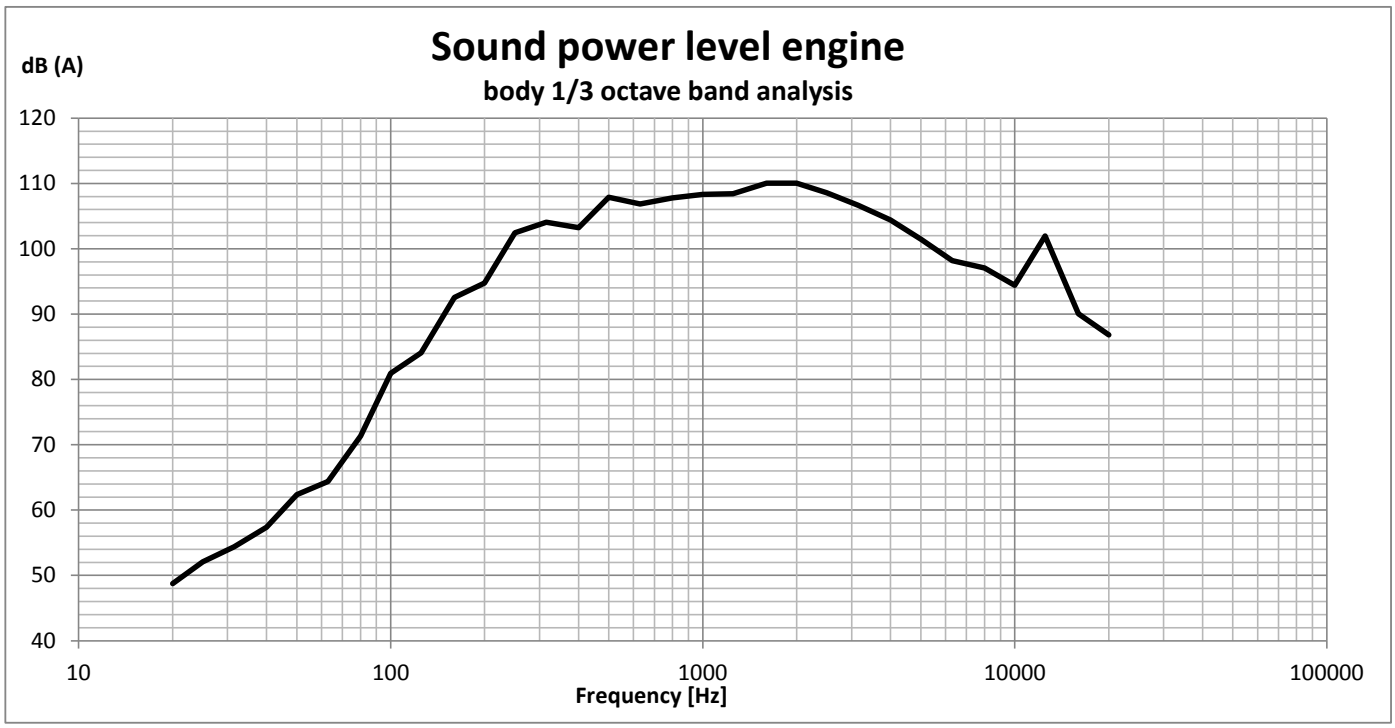
Engine protection for charge air pressure is complex and the trigger levels varies depending on engine mode, altitude and charge air temperature, ambient temperature.
Below is an example of engine protection limits for charge air pressure for normal operation engine mode, on the sea level with charge air temperature 50 degrees (normal charge cooler CAC efficiency) , and ambient temperature 25 degrees.
When engine speed increases above 1900 rpm (maximum power) charge pressure demand drops significantly but the actual charge pressure has a phycical delay to decrease therefore the fault limit is higher to avoid false alarm.

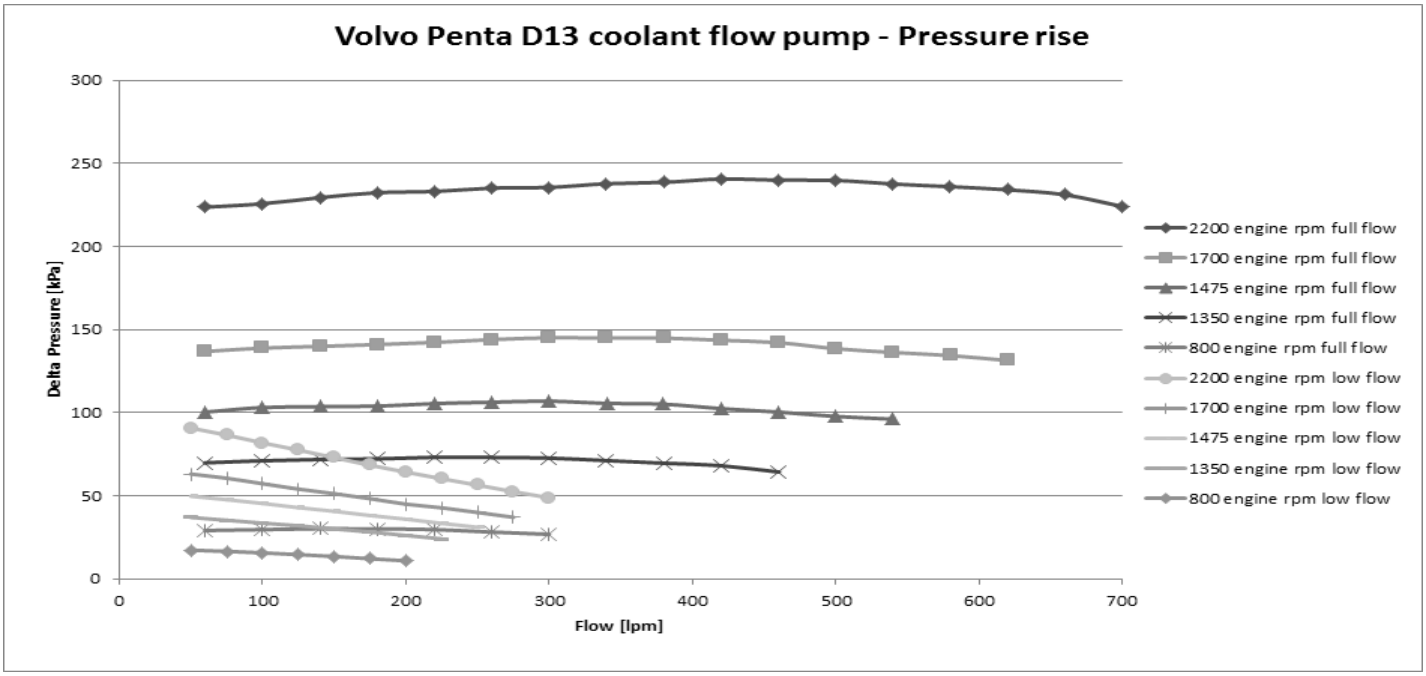


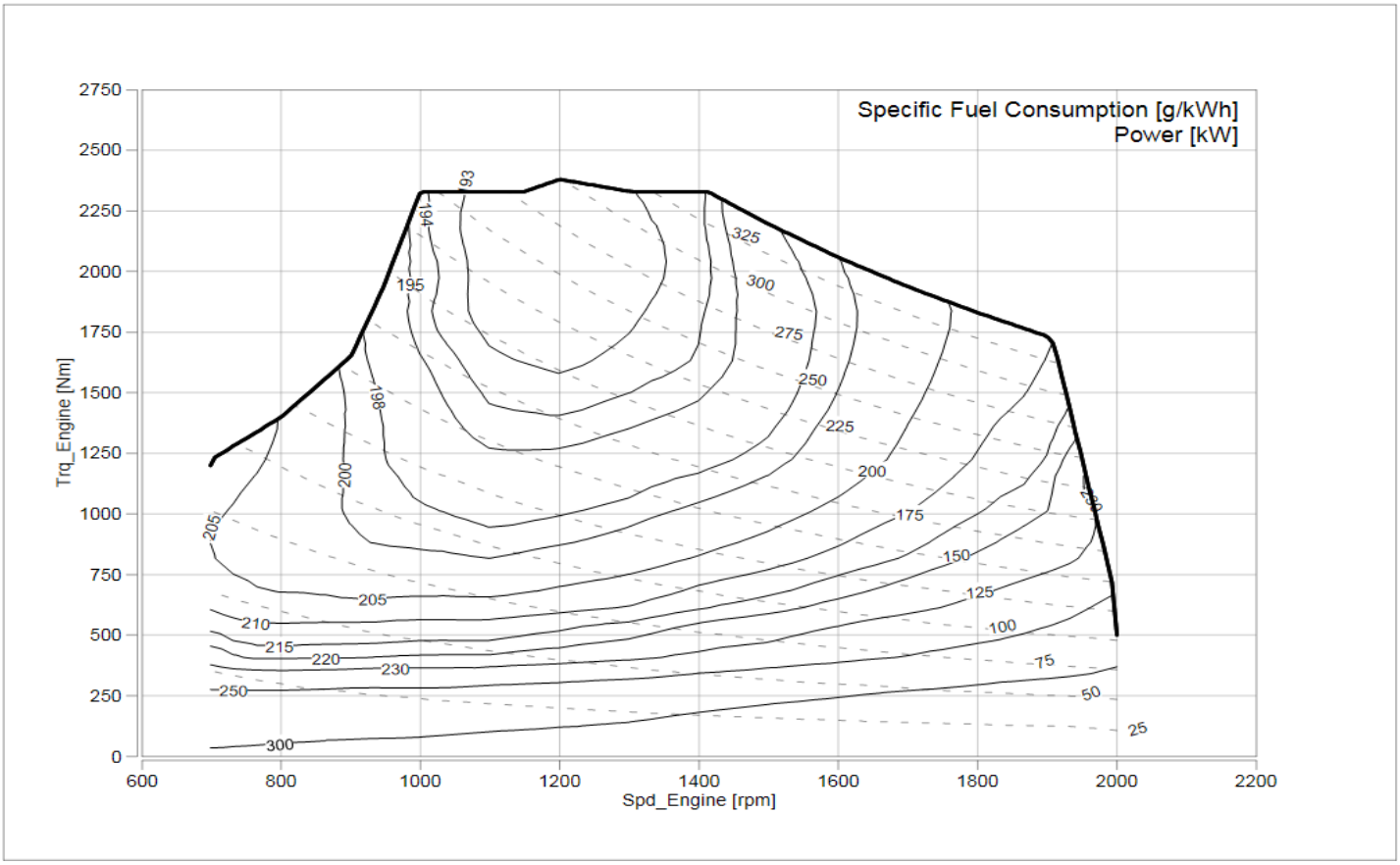


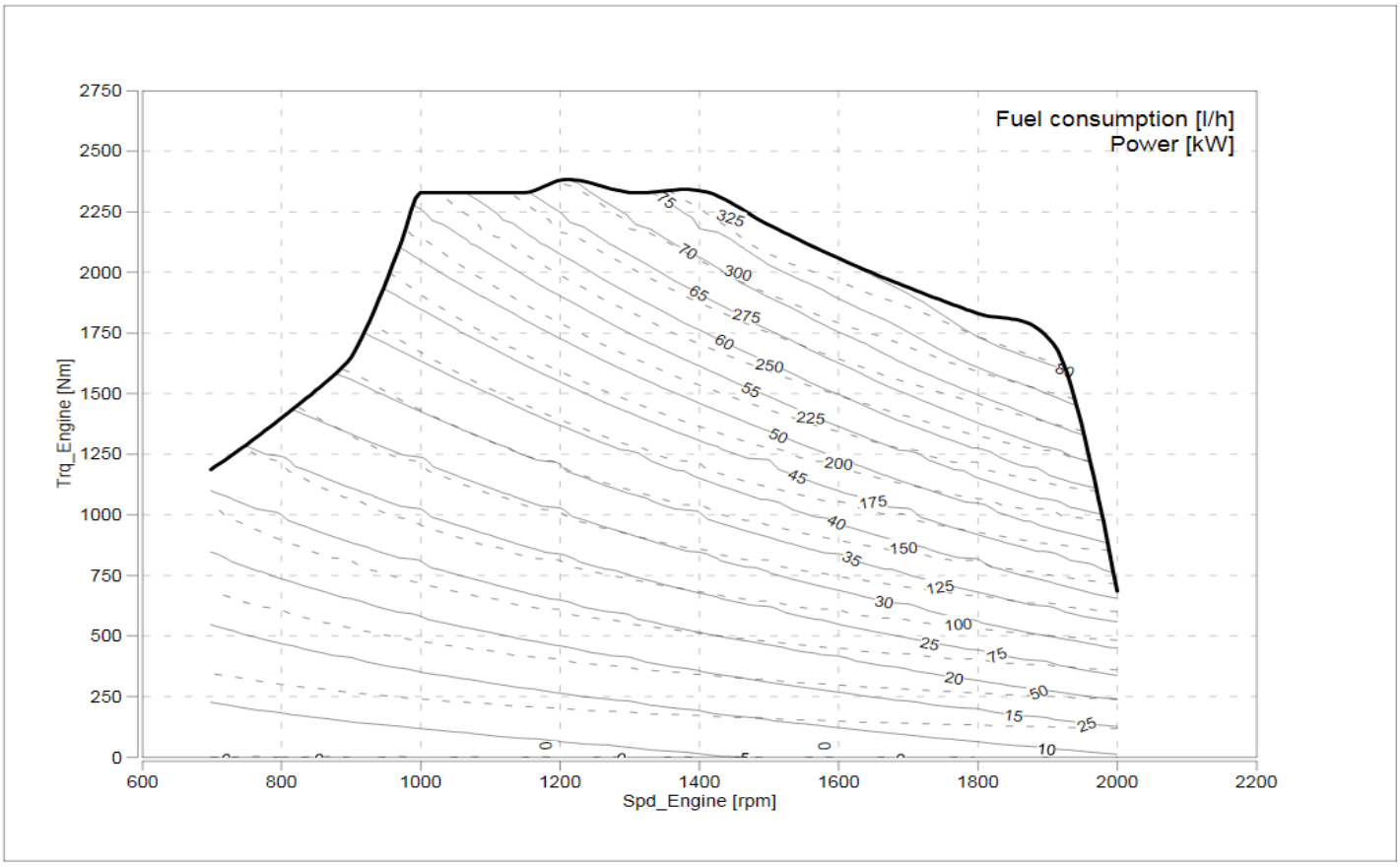

Altitude
Available engine torque
Nm
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
Engine Speed [rpm]
0m
1000m
1700m
2500m
3500m


Sound (Estimated 1m from Engine)
dB (A)
119
118
117
116
115
114
113
112
111
110
109
108
1000
1200
1400
1600
1800
2000
2200
Engine speed [rpm]


Sound power level engine
body 1/3 octave band analysis
dB (A)
120
110
100
90
80
70
60
50
40
10
100
1000
10000
100000
Frequency [Hz]


Volvo Penta D13 coolant flow pump - Pressure rise
Delta Pressure [kPa]
Flow [lpm]
0
50
100
150
200
250
300
0
100
200
300
400
500
600
700
2200 engine rpm full flow
1700 engine rpm full flow
1475 engine rpm full flow
1350 engine rpm full flow
800 engine rpm full flow
2200 engine rpm low flow
1700 engine rpm low flow
1475 engine rpm low flow
1350 engine rpm low flow
800 engine rpm low flow


Specific Fuel Consumption [g/kWh]
Power [kW]
Trq_Engine [Nm]
Spd_Engine [rpm]
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
600
800
1000
1200
1400
1600
1800
2000
2200
193
194
195
198
200
205
210
215
220
230
250
300
325
275
225
175
150
125
100
75
50
25


Fuel consumption [l/h]
Power [kW]
Trq_Engine [Nm]
Spd_Engine [rpm]
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
600
800
1000
1200
1400
1600
1800
2000
2200
75
70
65
60
55
50
45
40
35
30
25
20
15
10
325
300
275
250
225
200
175
150
125
100
75
50
25
0