

Engine Mechanical System [2.5 TCI]

GENERAL

ENGINE BLOCK

ENGINE BLOCK
ENGINE MOUNTS
FRONT CASE

MAIN MOVING SYSTEM

CRANK SHAFT
PISTON

COOLING SYSTEM

ENGINE COOLANT PUMP
RADIATOR
RADIATOR PAN MOTOR

LUBRICATION SYSTEM

OIL FILTER
OIL PUMP

INTAKE AND EXHAUST SYSTEM

EXHAUST MANIFOLD
MUFFLER
TURBO CHARGER (TC)
INTERCOOLER
AIR CLEANER (ACL)

CYLINDER HEAD ASSEMBLY

CYLINDER HEAD
ROCKER ARM

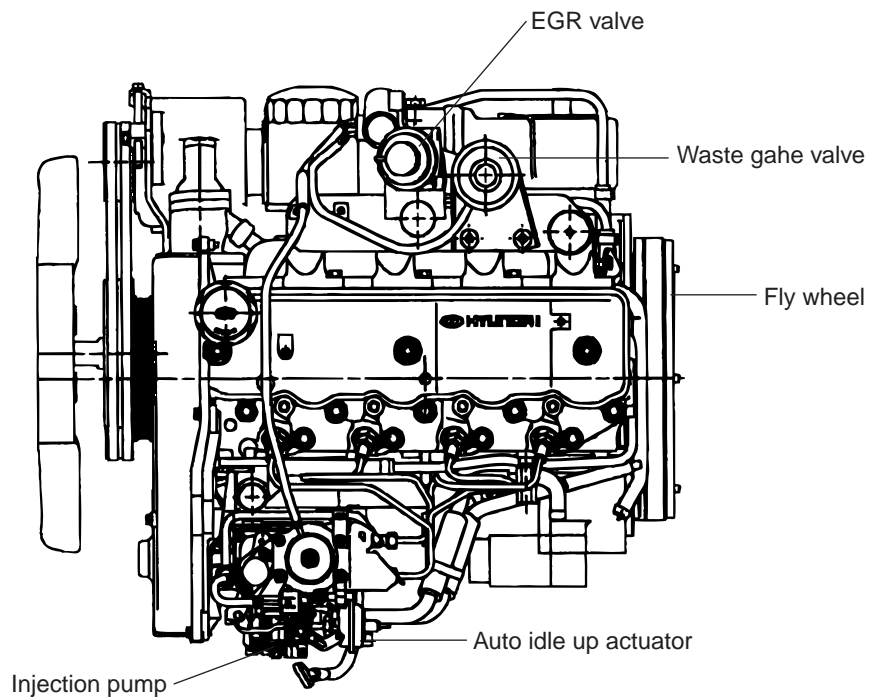
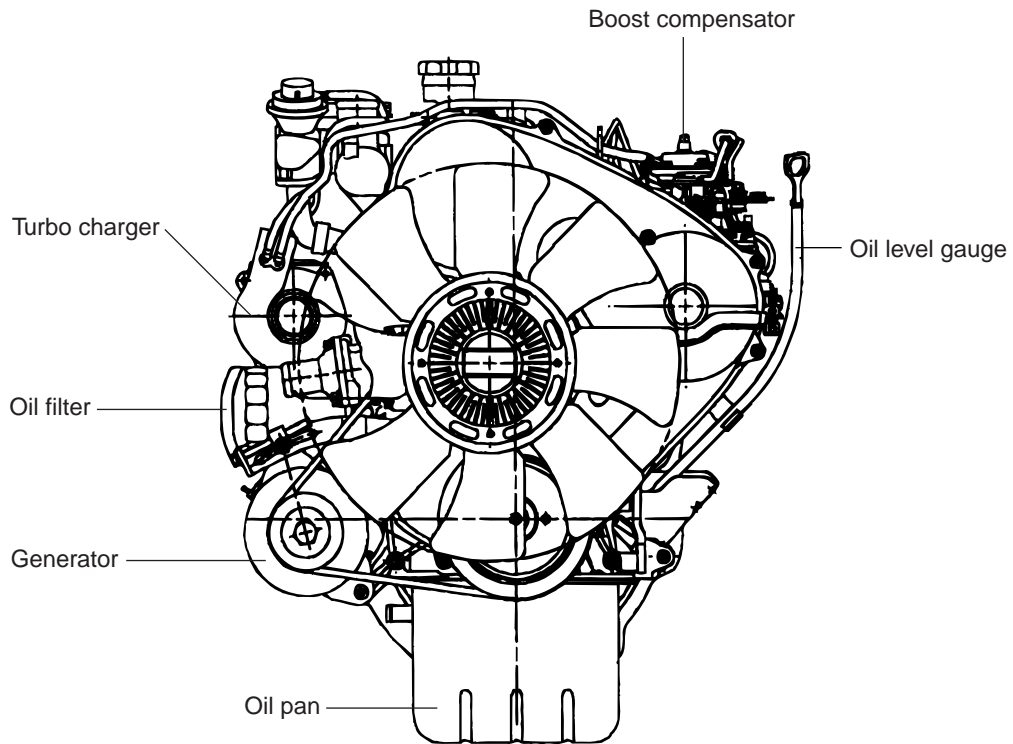
TIMING SYSTEM

TIMING BELT

GENERAL

GENERAL ELCB0010

[2.5 TCI]



SPECIFICATIONS

ELCB0020

	Standard	Limit
Engine model Type No. of cylinders Valve mechanism Total displacement Bor x stroke Compression ratio	D4BH (2.5 TCI) Diesel engine 4 in - line OHC 2,467 cc 91.1 x 95 mm 21	
Valve timing Intake valve Opens (BTDC) Closes (ABDC) Exhaust valve Opens (BBDC) Closes (ATDC)	 20° 48° 54° 22°	
Firing order	1 - 3 - 4 - 2	
Cylinder head Flatness of gasket surface Flatness of maunting mounting surface Overall height Oversize rework dimensions of valve guide hole (both intake and exhaust) 0.05 0.25 0.50 Oversize rework dimensions of intake valve seat ring hole 0.30 0.60 Oversize rework dimensions of intake valve seat ring hole 0.30 0.60	0.05 mm (0.002 in.) 0.15 mm (0.006 in.) 94.0 - 94.1 mm (3.701 - 3.705in.) 13.050 - 13.068 mm (0.5138 - 0.5145) 13.250 - 13.268 mm (0.5127 - 0.5224) 13.500 - 13.518 mm (0.5315 - 0.5322) 43.300 - 43.325 mm (1.7047 - 1.7057 in.) 43.600 - 43.625 mm (1.7165 - 1.7175 in.) 37.300 - 37.325 mm (1.4685 - 1.4695 in.) 37.600 - 37.625 mm (1.4803 - 1.4813 in.)	0.2 mm (0.0079 in.) 0.3 mm (0.0118 in.)
Camshaft Cam height Intake and Exhaust Journal diameter Oil clearance End play	37.05 mm (1.4587 in.) 29.94 - 29.95 mm (1.1787 - 1.1791in.) 0.05 - 0.08 mm (0.002 - 0.0031in.) 0.1 - 0.2 mm (0.0039 - 0.0079 in.)	36.55 mm (1.4389) 0.13 mm (0.005 in.) 0.4 mm (0.0157 in.)
Rocker arm I.D. Rocker arm - to - shaft clearance	18.910 - 18.928 mm (0.7445 - 0.7452 in.) 0.012 - 0.050 mm (0.0005 - 0.0020 in.)	0.08 mm (0.0031 in.)
Rocker shaft O.D.	18.878 - 18.898 mm (0.7432 - 0.7440 in.)	

	Standard	Limit
Valve Overall length Intake and Exhaust Stem diameter Intake Exhaust Face angle Thickness of valve head (margin) Intake and Exhaust Stem-to - guide clearance Intake Exhaust	136.5 mm (5.3740 in.) 7.96 - 7.975 mm (0.3133 - 0.3140 in.) 7.93 - 7.950 mm (0.3122 - 0.3130 in.) 45° - 45°30' 2.0 mm (0.0787 in.) 0.03 - 0.06 mm (0.0012 - 0.0024 in.) 0.05 - 0.09 mm (0.0020 - 0.0035 in.)	 1.0 mm (0.0394 in.) 0.10 mm (0.0039 in.) 0.15 mm (0.0059 in.)
Valve spring Free height Lode / Installed height Out - of squareness	49.1 mm (1.9331 in.) 276 N (27.6 kg) / 40.4 Max 2°	48.1 mm (1.8937 in.) 4°
Valve guide Overall length Intake Exhaust I.D. O.D.	 71 mm (2.7953 in.) 74 mm (2.9134 in.) 8.0 - 8.02 mm (0.3150 - 0.3157 in.) 13.06 - 13.07 mm (0.5142 - 0.5146 in.)	
Valve stat Seat angle Valve contact width Sinkage	45° 0.9 - 1.3 mm (0.0354 - 0.0512 in.)	0.2 mm (0.0079 in.)
Silent shaft Journal diameter Right (front) (rear) Left (front) (rear) Oil clearance Front Rear	 18.300 - 18.467 mm (0.7205 - 0.7270 in.) 42.975 - 42.991 mm (1.6920 - 1.6926 in.) 18.959 - 18.980 mm (0.7464 - 0.7472 in.) 42.975 - 42.991 mm (1.6919 - 1.6926 in.) 0.02 - 0.06 mm (0.0008 - 0.0024 in.) 0.05 - 0.09 mm (0.0020 - 0.0035 in.)	
Piston O.D. Piston - to cylinder clearance	79.0 - 79.2 mm (3.1102 - 3.1181 in.) 0.04 - 0.08 mm (0.0016 - 0.0031 in.)	
Ring groove width No. 1 ring No. 2 ring Oil ring Service size	2.601 - 2.603 mm (0.1024 - 0.1025 in.) 2.100 - 2.102 mm (0.0827 - 0.0828 in.) 4.010 - 4.035 mm (0.1579 - 0.1589 in.) 0.25, 0.50, 0.75, 1.00 oversize	

	Standard	Limit
Piston ring End gap No. 1 ring No. 2 ring Oil ring Ring - to - ring groove clearance No. 1 ring No. 2 ring Oil ring Service size	 0.35 - 0.50 mm (0.0138 - 0.0197 in.) 0.25 - 0.40 mm (0.0098 - 0.0157 in.) 0.25 - 0.45 mm (0.0098 - 0.0177 in.) 0.056 - 0.076 mm (0.0022 - 0.0030 in.) 0.046 - 0.066 mm (0.0018 - 0.0026 in.) 0.02 - 0.065 mm (0.0008 - 0.0026 in.) 0.25, 0.05, 0.75, 1.00	 0.8 mm (0.0315 in.) 0.8 mm (0.0315 in.) 0.8 mm (0.0315 in.) 0.15 mm (0.0059) 0.15 mm (0.0059) 0.1 mm (0.0039)
Piston pin O.D.	28.994 - 29.0 mm (1.1415 - 1.1417 in.)	
Coonecting rod Big end center - to - small end center lenght Bend Twist Big end side clearance	157.95 - 158.05 mm (6.2185 - 6.2224 in.) Max. 0.05 (0.0020) Max. 0.1 (0.0039) 0.10 - 0.25 mm (0.0039 - 0.0098 in.)	
Crankshaft End play Journal O.D. Pin O.D. Out - of roundness and taper of journal and pin Oil clearance of journal Oil clearance of pin Journal 0.25 U.S. 0.50 U.S. 0.75 U.S. Pin 0.25 U.S. 0.50 U.S. 0.75 U.S.	0.05 - 0.18 mm (0.0020 - 0.0071 in.) 66 mm (2.5984 in.) 53 mm (2.0866 in.) 0.05 mm (0.0020 in.) 0.02 - 0.05 mm (0.0008 - 0.0020 in.) 0.02 - 0.05 mm (0.0008 - 0.0020 in.) 65.735 - 65.750 mm (2.5879 - 2.5886 in.) 65.485 - 65.500 mm (2.5781 - 2.5787 in.) 65.235 - 65.250 mm (2.5683 - 2.5689 in.) 52.735 - 52.750 mm (2.0716 - 2.0768 in.) 52.485 - 52.500 mm (2.0663 - 2.0669 in.) 52.235 - 52.250 mm (2.0565 - 2.0571 in.)	0.25 mm (0.0098 in.) 0.1 mm (0.0039 in.) 0.1 mm (0.0039 in.)
Cylinder block I.D. Flatness of gasket surface Overall height	91.10 - 91.13 mm (3.5866 - 3.5878 in.) 0.05 mm (0.0020 in.) 318.45 - 318.55 mm (12.537 - 12.541 in.)	0.1 mm (0.0039 in.)
Flywheel Flatness	0.13 mm (0.0051 in.)	0.13 mm (0.0051 in.)
Oil pump Tip clearance Inner gear Outer gear Side clearance Inner gear, Outer gear Body clearance Outer gear Inner gear, Oil pressure at engine idle speed	 0.22 - 0.35 mm (0.0087 - 0.0138in.) 0.12 - 0.22 mm (0.0047 - 0.0087 in.) 0.04 - 0.10 mm (0.0016 - 0.0039 in.) 0.12 - 0.22 mm (0.0047 - 0.0087 in.) 0.03 - 0.09 mm (0.0012 - 0.0035 in.) 80 Kpa (0.8 kg/cm ²) or more	 0.5 mm (0.0197 in.) 0.4 mm (0.0157 in.) 0.15 mm (0.0059 in.)
Cooling system Drive belt Water pump type Fan clutch type	Water - cooled forced circulation system V - type Centrifugal impeller Thermo type with plate type bimetal	

	Standard	Limit
Thermostat type Type	Wax type with by - pass valve	
Coolant temperature gauge unit Type	Thermister type (2 elements)	
Thermostat Valve opening temperature (°C) Fully opening temperature (°C)	82 95	
Coolant temperature gauge unit Resistance Coolant temperature gauge element (Ω /°C) Glow control element (Ω /°C)	90.5 - 117.5 / 70, 21.3 - 26.3 / 115 22.3 - 27.3 / -20, 2.92 - 3.58 / 20	
Air cleaner	Paper filter type	
Muffler	Expansion resonance type	

**NOTE**

- *O.D. : Outer Diameter*
- *I.D. : Inner Diameter*
- *U.S. : Undersize Diameter*
- *O.S. : Oversize Diameter*

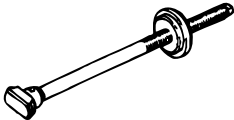
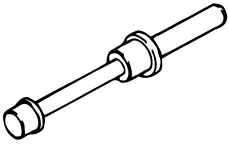


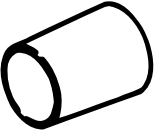
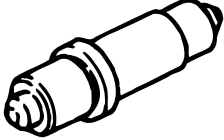

TORQUE SPECIFICATIONSSS ELCB0030

	Nm	kg.cm	lb.ft
Crankshaft pulley bolt	170 - 190	1700 - 1900	125 - 140
Camshaft sprocket bolt	65 - 75	650 - 750	48 - 55
Timing belt tensioner bolt	22 - 30	220 - 300	16 - 22
Injection pump sprocket nut	80 - 90	800 - 900	59 - 66
Silent shaft sprocket nut	34 - 40	340 - 400	25 - 30
Timing belt tensioner " B" nut	22 - 30	220 - 300	16 - 22
Rocker cover bolt	5 - 7	50 - 70	4 - 5
Rocker arm shaft bolt	35 - 40	350 - 400	25 - 29
Camshaft bearing cap bolt	19 - 21	190 - 210	13 - 15
Cylinder head bolt			
Cold engine	105 - 115	1050 - 1150	77 - 85
Hot engine	115 - 125	1150 - 1250	85 - 92
Oil pan bolt	6 - 8	60 - 80	4 - 6
Oil pan drain plug	35 - 45	350 - 450	26 - 33
Front case bolt (upper, lower)	12 - 15	120 - 150	9 - 11
Silent shaft driven gear bolt	34 - 40	340 - 400	25 - 30
Silent shaft plug cap	30 - 45	300 - 450	22 - 33
Silent shaft gear cover bolt	15 - 18	150 - 180	11 - 13
Connecting rod cap nut	45 - 48	450 - 480	33 - 35
Flywheel bolt	130 - 140	1300 - 1400	96 - 103
Crankshaft bearing cap bolt	75 - 85	750 - 850	55 - 63
Oil relief valve plug	30 - 45	300 - 450	22 - 33
Oil pump cover screw	9 - 14	90 - 140	7 - 10
Oil pressure switch	8 - 12	80 - 120	6 - 9
Oil filter bracket	12 - 15	120 - 150	9 - 11
Oil jet check valve	30 - 35	300 - 350	22 - 26
Oil cooler by - pass valve	50 - 60	500 - 600	37 - 44
Cooling fan attaching bolt	10 - 12	100 - 120	7 - 8
Fan clutch attaching bolt	10 - 12	100 - 120	7 - 8
Water outlet fitting attaching bolt	10 - 13	100 - 130	7 - 9
Water pump attaching bolt	12 - 15	120 - 150	8 - 11
Coolant temperature gauge unit	30 - 40	300 - 400	22 - 30
Intake and exhaust manifold nuts and bolts	15 - 20	150 - 200	11 - 15
Heat protector to exhaust manifold	12 - 15	120 - 150	9 - 11
Exhaust pipe to exhaust manifold stud nuts	30 - 40	300 - 400	22 - 30
Exhaust pipe to muffler	30 - 40	300 - 400	22 - 30

EM -8

ENGINE MECHANICAL SYSTEM [2.5 TCI]

SPECIAL TOOLS ELCB0040

Tool (Number and name)	Illustration	Use
Silent shaft bearing puller (09212 - 43100)	 <p style="text-align: right; margin-right: 50px;">ECLA002L</p>	Removal of silent shaft rear bearing
Silent shaft bearing installer (09212 - 43200)	 <p style="text-align: right; margin-right: 50px;">ECLA002M</p>	Installation of silent shaft rear bearing
Bearing installer stopper (09212 - 43300)	 <p style="text-align: right; margin-right: 50px;">ECLA002N</p>	Removal of Right silent shaft rear bearing
Crank shaft front oil seal installer (09214 - 32000)	 <p style="text-align: right; margin-right: 50px;">ECLA002O</p>	Installation of crankshaft front oil seal
Crankshaft front oil seal guide (09214 - 32100)	 <p style="text-align: right; margin-right: 50px;">ECLA002P</p>	Guide for installation of crank shaft front oil seal
Connecting - rod small - end busing replacement tool (09214 - 43000)	 <p style="text-align: right; margin-right: 50px;">ECLA002J</p>	Replacement of connecting - rod small - end busing
Camshaft oil seal installer (09221 - 21000)	 <p style="text-align: right; margin-right: 50px;">ECLA002I</p>	Installation of the camshaft oil seal