

Section 2 Engine

Group 20 General

Performance and other data, petrol engines:

Engine type: (Geometric compression ratio)	Fuel: Rec. Octane rating*. Diesel: Cetane rating.	Power:		Maximum torque:
		kW at r/s	hp / rpm	Nm / rpm
B 5204 T5 (9.5:1)	95	132 / 88	180 / 5300	240 / 2200-5300
B5244S (10.3:1)	95	125/98	170/5900	230 / 4500
B5244S2 (10.3:1)	95	103 / 75	140 / 4500	220 / 3750
B 5244 T3 (9.0:1)	95	147 / 100	200 / 6000	285 / 1800-5000
B 5234 T3 (8.5:1)	95	184 / 87	250 / 5200	330 / 2400-5200
B5234T7 (8.5:1)	95	147/83	200/5000	285 / 2000-5000

* Use only **unleaded petrol** .

Can also be driven on 91-98 octane petrol.

For best performance and minimum fuel consumption use 98 octane unleaded petrol.

Other general data

Engine type:	B 5204 T5 Engine code 49	B5244S Engine code 61	B5244S2 Engine code 65	B 5234 T3 Engine code 53	B 5244 T3 Engine code 58	B5234T7 engine code 57
No. of cylinders	5	5	5	5	5	5
Cylinder diameter mm (inches)	81 (3.19")	83 (3.27")	83 (3.27")	81 (3.19")	83 (3.27")	81 (3.19")
Cylinder stroke mm (inches)	77 (3.03")	90 (3.54")	90 (3.54")	90 (3.54")	90 (3.54")	90 (3.54")
Cylinder displacement litres	1.984	2.435	2.435	2.319	2.435	2.319
Boost pressure, absolute pressure at sea level kPa	Normal: 153 Max.: 158			Normal: 182 Max.: 193	Normal: 140 Max.: 147	Normal: 140 Max 147
Firing order	1-2-4 -5-3	1-2-4 -5-3	1-2-4 -5-3	1-2-4 -5-3	1-2-4 -5-3	1-2-4 -5-3
Engine speed (RPM), idle speed rpm	670	750	750	670	670	670
Engine speed (RPM), maximum rpm	6200	6500/ 6800	6500/ 6800	6200	6200	6200
Weight, gross, including auxiliary equipment and oil etc. kg (lb.)	166-186 (366-410)	142-154 (315-342)	142-154 (315-342)	144-156 (317-344)	143-156 (315-344)	166-186 (369-413)

Group 21 Cylinder block

Tightening torques for petrol engines: B 5XX4 TX, Cylinder block

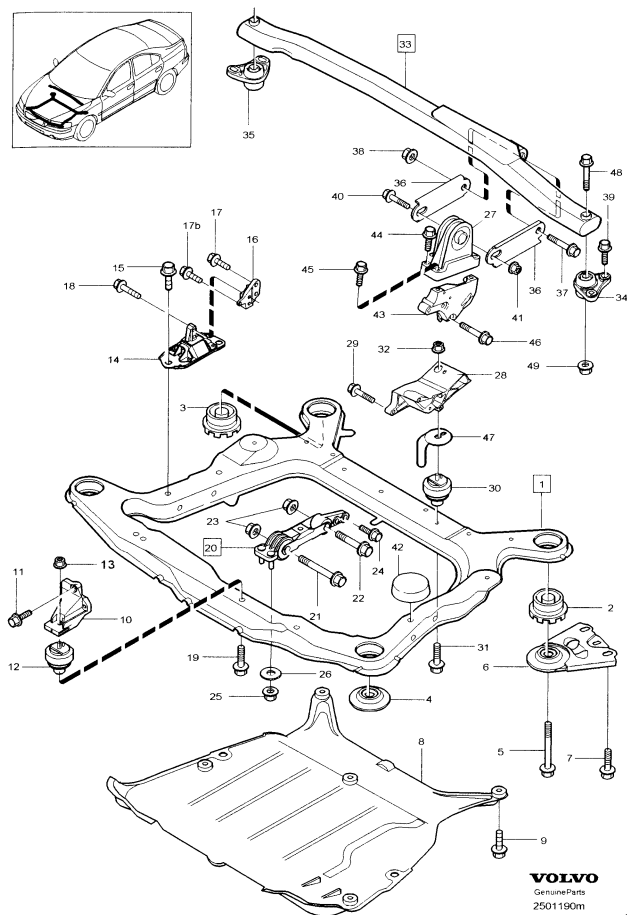
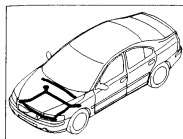
Tightening torques for lubricated screws and nuts:	Nm / lbf ft.
Cylinder head (tighten the screws in sequence from the centre outwards):	
Step 1	20/15
Step 2	60/44
Step 3 angle-tighten	130°
Intermediate section:	
Tighten the screws in sequence from the centre and outwards.	
Step 1, M10	20/15
Step 2, M10	40/30
Step 3, M8	25/18
Step 4, M7	16/13
Step 5, M10 angle tighten	90°
Connecting rod cap:	
Step 1	20/15
Step 2 angle-tighten	90°
Crankshaft centre nut	180/133
Flange screw, vibration damper:	
Step 1	25/18
Step 2 angle-tighten	30°
Carrier plate:	
Step 1	45/33
Step 2 angle-tighten	50°
Gearbox - engine	48/35
Torque converter	50/37
Engine mounting Right side, cylinder block:	
Step 1 M10x35	35/26
Step 2 M10x35 angle tighten	60°
Step 1 M8x23	20/15
Step 2 M8x23 angle-tighten	60°
Timing cover, front	12/9
Timing cover, upper	8/6
Timing gear pulley, camshaft without VVT	20/15

Tightening torques for lubricated screws and nuts:	Nm / lbf ft.
Timing gear pulley, camshaft with VVT	10/7.4
Camshaft pulley with VVT, centre screw	120/89
Camshaft pulley with VVT, centre screw	35/26
Belt tensioner, mechanical	20/15
Idler pulley, timing belt	24/18
Water pump	17/13
Exhaust manifold	25/19
Manifold, exhaust port, stud screw, turbocharger (TC)	20/15
Intake manifold	19/14
Fuel rail:	
Step 1	10/7.4
Step 2	75°
Oil pan	17/13
Oil pump	6/4.5
Plug, oil pan	38/28
Plug, crankshaft seal	38/28
Oil intake line	17/13
Drain hose, turbocharger (TC)	12/9
Pipe screws, crankcase ventilation	26/19
Pipe screws, oil pressure pipes, turbocharger (TC)	26/19
Pipe screws, coolant pipes, turbocharger (TC)	26/19
Pipe screws, oil pressure pipes, cylinder block	38/28
Oil trap	15/11
Oil filter, environmental filter	25/19
Oil pressure switch	50/37
Engine speed (RPM) sensor	10/7.4
Knock sensor (KS)	20/15
Temperature sensor, engine coolant	22/16
Piston cooling valve, oil duct	35/26
Spark plugs	30/22
Flywheel:	
Step 1	45/33
Step 2	65°

Tightening torques for the intake and exhaust systems

Tightening torques for lubricated screws and nuts. Specific component:	Nm/lbf ft.
Exhaust manifold, cylinder head side	25/18
Exhaust manifold - heat shield	15/11
Exhaust manifold - turbocharger (TC), nuts	25/18
Exhaust manifold - turbocharger (TC), studs	20/15
Exhaust system, pipe to turbocharger (TC)	30/22
Exhaust system, flange front - rear pipe	25/18
Exhaust system, pipe to exhaust manifold	10/7.4
Intake pipe	17/12.5

Engine mountings for petrol engines:
5-cylinder



VOLVO
Genuine Parts
2501190m

Engine mountings for 5-cylinder petrol engines

Number (as illustrated):	Tightening torques for lubricated screws and nuts: Nm / lbf ft. And angle tightening if necessary: Degrees
5	105/78 Angle tightening: 120°
7	50/37
9	20/15
11	50/37
13	50/37
15	65/48 Angle tightening: 60°
17	35/26 Angle tightening: 60°
17 b	20/15
18	Angle (Protractor) tightening: 60°
18	35/26 Angle tightening: 90°
19	50/37
21, 23	35/26
21, 23	Angle (Protractor) tightening: 90°
22, 23	35/26
22, 23	Angle (Protractor) tightening: 90°
24	35/26 Angle tightening: 40°
25	65/48 Angle tightening: 60°
29	50/37
31	50/37
32	50/37
37, 38	80/59
39	50/37
40, 41	80/59
44, 45	50/37
46	50/37
48, 49	80/59

Group 22 Lubrication system**General**

Oil volumes and grades, see: Section 1: Service and maintenance, Group 16: Lubrication

Petrol engines:	Oil pressure:
Engine at operating temperature, thermostat open and new oil filter.	
Engine speed 14 r/s (810 rpm), minimum MPa	0.1
Engine speed 67.7 r/s (4000 rpm), minimum MPa	0.35
Engine speed 33.3 r/s (2000 rpm), minimum MPa	-
Relief valve:	
The relief valve opens at a pressure of Mpa	0.48
Maximum oil pressure MPa	0.7
Oil pressure sensor: Breakpoint	
The indicator lamp goes out at a pressure MPa	0.04 - 0.06

Group 26 Cooling system

General

Never top up with water only.

Use Volvo Genuine parts **green coolant** (see table below) diluted 50/50 with **clean water**.

This mixture prevents corrosion and frost damage.

The coolant does not usually need replacing.

In the case of larger repairs when coolant needs to be drained, new coolant must be used because the old has been exposed to oxidation and dirt.

Clean the cooling system when replacing coolant.

Use Volvo cleaning agent P/N 11 61 328.

Coolant, Volvo, green	Volvo P/N:
1 litres/0.26 gal, cold climate markets	13 81 076
5 litres/1.32 gal, cold climate markets	13 81 077
1 litres/0.26 gal, EU, rest of the world	13 81 078
5 litres/1.32 gal, EU, rest of the world	13 81 079
210 litres/55.5 gal, whole world	13 81 080
1 gal (3.785 litres), USA	13 81 081
5 litres/1.32 gal, ready-mixed: 50/50, Australia	13 81 082

Cooling system: Capacity, pressure and thermostat

Engine type:	Volume litre (gal)	Expansion tank pressure valve opens at		Thermostat °C (°F)		
		Over pressure kPa (psi)	Negative pressure kPa (psi)	Marking	Starts to open	Fully open
B 5204 T5	8.8 (2.32)	150 (22 psi)	7 (1 psi)	90°(194°)	90° (194°)	105° (221°)
B 5244 S	8.8 (2.32)	150 (22 psi)	7 (1 psi)	90°(194°)	90°(194°)	105° (221°)
B 5244 S2	8.8 (2.32)	150 (22 psi)	7 (1 psi)	90°(194°)	90°(194°)	105° (221°)
B 5244 T3	8.0 (2.1)	150 (22 psi)	7 (1 psi)	90° (194°)	90° (194°)	105° (221°)
B 5234 T3	8.0 (2.1)	150 (22 psi)	7 (1 psi)	90° (194°)	90° (194°)	105° (221°)

Engine type:	Volume litre (gal)	Expansion tank pressure valve opens at		Thermostat °C (°F)		
		Over pressure kPa (psi)	Negative pressure kPa (psi)	Marking	Starts to open	Fully open
B 5234 T7	8.0 (2.1)	150 (22 psi)	7 (1 psi)	90° (194°)	90° (194°)	105° (221°)

Group 28 Ignition system

General

Engine type	Ignition system	Ignition timing (btdc)	Engine speed rpm
B 5204 T5	Bosch ME 7.0	6° ± 2°	670 ± 50
B 5244 S	Denso	6° ± 2°	750±50
B 5244 S2	Denso	6° ± 2°	750±50
B 5244 T3	Bosch ME 7.0	6° ± 2°	670 ± 50
B 5234 T3	Bosch ME 7.0	6° ± 2°	670 ± 50
B 5234 T7	Bosch ME 7.0	6° ± 2°	670 ± 50

Group 28 Components

Technical data, ignition coil, spark plugs, sensors, engine cooling fan (FC), and tightening torques etc:

Components: Related to the ignition system		
Ignition coil, ignition discharge module	Volvo P/N	91 25 601
Spark plugs:		
B 5204 T5, B 5244 T3 and B 5234 T3	Volvo kit no.	272 313
Electrode gap:	mm	0.75 (0.03")
Tightening torques	Nm (lbf ft.)	30 (22)
Knock sensor (KS)	Volvo P/N.	94 32 570
Denso own system		
Tightening torques	Nm (lbf ft.)	20 (15)
Speed sensor, flywheel	Volvo P/N.	12 75 599
Resistance in coil, at 20C°/68F° degrees	Ω	125 ± 25
Inductance in coil, at 20C°/68F° degrees	mH	85 ± 10 (1 kHz)
Camshaft position (CMP) sensor	Volvo P/N.	92 25 134
Engine cooling fan (FC), control module 40 A	Volvo P/N.	92 09 814
Relay, A/C	Volvo P/N	91 62 300

Components Bosch ME-7.0:

Components related to the ignition and fuel system

Type ME-7.0:

Control module	Built-in atmospheric pressure sensor.
Throttle unit	Damper motor integrated with electronic module.
Accelerator pedal (AP) position sensor	Pulse width modulated and linear signal (digital / analogue).
Pressure regulator	Line pressure 380 kPa.
Mass air flow (MAF) sensor	Mass air flow (MAF) sensor resistive film. Measurement range 12 - 640 kg/h.
Fuel pump	Pump capacity: At line pressure of 380 kPa and 13 V is > 125 l/min. Power consumption at line pressure: 7.5 A.
Injector	Resistance, coil: 12 Ω .
Boost pressure sensor	Piezo resistive linear pressure sensor. Measurement range 20 - 250 kPa.
Turbocharger (TC) control valve ..	PWM controlled valve. Resistance 29.7 Ω .
Camshaft reset valve VVT	PWM controlled valve. Resistance 3.7 Ω .
Intake air temperature sensor ...	NTC resistor.
Knock sensor (KS)	Piezoelectric crystal.
Camshaft position sensor (CMP) ..	Magneto-resistive sensor with a permanent magnet.
Engine speed (RPM) sensor. Applies at 20°C/68°F	Inductive sensor with permanent magnet. Resistance 125.5 \pm 25 Ω .
Heated oxygen sensor (HO2S), front Preheating	Linear sensor. Resistance 3 Ω , at 20°C/68°F.
Heated oxygen sensor (HO2S), rear Preheating	Binary sensor. Resistance 9 Ω , at 20°C/68°F.
Ignition coil	Individually mounted ignition coil. Integrated ignition discharge module (IDM) and diagnostics.
Outer temperature sensor	NTC resistor.
A/C pressure sensor	Linear pressure sensor. Measurement range 0 -3100 kPa.
Canister purge (CP) valve	PWM controlled Resistance 29.7 \pm 1.4 Ω .

Components related to the ignition and fuel system

Type ME-7.0:

EVAP canister shut-off valve	Solenoid valve. Resistance $17 \pm 1 \Omega$.
Fuel tank pressure sensor	Piezo electric linear pressure sensor.
Fuel pump (FP) relay	Frequency controlled mechanical relay.
Air conditioning (A/C) relay	Mechanical relay. Resistance in coil 96Ω .
Engine cooling fan (FC) control module	PWM controlled discharge module with variable output voltage and diagnostics.
System relay	Mechanical relay. Resistance 80Ω .
Clutch pedal position sensor	Self-adjusting.
Brake pedal position sensor	Self-adjusting.
Stop lamp switch	Two. One switch one sensor.
Coolant level sensor	Level indicator.
Oil pressure switch	Pressure switch.

Technical data

Applies to ME-7.0 ignition and fuel system:

Mass air flow (MAF) sensor:

Q kg/h	12	15	30	60
Voltage V	1.3	1.4	1.7	2.1

Boost pressure sensor:

P kPa	90	101	150	200
Voltage V	1.7	1.9	2.8	3.7

Engine coolant temperature (ECT) sensor:

Temperature °C (F°)	10° (50°)	20° (68°)	80° (176°)	100° (212°)
Resistance Ω	3700	2450	318	184
Voltage V	2.1	1.6	0.3	0.2

Temperature sensor, intake air:

Temperature °C (F°)	0° (32°)	20° (68°)	30° (86°)	40° (104°)
Resistance Ω	15 931	6 068	3 923	2 603
Voltage V	4.3	3.5	3	2.5

Outside temperature sensor:

Technical data					
Applies to ME-7.0 ignition and fuel system:					
Temperature	°C (F°)	0° (32°)	20° (68°)	25° (77°)	30° (86°)
Resistance	Ω	6318	2424	1941	1513
Voltage	V	4.3	3.5	3.3	3
Air conditioning (A/C) pressure switch (Pressostat):					
Press	kPa	195 - 325		160 - 180	
Status	To/From	On		Off	
Fuel tank pressure sensor:					
Press P	kPa	0			
Voltage	V	3.3			
Clutch pedal position sensor:					
Position	mm	0	25 (0.98")	50 (1.97")	100 (3.93")
Resistance	Ω	1500 - 2500	1000 - 2000	750 - 1750	500 - 1000
Brake pedal position sensor:					
Position	mm	0	20 (0.79")	30 (1.18")	50 (1.97")
Resistance	Ω	1300 - 2100	1000 - 1800	900 - 1700	600 - 1400

Components DENSO:

	Components related to the DENSO ignition and fuel system:
Control module	Built-in atmospheric pressure sensor.
Throttle unit	Damper motor integrated with electronic module.
Accelerator pedal (AP) position sensor	Pulse width modulated and linear signal (digital / analogue).
Pressure regulator	
Mass air flow (MAF) sensor	Mass air flow (MAF) sensor resistive film. Measurement range 1.4-180 g/s.
Fuel pump	Pump capacity at line pressure of 300 kPa and 12.5 V is > 125 l/min. Power consumption at line pressure: 7.5 A.
Injector	12 hole Resistance, coil: 13.8 Ω .
Manifold absolute pressure (MAP) sensor	Semi-capacitive linear pressure sensor. Measurement range 13.3 - 120 kPa.
Temperature sensor, intake	Integrated into the mass air flow (MAF) sensor. NTC resistor.
Engine coolant temperature (ECT) sensor	NTC resistor.
Knock sensor (KS)	Piezoelectric crystal. Resistance 200 \pm 80 Ω .
Camshaft position sensor (CMP) ...	Magneto-resistive sensor with a permanent magnet.
Engine speed (RPM) sensor	Inductive sensor with permanent magnet. Resistance 125 \pm 25 Ω , at 20°C/68°F.
Heated oxygen sensor (HO2S), front Preheating	Linear sensor. Resistance 1 Ω , at 20°C/68°F.
Heated oxygen sensor (HO2S), rear Preheating	Binary sensor. Resistance 5.6 Ω , at 20°C/68°F.
Ignition coil	Individually mounted ignition coil. Integrated ignition discharge module (IDM) and diagnostics.
Spark plug type	Multi-electrode.
Outer temperature sensor	NTC resistor.
A/C pressure sensor	Linear pressure sensor. Measurement range 0 -3100 kPa.

	Components related to the DENSO ignition and fuel system:
Canister purge (CP) valve	Pulse width modulated. Controlled valve. Resistance $29.7 \pm 1.4 \Omega$.
EVAP canister shut-off valve	Solenoid valve. Resistance $17 \pm 1 \Omega$.
Fuel tank pressure sensor	Piezo electric linear pressure sensor.
Fuel pump (FP) relay	Frequency controlled mechanical relay.
Air conditioning (A/C) relay	Mechanical relay. Resistance in coil 85Ω .
Engine cooling fan (FC) control module	Mechanical relay. Two coil relay. Resistance 80Ω .
System relay	Mechanical relay. Resistance 80Ω .
Clutch pedal sensor	Self-adjusting.
Brake pedal sensor	Self-adjusting.
Stop lamp switch	Two separate switches.
Coolant level sensor	Level indicator.

Technical data for the DENSO system:

Mass air flow (MAF) sensor:					
Q	g/s	3.1	5.7	7.3	9.3
Engine speed (RPM) ..	rpm	750	1500	2000	2500
Voltage	V	1.3	1.6	1.7	1.8
Manifold absolute pressure (MAP) sensor:					
P	kPa		90	70	50
Voltage	V		3.3	2.7	2.1
Engine coolant temperature (ECT) sensor:					
Temperature	°C		40	80	100
Resistance	Ω		1150	318	184
Voltage	V		2.2	0.9	0.6

Temperature sensor, intake:				
Temperature	°C	20	25	30
Resistance	Ω	2450	2000	1800
Voltage	V	2.4	2.1	1.9
Outside temperature sensor S80:				
Temperature	°C	20	25	30
Resistance	Ω	2424	1941	1513
Voltage	V	3.5	3.3	3
Air conditioning (A/C) pressure sensor:				
Press	kPa	1206	1894	3100
Voltage	V	2	3	4.75
Air conditioning (A/C) pressure switch (Pressostat):				
Press	kPa	160 - 180		
Status	To/From	Off		
Fuel tank pressure sensor:				
Press P	kPa	-1.5	0	+0.5
Voltage	V	2.1	3.3	3.7
Clutch pedal sensor				
Position	mm	25	50	100
Resistance	Ω	1000 - 2000	750 - 1750	500 - 1000
Brake pedal sensor:				
Position	mm	20	30	50
Resistance	Ω	850 - 1550	700 - 1400	400 - 1000