


Important

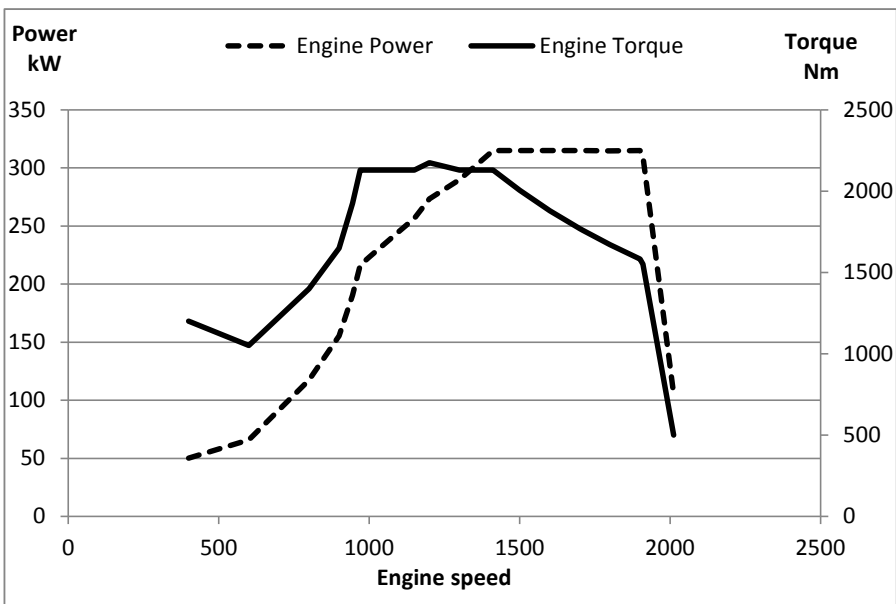
This Technical Data Sheet and the corresponding Installation Instructions provide important information to ensure the installed engine will operate according to the design specification in the Volvo Penta application for certification.

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.

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

Peak Power		kW	315
		hp	428
		rpm	1900
Peak Torque		Nm	2175
		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	213	228	254	268
		lb/hph	0,35	0,37	0,41	0,43
	50%	g/kWh	197	202	219	226
		lb/hph	0,32	0,33	0,35	0,37
	75%	g/kWh	193	196	209	214
		lb/hph	0,31	0,32	0,34	0,35
	100%	g/kWh	192	195	205	209
		lb/hph	0,31	0,32	0,33	0,34
Specific AdBlue®/DEF consumption of diesel consumption, NRTC		Vol%	6,20			

CO₂ emission declaration

Carbon dioxide (CO ₂) emissions determined during the EU type approval process and recorded in EU type approval certificate, NRTC.	g/kWh	685,2
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General

Number of cylinders			6
Displacement, total		liters	12,78
		in ³	780
Firing order			1-5-3-6-2-4
Bore		mm	131
		in	5,16
Stroke		mm	158
		in	6,22
Compression ratio			16,8:1
Wet weight	Engine only	kg	1267
		lb	2793
	<u>The weight includes:</u> 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	N/A
		lb	N/A
<u>The weight includes:</u> N/A			

Performance

Rated power	kW	315
	rpm	1900
IFN Power	kW	315
ICFN Power	kW	285

The engine performance corresponds to ISO 3046.

For ICFN please see Technical data for TAD1381VE

		rpm	1200	1500	1800	1900
Power	without fan	kW	273	315	315	315
		hp	372	428	428	428
For performance with fan see options technical data for the desired module.						
Torque (IFN)	without fan	Nm	2175	2005	1670	1583
		lbf ft	1604	1479	1232	1167
Max torque at engine speed	1200	rpm	2175			
			1604			
Power tolerance		%	±3%			
Total mass moment of inertia, J (mR ²) for two mass calculations (not including flywheel)		kgm ²	1,075			
		lbft ²	25,5			
Total mass moment of inertia, J (mR ²) for transient load response calculations (not including flywheel)		kgm ²	1,075			
		lbft ²	25,5			
Friction Power warm engine			20	30	43	48
			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 @	°C	-30
	Blockheater: Volvo 21694291 1500W/230V	°F	-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	262,4
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 (measured at fuel inlet connection @ engine)		kPa	16,5
		psi	2,39
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection @ engine)		kPa	16,5
		psi	2,39
Fuel supply line min. pressure, during engine stand still (measured at fuel inlet connection @ engine)		kPa	-12,5
		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)	m ³ /min	18,2	24,6	26,1	26,7
	cfm	642	870	921	944
					
See front page for important information					
Max allowable air intake restriction including piping, with clean air filters	kPa		6		
	psi		0,9		

Exhaust system	rpm	1200	1500	1800	1900
Heat rejection to exhaust:	kW	190	231	256	258
	BTU/min	10792	13139	14572	14659
Exhaust gas temperature after turbine at:	°C	475	428	437	432
	°F	886	802	819	809
 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 (at exhaust gas flow and exhaust temp specified in this table)	kPa	15	21	23	23
	psi	2,2	3,0	3,3	3,3
Muffler 2 pressure drop (at exhaust gas flow and exhaust temp specified in this table)	kPa	N/A	N/A	N/A	N/A
	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	39,6	46,5	49,4	50,0
	cfm	1400	1643	1743	1766
 See front page for important information					
Engine speed during stand still regeneration	rpm	1400 ± 100			
 See front page for important information					
Max allowed load during stand still regeneration	Nm	1000			
	lb ft	738			

Cooling system		rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	kW		10	9	9	11
	BTU/min		551	506	498	620
Heat rejection to coolant at:	kW		127	145	160	166
	BTU/min		7220	8233	9105	9445
Coolant	Volvo Penta Coolant VCS (Yellow) Ready Mix 40/60 or Mix 40% Volvo Penta Coolant VCS (Yellow) + 60% tap Water*. * Tap water must fulfill Volvo quality standard VOLVO STD: 1285, 1					
Coolant capacity:	Engine only	liter	20			
<i>For coolant capacity for engine and cooling packages see Technical data for the specific option.</i>		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		22	23	22	24
	psi		3,2	3,3	3,2	3,5
Coolant pressure drop over complete engine circuit (at coolant flow below)	kPa		21	32	42	46
	psi		3,0	4,7	6,0	6,7
Coolant flow	l/s		4,17	5,26	6,31	6,67
	US gal/s		1,102	1,390	1,666	1,762
Minimum coolant flow At fully opened thermostat	l/s		3,20	4,20	5,50	5,50
	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	44	65	64	65
	BTU/min	2487	3684	3629	3723
Charge air mass flow	kg/s	0,36	0,49	0,51	0,53
Charge air inlet temp @ 25 °C (Charge air temp after turbo compressor)	°C	154	170	163	164
	°F	310	338	325	327
 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	172	202	173	170
	psi	25,0	29,4	25,1	24,6

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 than one PTO output is used simultaneously, calculations need 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 continuous load:	Nm	2210	2030	1680	1580
	lbt ft	1630	1497	1239	1165
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			

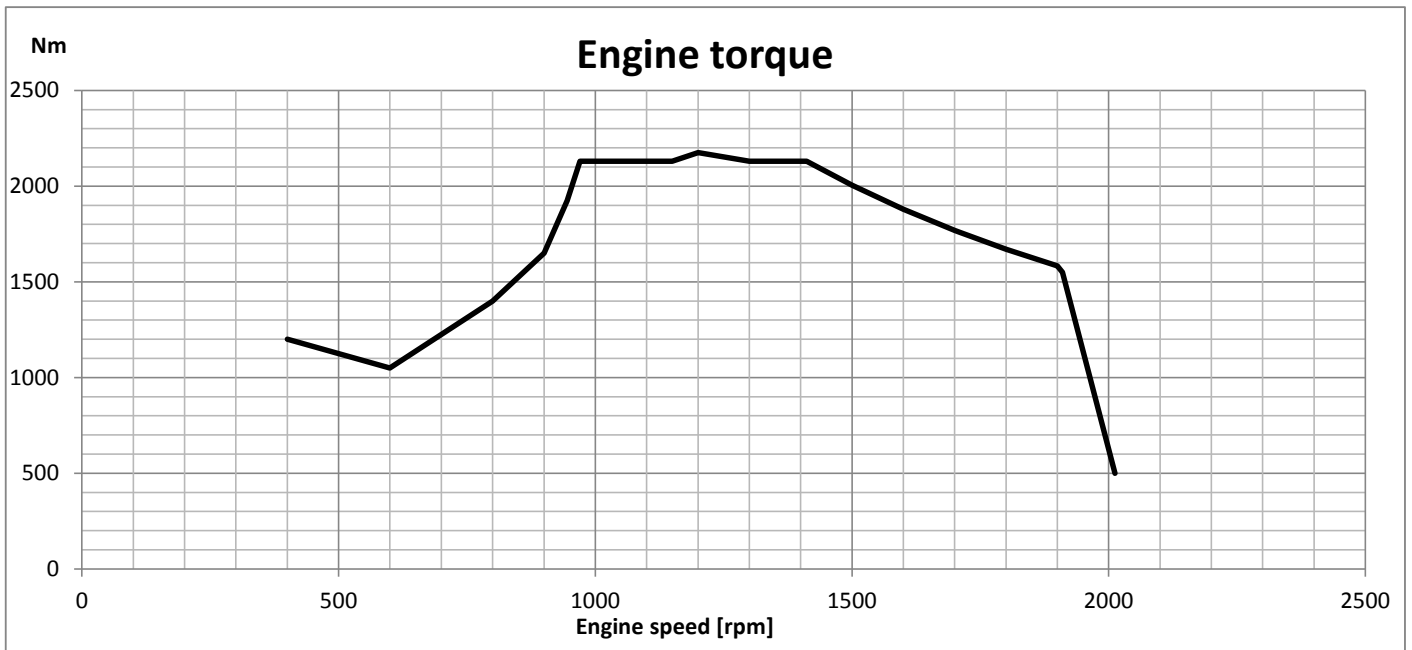
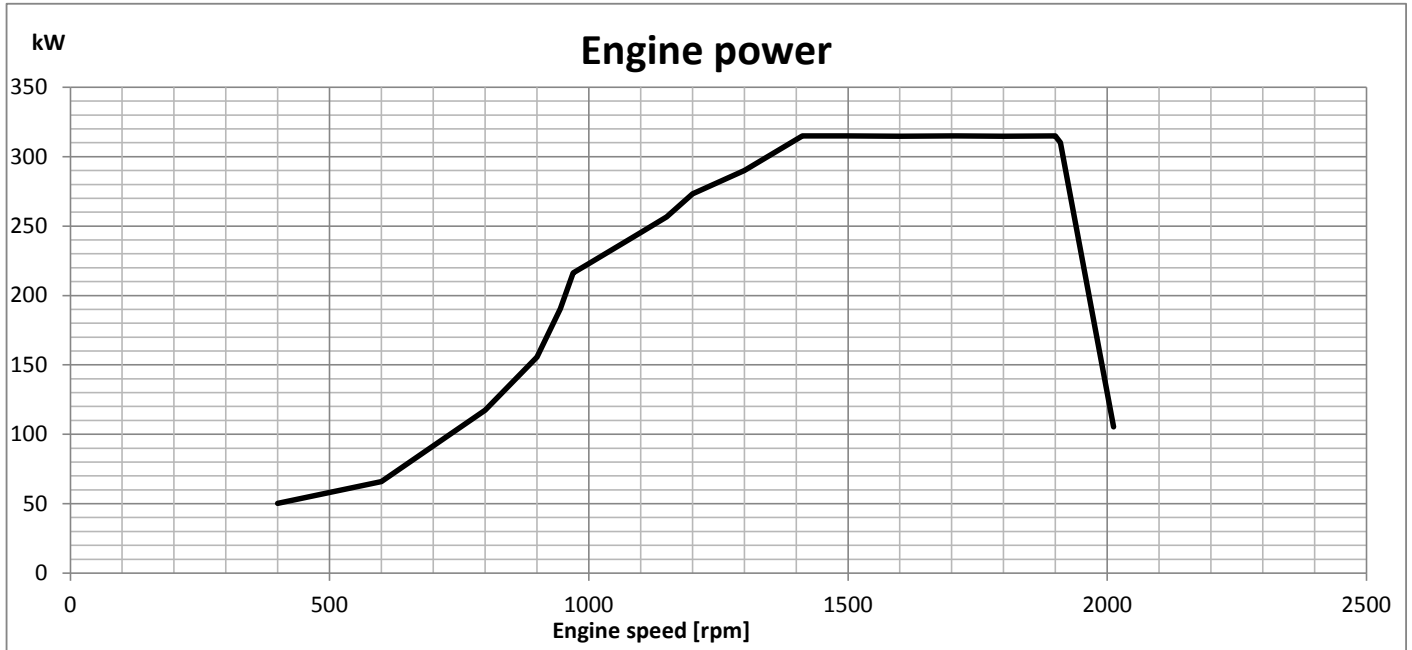
Engine Protection

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

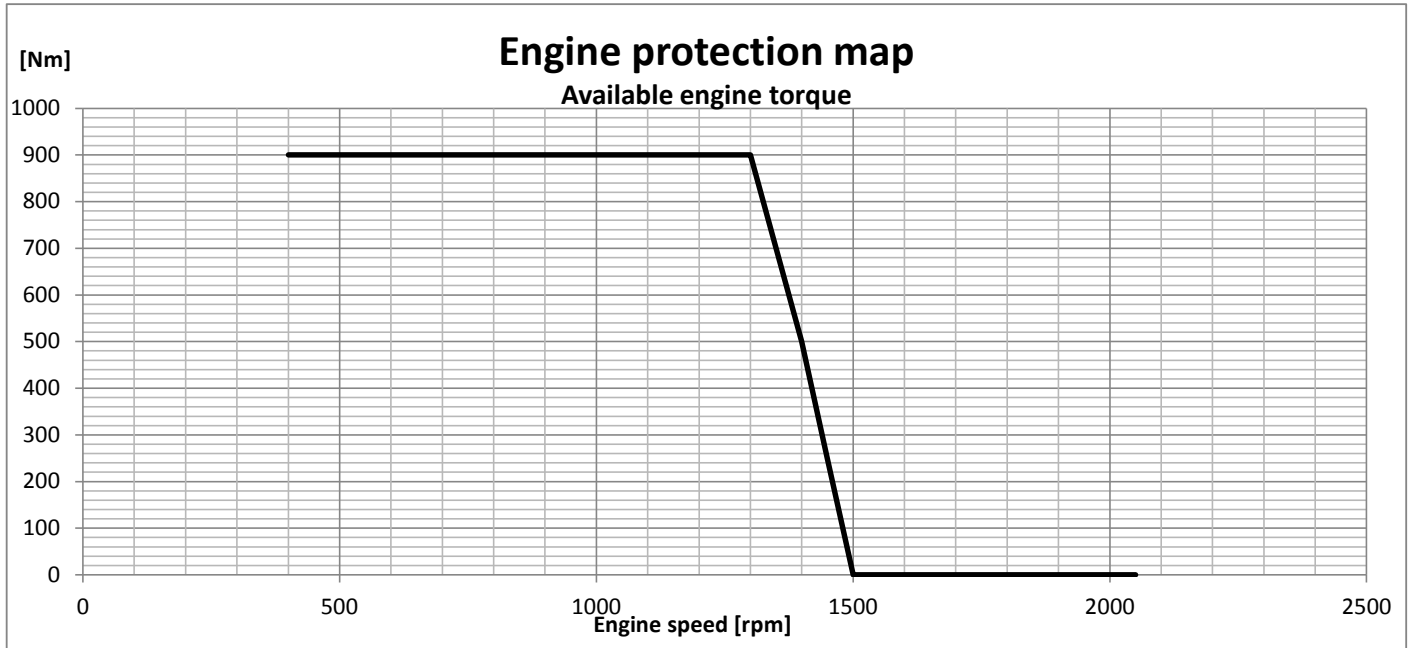
Engine sensors				Engine protection action		
	Unit	Warning level (Yellow)	Alarm level (Red)	Default	Max derate, acc engine protection map	Optional (Module or conversion kit)
Fuel temperature ¹	°C	Not installed	Not installed	Not installed	Not installed	Not installed
Oil temperature	°C	125	130	Derate	132	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

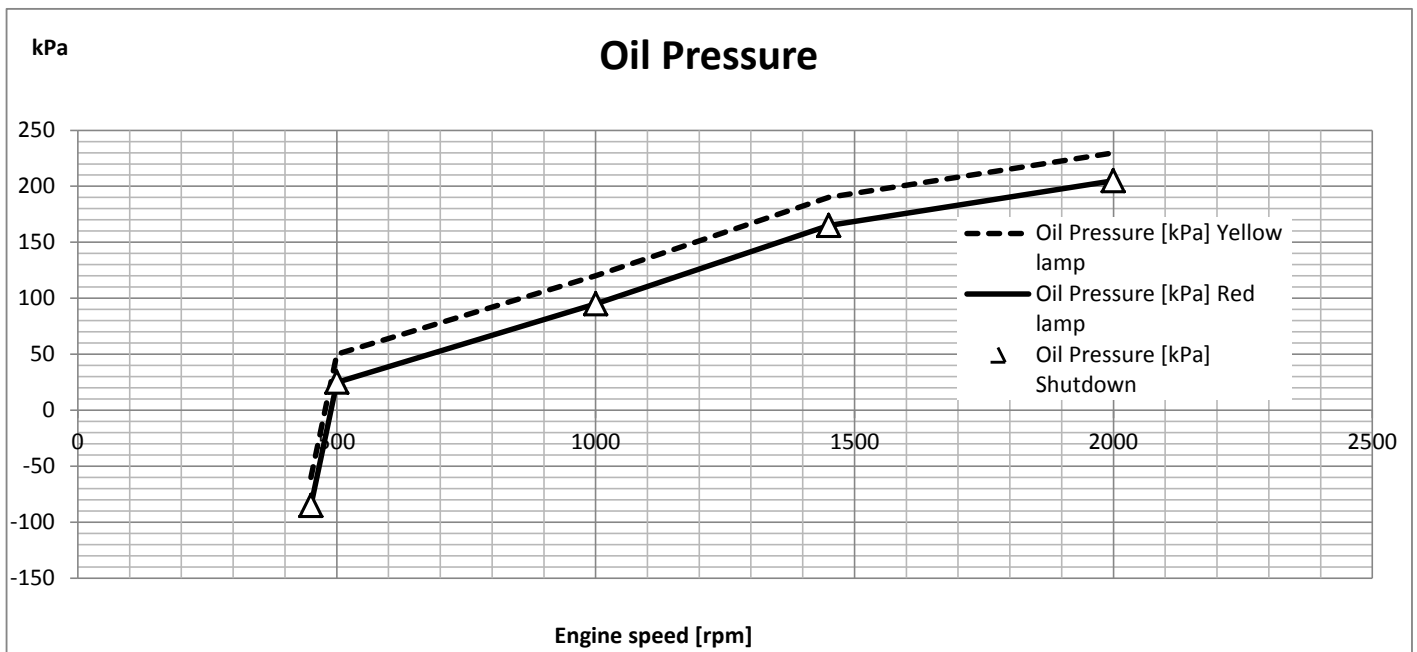
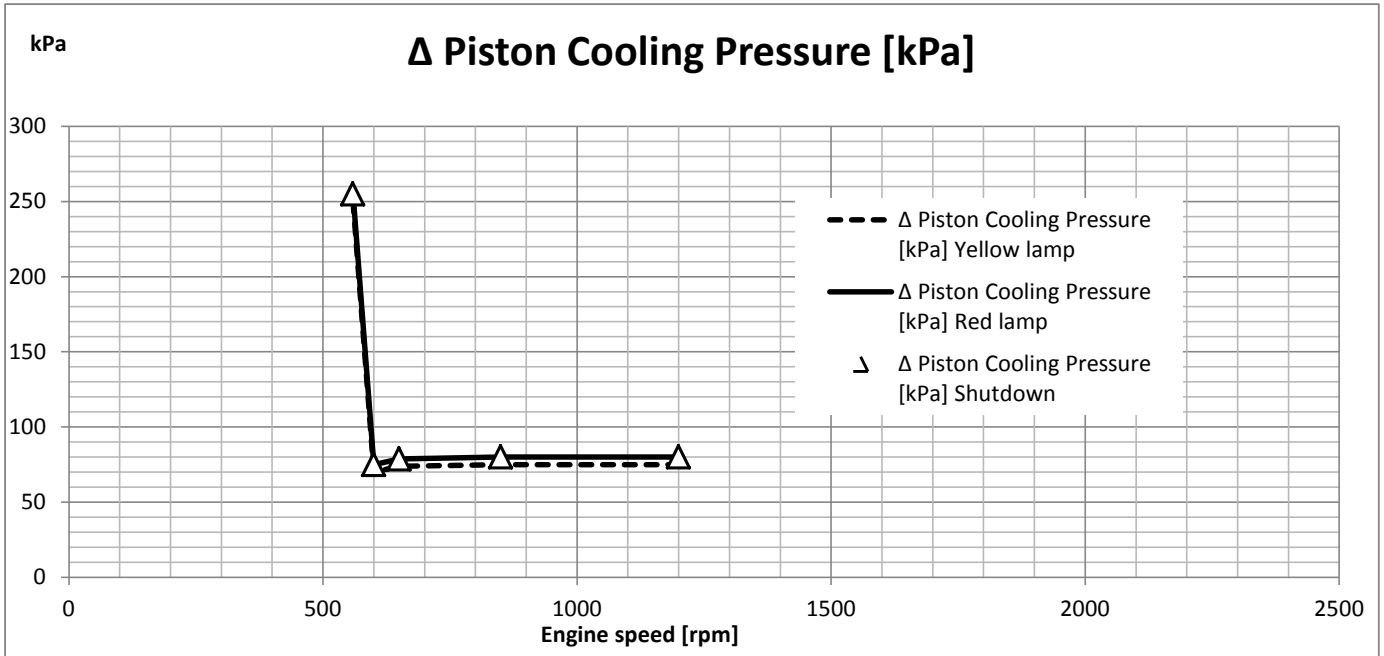
¹ Sensor not installed for this engine type

Graphs



Warning and derate maps

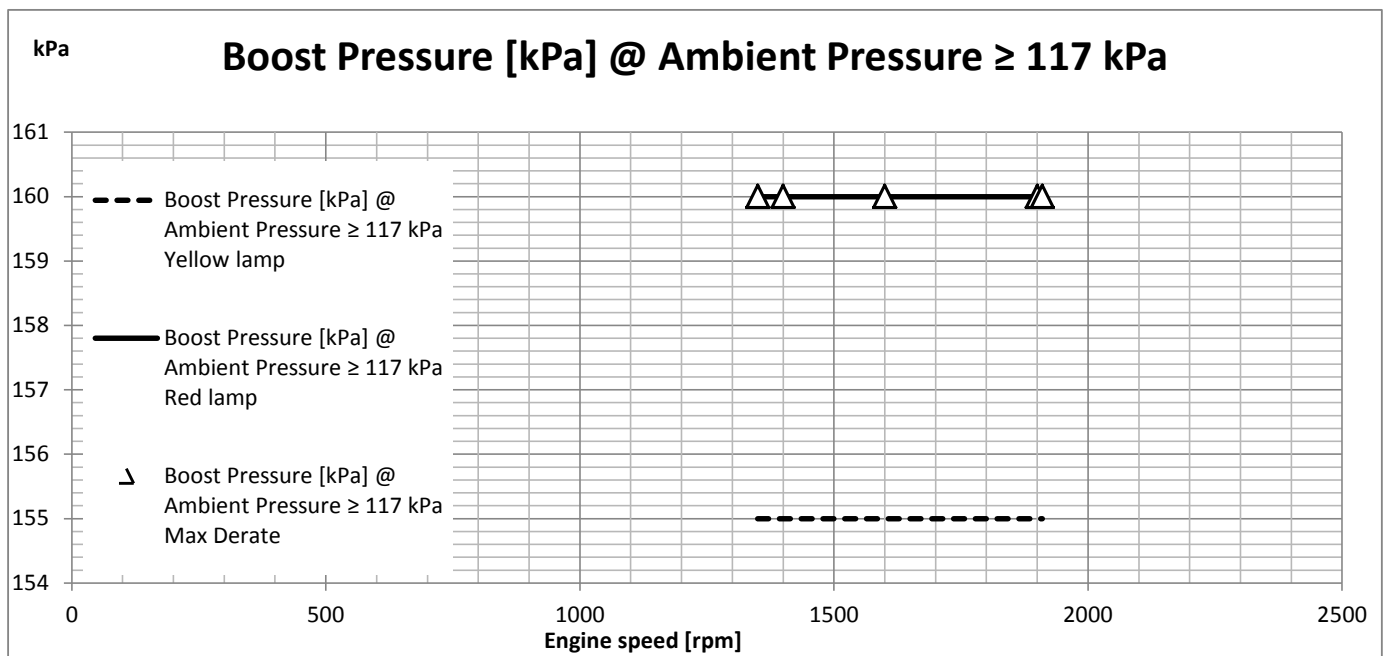
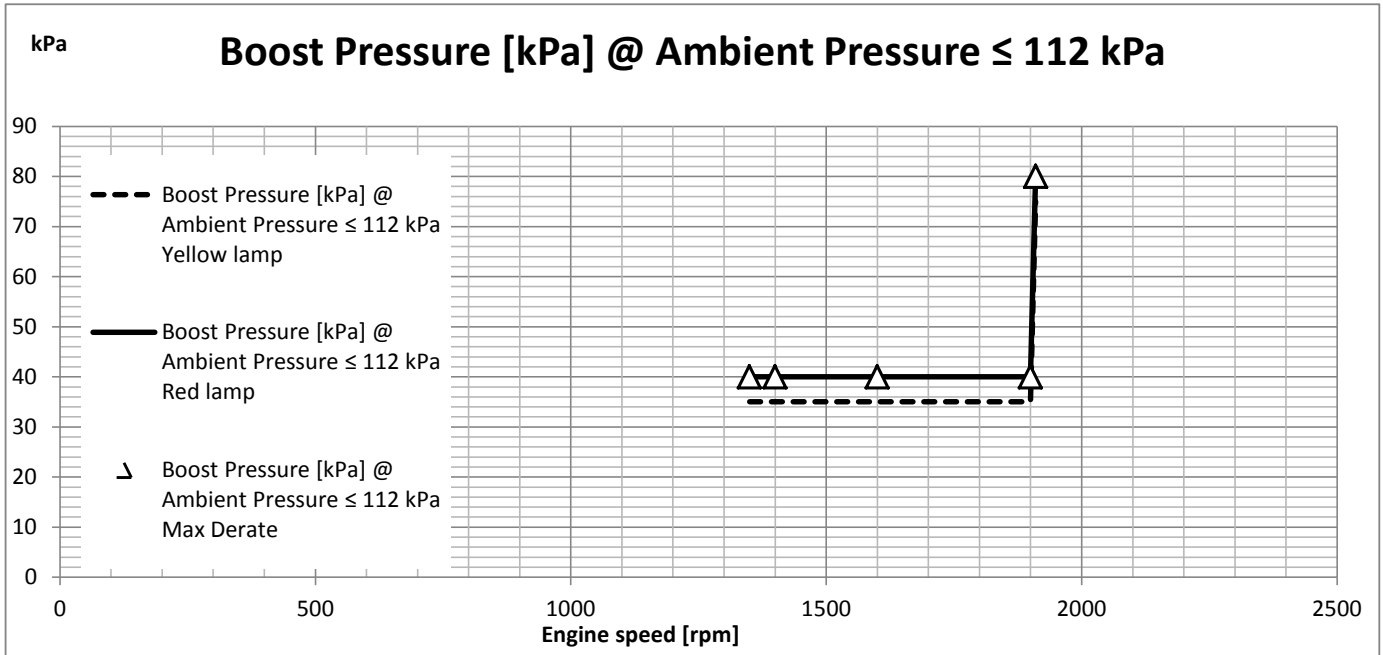


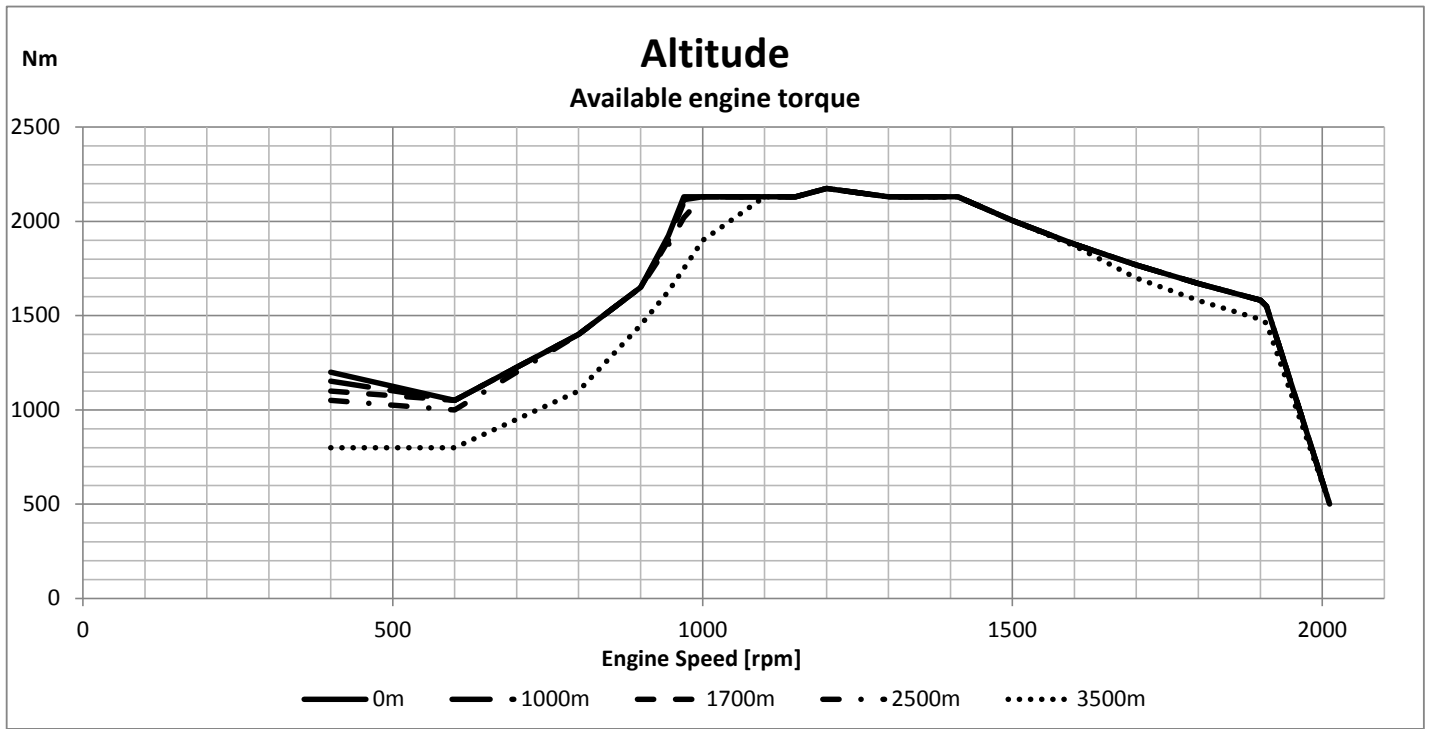


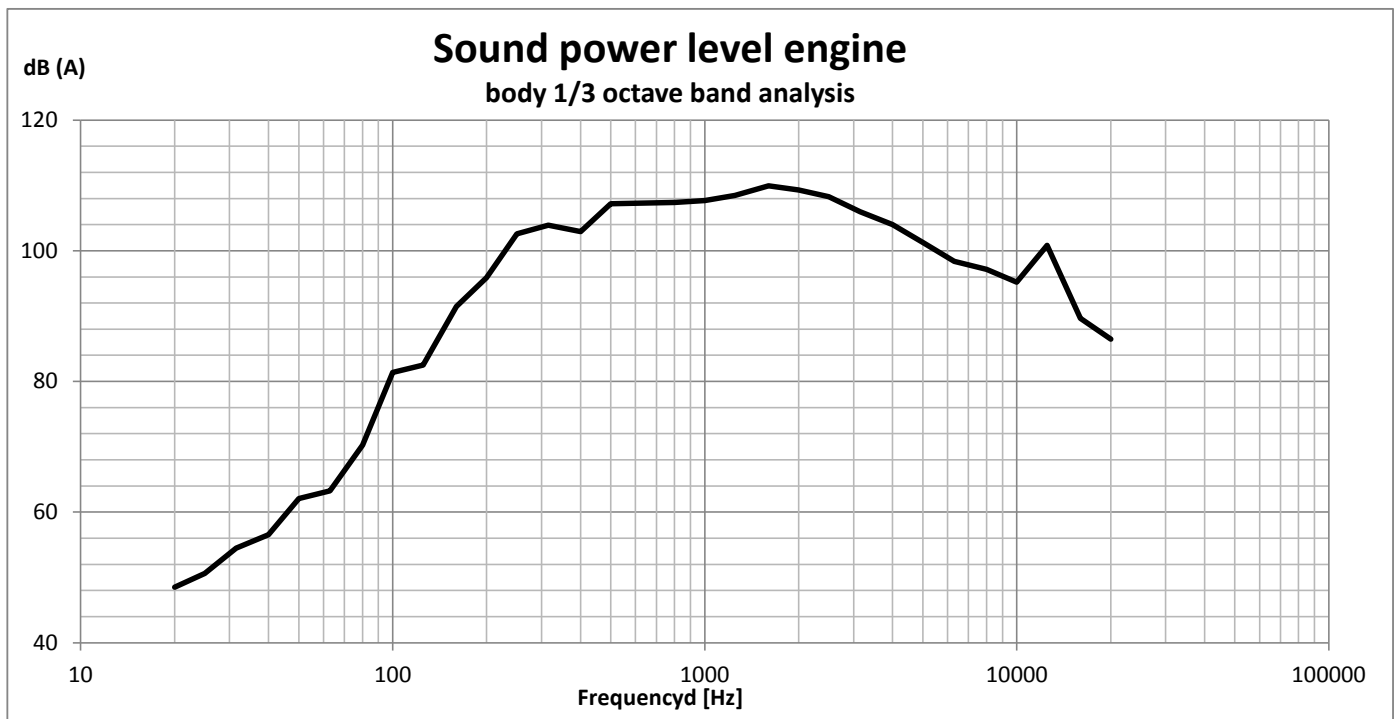
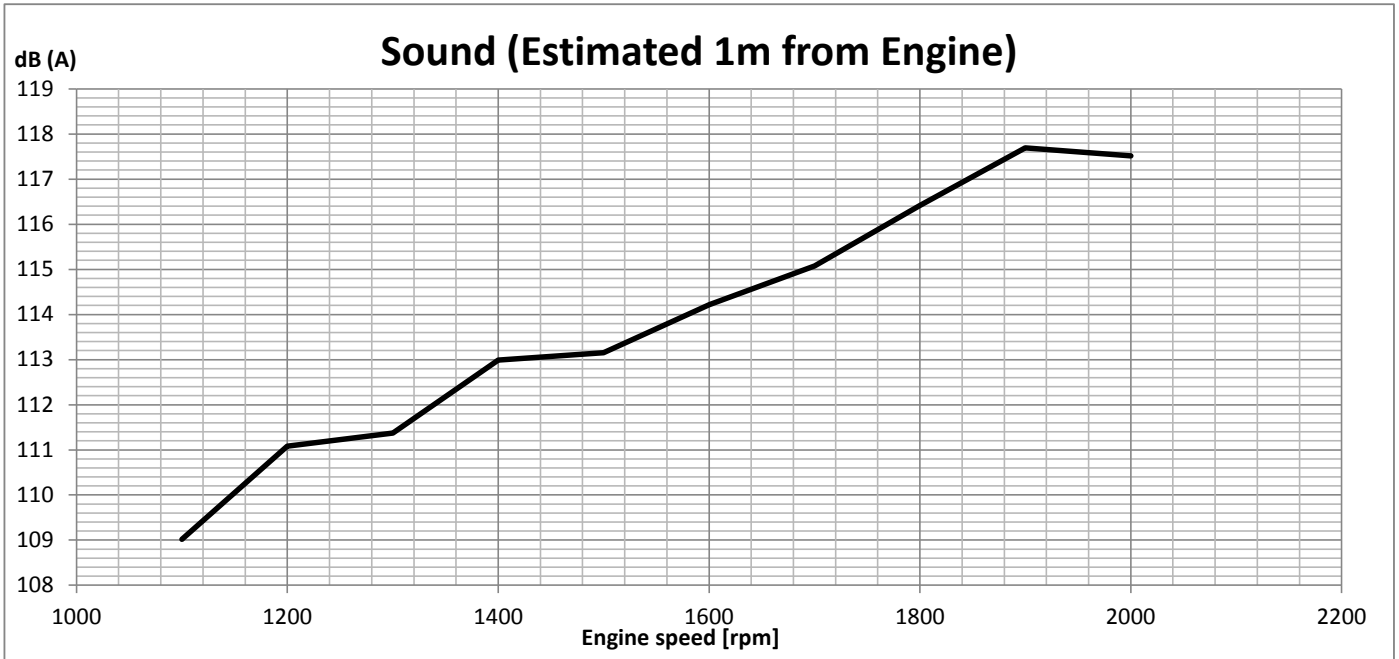
Engine protection for charge air pressure is complex and the trigger levels varies depending on engine mode, altitude and charge air temperature, ambient temperature.

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 physical delay to decrease therefore the fault limit is higher to avoid false alarm.







Volvo Penta D13 coolant flow pump - Pressure rise

