

Section 2 Engine

Group 20 General

Performance, compression ratio, octane no

Engine type	Compression ratio	Rec. octane no.	Power		Max torque	
			kW at r/s	hp at rpm	Nm at r/s	kpm (ft.lbs) at rpm
B 5204 T2 (Motr. 4.4)	8.4:1	95	132/95	180/5700 (177/5700)	220/ 3590	22.4/2100-5400 (162/2100-5400)
B 5204 T3	8.4:1	95 - 98	166/95	225/5700 (222/5700)	310/ 45-85	31.6/2700-5100 (229/2700-5100)
B 5234 T3	8.5:1	95 - 98	178/85	240/5100 (236/5100)	330/ 45-85	33.6/2700-5100 (243/2700-5100)
B 5254 T	9.0:1	95	142/85	193/5100 190/5100	270/ 30-83	27.5/1800-5000 199/1800-5000

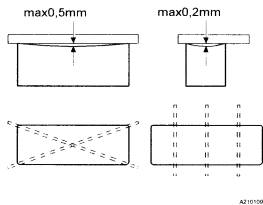
Lead free gasoline must be used. Can be driven on 91 octane lead-free

Other general data

	B 5204 T2/T3	B 5234 T3	B 5254 T
No. of cylinders	5	5	5
Cylinder diameter mm	81.0	81.0	83.0
Cylinder stroke mm	77.0	90.0	90.0
Cylinder displacement dm ³ (liters)	1.984	2.319	2.435
Firing order	1-2-4-5-3	1-2-4-5-3	1-2-4-5-3
Weight, assembly (incl. auxiliary equipment and oil) approx. kg	173-190	176-190	173

	B 5204 T2/T3 B 5234 T3 B 5254 T
Compression MPa	1.1 - 1.3
max difference between highest/lowest MPa	0.2

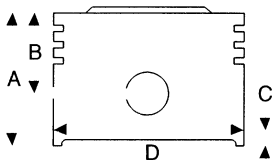
Group 21 Engine block



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	B 5204 T2/T3 B 5234 T3 B 5254 T
Cylinder head	Measurement (mm)
Height, new	129.0 ± 0.05
Maximum, machining	0.30
Max distortion, front-rear	0.50
Maximum distortion, crossways	0.20

Cylinder block	B 5204 T2/T3 B 5234 T3	B 5254 T
Cylinder diameter		
Standard (marked C)	81.00 - 81.01	83.00 - 83.01
Standard (marked D)	81.01 - 81.02	83.01 - 83.02
Standard (marked E)	81.02 - 81.03	83.02 - 83.03
Standard (marked G)	81.04 - 81.05	83.04 - 83.05
Over size 1	81.20 - 81.21	83.20 - 83.21
Over size 2	81.40 - 81.41	83.40 - 83.41



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Engine type	Pistons		
	Measurement (mm)		
	A	B	C
B 5204 T2/T3	66.4	42.4	16.0
B 5234 T3	59.9	35.9	16.0
B 5254 T	59.9	35.9	16.0

Pistons	B 5204 T2/T3 B 5234 T3	B 5254 T
Piston diameter (D) (measured perpendicular to the gudgeon pin hole, C from the lower edge)		
Standard (marked C) mm	80.98 - 80.99	82.98 - 82.99
(marked D) mm	80.99 - 81.00	82.99 - 83.00
(marked E) mm	81.00 - 81.01	83.00 - 83.01
(marked G) mm	81.017 - 81.032	83.017 - 83.032
Over size 1 mm	81.177 - 81.192	83.177 - 83.192
Over size 2 mm	81.377 - 81.392	83.377 - 83.392
Piston running clearance, new piston mm	0.01 - 0.03	0.01 - 0.03
Piston weight Maximum weight difference between pistons in the same engine g		
	10	10
Piston rings, axial clearance		
upper comp ring mm	0.05 - 0.085	0.05 - 0.085
lower comp ring mm	0.03 - 0.065	0.03 - 0.065
oil scraper rings mm	0.02 - 0.055	0.02 - 0.055
Piston rings, gap (measured in cylinder)		
upper comp ring mm	0.20 - 0.40	0.20 - 0.40
lower comp ring mm	0.20 - 0.40	0.20 - 0.40
oil scraper rings mm	0.25 - 0.50	0.25 - 0.50
Gudgeon pin		
diameter mm	$23.0^{+0}_{-0.004}$	$23.0^{+0}_{-0.004}$
length mm	66.0	
installation in connecting rod	light thumb pressure (exact alignment)	
installation in piston	thumb pressure (sliding alignment)	

Valves		B 5204 T2/T3 B 5234 T3 B 5254 T
Intake		
diameter, crown	mm	31.0 ± 0.15
diameter, stem	mm	6.97 ⁺⁰ _{-0.015}
total length	mm	104.05 ± 0.18
maximum machining valve stem	mm	0.4
Height, disc edge	mm	1.5
min, after grinding	mm	1.2
matching surface angle	°	44.5
Outlet(stellite coated, must not be machine ground)		
diameter, crown	mm	27.0 ± 0.15
diameter, stem, Turbo	mm	6.96 ⁺⁰ _{-0.015}
Other	mm	6.97 ⁺⁰ _{-0.015}
total length	mm	103.30 ± 0.18
maximum machining valve stem	mm	0.4
Height, disc edge	mm	1.5
matching surface angle	°	44.5

Power transmission								
Engine type	Camshaft		Checking camshaft adjustment (cold engine)					
	Marking		Max lift height		Valve opening at control (mm)		Cam angle	
	Intake	Outlet	Intake	Outlet	Intake	Outlet	Intake	Outlet
B 5204 T2/T3	PHI	PHE	7.95	7.95	0.7	0.7	4.2° *	31.8° **
B 5234 T3	PHI	PHE	7.95	7.95	0.7	0.7	4.2° *	31.8° **
B 5254 T (Motr. 4.3)	PHI	PHE	7.95	7.95	0.7	0.7	4.2° *	31.8° **

* after top dead center (TDC)

** before top dead center (TDC)

Camshaft	
Engine type	B 5204 T2/T3 B 5234 T3 B 5254 T
Radial clearance, min	mm 0.030
Radial clearance, max	mm 0.071
Axial clearance	mm 0.05 - 0.20
Timing belt, dimension	148 x 23
Timing belt tension, control value (measure with 998 8500)	
23 mm belt	units 2.5 - 4.0

Crank mechanism	
	B 5204 T2/T3 B 5234 T3 B 5254 T
Crankshaft	
Out-of-true (Main bearing position) max deviation	mm 0.040
Crankshaft, max axial clearance	mm 0.19
Main bearings, radial clearance	mm 0.021 - 0.043
Main bearing pins	
Diameter, standard	mm $65.00^{+0.003}_{-0.016}$
Diameter, undersized	mm $64.75^{+0}_{-0.013}$
Out-of-round, max	mm 0.004
Taper, max	mm 0.006
Out-of-true, max deviation	mm 0.004
Axial bearing position, width	mm $26.0^{+0}_{-0.04}$
Big end journals	
Diameter, standard	mm $50.00^{+0}_{-0.016}$
Diameter, undersized	mm $49.75^{+0}_{-0.013}$
Bearing location width	mm 26.0 + 0.1
Out-of-round, max	mm 0.004
Taper, max	mm 0.004
Out-of-true, max deviation	mm 0.004
Connecting rods	

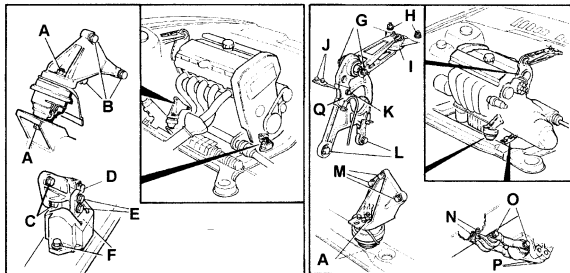
Crank mechanism		B 5204 T2/T3 B 5234 T3 B 5254 T
Diameter	mm	53.00 ^{+0.013} ₋₀
Maximum out of round	mm	0.006
Axial clearance at crankshaft	mm	0.15 - 0.45

Classification of main bearings (stamped on cylinder block and crankshaft)

Block	A small diameter		B medium diameter		C large diameter	
	block	center section	block	center section	block	center section
Crankshaft						
A small	yellow medium	yellow medium	yellow medium	blue thick	blue thick	blue thick
B medium	red thin	yellow medium	yellow medium	yellow medium	yellow medium	blue thick
C large	red thin	red thin	red thin	yellow medium	yellow medium	yellow medium

Tightening torques (applies for lubricated screws and nuts)	Nm
Cylinder head (stage 1)	20
(stage 2)	60
(stage 3) Angle tightening	130°
Tighten screws in sequence from center and outwards.	
Center section M10 (stage 1)	20
M10 (stage 2)	45
M 8 (stage 3)	24
M 7 (stage 4)	17
M10 (stage 5) Angle tightening	90°
Tighten screws in sequence from center and outwards.	
Connecting rod cap (stage 1)	20
(stage 2) Angle tightening	90°
Vibration damper (center nut)	180
Flanged screw, vibration damper (stage 1)	25
(stage 2) angle tightening	30°
Carrier plate (stage 1)	45

Tightening torques (applies for lubricated screws and nuts)	Nm
(stage 2) angle tightening	50°
Transmission - engine	48
Camshaft pulley	20
Tension pulley,timing belt	30
Vibration damper,timing belt	24
Idler pulley,timing belt	24
Water pump	17
Exhaust manifold	23
Intake manifold	17
Fuel rail, (stage 1)	10
(stage 2) angle tightening	75
Oil pan	17
Oil pump	10
Plug, oil pan	35
Oil intake	17
Cover, front edge	17
Oil trap	15
Nipple, oil filter	40
Oil pressure switch	25
Engine speed (RPM) sensor	6
Knock sensor (KS)	20
Temp sensor, thermostat	20
Spark plugs	25
Flywheel (stage 1)	45
(stage 2) angle tightening	65°



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Tightening torques for engine mountings		Nm + degrees
A	Nut (screw) for engine pad	50
B	Rear engine mounting - transmission	50
	Right engine mounting	
C	rear bolts - cylinder block (10 mm)	angle 35 + 60°
C	rear bolts - cylinder block (8 mm)	angle
D	front bolt - cylinder block (8 mm)	angle 20 + 60°
E	engine pad - engine pad	angle 35 + 90°
F	engine pad - frame	angle 65 + 60°
	Upper torque rod	
G	front bushing	angle 35 + 90°
H	rear bushing - body	angle 35 + 60°
I	rear bushing - bushing	angle 35 + 60°
J	stay - cylinder head	10
K	stay - torque control arm	25
L	torque control arm - cylinder block	angle 45 + 90°
M	Front engine mounting - cylinder block	25
	Lower torque rod,	
N	front bushing - frame, M12	angle 65 + 60°
	(early 1992, M 8)	30
O	torque rod - bushings	angle 35 + 90°

Tightening torques for engine mountings		Nm + degrees
P	rear bushing - transmission angle	35 + 40°
Q	Torque control arm - cylinder head (Turbo) angle	35 + 60°

Group 22 Lubrication system

General

Oil capacity and quality, see Section 1
Service and maintenance, Group 16 Lu-
brication.

Oil pressure with warm engine and new oil filter

B 5204 T2/T3, B 5234 T3, B 5254 T	
Engine speed r/s (rpm)	Oil pressure (MPa)
12.5 (750) min	0.10
67.7 (4000) min	0.35
Relief valve opens at	0.60
Max. oil pressure	0.70

B 5204 T2/T3, B 5234 T3, B 5254 T	
Spring, relief valve	
number of coils	
external diameter mm	
length unloaded mm	76.22
loaded to length 56.1 mm N	59 ± 4
39.9 mm. N	108 ± 8

Group 23 Fuel system

Engine type	Fuel system
B 5204 T2/T3, B 5234 T3, B 5254 T	Motronic 4.4

CO content, idling speed	B 5204 T2/T3, B 5234 T3, B 5254 T
Control value for CO content %	0.6 ± 0.4
Idling speed r/s (rpm)	14.2
with activated engine cooling fan (FC) r/s (rpm)	14.2

CO content and idling speed cannot be adjusted, only checked. Measured upstream of the catalytic converter

Heated Oxygen Sensor connected.

Automatic transmission: Gear selector lever in position P during test

Components

Control module	Volvo P/N	Manufacturers P/N
B 5204 T2		
97-, man Bosch	91 55 746	0 261 204 442
97-, auto Bosch	91 55 748	0 261 204 443
B 5204 T3		
97-, man Bosch	91 55 752	0 261 204 446
97-, auto Bosch	91 55 754	0 261 204 447
97-, auto, OBD Bosch	91 55 818	0 261 204 449
97-, auto, OBD2 Bosch	91 55 876	0 261 204 607
B 5234 T3		
97-, excl US/CDN, man, OBD Bosch	91 55 773	0 261 204 448
97-, US/CDN, man, OBD2 Bosch	91 55 761	0 261 204 608
B 5254 T		
97-, Motr. 4.4, auto, US/CDN Bosch	91 55 785	0 261 204 610
97-, Motr. 4.4, man Bosch	91 55 779	0 261 204 456
97-, Motr. 4.4, auto Bosch	91 55 781	0 261 204 457

Mass air flow (MAF) sensor (HFM)	Volvo P/N	Manufacturers P/N
B 5204 T2/T3, B 5234 T3, B 5254 T	12 75 749	0 280 217 107
Resistance between terminal 1-4, approx Ω	110	

Pressure regulator	B 5204 T2/T3, B 5234 T3
Volvo P/N, -1995	35 07 902
Manufacturers P/N Bosch/Siemens	0 280 160 746
Volvo P/N, 1996-	9146 761
Manufacturers P/N Bosch	0 280 160 554
Line pressure kPa	300
(fuel pressure over pressure in intake manifold)	

Injector	B 5204 T2/T3, B 5234 T3
Volvo P/N:	68 42 369
Manufacturers P/N	0 280 150 785
Quantity of fuel injected g/min (cm ³ /min)	232 (≈310)
at line pressure kPa	400
resistance in winding, approx Ω	14.5

Injector	B 5204 T2, B 5254 T
Volvo P/N	12 75 395
Manufacturers P/N	0 280 155 759
Quantity of fuel injected g/min (cm ³ /min)	237 (≈315)
at line pressure kPa	300
resistance in winding, approx Ω	15.9 ± 0.80

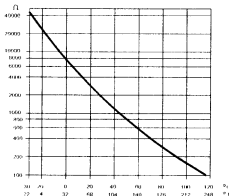
Injector	B 5204 T3, B 5234 T3
Volvo P/N	12 70 534
Manufacturers P/N	= 280 155 766
Quantity of fuel injected g/min (cm ³ /min)	261 (≈350)
at line pressure kPa	300
resistance in winding, approx Ω	15.9 ±0.80

Idle air control (IAC) valve	B 5204 T2/T3, B 5234 T3 B 5254 T
Volvo P/N	13 89 618
Resistance between terminals Ω	10 - 14

Altitude sensor	B 5204 T2/T3, B 5234 T3 B 5254 T
Volvo P/N	12 75 342
Manufacturers P/N	0 261 230 018

Throttle position (TP) sensor	B 5204 T2/T3, B 5234 T3 B 5254 T
Volvo P/N	1 336 385
Manufacturer P/N	0 280 122 001

Throttle position (TP) sensor	B 5204 T2/T3, B 5234 T3 B 5254 T
Resistance between terminals	
1 and 3, idling k Ω	0.9 - 1.1
full load k Ω	2.3 - 2.9



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Engine coolant temperature (ECT) sensor (all models)	
Volvo P/N	35 45 031
Manufacturer P/N SWF	
Resistance at:	
0°C Ω	7300
+ 20°C: Ω	2800
+ 40°C Ω	1200
+ 80°C Ω	300
+ 100°C Ω	150

Heated oxygen sensor (HO2S), P/N	Volvo P/N
B 5204 T2/T3, B 5234 T3	
front, OBD2	12 71 939
lead tolerant	12 71 998
B 5204 T3, rear, AWD	12 75 610
B 5234 T3, rear,	12 75 610
B 5254 T	
front, lead tolerant	12 71 998
rear	12 75 610

Heated oxygen sensor (HO2S), control value	B 5204 T2/T3, B 5234 T3 B 5254 T
Resistance in preheating resistor:	
cold HO2S (+20°C) Ω	1.5 - 2.5
hot HO2S (above 350°C) Ω	6.0 - 10.0
Tightening torques Nm (ft.lb)	45 (33)

Fuel pump (FP)	B 5204 T2/T3, B 5234 T3 B 5254 T
Volvo P/N	91 35 605
Manufacturers P/N Bosch	0 580 453 037
Pump capacity (at + 20°C and line pressure of 400 kPa)	
13V l/h	>140
12V l/h	>120
11V l/h	>100
Power use (at + 20°C and line pressure of 400 kPa)	
13V max A	12.0
12V max A	12.0
11V max A	12.0

Fuel filter	B 5204 T2/T3, B 5234 T3, B 5254 T
Volvo P/N	91 42 658
Manufacturers P/N Bosch	0 450 905
Filters particles down to mm	0.002
Main relay	
Volvo P/N	35 45 803
Resistance in coil Ω	80 - 130
Fuel pump relay	
Volvo P/N	94 34 225
Control module, fuel pump (FP)	
Volvo P/N, OBD2	94 41 029

Group 25 Intake and exhaust system

Turbo engines

Engine variant	B 5204 T2/T3 B 5234 T3	B 5254 T
Initial boost pressure (without electronic control) full load and 20°C, 3000 rpm kPa	35 \pm 5	25 - 32
Maximum boost pressure, (with electronic control) full load and 20°C, 5100 rpm kPa	66 \pm 7	36 - 50

Tightening torques	Nm
Exhaust manifold, cylinder side	23
Exhaust manifold - heat shield	15
Exhaust manifold - turbocharger (TC), nuts	25
Exhaust manifold - turbocharger (TC), studs	20
Exhaust system, pipe to turbocharger (TC)	30
Exhaust system, flange front - rear pipe	25
Exhaust system, pipe to exhaust manifold	10
Intake manifold	17

Group 26 Cooling system

General

- Never top up with water only. Use Volvo original **green coolant** thinned with **pure water** to a ratio of 50/50. This mixture prevents corrosion and damage from freezing.
- The coolant does not usually need replacing. In case of large 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 lubricant 11 61 328.

Engine type	Capacity approx liters	Expansion tank. Pressure valve opens at		Thermostat °C (°F)		
		Over pressure kPa	Negative pressure kPa	Marking	Starts to open	Fully open
B 5204 T2	7.0	150	7	87	87(189)	102(216)
B 5204 T3						
B 5234 T3						
B 5254 T	7.2	150	7	90	90(194)	105(220)

Group 28 Ignition system

General

Engine type	Type	Ignition timing* (btdc)	Engine speed (RPM) r/s (rpm)
B 5204 T2/T3	Motronic 4.3	$6^{\circ} \pm 2^{\circ}$	850 ± 50
B 5234 T3	Motronic 4.3	$6^{\circ} \pm 2^{\circ}$	850 ± 50
B 5254 T	Motronic 4.4	$10^{\circ} \pm 2^{\circ}$	850 ± 50

Can not be adjusted, only checked

Components

Ignition coil/injector driver

Engine type	Volvo P/N	Manufacturer P/N	Resistance in windings	
			1 and 15	1 and high voltage
B 5204 T2/T3, B 5234 T3, B 5254 T	12 75 174	0 221 601 012	0.5 - 1.5 Ω	8 - 9 k Ω

Spark plugs

Engine type	Volvo kit no.	Code		Electrode distance	Tightening torques
		Bosch	Champion		
B 5204 T2/T3, B 5234 T3, B 5254 T	272 313	FR 6 DC	RC 7 YC	0.7 - 0.8	25 Nm (18 ft.lb)

Distributor arm (rotor)

Volvo P/N	Bosch P/N	Resistance (k Ω)
13 67 783	1 234 332 390	1.1 - 1.3

Ignition cables

Cable type	Volvo P/N	Resistance (k Ω \pm 20%)					
			cyl 1	cyl 2	cyl 3	cyl 4	cyl 5
Ignition coil - Distributor	13 35 874	2.4					
Distributor - Spark plugs	91 35 700		4.5	4.0	3.3	2.9	2.3

Knock sensor (KS)

Engine type	Volvo P/N	Manufacturer P/N	Tightening torques
B 5204 T2/T3, B 5254 T	13 67 644	0 261 231 046	20 Nm (15 ft.lb)
B 5234 T3	13 67 644	0 261 231 046	20 Nm (15 ft.lb)

Engine speed and position sensor (flywheel)

Engine type	Volvo P/N	VDO P/N	Resistance in coil (Ω)	Inductance in coil (mH)
1997-	35 47 699	S102 460 001	300 \pm 40	70 \pm 10(10kHz)

Camshaft position (CMP) sensor

Engine type	Volvo P/N	Bosch P/N
1997-	91 46 108	023

Relay, engine cooling fan (FC)

Volvo P/N	Resistance in coil (Ω)
13 98 845	80

Relay, AC

Volvo P/N
35 45 619