

SPECIFICATIONS

MATERIAL SPECIFICATIONS

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Item	Specification	Fill Capacity
Gasket Maker TA-16	WSK-M2G348-A5	-
Motorcraft® Metal Surface Prep ZC-31-A	-	-
Motorcraft® Premium Gold Engine Coolant with Bittering Agent (US); Motorcraft® Premium Gold Engine Coolant (Canada) VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)	WSS-M97B51-A1	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A	6.0L (6.5 qt)
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4	-
Silicone Gasket Remover ZC-30	-	-

GENERAL SPECIFICATIONS

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Item	Specification
Engine	
Displacement	4.6L (281 CID)
Number of cylinders	8
Bore	90.2 mm (3.55 in)
Stroke	90.0 mm (3.54 in)
Firing order	1-3-7-2-6-5-4-8
Spark plugs	HJFS-24FP
Minimum oil pressure at idle (engine as normal operating temperature)	172 kPa (25 psi)
Oil pressure minimum at 2,000 rpm (engine at normal operating temperature)	517 kPa (75 psi)
Compression ratio	9.8:1
Engine weight (without accessory drive components or flexplate)	220 kg (485 lb)
Cylinder Head and Valve Train	
Combustion chamber volume	48.1-51.1 cc (2.94-3.12 cu in)

Valve arrangement (front to rear) - LH	I-E-I-I-E-I-I-E-I-I-E-I
Valve arrangement (front to rear) - RH	I-E-I-I-E-I-I-E-I-I-E-I
Valve guide bore diameter	6.015-6.044 mm (0.237-0.238 in)
Valve stem diameter - intake	5.975-5.995 mm (0.235-0.236 in)
Valve stem diameter - exhaust	5.95-5.97 mm (0.234-0.235 in)
Valve stem-to-guide clearance - intake	0.020-0.069 mm (0.001-0.003 in)
Valve stem-to-guide clearance - exhaust	0.045-0.094 mm (0.002-0.004 in)
Valve head diameter - intake	33.62-33.98 mm (1.324-1.338 in)
Valve head diameter - exhaust	37.32-37.68 mm (1.469-1.483 in)
Valve face runout	0.05 mm (0.002 in)
Valve face angle	45.5°
Valve seat width - intake	1.2-1.4 mm (0.047-0.055 in)
Valve seat width - exhaust	1.4-1.6 mm (0.055-0.063 in)
Valve seat angle	44.5-45.0°
Valve spring free length	56.5 mm (2.22 in)
Valve spring compression pressure (maximum lift)	760 N (171 lb) ± 39.0 N (8.8 lb) @ 31.04 mm (1.22 in)
Valve spring installed height	42.04 mm (1.66 in)
Valve spring installed pressure	350 N (79 lb) ± 17.5 N (4 lb) @ 42.04 mm (1.66 in)
Head Gasket Surface Flatness	0.025 mm (0.001 in) in any 25 mm (1 in) x 25 mm (1 in) area; 0.05 mm (0.002 in) in any 150 mm (6 in) x 150 mm (6 in) area; 0.1 mm (0.004 in) overall
Hydraulic Lash Adjuster	
Diameter	15.988-16.000 mm (0.6294-0.6299 in)
Clearance-to-bore	0.018-0.069 mm (0.0007-0.0027 in)
Service limit	-
Collapsed lash adjuster gap	0.45-0.85 mm (0.018-0.033 in)
Camshaft	
Theoretical valve lift @ 0 lash - intake	11.166 mm (0.439 in)
Theoretical valve lift @ 0 lash - exhaust	11.066 mm (0.436 in)
Lobe lift - intake	5.520 mm (0.217 in)
Lobe lift - exhaust	5.506 mm (0.217 in)
Allowable lobe lift loss	0.00127 mm (0.00005 in)
Journal diameter	28.607-28.633 mm (1.126-1.127 in)
Camshaft journal bore inside diameter	28.657-28.682 mm (1.128-1.129 in)
Camshaft journal-to-bearing clearance	0.024-0.075 mm (0.001-0.003 in)
Runout	0.03 mm (0.001 in)
End play	0.027-0.190 mm (0.001-0.007 in)

Cylinder Block	
Cylinder bore diameter - grade 1	90.200-90.210 mm (3.5512-3.5516 in)
Cylinder bore diameter - grade 2	90.210-90.220 mm (3.5516-3.5520 in)
Cylinder bore diameter - grade 3	90.220-90.230 mm (3.5520-3.5524 in)
Cylinder bore maximum taper	0.006 mm (0.0002 in)
Cylinder bore maximum out-of-round	0.020 mm (0.0008 in)
Main bearing bore inside diameter	72.400-72.424 mm (2.850-2.851 in)
Head Gasket Surface Flatness	0.03 mm (0.001 in) in any 40 mm (1.5 in) x 40 mm (1.5 in) area; 0.05 mm (0.002 in) in any 150 mm (6 in) x 150 mm (6 in) area; 0.15 mm (0.006 in) overall
Crankshaft	
Main bearing journal diameter	67.481-67.505 mm (2.6567-2.6576 in)
Main bearing journal maximum taper	0.004 mm (0.0002 in)
Main bearing journal maximum out-of-round	0.0075 mm (0.0003 in) between cross sections
Main bearing journal-to-cylinder block clearance	0.024-0.048 mm (0.0009-0.0019 in)
Connecting rod journal diameter	52.983-53.003 mm (2.0859-2.0867 in)
Connecting rod journal maximum taper	0.004 mm (0.0002 in)
Connecting rod journal maximum out-of-round	0.0075 mm (0.0003 in) between cross sections
Crankshaft maximum end play	0.075-0.377 mm (0.0030-0.0148 in)
Piston and Connecting Rod	
Piston diameter - grade 1 (at right angle to pin bore) (uncoated)	90.167-90.182 mm (3.5499-3.5504 in)
Piston diameter - grade 2 (at right angle to pin bore) (uncoated)	90.179-90.196 mm (3.5503-3.551 in)
Piston diameter - grade 3 (at right angle to pin bore) (uncoated)	90.193-90.208 mm (3.551-3.5515 in)
Piston-to-cylinder bore clearance (at grade size)	0.017-0.047 mm (0.0007-0.0019 in)
Piston ring end gap - top	0.15-0.30 mm (0.006-0.012 in)
Piston ring end gap - intermediate	0.25-0.50 mm (0.0098-0.0197 in)
Piston ring end gap - oil control	0.15-0.65 mm (0.0059-0.0256 in)
Piston ring groove width - top	1.52-1.54 mm (0.0598-0.0606 in)
Piston ring groove width - intermediate	1.52-1.54 mm (0.0598-0.0606 in)
Piston ring groove width - oil control	3.030-3.056 mm (0.1193-0.1203 in)
Piston ring width - top and intermediate	1.48-1.50 mm (0.0582-0.0590 in)
Piston ring-to-groove clearance - top	0.020-0.060 mm (0.0008-0.0020 in)
Piston ring-to-groove clearance -	

intermediate	0.020-0.060 mm (0.0008-0.0020 in)
Piston pin bore diameter	22.0125-22.0175 mm (0.8666-0.8668 in)
Piston pin diameter	22.0010-22.0030 mm (0.8662-0.8663 in)
Piston pin length	61.8 mm (2.433 in)
Piston pin-to-piston fit	0.0095-0.023 mm (0.0004-0.0009 in)
Connecting rod-to-pin clearance	0.009-0.023 mm (0.0004-0.0009 in)
Connecting rod pin bore diameter	22.012-22.024 mm (0.8666-0.8671 in)
Connecting rod length (center-to-center)	150.7 mm (5.933 in)
Connecting rod maximum allowed bend	± 0.038 mm (0.0015 in)
Connecting rod maximum allowed twist ⁽¹⁾	± 0.05 mm (0.0020 in)
Connecting rod bearing bore diameter (with assembled liners)	53.027-53.049 mm (2.0877-2.0885 in)
Connecting rod bearing-to-crankshaft clearance	0.024-0.066 mm (0.0009-0.0026 in)
Connecting rod side clearance	0.5-0.15 mm (0.02-0.006 in)
⁽¹⁾ a The pin bore and crank bearing bore must be parallel and in the same vertical plane within the specified total difference when measured at the ends of a 203 mm bar, 105.5 mm on each side of rod centerline.	

TORQUE SPECIFICATIONS

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Description	Nm	lb-ft	lb-in
A/C compressor bolts	25	18	-
Accessory drive belt idler pulley bolts	25	18	-
Accessory drive belt tensioner bolts	25	18	-
Camshaft bearing cap bolts ⁽¹⁾	-	-	-
Camshaft phaser sprocket assembly bolts ⁽¹⁾	-	-	-
Camshaft Position (CMP) sensor bolt	10	-	89
Connecting rod cap bolts ⁽¹⁾	-	-	-
Coolant crossover manifold assembly bolts	10	-	89
Coolant pump bolts	25	18	-
Coolant pump pulley bolts	25	18	-
Crankshaft main bearing cap bolts ⁽¹⁾	-	-	-
Crankshaft main bearing cap jack screws ⁽¹⁾	-	-	-
Crankshaft main bearing cap side bolts ⁽¹⁾	-	-	-
Crankshaft main bearing cap stud bolt ⁽¹⁾	-	-	-
Crankshaft Position (CKP) sensor bolt	10	-	89
Crankshaft pulley bolt ⁽¹⁾	-	-	-
Crankshaft rear seal retainer plate bolts ⁽¹⁾	-	-	-

Crossmember bolts and nuts	115	85	-
Cylinder block drain plugs	24	18	-
Cylinder heads bolts ⁽¹⁾	-	-	-
Cylinder Head Temperature (CHT) sensor	10	-	89
Dual converter Y-pipe-to-exhaust pipe flange bolts	47	35	-
Engine front cover bolts ⁽¹⁾	-	-	-
Engine support insulator bolts	175	129	-
Engine support insulator bracket bolts	63	46	-
Engine support insulator nuts	250	184	-
Engine support insulator studs	15	-	133
Engine support insulator through bolts	350	258	-
Exhaust manifold heat shield bolts	10	-	89
Exhaust manifold nuts ⁽¹⁾	-	-	-
Exhaust manifold studs	12	-	106
Exhaust manifold-to-dual converter Y-pipe nuts	40	30	-
Flexplate bolts ⁽¹⁾	-	-	-
Flexplate inspection cover bolts	35	26	-
Front axle CV joint bolts	19	-	168
Front axle housing mounting bushing bolts	90	66	-
Generator lower mounting nuts	25	18	-
Generator mounting bracket bolts	10	-	89
Ground strap-to-cowl bolt	10	-	89
Ground strap-to-heater supply tube nut	10	-	89
Heated PCV fitting bolts	10	-	89
Heater supply tube stud bolt	10	-	89
Hood hinge bolts	12	-	106
Ignition coil bolts	6	-	53
Intake manifold bolts ⁽¹⁾	-	-	-
Oil filter adapter bolts	25	18	-
Oil level indicator tube bolt	10	-	89
Oil pan bolts ⁽¹⁾	-	-	-
Oil pan drain plug	23	17	-
Oil pump bolts	10	-	89
Oil pump screen and pickup tube spacer	25	18	-
Oil pump screen and pickup tube-to-oil pump bolts	10	-	89
Oil pump screen and pickup tube-to-spacer bolt	25	18	-
Power steering hose clamp plate bolt	23	17	-
Power Steering Pressure (PSP) hose-to-front cover nut	40	30	-
PSP hose-to-power steering pump fitting	65	48	-
Power steering pump bolts and stud bolts	25	18	-
Radio ignition interference capacitor nuts	25	18	-
Skid plate bolts	25	18	-
Spark plugs	12	-	106

Starter wiring harness bracket bolt	10	-	89
Throttle Body (TB) bolts	10	-	89
Timing chain guide bolts	10	-	89
Timing chain hydraulic tensioner bolts	25	18	-
Torque converter-to-flexplate nuts	44	32	-
Transmission cooler tube bracket-to-engine front cover nut	10	-	89
Transmission fluid cooling tubes bracket bolt	48	35	-
Transmission mount nuts	103	76	-
Transmission-to-engine bolts	48	35	-
Valve cover bolts ⁽¹⁾	-	-	-
Variable Camshaft Timing (VCT) housing bolts	10	-	89

(1) Refer to the appropriate procedure(s).