ENGINE MECHANICAL SYSTEM

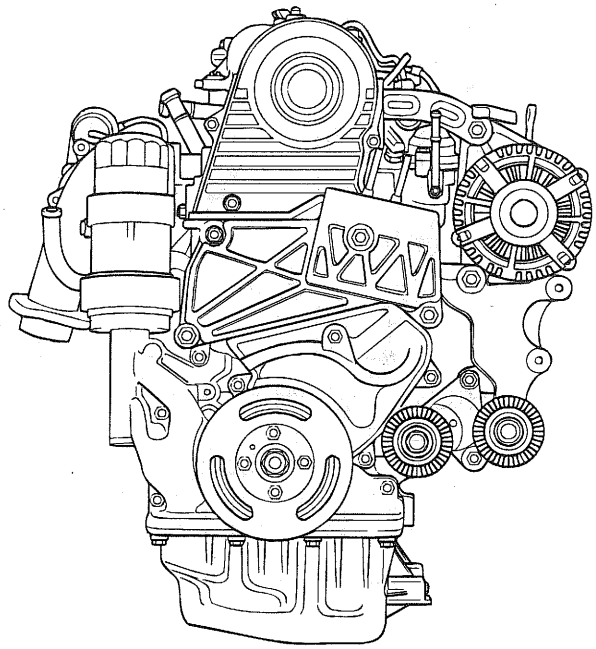
GENERAL

WARNING ECHB0100

REMOVAL AND INSTALLATION OF INJECTOR AND HIGH PRESSURE PUMP.

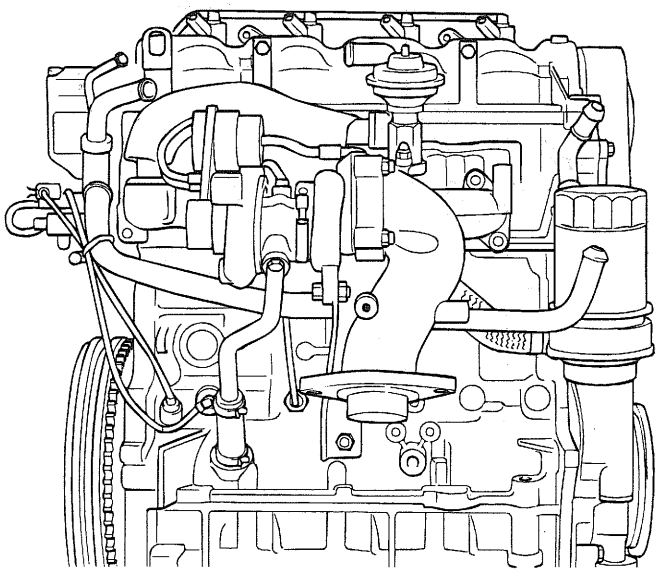
1. Fuel system is subject to extremely high pressure (1350 bar).
2. Never perform any work on injection system with engine running or within 30 seconds after stopping the engine.
3. Always pay attention to safety precautions.
4. Ensure the absolute cleanliness.
5. Never remove the injectors.

2.0TCI ENGINE



TORQUE : Nm (kg·cm, lb· ft)

KCHB001A



TORQUE : Nm (kg·cm, lb· ft)

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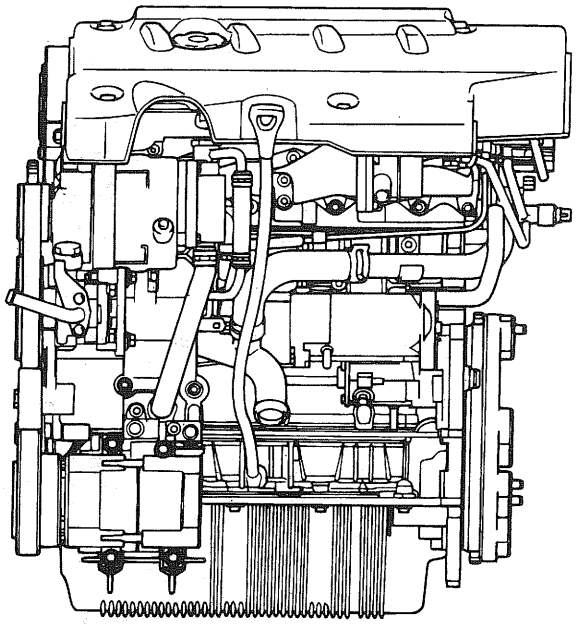
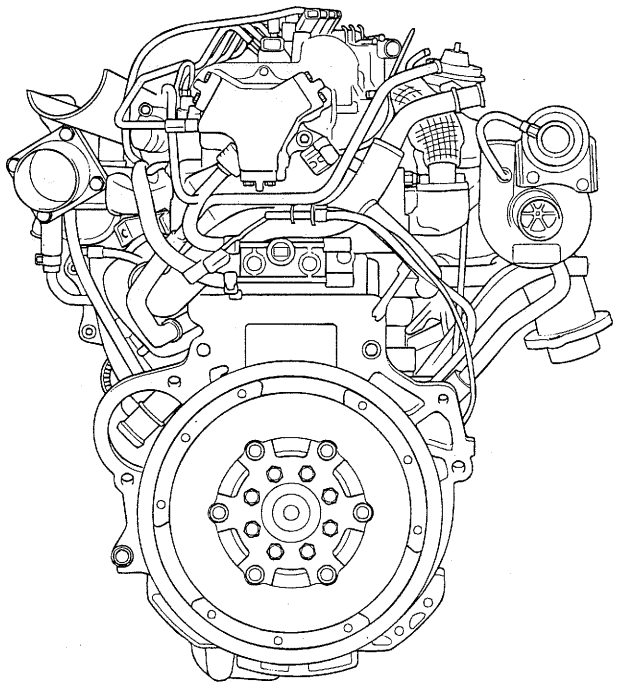


TORQUE : Nm (kg·cm, lb· ft)

KCHB001C



TORQUE : Nm (kg·cm, lb· ft)

KCHB001D

SPECIFICATIONS(D4EA) ECHB0200

Description	Specification 2.0(D4EA)	Limit
General		
Type	In-line, Single Overhead Camshaft	
Number of cylinders	4	
Bore	83 mm (3.27 in.)	
Stroke	92 mm (3.62 in.)	
Total displacement	1991 cc (121.5 cu.in.)	
Compression ratio	17.7:1	
Firing order	1-3-4-2	
Valve timing		
Intake valve		
Opens (BTDC)	7°	
Closes (ABDC)	43°	
Exhaust valve		
Opens (BBDC)	52°	
Closes (ATDC)	6°	
Cylinder head		
Flatness of gasket surface	Max. 0.03 mm (0.0012 in.)	0.2 mm (0.008 in.)
Dimensions for reworking oversize valve seat hole		
Intake		
0.3 mm (0.012 in.) O.S.	29.993-30.006 mm (1.18-1.1813 in.)	
0.6 mm (0.024 in.) O.S.	30.023-30.036 mm (1.182-1.1825 in.)	
Exhaust		
0.3mm (0.012 in.) O.S.	25.393-25.406 mm (0.9997-1.0002 in)	
0.6mm (0.024 in.) O.S.	25.423-25.436 mm (1.0009-1.0014 in.)	
Dimensions for reworking oversize valve guide hole (both intake and exhaust)		
0.05mm (0.002in.) O.S.	12.805-13.205 mm (0.504-0.519 in.)	
0.25mm (0.010in.) O.S.	12.825-13.225 mm (0.5049-0.5206 in.)	
0.50mm (0.020in.) O.S.	12.85-13.25 mm (0.5059-0.5216 in.)	
Camshaft		
Cam height		
Intake	34.697 mm (1.366 in.)	34.197 mm (1.346 in.)
Exhaust	34.570 mm (1.361 in.)	34.070 mm (1.341 in.)
Journal O.D.	28 mm (1.10 in.)	
Bearing oil clearance	0.040-0.074 mm (0.0020-0.0029 in.)	
End play	0.05-0.15 mm (0.002-0.006 in.)	

Description	Specification 2.0(D4EA)	Limit
Valve		
Valve length		
Intake	95.7 mm (3.77 in.)	
Exhaust	95.4 mm (3.76 in.)	
Stem O.D.		
Intake	5.953 mm (0.234 in.)	
Exhaust	5.925 mm (0.233 in.)	
Face angle	44.5°	
Thickness of valve head (margin)		
Intake	1.6 mm (0.063 in.)	
Exhaust	1.3 mm(0.0512 in.)	
Valve stem to valve guide clearance		
Intake	0.022-0.049 mm (0.00086-0.00193 in.)	0.1 mm (0.0039 in.)
Exhaust	0.050-0.077 mm (0.0020-0.0030 in.)	0.15 mm (0.0059 in.)
Valve guide		
Length		
Intake	36.5 mm (1.437 in.)	
Exhaust	36.5 mm (1.437 in.)	
Service over size	0.05, 0.25, 0.50 mm (0.002, 0.010, 0.020 in.)	
Valve seat		
Width of seat contact	1.21mm (0.0477 in.)/ 1.61mm(0.0634 in.) (IN/EX)	
Seat angle	44°~44°. 5'	
Service size	0.3 mm (0.012 in.), 0.6 mm (0.024 in.) oversize	
Valve spring		
Free length	39.14 mm (1.541 in.)	38.14 mm (1.502 in.)
Load	21.4 kg/32 mm (47.2 lb/1.26 in.) at installed height	
Cylinder block		
Cylinder bore	83 + 0.03 mm (3.27 + 0.0012 in.)	
Out-of-round and taper of cylinder bore	Less than 0.01 mm (0.0004 in.)	
Flatness of gasket surface	Less than 0.05 mm (0.0020 in.)	0.1 mm (0.0039 in.)

Description	Specification 2.0(D4EA)	Limit
Piston		
O.D.	82.919 - 82.951 mm (3.26 - 3.27 in.)	
Piston - to - cylinder clearance	0.069 - 0.091 mm (0.0027 - 0.0036 in.)	
Ring groove width		
No. 1	1.915 - 1.945 mm (0.075 - 0.076 in.)	
No. 2	2.06 - 2.08 mm (0.08 - 0.082 in.)	
Oil	3.02 - 3.04 mm (0.119 - 0.1196 in.)	
Service size	0.25 mm (0.010 in), 0.5 mm (0.020 in.) 0.75 mm (0.030 in.), 1.00 mm (0.039 in.) oversize	
Piston ring		
Side clearance		
No. 2	0.065 - 0.11 mm (0.00256 - 0.00433 in.)	
Oil ring	0.03 - 0.07 mm (0.00118 - 0.00275 in.)	
End gap		
No. 1	0.2 - 0.3 mm (0.0079 - 0.0118 in.)	
No. 2	0.3 - 0.45 mm (0.0118 - 0.0177 in.)	
Oil ring side rail	0.2 - 0.45 mm (0.0079-0.0177 in.)	
Connecting rod		
Connecting rod pin O.D	28.022 - 28.034 mm (1.103 - 1.104 in.)	
Connecting rod bearing oil clearance	0.024 - 0.042 mm (0.0009 - 0.0016 in.)	0.1 mm (0.0039 in.)
Crankshaft main bearing oil clearance	0.024-0.042 mm (0.0009-0.0016 in.)	0.1 mm (0.0039 in.)
Crankshaft		
Journal O.D.	60.002 - 60.020 mm (2.362 - 2.363 in.)	
Out-of-round of journal and pin	Less than 0.015 mm (0.0006 in.)	
Taper of journal and pin	Less than 0.005 (0.0002 in.)	
End play	0.09 - 0.32 mm (0.0035 - 0.0126 in.)	
Flywheel		
Runout		0.13 mm (0.0051in.)
Oil pressure (1500 rpm) **[Oil temperature is 95-105°C (203-221°F)]**	More than 392.3 kPa (56.88 psi)	

Description	Specification 2.0(D4EA)	Limit
Oil pump		
Tip clearance		
Drive gear	0.12 - 0.2 mm (0.00472-0.0078 in.)	
Driven gear	0.13 -0 .23 mm (0.0051-0.009 in.)	
Side clearance	0.02 - 0.07 mm (0.00078 - 0.0027 in.)	
Relief spring		
Free length	47.5 mm (1.835 in.)	
Opening pressure	686.5±49 kPa (99.54 ± 7.1 psi)	
Silent shaft		
Front journal diameter	27.99 - 28.01 mm (1.102 - 1.1027 in.)	
Rear journal diameter	41.99 - 42.01 mm (1.6531 - 1.6539 in.)	
Oil clearance		
Front	0.050 - 0.09 mm (0.0020 - 0.0036 in.)	
Rear	0.050-0.091 mm (0.0020-0.0036 in.)	
Cooling method	Forced circulation with electric fan	
Cooling system quantity (Radiator)	5 lit (5.3 U.S.qts., 4.4 Imp.qts.)	
Thermostat		
Type	Wax pellet type with jiggle valve	
Normal opening temperature	82°C(180°F)	
Opening temperature range	80°C-84°C (176°F-183°F)	
Wide open temperature	95°C (203°F)	
Radiator cap		
Main valve opening pressure	107.9±14.7 kPa (1.1±0.15 kg/cm², 15.64±2.13 psi)	
Main valve closing pressure	83.4 kPa (0.85 kg/ cm², 12.1 psi)	
Vacuum valve opening pressure	-6.86 kPa (-0.07 kg/ cm², -1.00 psi)	
Air cleaner		
Type	Dry type	
Element	Unwoven cloth type	
Exhaust pipe		
Muffler	Expansion resonance type	
Suspension system	Rubber hangers	
Coolant temperature sensor		
Type	Thermister type	
Resistance		
20°C (68°F)	2.45±0.14 kΩ	
80°C (176°F)	0.3222 kΩ	

SERVICE STANDARDS

Standard value	
Coolant concentration	
Tropical area	40%
Other area	50%

LUBRICANT

Engine coolant	Ethylene glycol base for aluminum radiator

SEALANT

Engine coolant temperature sensor	LOCTITE 262, three bond No. 1324 or equivalent
Oil pressure switch	3M ATD No. 8660 or Three bond No. 1141E

NOTE

O.D.= Outer Diameter

I.D.= Inner Diameter

O.S.= Oversize Diameter

U.S. = Undersize Diameter