

## Section 2 Engine

### Group 20 General

Performance and other data, petrol and diesel engines:

Engine type: (Geometric compression ratio)	Fuel: Recom- mended Oc- tane 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 / 2220-5280
B5244 S (10.3:1)	95	125 / 98	170 / 5900	230 / 4500
B5244 S2 (10.3:1)	95	103 / 75	140 / 4500	220 / 3780
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 / 2520-5220
B5234 T7 (8.5:1)	95	147 / 83	200 / 5000	285 / 2000-5000
D 5252 T (20.5:1)	Cetane rating: 51	103 / 67	140 / 4000	290 / 1900-3100
D 5244 T (18.0:1)	Cetane rating: 51	120 / 67	163 / 4000	340 / 1740-3000
D 5244 T2 (18.0:1)	Cetane rating: 51	96 / 67	130 / 4000	280 / 1740-3000
B 5244 SG (10.3:1)	95/CNG Methane (CH <sub>4</sub> )	103 / 97	140 / 5800	192 / 4500
B 5244 SG2 (10.3:1)	95/LPG 40% Butane and 60% Propane 40% C <sub>4</sub> H <sub>10</sub> , 60% C <sub>3</sub> H <sub>8</sub>	103 / 85	140 / 5100	214 / 4500
B5254 T2 (9.0:1)	95	154 / 83	210 / 5000	320 / 1800-4500
B5254 T4 (8.5:1) - Manual	95	220 / 92	300 / 5500	400 / 2100-5100
B5254T4 (8.5:1) - Automatic	95	220 / 100	300 / 6000	350 / 1900-6000

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*Group 20 General*

\* Use only unleaded petrol.

Can also be driven on 91-98 octane petrol.  
For best performance select 98 octane.

## 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
Engine management system: .....	Bosch	Denso	Denso	Bosch	Bosch
No. of cylinders .....	5	5	5	5	5
Cylinder diameter .. mm (inches)	81 (3.19")	83 (3.27")	83 (3.27")	81 (3.19")	83 (3.27")
Cylinder stroke .. mm (inches)	77 (3.03")	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
Boost pressure, absolute pressure at sea level .....	Normal: 153 Max.: 158	-	-	Normal: 182 Max.: 193	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
Engine speed, idle speed .....	670	750	750	670	670
Engine speed, max .....	6200	6500/6800	6500/6800	6500/6800	6200
Weight, gross, including auxiliary equipment and oil etc. ....	166-186 (366-410)	142-154 (315-342)	142-154 (315-342)	144-156 (317-344)	143-156 (315-344)

## Other general data

Engine type:	B5234T7 Engine code 57	D 5252 T Engine code 72	D5244T Engine code 79	D5244T2 Engine code 74	B5244SG Engine code 32
Engine management system: .....	Bosch		EDC 15 C11	EDC 15 C11	Denso
No. of cylinders .....	5	5	5	5	5
Cylinder diameter .. mm (inches)	81 (3.19")	81 (3.19")	81 (3.19")	81 (3.19")	81 (3.19")
Cylinder stroke .. mm (inches)	90 (3.54")	95.5 (3.76")	93.2 (3.67")	93.2 (3.67")	90 (3.54")
Cylinder displacement .. litres	2,319	2,461	2,401	2,401	2,435
Boost pressure, absolute pressure at sea level .....	Normal: 140 Max: 147	Normal: 170 Max.: 190	Normal		-
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

Engine type:	B5234T7 Engine code 57	D 5252 T Engine code 72	D5244T Engine code 79	D5244T2 Engine code 74	B5244SG Engine code 32
Engine speed, idle speed ..... rpm	670	790	700	700	750
Engine speed, max ..... rpm	6200	4500/5700	4600	4600	6500/6800
Weight, gross, including auxiliary equipment and oil etc. ..... kg (lb.)	166-186 (369-413)	184-222 (406-489)	185/(407)	185/(407)	146-160 (322-353)

## Other general data

Engine type:	B5244SG2 Engine code 33	B5254 T2 Engine code 59	B5254 T4 Engine code 52
Engine management system: ..	Denso	Bosch ME 7	Bosch ME 7
No. of cylinders .....	5	5	5
Cylinder diameter .. mm (inches)	81 (3.19")	83 (3.27")	83 (3.27")
Cylinder stroke .... mm (inches)	90 (3.54")	93.2 (3.67")	93.2 (3.67")
Cylinder displacement ... litres	2,435	2,521	2,521
Boost pressure, absolute pressure at sea level ..... kPa	-		
Firing order .....	1-2-4 -5-3	1-2-4 -5-3	1-2-4 -5-3
Engine speed, idle speed .... rpm	750	670	720
Engine speed, max ..... rpm	6500/6800	6500/6800	6500/6800
Weight, gross, including auxiliary equipment and oil etc. .... kg (lb.)	146-160 (322-353)	163-176 (359-388)	

### Group 21 Cylinder block

Technical data applying to diesel engine D 5252 T

Cylinder head:	Dimension:	
<p>If the cylinder head displays excessive distortion it must be replaced.</p> <p><b>It cannot be ground flat.</b></p> <p>Maximum distortion, front-rear .....</p> <p>Maximum distortion, lateral .....</p>	<p>0.2 mm/0.008"</p> <p>0.2 mm/0.008"</p>	
Cylinder head gasket:		
<p>One of the following gaskets is used dependent on the piston height above the cylinder block surface:</p> <p>Measured height .....</p> <p>0.76 - 1.01 mm</p> <p>0.03" - 0.04"</p> <p>Measured height .....</p> <p>1.02 - 1.05 mm</p> <p>0.04" - 0.041"</p> <p>Measured height .....</p> <p>1.06 - 1.13 mm</p> <p>0.042" - 0.044"</p>	<p>Gasket:</p> <p>1.53 mm</p> <p>0.06"</p> <p>1.57 mm</p> <p>0.062"</p> <p>1.61 mm</p> <p>0.063"</p>	<p>Marking with 1 holes.</p> <p>Marking with 2 holes.</p> <p>Marking with 3 holes.</p>
Cylinder block Dimensions:	Piston diameter	Cylinder diameter
<p>Standard .....</p>	<p>80.96 mm</p> <p>3.1874"</p>	<p>81.01 mm</p> <p>3.1893"</p>

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## Group 21 Cylinder block

## Tightening torques for petrol engines: B 52XX XX, Cylinder block

Tightening torques for lubricated screws and nuts:	Nm / lbf.ft.
Cylinder head (tighten the screws in sequence from the centre outwards):	
Stage 1 .....	20/15
Stage 2 .....	60/44
Step 3 ..... angle-tighten	130°
Intermediate section:	
Tighten the screws in sequence from the centre outwards.	
Stage 1, M10 .....	20/15
Stage 2, M10 .....	45/33
Stage 3, M8 .....	24/18
Stage 4, M7 .....	17/13
Step 5, M10 ..... angle tighten	90°
Connecting rod cap:	
Stage 1 .....	30 ± 3/22 ± 2
Step 2 ..... angle-tighten	90°
Crankshaft centre nut .....	180/133
Flange screw, vibration damper:	
Stage 1 .....	25/19
Step 2 ..... angle-tighten	60°
Carrier plate:	
Stage 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
Camshaft pulley .....	25/19
Timing gear pulley, camshaft without VVT .....	20/15
Timing gear pulley, camshaft with VVT .....	10/7.4
Camshaft pulley with VVT, centre screw .....	120/89
Camshaft pulley with VVT, centre plug .....	35/26

Tightening torques for lubricated screws and nuts:	Nm / lbf.ft.
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
Exhaust manifold .....	25/19
Studs (at exhaust port, manifold, turbocharger (TC)) .....	20/15
Intake manifold .....	20/15
Fuel rail:	
Stage 1 .....	10/7.4
Step 2 .....	75°
angle-tighten	
Sump .....	17/13
Oil pump .....	6/4.5
Plug, sump .....	38/28
Plug, gauge hole / crankshaft seal .....	38/28
Plug, gauge hole for gauging valve clearance .....	20/15
Oil intake line .....	17/13
Drain hose, turbocharger (TC) .....	12/9
Pipe screw, crankcase ventilation .....	26/19
Pipe screw, oil pressure pipes, turbocharger (TC) .....	26/19
Pipe screw, coolant pipes, turbocharger (TC) .....	26/19
Pipe screw, oil pressure pipes, cylinder block .....	38/28
Cover, front edge .....	17/13
Oil trap .....	15/11
Nipple, oil filter .....	40/30
Oil filter, environmental filter .....	25/19
Oil pressure switch .....	50/37
Dip stick .....	10/7.5
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:	
Stage 1 .....	45/33
Step 2 .....	65°
angle-tighten	

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*Group 21 Cylinder block*

Tightening torques for lubricated screws and nuts:	Nm / lbf.ft.
Gearbox screw (lower torque rod):	
Stage 1 .....	35/26
Step 2 ..... angle-tighten	40 <sup>o</sup>

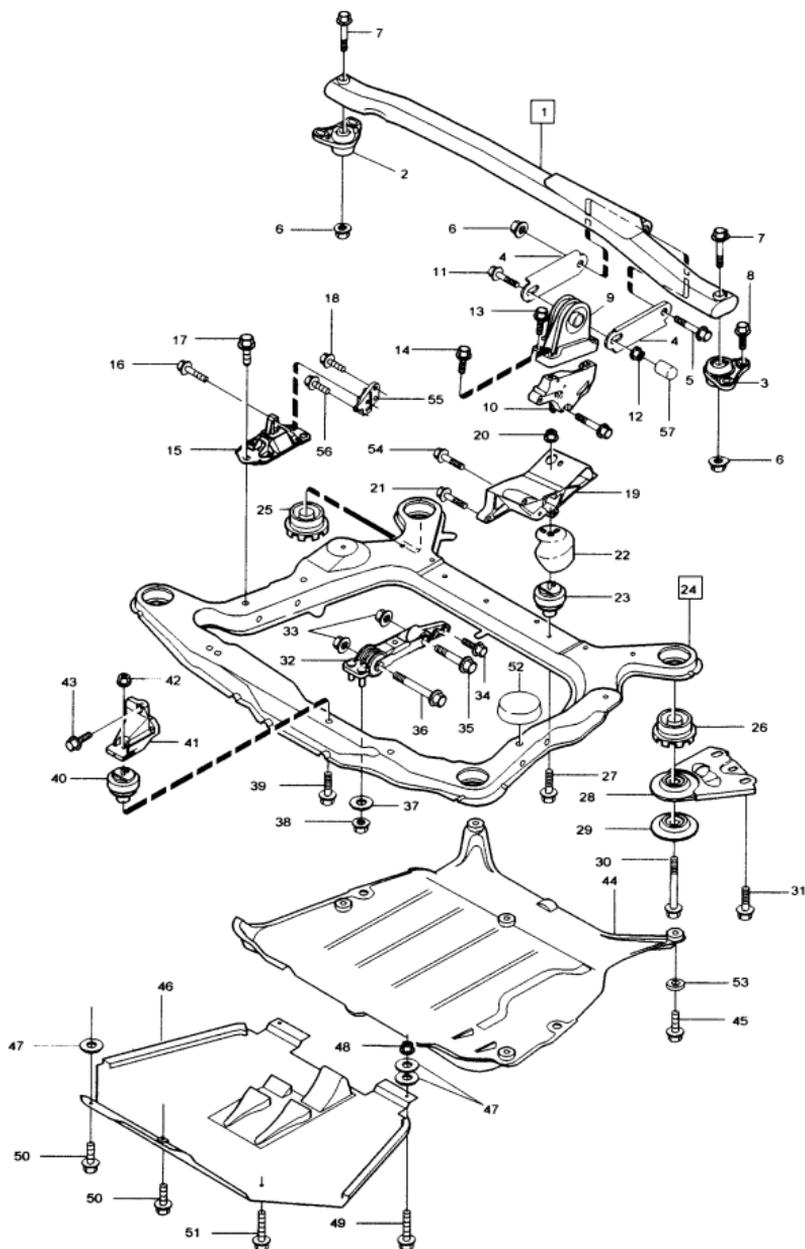
## Tightening torques for D5244 T/T2, cylinder block

Tightening torques for lubricated screws and nuts:	Nm / lbf.ft.
Cylinder head (tighten the screws in sequence from the centre outwards):	
Stage 1 .....	50/37
Stage 2 .....	90/44
Step 3 ..... angle-tighten	90°
Engine mounting Right side	
Stage 1, M10 .....	35/26
Step 2, M8 ..... angle-tighten	60°
Connecting rod cap:	
Stage 1 .....	30 ± 3/22 ± 2
Step 2 ..... angle-tighten	90°
Crankshaft centre nut .....	300/221
Flanged screw, vibration damper (4 flanged screws)	
Stage 1 .....	35/26
Step 2 ..... angle-tighten	50°
Carrier plate:	
Stage 1 .....	45/33
Step 2 ..... angle-tighten	50°
Gearbox - engine .....	48/35
Torque converter .....	50/37
Timing cover, front .....	12/9
Timing cover, rear .....	8/6
Timing gear pulley, camshaft .....	30/22
Timing gear pulley, camshaft with VVT .....	10/7.4
Camshaft pulley with VVT, centre screw .....	120/89
Camshaft pulley with VVT, centre plug .....	35/26
Belt tensioner, mechanical .....	35/26
Idler pulley, timing belt .....	24/18
Water pump .....	17/13
Exhaust manifold .....	30/22
Manifold, exhaust port, stud screw, turbocharger (TC) .....	20/15
EGR cooler, cylinder head side .....	50/37
Intake manifold .....	19/14
Fuel rail:	
Stage 1 .....	10/7.4
Step 2 ..... angle-tighten	75°

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## Group 21 Cylinder block

Tightening torques for lubricated screws and nuts:	Nm / lbf.ft.
Sump .....	17/13
Oil pump .....	6/4.5
Plug, sump .....	38/28
Oil intake line .....	17/13
Fuel injection pump .....	20/15
Drain hose, turbocharger (TC) .....	12/9
Pipe screw, crankcase ventilation .....	26/19
Pipe screw, oil pressure pipes, turbocharger (TC) .....	18/13
Pipe screw, coolant pipes, turbocharger (TC) .....	26/19
Pipe screw, oil pressure pipes, cylinder block .....	38/28
Oil trap .....	15/11
Oil filter, environmental filter .....	25/19
Oil pressure switch .....	27/20
Dip stick .....	10/7.5
Engine speed (RPM) sensor .....	10/7.4
Knock sensor (KS) .....	20/15
Temperature sensor, engine coolant .....	22/16
Glow plug .....	10.5/7.5
Flywheel:	
Stage 1 .....	45/33
Step 2 .....	angle-tighten 65°

Engine mountings for petrol engines:  
B52XX

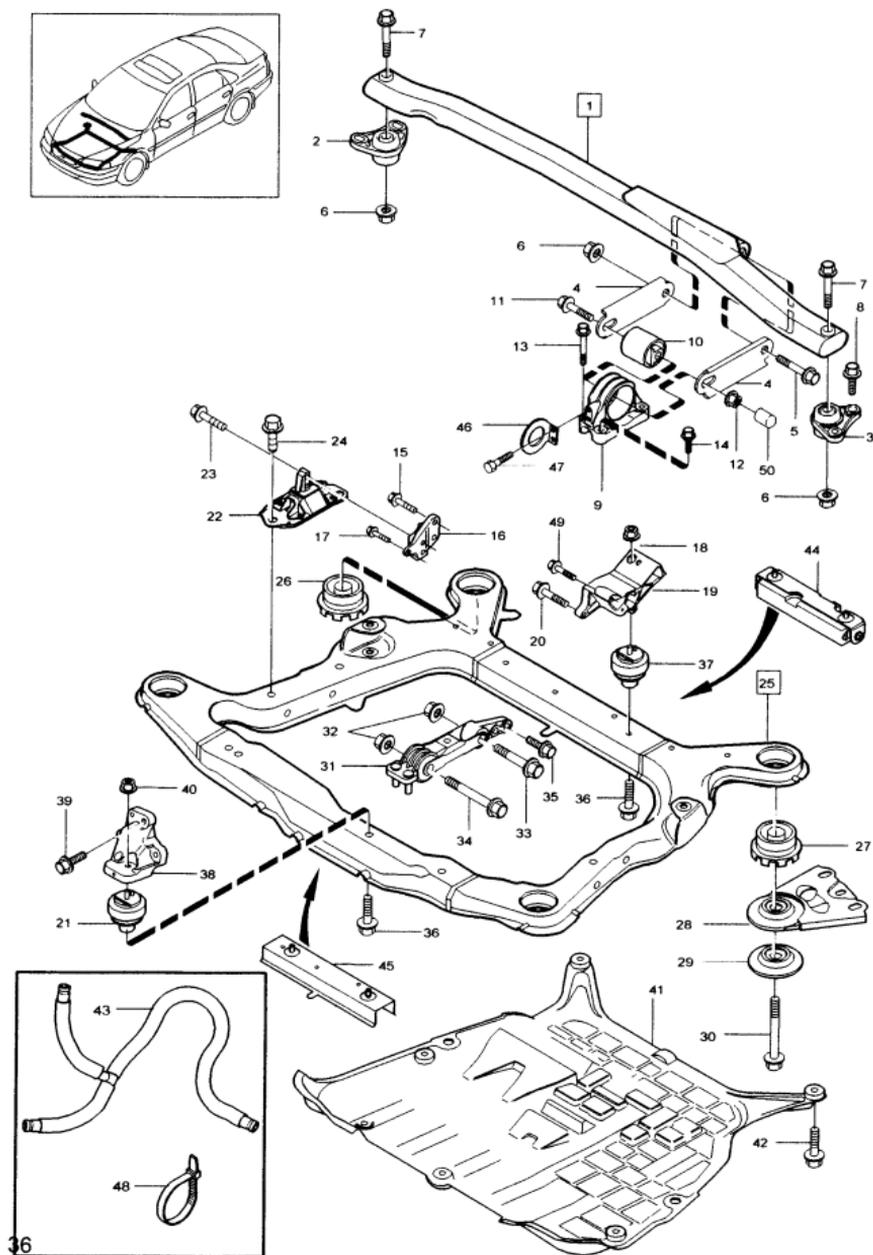
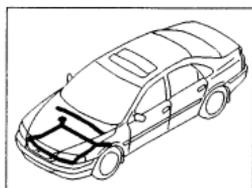
Engine mountings for 5-cylinder petrol engines		
Number (as illustrated):	Tightening torques for lubricated screws and nuts: Nm /lbf ft. And angle tightening if necessary: Degrees	Remarks
1		Engine stabiliser brace
5	80/59	Flanged screw
7	80/59	Flanged screw
8	50/37	Flanged screw
9		Engine mounting, upper
10	50/37	Flanged screw
11	80/59	Flanged screw
13.14	50/37	Flanged screw
15		Engine pad, right
16	35/26 Angle tightening: 90°	Flanged screw
17	65/48 Angle tightening: 60°	Flanged screw
18	35/26 Angle tightening: 60°	Flanged screw
19		Engine mounting, rear
20	50/37	Flanged nut
21	50/37	Flanged screw
23		Engine pad, rear
27	50/37	Flanged screw
30	105/78 Angle tightening: 120°	Flanged screw
31	50/37	Flanged screw
34	35/26 Angle tightening: 40°	Flanged screw
35	35/26 Angle (Protractor) tightening: 90°	Flanged screw
36	35/26 Angle (Protractor) tightening: 90°	Flanged screw
38	65/48 Angle tightening: 60°	Flanged nut
39	50/37	Flanged screw
40		Engine pad, front
41		Engine mounting, front
42	50/37	Flanged nut
43	50/37	Flanged screw
49	20/15	Flanged screw
56	20/15 Angle (Protractor) tightening: 60°	Flanged screw

<b>Engine mountings for 5-cylinder petrol engines</b>		
<b>Number (as illustrated):</b>	<b>Tightening torques for lubricated screws and nuts: Nm /lbf ft. And angle tightening if necessary: Degrees</b>	<b>Remarks</b>
	50/37 bracket, exhaust support Rubber exhaust mounting P/N:	Flanged screw 866 62 55

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Group 21 Cylinder block

Engine mountings for diesel engines:  
D5244 X

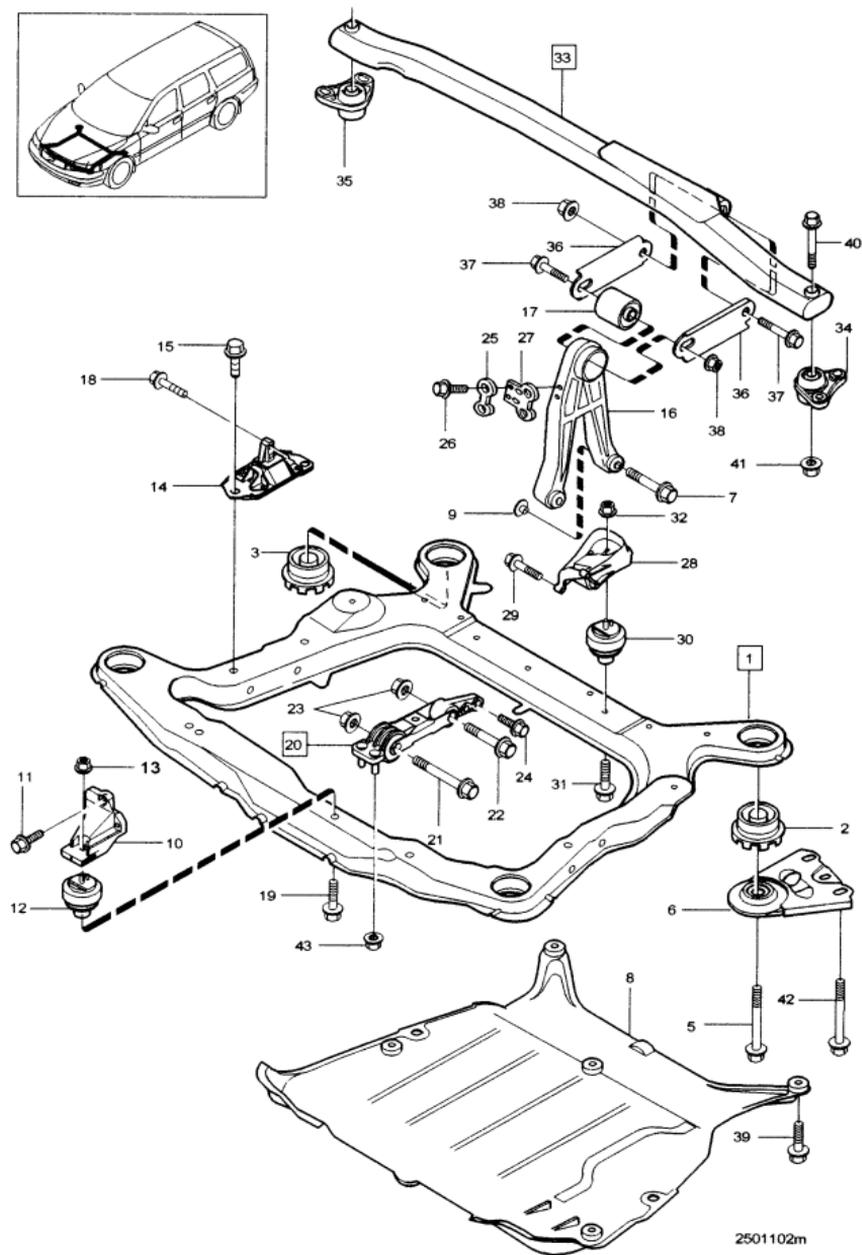
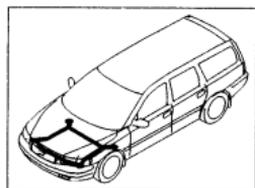


Engine mountings for D5244 T/T2		
Number (as illustrated):	Tightening torques for lubricated screws and nuts: Nm /lbf ft. And angle tightening if necessary: Degrees	
1		Engine stabiliser brace
5	80/59	Flanged screw
7	80/59	Flanged screw
9		Engine mounting, upper
11	80/59	Flanged screw
13.14	50/37	Flanged screw
15	35/26 Angle tightening: 60°	Flanged screw
17	20/15 Angle (Protractor) tightening: 60°	Flanged screw
18	50/37	Flanged nut
19		Engine mounting, rear
20	50/37	Flanged screw
21		Engine pad, front
22		Engine pad, right
23	35/26 Angle tightening: 90°	Flanged screw
24	65/48 Angle tightening: 60°	Flanged screw
25		Frame
30	105/78 Angle tightening: 120°	Sems screw
31	65/48 Angle tightening: 60°	Engine stabiliser brace
33	35/26 Angle (Protractor) tightening: 90°	Flanged screw
34	35/26 Angle (Protractor) tightening: 90°	Flanged screw
35	35/26 Angle tightening: 40°	Flanged screw
36	50/37	Flanged screw
37		Engine pad, rear
38		Engine mounting, front
39	50/37	Flanged screw
40	50/37	Flanged nut
42	20/15	Flanged screw
45	50/37	Vibration damper
47	50/37	Flanged screw
52	Rubber exhaust mounting P/N:	866 62 55

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Group 21 Cylinder block

Engine mountings for Diesel engine D  
5252 T



<b>Engine mountings for diesel engine D 5252 T</b>	
<b>Number as illustrated:</b>	<b>Tightening torques for lubricated screws and nuts: Nm /lbf ft. And angle tightening if necessary: Degrees.</b>
5	105/78 Angle tightening: 120°
7	45/33 Angle tightening: 90°
11	50/37
13	50/37
15	65/48 Angle tightening: 60°
18	35/26 Angle tightening: 90°
19	50/37
21.23	35/26 Angle tightening: 90°
22.23	35/26 Angle tightening: 90°
24	35/26 Angle tightening: 40°
26	10/7
29	50/37
31	50/37
32	50/37
37.38	80/59
39	20/15
40.41	80/59
42	50/37
43	65/48 Angle tightening: 60°

## Group 22 Lubrication system

## General

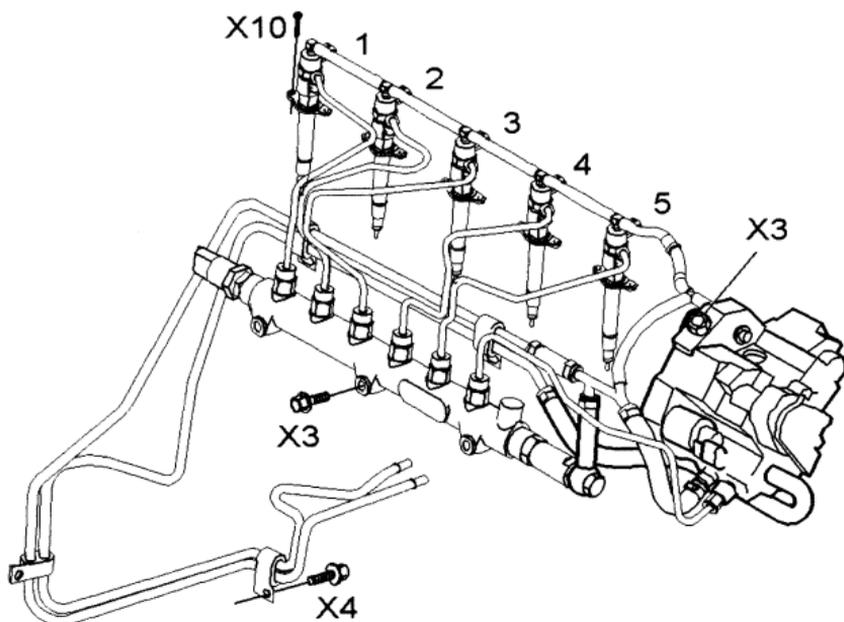
Oil volumes and grades, see: Section 1: Service and maintenance, Group 17: Service

Oil pressure: Engine at operating temperature, thermostat open and new oil filter. Engine speed rps (rpm)	Petrol engines:	D5252 T (S80,V70)	D5244 T
14 (810), minimum ..... MPa	0.1	0.015	
67.7 (4000), minimum ..... MPa	0.35	-	
33.3 (2000) ..... MPa	-	0.2	
The relief valve opens at a pressure of:			
5 cylinder ..... Mpa	0.48	0.53 - 0.63	0.55
6 cylinder (S80) ..... Mpa	0.65	-	-
Maximum oil pressure:			
5 cylinder ..... Mpa	0.7	0.7	0.7
6 cylinder (S80) ..... Mpa	0.9	-	-
Oil pressure sensor:			
Breakpoint, indicator lamp goes out at a pressure ..... MPa	0.04 - 0.06	0.015 - 0.035	0.06

## Group 23 Fuel system

## Fuel injection system, Diesel engine D 5244 T/T2

High-pressure pump:		
Type .....		Piston pump
Make .....		Bosch
Designation .....		CP3.3
Injectors:		Assembly:
EDC15C11 .....	Class 1	Volvo P/N: 8602667
EDC15C11 .....	Class 2	Volvo P/N: 8602668
EDC15C11 .....	Class 3	Volvo P/N: 8602669
Turbocharger (TC) boost pressure, absolute pressure:		210 kPa



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*Group 23 Fuel system*

Tightening torques

D5244 T/T2	Tightening torques Nm
Injectors: 1-5, two screws per injector. M6	10±1.5
X3, Rail secured with 3x M7 screws	16±3
X4, Fuel line secured with 4x M7 screws	14±3
X3, High-pressure pump 3x M7 screws	18±2
Fuel pressure pipe 12x nuts	28±3

## Group 24 Bi-Fuel

## Bi-fuel specifications

Volvo's bifuel cars have two fuel systems and two fuel tanks.

The engine always starts on petrol before switching to gas power when the coolant temperature reaches 15°C, if gas power is selected. The car switches to petrol automatically if the gas runs out. To a certain extent, the same technical solutions are used in the bifuel system.

A pressure regulator reduces the pressure to the desired level.

A fuel rail distributes the fuel to each cylinder.

Injectors, there are gas injectors in the engine intake manifold.

A control module, in addition to the normal control modules, which regulates fuel and ignition.

## Safety

The combustion point of CNG in air at 20°C is between 5.3 and 13.9 volume

The combustion point of LPG in air at 20°C is between 2.2 and 8.4 volume

The CNG that flows out is gaseous and expands to fill its enclosure.

There is the risk of explosion if CNG leaks out into unventilated spaces.

LPG that flows out sinks.

There is the risk of explosion if LPG leaks out into unventilated spaces.

## Important!

- Always ensure good ventilation when working with Bi-fuel cars.
- Carefully follow the safety instructions in VADIS.
- Observe all transportation regulations for pressurised fuel tanks.
- Contact your gas supplier when draining the system and for final handling.

Emissions [g/km]	CO <sub>2</sub>	CO	HC + NO <sub>x</sub>
Statutory requirements . . . . .		2.2	0.5
Petrol . . . . .	205		
LPG . . . . .	185	0.19	0.11
CNG . . . . .	165	0.31	0.124

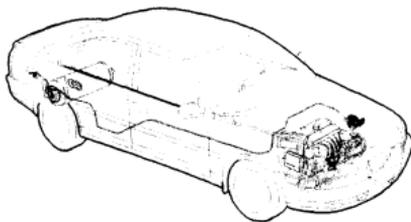
	LPG	CNG
Engine	B5244SG2	B5244SG
Maximum output	103kW, 140bhp/5100 rpm	103kW, 140bhp/5800 rpm
Maximum torque	214 Nm / 4500 rpm	192 Nm / 4500 rpm
Top speed manual / automatic	205 / 200 km/h	205 / 200 km/h
Acceleration 0-100 km/h manual.	M56 L: 10.6 s AW55-50: 11.5	M56 L: 11.0 s AW55-50: 11.9
Fuel consumption manual / automatic	11.4/12.9 m <sup>3</sup> /100 km	8.2/9.1 m <sup>3</sup> /100 km
Range, manual	505km + 349km	311km + 349km
Fuel tank	50 l LPG (8 bar)+ 29 l petrol	73 l + 13 l + 13 l CNG (200 bar) + 29 l petrol

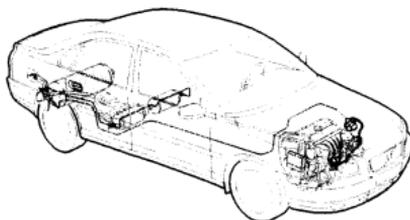
#### Chemical summary

CNG - Compressed Natural Gas. The fuel consists of methane CH<sub>4</sub>. Natural gas and bio gas are other designations. Natural gas is extracted from the earth. Bio gas forms when organic material degrades in an oxygen starved environment.

LPG - Liquefied Petroleum Gas. Consists of a mixture of butane and propane. 40 percent butane C<sub>4</sub>H<sub>10</sub> and 60 percent C<sub>3</sub>H<sub>8</sub>. Normally referred to as bottled gas. The gas is extracted when natural gas and oil is refined.

#### Fuel tank systems for LPG and CNG cars





CNG: B5244SG

**Important!**

There is no bracket and rubber on the left-hand exhaust mounting. Instead the silencer is mounted in a new mounting on the left-hand side in the space normally occupied by the standard fuel tank.

The mounting hook can be easily damaged by a workshop hoist.

When installing the rear pipe, ensure that the rear silencer is not in contact with the petrol tank guard.

Designation	Tightening torques Nm
Fuel shut-off valve (deceleration fuel cut off)	25±6
Shut-off valve, petrol tank	80
Level sensor in the petrol tank, four screws	6
Safety valve	100
Intake valve	80
Shut-off valve, governor	12±3
Governor bracket	10

See the tables at the end of the book for further information

## Group 25 Intake and exhaust system

## Tightening torques for the intake and exhaust system components

<b>Petrol engines:</b> Specific component:	Tightening torques Nm/lbf. ft.
Exhaust manifold, cylinder head side .....	25/19
Exhaust manifold - heat shield .....	15/11
Exhaust manifold - turbocharger (TC), nuts .....	25/19
Exhaust manifold - turbocharger (TC), studs .....	20/15
Exhaust system, pipe to turbocharger (TC) .....	30/22
Catalytic converter:	
towards the turbocharger (TC) .....	25/19
towards the exhaust system .....	24/17
Exhaust system, flange front - rear pipe .....	25/19
Exhaust system, pipe to exhaust manifold .....	25/19
Intake manifold, cylinder head side .....	20/15
<b>Diesel engine D5244 T:</b>	
Exhaust manifold, cylinder head side .....	30/22
Exhaust manifold - heat shield .....	15/11
Exhaust manifold - turbocharger (TC), nuts .....	30/22
Exhaust manifold - turbocharger (TC), studs .....	20/15
Exhaust system, pipe to turbocharger (TC) .....	40/30
Use copper paste:	
Volvo P/N: 11 61 408-8	
Intake manifold, cylinder head side .....	20/15
Three-way catalytic converter (TWC) stay - block	25/19
<b>Diesel engine D5252 T (S80, V70):</b>	
Exhaust manifold, cylinder head side .....	25/19
Exhaust manifold - heat shield .....	8/6
Exhaust manifold - turbocharger (TC), nuts/bi-hex screw .....	60/44
Exhaust manifold - turbocharger (TC), studs .....	40/30
Catalytic converter:	
towards the turbocharger (TC) .....	45/33
towards the exhaust system .....	25/19
Intake manifold, cylinder head side .....	22/16

## 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 coolant 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, cold market .....	13 81 076
5 litres, 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/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 litres	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	150 (22 psi)	10 (1.4 psi)	90°(194°)	90° (194°)	105° (221°)
B 5244 S	8.8	150 (22 psi)	10 (1.4 psi)	90°(194°)	90°(194°)	105° (221°)
B 5244 S2	8.8	150 (22 psi)	10 (1.4 psi)	90°(194°)	90°(194°)	105° (221°)
B 5244 T3	8.0	150 (22 psi)	10 (1.4 psi)	90° (194°)	90° (194°)	105° (221°)
B 5234 T3	8.0	150 (22 psi)	10 (1.4 psi)	90° (194°)	90° (194°)	105° (221°)
B 5234 T7	8.0	150 (22 psi)	10 (1.4 psi)	90° (194°)	90° (194°)	105° (221°)
D 5252 T	12.5	150 (22 psi)	10 (1.4 psi)	87° (188°)	87° (188°)	102° (216°)

V70*Group 26 Cooling system*

Engine type:	Volume litres	Expansion tank pressure valve opens at		Thermostat °C (°F)		
		Over pressure kPa (psi)	Negative pressure kPa (psi)	Marking	Starts to open	Fully open
D 5244 T	9.0	150 (22 psi)	10 (1.4 psi)	90° (194°)	90° (194°)	105° (221°)
D5244 T2	9.0	150 (22 psi)	10 (1.4 psi)	90° (194°)	90° (194°)	105° (221°)
B5254 T2	8.0	150 (22 psi)	10 (1.4 psi)	90° (194°)	90° (194°)	105° (221°)

## Group 28 Engine management system - 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 52XX Turbo .....	Volvo kit no.	86 92 071
B 62XX Turbo .....	Volvo kit no.	86 92 072
B 6XXX without Turbo .....	Volvo kit no.	86 42 661
B 52XX without Turbo .....	Volvo kit no.	86 42 660
Spark gap:		
B 5204 T3/T4, B 6284 T .....	mm	0.7 (0.027")
Spark plug with three electrodes: B 6304 S3, one spark gap .....	mm	0.5 ± 0.10
B 6304 S3, the other two spark gaps .....	mm	0.5 ± 0.25
Tightening torque spark plugs .....	Nm (lbf ft.)	30 (22)
Knock sensor (KS) .....	Volvo P/N.	94 32 570
		Denso own system
Knock sensors (KS) apply to engines: B 5244 S .....	Volvo P/N.	12 75 629
		Denso own system
Tightening torque knock sensor (KS) .....	Nm (lbf ft.)	20 (15)
Speed sensor, flywheel –2003 .....	Volvo P/N.	12 75 599
Speed sensor, flywheel 2003– .....	Volvo P/N.	86 27 355
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, early version .....	Volvo P/N.	91 86 812
Camshaft position (CMP) sensor –2003 .....	Volvo P/N	92 25 134
Camshaft position (CMP) sensor 2003– .....	Volvo P/N	86 27 354
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

## Components Bosch ME-7:

Components related to the ignition and fuel system Type ME-7:	
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: > 125 l/hour at line pressure of 380 kPa and 13 V. Power consumption at line pressure: 7.5 A.
Fuel pump, R-line (S60/V70):	
pump 1 .. motor supply	Pump capacity: > 135 l/hour at line pressure of 380 kPa and 13 V. Power consumption at line pressure: 8 A.
pump 2 .. fuel transportation in tank	Pump capacity: Ejector performance left-hand half of the tank approximately 100 l/hour Power consumption at line pressure: < 4.0 A.
Injector .....	Resistance, coil: 12 $\Omega$ .
Boost pressure sensor ..... -2003	Piezo resistive linear pressure sensor. Measurement range 20 - 250 kPa.
Intake air temperature sensor ..... -2003	NTC resistor.
T-MAPS: Charge air sensor/Intake air temperature sensor ..... 2003-	Piezo resistive linear pressure sensor. Measurement range 20 - 250 kPa. NTC resistor.
Turbocharger (TC) control valve ...	PWM controlled valve. Resistance 29.7 $\Omega$ .
Camshaft reset valve VVT .....	PWM controlled valve. Resistance 3.7 $\Omega$ .
Knock sensor (KS) .....	Piezo-electric crystal. Resistance 200 $\pm$ 80 $\Omega$ .
Camshaft position (CMP) sensor ...	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 $\Omega$ .
Heated oxygen sensor (HO2S), front Preheating .....	Linear sensor. Resistance 3 $\Omega$ , at 20°C/68°F.

Components related to the ignition and fuel system	
Type ME-7:	
Heated oxygen sensor (HO2S), rear Preheating .....	Binary sensor. Resistance 9 $\Omega$ , at 20°C/68°F.
Ignition coil .....	Individually mounted ignition coil. Integrated ignition discharge module (IDM) and diagnostics.
Outside 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 $\Omega$ .
Fuel pump (FP) relay .....	Frequency controlled mechanical relay.
Air conditioning (A/C) relay .....	Mechanical relay. Resistance in coil 96 $\Omega$ .
Engine cooling fan (FC) control module .....	PWM controlled discharge module with variable output voltage and diagnostics.
System relay .....	Mechanical relay. Resistance 80 $\Omega$ .
Clutch pedal position sensor .....	Self-adjusting.
Brake pedal position sensor .....	Self-adjusting.
Brake lamp switch .....	Two. One switch and one sensor.
Engine coolant level switch .....	Level indicator.
Oil pressure switch .....	Pressure switch.

**Technical data**

Applies to ME-7 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 .....	$\Omega$	3700	2450	318	184
Voltage .....	V	2.1	1.6	0.3	0.2

Temperature sensor, intake air: -2003

Temperature .....	°C (F°)	0° (32°)	20° (68°)	30° (86°)	40° (104°)
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<b>Technical data</b>					
Applies to ME-7 ignition and fuel system:					
Resistance .....	$\Omega$	15 931	6 068	3 923	2 603
Voltage .....	V	4.3	3.5	3	2.5
Temperature sensor, intake air: 2003-					
Temperature .....	$^{\circ}\text{C}$ ( $^{\circ}\text{F}$ )	0 $^{\circ}$ (32 $^{\circ}$ )	20 $^{\circ}$ (68 $^{\circ}$ )	30 $^{\circ}$ (86 $^{\circ}$ )	40 $^{\circ}$ (104 $^{\circ}$ )
Resistance .....	$\Omega$	5886 $\pm$ 5%	2510 $\pm$ 5%	1715 $\pm$ 5%	1199 $\pm$ 5%
Outside temperature sensor:					
Temperature .....	$^{\circ}\text{C}$ ( $^{\circ}\text{F}$ )	0 $^{\circ}$ (32 $^{\circ}$ )	20 $^{\circ}$ (68 $^{\circ}$ )	25 $^{\circ}$ (77 $^{\circ}$ )	30 $^{\circ}$ (86 $^{\circ}$ )
Resistance .....	$\Omega$	6318	2424	1941	1513
Voltage .....	V	4.3	3.5	3.3	3
Air conditioning (A/C) pressure switch (Pressostat):					
Pressure .....	kPa	195 - 325		160 - 180	
Status .....	To/From	On		Off	
Clutch pedal position sensor:					
Position .....	mm	0	25 (0.98")	50 (1.97")	100 (3.93")
Resistance .....	$\Omega$	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 .....	$\Omega$	1300 - 2100	1000 - 1800	900 - 1700	600 - 1400

**Components DENSO:**

Components related to the DENSO -2000 ignition and fuel system:		Components related to the DENSO 2000- ignition and fuel system:
Control module ..	Built-in atmospheric pressure sensor.	Built-in atmospheric pressure sensor.
Throttle unit .....	Damper motor integrated with electronic module.	Damper motor integrated with electronic module.
Accelerator pedal (AP) position sensor .....	Pulse width modulated and linear signal (digital / analogue).	Pulse width modulated and linear signal (digital / analogue).
Pressure regulator .....	Line pressure 380 kPa.	
Mass air flow (MAF) sensor .....	Wire mass air flow (MAF) sensor. Measurement range 1.4-180 g/s.	Wire mass air flow (MAF) sensor. Measurement range 1.4-180 g/s.
Fuel pump .....	Pump capacity at line pressure of 380 kPa and 12.5 V is > 125 l/min. Power consumption at line pressure: 7.5 A.	Pump capacity at line pressure of 380 kPa and 12.5 V is > 125 l/min. Power consumption at line pressure: 7.5 A.

Components related to the DENSO -2000 ignition and fuel system:		Components related to the DENSO 2000- ignition and fuel system:
Injector .....	Resistance, coil: 13.8 $\Omega$ .	12 hole Resistance, coil: 13.8 $\Omega$ .
Manifold absolute pressure (MAP) sensor .....	Semi-capacitive linear pressure sensor. Measurement range 13.3 -120 kPa.	Semi-capacitive linear pressure sensor. Measurement range 13.3 -120 kPa.
Temperature sensor, intake .....	Integrated into the mass air flow (MAF) sensor. NTC resistor.	Integrated into the mass air flow (MAF) sensor. NTC resistor.
Engine coolant temperature (ECT) sensor .....	NTC resistor.	NTC resistor.
Knock sensor (KS) .....	Piezo-electric crystal. Resistance 200 $\pm$ 80 $\Omega$ .	Piezo-electric crystal. Resistance 200 $\pm$ 80 $\Omega$ .
Camshaft position (CMP) sensor .....	Magneto-resistive sensor with a permanent magnet.	Magneto-resistive sensor with a permanent magnet.
Engine speed (RPM) sensor .....	Inductive sensor with permanent magnet. Resistance 125 $\pm$ 25 $\Omega$ , at 20°C/68°F.	Inductive sensor with permanent magnet. Resistance 125 $\pm$ 25 $\Omega$ , at 20°C/68°F.
Heated oxygen sensor (HO2S), front Preheating .....	Linear sensor. Resistance 1 $\Omega$ , at 20°C/68°F.	Linear sensor. Resistance 1 $\Omega$ , at 20°C/68°F.
Heated oxygen sensor (HO2S), rear Preheating .....	Binary sensor. Resistance 5.6 $\Omega$ , at 20°C/68°F.	Binary sensor. Resistance 5.6 $\Omega$ , at 20°C/68°F.
Ignition coil .....	Individually mounted ignition coil. Integrated ignition discharge module (IDM) and diagnostics.	Individually mounted ignition coil. Integrated ignition discharge module (IDM) and diagnostics.
Spark plug type .....	Multi-electrode.	Multi-electrode.
Outside temperature sensor .....	NTC resistor.	NTC resistor.
A/C pressure sensor .....	Linear pressure sensor. Measurement range 0 -3100 kPa.	Linear pressure sensor. Measurement range 0 -3100 kPa.
Canister purge (CP) valve .....	Pulse width modulated. Controlled valve. Resistance 29.7 $\pm$ 1.4 $\Omega$ .	Pulse width modulated. Controlled valve. Resistance 29.7 $\pm$ 1.4 $\Omega$ .
Fuel pump (FP) relay .....	Frequency controlled mechanical relay.	Frequency controlled mechanical relay.

Components related to the DENSO -2000 ignition and fuel system:		Components related to the DENSO 2000- ignition and fuel system:
Air conditioning (A/C) relay .....	Mechanical relay. Resistance in coil 85 $\Omega$ .	Mechanical relay. Resistance in coil 85 $\Omega$ .
Engine cooling fan (FC) control module .....	PWM controlled discharge module with variable output voltage and diagnostic	Two-coil relay. Resistance 80 $\Omega$ . -2002
System relay .....	Mechanical relay. Resistance 80 $\Omega$ .	Mechanical relay. Resistance 80 $\Omega$ .
Clutch pedal sensor .....	Self-adjusting.	Self-adjusting.
Brake pedal sensor .....	Self-adjusting.	Self-adjusting.
Brake lamp switch .....	Two separate switches.	Two separate switches.
Engine coolant level switch .....	Level indicator.	Level indicator.

**Technical data for the DENSO system:**

Mass air flow (MAF) sensor:						
		-2000	2000-			
Q .....	g/s	3.3	3.1	5.7	7.3	9.3
Engine speed .....	rpm	850	750	1500	2000	2500
Voltage .....	V	1.3	1.3	1.6	1.7	1.8
Manifold absolute pressure (MAP) sensor:						
P .....	kPa	101.3		90	70	50
Voltage .....	V	3.6		3.3	2.7	2.1
Engine coolant temperature (ECT) sensor:						
Temperature .....	$^{\circ}\text{C}$	20		40	80	100
Resistance .....	$\Omega$	2450		1150	318	184
Voltage .....	V	3.1		2.2	0.9	0.6
Temperature sensor, intake:						
Temperature .....	$^{\circ}\text{C}$	10		20	25	30
Resistance .....	$\Omega$	4000		2450	2000	1800
Voltage .....	V	2.9		2.4	2.1	1.9

Outside temperature sensor:						
Temperature .....	°C	0		20	25	30
Resistance .....	Ω	6318		2424	1941	1513
Voltage .....	V	4.3		3.5	3.3	3
Air conditioning (A/C) pressure sensor:						
Pressure .....	kPa	517		1206	1894	3100
Voltage .....	V	1		2	3	4.75
Air conditioning (A/C) pressure switch (Pressostat):						
Pressure .....	kPa	295 - 325			160 - 180	
Status .....	To/From	On			Off	
Clutch pedal sensor						
Position .....	mm	0		25	50	100
Resistance .....	Ω	1500 - 2500		1000 - 2000	750 - 1750	500 - 1000
Brake pedal sensor:						
Position .....	mm	0		20	30	50
Resistance .....	Ω	1200 - 1950		850 - 1550	700 - 1400	400 - 1000