

# 12. CRANKSHAFT/PISTON/CYLINDER

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## SERVICE INFORMATION

### GENERAL

- The crankcase must be separated to service the crankshaft and piston connecting rod. Refer to section 11 for crankcase separation and assembly.
- Mark and store the connecting rods, bearing caps and bearing inserts to be sure of their correct locations for reassembly.
- The crankpin and main journal bearing inserts are select fit and are identified by color codes. Select replacement bearings from the code tables. After selecting new bearings, recheck the oil clearance with a plastigauge. Incorrect oil clearance can cause major engine damage.

### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT	
Crankshaft	Connecting rod side clearance	0.10–0.30 (0.004–0.012)	0.40 (0.016)	
	Crankpin bearing oil clearance	0.032–0.050 (0.0013–0.0020)	0.060 (0.0024)	
	Main journal bearing oil clearance	0.020–0.038 (0.0008–0.0015)	0.048 (0.0019)	
	Runout	—	0.10 (0.004)	
Piston, piston pin, piston ring	Piston O. D. at 10 (0.4) from bottom	97.965–97.985 (3.8569–3.8577)	97.900 (3.8543)	
	Piston pin hole I. D.	24.002–24.008 (0.9450–0.9452)	24.03 (0.946)	
	Piston pin O. D.	23.994–24.000 (0.9446–0.9449)	23.984 (0.9443)	
	Piston-to-piston pin clearance	0.002–0.014 (0.0001–0.0006)	0.046 (0.0018)	
	Piston ring end gap	Top	0.25–0.40 (0.010–0.016)	0.55 (0.022)
		Second	0.40–0.55 (0.016–0.022)	0.70 (0.028)
		Oil (side rail)	0.20–0.70 (0.008–0.028)	0.90 (0.035)
	Piston ring-to-ring groove clearance	Top	0.065–0.100 (0.0026–0.0039)	0.115 (0.0045)
Second		0.035–0.070 (0.0014–0.0028)	0.085 (0.0033)	
Cylinder	I. D.	98.005–98.025 (3.8585–3.8592)	98.100 (3.8622)	
	Out of round	—	0.10 (0.004)	
	Taper	—	0.10 (0.004)	
	Warpage	—	0.05 (0.002)	
Cylinder-to-piston clearance		0.020–0.060 (0.0008–0.0024)	0.200 (0.0079)	
Connecting rod small end I. D.		24.020–24.041 (0.9457–0.9465)	24.051 (0.9469)	
Connecting rod-to-piston clearance		0.020–0.047 (0.0008–0.0019)	0.067 (0.0026)	

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### TORQUE VALUES

Connecting rod bolt (standard)	29 N·m (3.0 kgf·m , 22 lbf·ft) + 120°	Apply oil to the threads and seating surface
Connecting rod bolt (checking the oil clearance)	20 N·m (2.0 kgf·m , 14 lbf·ft) + 120°	Apply oil to the threads and seating surface
Crankcase 10 mm special bolt	42 N·m (4.3 kgf·m , 31 lbf·ft)	Apply oil to the threads and seating surface