
SECTION 1

ENGINE CIELO EURO III

SECTION 1A

GENERAL ENGINE INFORMATION

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DIAGNOSIS

COMPRESSION TEST

Important: Disconnect the Crankshaft Position (CKP) Sensor connector to disable the fuel and the ignition systems.

Test the compression pressure for each cylinder. Low compression pressure may be the fault of the valves or the pistons. The following conditions should be considered when you check the cylinder compression:

- The engine should be at normal operating temperature.
 - The throttle must be wide open.
 - All the spark plugs should be removed.
 - The battery must be at or near full charge.
1. Place approximately three squirts of oil from a plunger-type oiler into each spark plug port.
 2. Insert the engine compression gauge into each spark plug port.
 3. Crank test each cylinder with four to five compression strokes using the starter motor.

4. The lowest reading should not be less than 70% of the highest reading. The compression gauge reading should not be less than 689 kPa (100 psi) for any of the cylinders.

5. Examine the gauge readings obtained after the four “puffs” per cylinder are obtained from cranking the starter motor. The readings are explained in the following descriptions:

- **Normal Condition** – Compression builds up quickly and evenly to the specified compression on each cylinder.
- **Piston Rings Faulty** – Compression is low on the first stroke and tends to build up on following strokes, but the compression pressure does not reach normal. The compression pressure improves considerably with the addition of oil into the cylinder.
- **Valves Faulty** – Low compression pressure on the first stroke. The compression pressure does not tend to build up on the following strokes. The compression pressure does not improve much with the addition of oil into the cylinder.

SPECIFICATIONS

ENGINE SPECIFICATIONS

Application	Description (Manual and Automatic)
General Data:	
Engine Type	4 Cylinder (In-Line)
Displacement:	
1.5 SOHC	1 498 cm ³ (91.44 in ³)
Bore Stroke:	
1.5 SOHC	76.5 X 81.5 mm (3.01 in. X 3.21 in.)
Compression Ratio	9.5 0.2:1
Firing Order	1-3-4-2
Cylinder Bore:	
Diameter	76.5 mm (3.01 in.)
Out of Round (Maximum)	0.0065 mm (0.00025 in.)
Taper (Maximum):	
1.5 SOHC	0.0065 mm (0.00025 in.)
Piston:	
Diameter	76.470 mm (3.01 in.)
Clearance to Bore	0.030 mm (0.0012 in.)
Piston Rings:	
Ring, End Gap:	
Top Compression	0.3 mm (0.019 in.)
2nd Compression	0.3 mm (0.019 in.)
Groove Clearance:	
Top Impression	0.02 mm (0.0008 in.)
2nd Impression	0.02 mm (0.0008 in.)
Piston Pin:	
Diameter	18.000 mm (0.708 in.)
Pin Off-Set	0.5 0.7 mm (0.019 0.027 in.)
Camshaft:	
Lift Intake:	
1.5 SOHC	6.12 mm (0.240 in.)
Lift Exhaust	6.12 mm (0.240 in.)
End Play	0.09 0.21 mm (0.0035 0.0082 in.)
Journal OD:	
No. 1	39.445 mm (1.552 in.)
No. 2	39.700 mm (1.562 in.)
No. 3	39.945 mm (1.572 in.)
No. 4	40.200 mm (1.582 in.)
No. 5	40.445 mm (1.592 in.)

ENGINE SPECIFICATIONS (Cont'd)

Application	Description (Manual and Automatic)
Bearing OD:	
No. 1	39.500 mm (1.555 in.)
No. 2	39.750 mm (1.564 in.)
No. 3	40.000 mm (1.574 in.)
No. 4	40.250 mm (1.584 in.)
No. 5	40.500 mm (1.594 in.)
Crankshaft:	
Main Journal:	
Diameter (All)	54.982 54.994 mm (2.164 2.165 in.)
Taper (Maximum)	0.005 mm (0.0001 in.)
Out of Round (Maximum)	0.004 mm (0.0001 in.)
Main Bearing Clearance (All)	0.005 mm (0.0001 in.)
Crankshaft End Play	0.1 mm (0.003 in.)
Connecting Rod Journal:	
Diameter (All)	42.971 42.987 mm (1.691 1.692 in.)
Taper (Maximum)	0.005 mm (0.0001 in.)
Out of Round (Maximum)	0.004 mm (0.0001 in.)
Rod Bearing Clearance (All)	0.019 0.070 mm (0.0007 0.0027 in.)
Rod Side Clearance	0.070 0.242 mm (0.0027 0.009 in.)
Valve System:	
Valve Lash Compensators	Hydraulic
Face Angle (All)	46
Seat Angle (All)	46
Seat Runout (Maximum, All)	0.03 mm (0.019 in.)
Face Runout (Maximum, All)	0.03 mm (0.019 in.)
Seat Width:	
Intake	1.3 1.5 mm (0.051 0.059 in.)
Exhaust	1.6 1.8 mm (0.063 0.071 in.)
Valve Guide Inside Diameter (All)	7.030 7.050 mm (0.276 0.277 in.)
Valve Stem Diameter (All)	7 mm (0.275 in.)
Valve Diameter (All):	
Intake	38.0 0.15 mm (1.49 0.0059 in.)
Exhaust	31.0 0.15 mm (1.22 0.0059 in.)
Valve Spring Loads:	
Valve Open	625 25 N (461 18 lbs) @ 21.5 mm (0.846 in.)
Valve Closed	275 15 N (202 11 lbs) @ 31.5 mm (1.240 in.)
Oil Pump:	
Gap Between Oil Pump Body and Out Rotor	0.400 0.484 mm (0.0157 0.0191 in.)
Out Rotor Side Clearance	0.045 0.100 mm (0.0018 0.0039 in.)
Inner Rotor Side Clearance	0.035 0.085 mm (0.0014 0.0033 in.)
Relief Valve Spring Free Length	81 mm (3.2 in.)

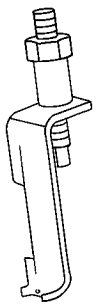
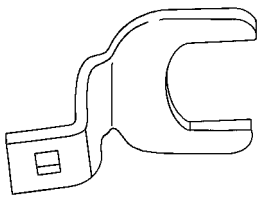
FASTENER TIGHTENING SPECIFICATIONS

Application	N m	Lb-Ft	Lb-In
A/C Compressor Hose Assembly Retaining Bolt	33	24	–
A/C Compressor Mounting Bolts	27	20	–
A/C Compressor Mounting Bracket Bolts	50	37	–
Air Filter Housing Bolts	8	–	71
Alternator Adjusting Bolt	25	18	–
Alternator Adjusting Bracket Retaining Bolt	25	18	–
Auxiliary Catalytic Converter-to-Exhaust Manifold Nuts and Bracket Bolts	40	30	–
Camshaft Gear Bolt	45	33	–
Camshaft Pressure Plate Bolts	10	–	89
Connecting Rod Bearing Cap Bolts	25 + 30	18 + 30	–
Coolant Pump Retaining Bolts	10	–	89
Coolant Temperature Sensor	20	15	–
Crankshaft Bearing Cap Bolts	50 + 45 + 15	37 + 45 + 15	–
Crankshaft Pulley Bolt	95 + 30 + 15	70 + 30 + 15	–
Crankshaft Position Sensor Retaining Bolt	10	–	89
Cylinder Head Bolts (Camshaft Support Housing & Cylinder Head Mounting Bolts)	25 + 70 + 70 + 30	18 + 70 + 70 + 30	–
Electronic Ignition System Ignition Coil Mounting Bolts	10	–	89
Electronic Ignition System Ignition Coil Mounting Plate Bolts	10	–	89
Engine Lift Bracket Bolt	25	18	–
Engine Mount Attaching Nuts	40	30	–
Engine Mount Bracket Retaining Bolts	60	44	–
Engine Mount Bracket-to-Engine Mount Retaining Bolts	60	44	–
Exhaust Manifold Heat Shield Bolts	15	11	–
Exhaust Manifold Nuts	25	18	–
Flexible Plate Bolts	60	44	–
Flexible Plate Inspection Cover Bolts	10	–	89
Flywheel Bolts	35 + 30 + 15	26 + 30 + 15	–
Flywheel Inspection Cover Bolts	12	–	106
Front Muffler-to-Main Catalytic Converter Nuts	30	22	–
Fuel Rail Retaining Bolts	25	18	–
Intake Manifold Retaining Nuts	25	18	–

FASTENER TIGHTENING SPECIFICATIONS (Cont'd)

Application	N m	Lb-Ft	Lb-In
Intake Manifold Support Bracket Retaining Bolts	22	16	–
Lower Timing Belt Cover Bolts	10	–	89
Oil Pan Retaining Bolts	10	–	89
Oil Pan Drain Plug	55	41	–
Oil Pressure Switch	40	30	–
Oil Pump Retaining Bolts	10	–	89
Oil Pump/Pickup Tube and Support Bracket Bolts	10	–	89
Oil Pump Safety Relief Valve Bolt	30	22	–
Oil Pump Rear Cover Bolts	6	–	53
Power Steering Pump Mounting Bolts	25	18	–
Power Steering Pump Pulley Bolts	25	18	–
Rear Timing Belt Cover Bolts	10	–	89
Right Transaxle Brace Bolts	60	44	–
Spark Plugs	25	18	–
Thermostat Housing Mounting Bolts	20	15	–
Throttle Cable Bracket Bolts	8	–	71
Timing Belt Automatic Tensioner Bolt	20	15	–
Transaxle Bell Housing Bolts	75	55	–
Transaxle Torque Converter Bolts	65	48	–
Upper Timing Belt Cover Bolts	10	–	89
Valve Cover Bolts	9	–	80

SPECIAL TOOLS**SPECIAL TOOLS TABLE**

 <p>A102B150</p>	<p>KM-565-A Valve Spring Compressor</p>	 <p>A102B151</p>	<p>J-42492 Timing Belt Adjuster</p>
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