

Section 2 Petrol engine

Group 20 General

Performance, compression ratio, octane number:						
Engine type	Com- pression ratio	Rec. octane rating	Power		Maximum torque	
			kW / r/s	hp / rpm (hp / rpm)	Nm / r/s	kpm / rpm (ft.lbf / rpm)
B 5202 S	10.0:1	95	93/104	126/6250 (125/6250)	170/80	17.3/4800 (125/4800)
B 5204 S	10.3:1	95	105/108	143/6500 (141/6500)	176/63	17.9/3800 (130/3800)
B 5204 T	8.4:1	95	155/83	210/5000 (208/5000)	300/ 37-82	30.6/2200-4900 (221/2200-4900)
B 5204 T2 Motronic 4.4	8.4:1	95	132/95	180/5700 (177/5700)	220/ 35-90	22.4/2100-5400 (162/2100-5400)
B 5204 T4 ME 7.0	9.5:1	91 - 98	120/95	163/5100 (161/5100)	230/ 33-85	23.0/2000-5000 (168/2000-5000)
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 S*	10.5:1	95	120/103	163/6200 (161/6200)	210/55	21.4/3300 (155/3300)
B 5234 S DENSO	10.3:1	91 - 95	120/100	163/6000 (161/6000)	210/85	21.4/5100 (155/5100)
B 5234 T	8.5:1	95	166/88	225/5280 (222/5280)	300/ 33-88	30.6/2000-5280 (221/2000-5280)
B 5234 T2*	8.5:1	95	160/85	218/5100 (215/5100)	300/ 33-85	30.6/2000-5100 (221/2000-5100)
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 5234 T4	8.5:1	91 - 98	184/100	250/6000	350/ 40-83	35.7/2400-5000 (258/2400-5000)
B 5234 T5**	8.5:1	95 - 98	177/94	240/5600 (237/5600)	300/ 33-94	30.6/2000-5600 (221/2000-5600)
B 5234 T5***	8.5:1	95 - 98	177/94	240/5600 (237/5600)	330/ 50-80	33.7/3000-4800 (243/3000-4800)
B 5234 T6**	8.5:1	95 - 98	176/100	240/6000 (236/6000)	310/ 40-90	31.6/2400-5400 (229/2400-5400)
B 5234 T7*	8.5:1	95	160/85	190/5400 (188/5400)	270/ 30-80	27.5/1800-4800 (199/1800-4800)
B 5234 T8	8.5:1	91 - 98	184/95	250/5700 (247/5700)	310/ 40-90	31.6/2400-5400 (229/2400-5400)

Performance, compression ratio, octane number:							
Engine type	Com- pression ratio	Rec. octane rating	Power		Maximum torque		
			kW / r/s	hp / rpm (hp / rpm)	Nm / r/s	kpm / rpm (ft.lbf / rpm)	
B 5244 S	10.3:1	98	125/95	170/5700 (168/5700)	230/75	23.5/4500 (170/4500)	
B 5244 S2	10.3:1	98	103/95	140/5700 (138/5700)	220/63	22.5/3750 (162/3750)	
B 5252 S	10.0:1	95	106/90	144/5400 (142/5400)	206/60	21.0/3600 (152/3600)	
B 5254 S LH 3.2	10.5:1	95	125/103	170/6200 (168/6200)	220/55	22.4/3300 (162/3300)	
B 5254 S Motronic 4.x	10.3:1	95	125/102	170/6100 (168/6100)	220/78	22.4/4700 (162/4700)	
B 5254 S DENSO	10.3:1	91 - 95	121/102	165/6100 (162/6100)	220/78	22.4/4700 (162/4700)	
B 5244 T	9.0:1	95	142/85	193/5100 (190/5100)	270/ 30-83	27.5/1800-5000 (199/1800-5000)	
B 5244 T2	8.5:1	95	195/95	265/5700	350/ 40-85	35.7/2400-5100 (258/2400-5100)	

Use only **unleaded petrol**.

Can be driven on 91 octane unleaded.

* Thailand.

** Automatic gearbox.

*** Manual gearbox.

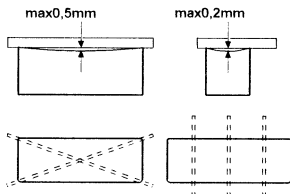
Other general data

	B 5202 S B 5204 S B 5204 T	B 5234 S B 5234 T	B 5252 S B 5254 S B 5254 T B 5244 T	B 5244 S B 5244 S2
No. of cylinders	5	5	5	5
Bore mm	81.0	81.0	83.0	83.0
Stroke mm	77.0	90.0	90.0	90.0
Cylinder displacement .. litres	1.984	2.319	2.435	2.435
Firing order	1-2-4-5-3	1-2-4-5-3	1-2-4-5-3	1-2-4-5-3
Weight, unit*, approximately kg	173-190	176-190	173	144-156
* including auxiliary equipment and oil				

	B 5204 T B 5234 T B 5254 T B 5244 T	B 5202 S B5204 S B 5234 S B 5252 S B 5254 S B 5244 S
Compression Mpa	1.1 - 1.3	1.3 - 1.5
Maximum difference between highest / lowest MPa	0.2	0.2

Group 21 Cylinder block

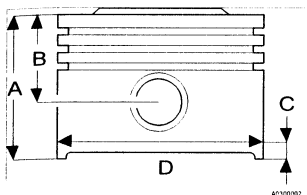
Technical data, tightening torques:



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Cylinder head	B 5204/5254/ 5234/5244	B 5202/5252	
Height, new	mm	129.0 ± 0.05	132.1 ± 0.05
Maximum machining	mm	0.30	0.30
Maximum distortion, front-rear	mm	0.50	0.50
Maximum distortion, lateral	mm	0.20	0.20

Cylinder block	B 5202/5204 /5234	B 5252/5254/5244	
Cylinder diameter:			
Standard (marked C)	mm	81.00 - 81.01	83.00 - 83.01
Standard (marked D)	mm	81.01 - 81.02	83.01 - 83.02
Standard (marked E)	mm	81.02 - 81.03	83.02 - 83.03
Standard (marked G)	mm	81.04 - 81.05	83.04 - 83.05
Over size 1	mm	81.20 - 81.21	83.20 - 83.21
Over size 2	mm	81.40 - 81.41	83.40 - 83.41



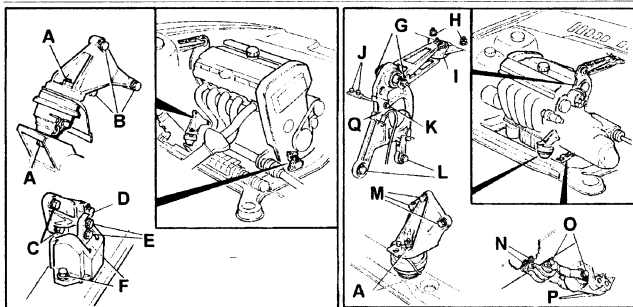
Piston sizes			
Engine type:	Measurement (mm):		
	A	B	C
B 5202 S	65.8	41.8	16.0
B 5204 S	66.4	42.4	16.0
B 5204 T	66.4	42.4	16.0
B 5234 S	59.9	35.9	16.0
B 5234 T	59.9	35.9	16.0
B 5252 S	59.9	35.9	16.0
B 5254 S	59.9	35.9	16.0
B 5254 T	59.9	35.9	16.0
B 5244 S	50.0	28.0	12.0

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

Block	A Small diameter		B Medium diameter		C Large diameter	
	block	intermediate section	block	intermediate section	block	intermediate section
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 for lubricated screws and nuts:	Nm / ft.lb. Degrees
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 outwards):	
step 1, M10	20/15
step 2, M10	40/30
step 3, M8	25/18
step 4, M7	16/12
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
Timing cover, front	12/9
Timing cover, upper	8/6
Camshaft pulley	20/15
Timing gear pulley, camshaft without VVT	20/15
Timing gear pulley, camshaft with VVT	10/7.5
Camshaft pulley with VVT, centre screw	120/89
Camshaft pulley with VVT, centre screw	35/26
Tension pulley, timing belt	30/22
Vibration damper, timing belt	24/18
Belt tensioner, mechanical	20/15
Idler pulley, timing belt	24/18
Water pump	17/13

Tightening torques for lubricated screws and nuts:	Nm / ft.lb. Degrees
Exhaust manifold	23/17
Manifold, exhaust port, stud screw, turbocharger (TC):	20/15
Intake manifold	19/14
Fuel rail:	
step 1	10/7.5
step 2	angle-tighten 75°
Oil pan	17/13
Oil pump	10/7.5
Plug, oil pan	38/28
Oil intake line	17/13
Drain hose, turbocharger (TC)	12/9
Pipescrews, crankcase ventilation	26/19
Pipescrews, oil pressure pipes, turbocharger (TC)	26/19
Pipescrews, coolant pipes, turbocharger (TC)	26/19
Pipescrews, oil pressure pipes, cylinder block	38/28
Cover, front edge	17/13
Oil trap	15/11
Nipple, oil filter	40/30
Oil pressure switch	27/20
Engine speed (RPM) sensor	6/4
Knock sensor (KS)	20/15
Temperature sensor, engine coolant	22/16
Spark plugs	30/22
Flywheel:	
step 1	45/33
step 2	angle-tighten 65°



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Tightening torques for engine mountings		Nm / ft.lb.
Oiled screws and nuts:		Degrees
A	Nut (screw) for the engine pad	50/37
B	Rear engine mounting - gearbox	50/37
C	Right engine mounting	
	rear bolts - cylinder block, M10	
	step 1, M10	35/26
	step 2, M10	angle tighten
	60°	
D	front bolt - engine block	
	step 1, M8	20/15
	step 2, M8	angle-tighten
	60°	
E	engine pad - engine mounting	
	step 1	35/26
	step 2	angle-tighten
	90°	
F	engine pad - frame	angle-tighten
	step 1	65/48
	step 2	angle-tighten
	60°	
G	Upper torque rod	
	front bushing	
	step 1	35/26

Tightening torques for engine mountings		Nm / ft.lb.
Oiled screws and nuts:		Degrees
H	step 2 angle-tighten	90°
	rear bushing - body	
I	step 1	35/26
	step 2 angle-tighten	60°
	rear bushing - torque rod	
J	step 1	35/26
	step 2 angle-tighten	60°
J	stay - cylinder head	10/7.5
K	stay - torque control arm	25/18
L	torque control arm - cylinder block	
	step 1	45/33
	step 2 angle-tighten	90°
M	Front engine mounting - cylinder block	25/18
N	Lower torque rod	
	front bushing - frame, M12	
	step 1	65/48
O	step 2 angle-tighten	60°
	torque rod - bushings	
	step 1	35/26
P	step 2 angle-tighten	90°
	rear bushing - gearbox	
	step 1	35/26
Q	step 2 angle-tighten	40°
	torque control arm - cylinder head (turbocharger (TC))	
	step 1	35/26
	step 2 angle-tighten	60°

Group 22 Lubrication system**General**

Oil volumes and grades, see:

Section 1 Service and maintenance.**Group 16 Lubrication.**

Oil pressure: Engine at operating temperature, thermostat open and new oil filter. Engine speed r/s (rpm)	6-cylinder engines	5-cylinder engines	5-cylinder diesel engines
14 (810), minimum MPa	0.1	0.1	0.015
67.7 (4000), minimum MPa	0.35	0.35	-
33.3 (2000), minimum MPa	-	-	0.2
Relief valve: The relief valve opens at a pressure of Mpa	0.65	0.48	0.53 - 0.63
Maximum oil pressure MPa	0.9	0.7	0.7
Oil pressure sensor: Breakpoint, indicator lamp goes out at a pressure MPa	0.04 - 0.06	0.04 - 0.06	0.015 - 0.035

Group 25 Intake and exhaust system

Tightening torques:	Nm / ft.lb.
Exhaust manifold, cylinder head side	23/17
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	10/7.5
Intake pipe	17/13

Group 26 Cooling system**General**

Never top up with water only. Use Volvo original **green coolant** (see table below) diluted 50/50 with **clean water**. This mixture will prevent corrosion and freezing.

General

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 cleaning agent 11 61 328.

Volvo coolant, green:	Volvo P/N
1 litre, cold market	13 81 076
5 litre, cold market	13 81 077
1 litres, EU, rest of the world	13 81 078
5 litres, EU, rest of the world	13 81 079
210 litres, world-wide	13 81 080
1 gal (3.785 litres), USA	13 81 081
5 litres (ready-mixed 50/50), Australia	13 81 082

Engine type	Volume litres	Expansion tank pressure valve opens at:		Thermostat °C (°F):		
		Over pressure kPa	Negative pressure kPa	Marking	Starts to open	Fully open
B 52xx	12.2	150	7	90	90 (194)	105 (221)

Group 28 Ignition system

General

Engine type	Ignition system	Ignition timing* (btdc)	Engine speed rpm
B 5202 S	Fenix 5.2	$5^{\circ} \pm 2^{\circ}$	850 ± 50
B 5204 T, T2	Motronic 4.4	$6^{\circ} \pm 2^{\circ}$	850 ± 50
B 5204 T4	ME 7.0	$6^{\circ} \pm 2^{\circ}$	850 ± 50
B 5234 S	Motronic 4.4	$10^{\circ} \pm 2^{\circ}$	850 ± 50
B 5234 S	DENSO	$5^{\circ} \pm 2^{\circ}$	850 ± 50
B 5234 T4, 97	Motronic 4.3	$6^{\circ} \pm 2^{\circ}$	850 ± 50
B 5234 T	Motronic 4.4	$5^{\circ} \pm 2^{\circ}$	850 ± 50
B 5234 T3, T8	ME 7.0	$5^{\circ} \pm 2^{\circ}$	850 ± 50
B 5244 S, S2 manual	DENSO	$5^{\circ} \pm 2^{\circ}$	850 ± 50
B 5244 S, S2 automatic	DENSO	$12^{\circ} \pm 2^{\circ}$	850 ± 50
B 5252 S	Fenix 5.2	$10^{\circ} \pm 2^{\circ}$	850 ± 50
B 5254 S	Motronic 4.4	$5^{\circ} \pm 2^{\circ}$	850 ± 50
B 5254 S	DENSO	$5^{\circ} \pm 2^{\circ}$	850 ± 50
B 5254 T	Motronic 4.4	$10^{\circ} \pm 2^{\circ}$	850 ± 50
B 5254 T	ME 7.0	$10^{\circ} \pm 2^{\circ}$	850 ± 50
B 52XX T, 99-	ME 7.0	$8^{\circ} \pm 2^{\circ}$	850 ± 50

* Cannot be adjusted, only checked.

Group 28 Components

Technical data, tightening torques and spark plugs:

Component:

Ignition coil, ignition discharge module ME 7	Volvo P/N	91 25 601
Ignition coil, ignition discharge module DENSO	Volvo P/N	91 25 601
Ignition coil, ignition discharge module	Volvo P/N	12 75 174
Resistance in windings, 1 and 15	Ω	0.5 - 1.5
Resistance in windings, 1 and HT	$k\Omega$	8 - 9
Spark plugs:		
B 52xx T	Volvo kit no.	272 313
B 52x4 S	Volvo kit no.	272 372
Spark gap:		
B 52xx T	mm	0.75
Tightening torques	Nm (ft.lb)	25 (18)
Distributor arm, rotor	Volvo P/N.	13 67 783
Resistance	$k\Omega$	1.1 - 1.3
Ignition cables:		
Ignition coil - distributor	Volvo P/N	13 35 874
Resistance	$k\Omega$	2.4 \pm 20%
Distributor - spark plugs	Volvo P/N	91 35 700
Resistance, cylinder 1	$k\Omega$	4.5 \pm 20%
Resistance, cylinder 2	$k\Omega$	4.0 \pm 20%
Resistance, cylinder 3	$k\Omega$	3.3 \pm 20%
Resistance, cylinder 4	$k\Omega$	2.9 \pm 20%
Resistance, cylinder 5	$k\Omega$	2.3 \pm 20%
Knock sensor (KS)	Volvo P/N.	13 67 644
Tightening torques	Nm (ft.lb)	20 (15)
Engine speed and position sensor, flywheel	Volvo P/N.	12 75 599
Resistance in coil, at 20C°/68F degrees	Ω	125 \pm 25
Inductance in coil, at 20C°/68F degrees	mH	85 \pm 10 (1 kHz)

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Group 28 Components

Component:		
Camshaft position (CMP) sensor	Volvo P/N.	92 02 134
Relay, engine cooling fan (FC)	Volvo P/N	13 98 845
Resistance in coil	Ω	80
Relay, A/C	Volvo P/N	35 45 619