

SPECIFICATIONS

GENERAL SPECIFICATIONS

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Item	Specification
Lubricants and Sealants	
SAE 5W-30 Super Premium Motor Oil XO-5W30-QSP or equivalent	WSS-M2C205-A
Motorcraft Premium Gold Engine Coolant VC-7-A (in Oregon VC-7-B) or equivalent ^{a (1)}	WSS-M97B51-A1 (yellow color)
Metal Surface Cleaner F4AZ-19A536-RA or equivalent	WSE-M5B392-A
Silicone Gasket and Sealant F7AZ-19554-EA or equivalent	WSE-M4G323-A4
Motorcraft Silicone Brake Caliper Grease and Dielectric Compound XG-3 or equivalent	ESE-M1C171-A
Engine	
Displacement	4.0L (244 CID)
Number of cylinders	6
Bore	100.4 mm (3.953 in)
Stroke	84.4 mm (3.31 in)
Firing order	1-4-2-5-3-6
Oil pressure minimum at 2,000 rpm (engine at normal operating temperature)	103 kPa (15 psi)
Oil capacity	4.73 liters (5 quarts) with filter
Cylinder Head and Valve Train	
Cylinder head gasket surface flatness	0.08 mm (0.003 in) total
Combustion chamber volume	65.197 +/- 2.068-2.018 cc
Valve arrangement (front to rear) - LH	I-E-I-E-I-E
Valve arrangement (front to rear) - RH	E-I-E-I-E-I
Valve guide bore diameter	7.00-7.018 mm (0.276 in)
Valve stem diameter - intake	6.965-6.98 mm (0.274-0.275 in)
Valve stem diameter - exhaust	6.95-6.965 mm (0.27-0.274 in)
Valve stem-to-guide clearance - intake	0.020-0.053 mm (0.001-0.002 in)
Valve stem-to-guide clearance - exhaust	0.035-0.068 mm (0.001-0.003 in)
Valve head diameter - intake	45.9-46.1 mm (1.807-1.815 in)
Valve head diameter - exhaust	38.9-39.1 mm (1.531-1.539 in)
Valve face runout	0.03 mm (0.001 in)
Valve face angle	45 degrees
Valve seat width - intake	1.273-2.121 mm (0.05-0.083 in)
Valve seat width - exhaust	1.556-2.404 mm (0.06-0.094 in)
Valve seat runout	0.059 mm (0.002 in)
Valve seat angle	45 degrees
Valve spring free length	43.1 mm (1.7 in)

Valve spring squareness	+/- 1.5 deg
Valve spring compression pressure at specified height (lbs)	275-305 Nm at 35.9-36.7 mm (202.84-224.968 lb-ft at 1.413-1.445 in)
Valve spring installed height	39.86-40.86 mm (1.569-1.601 in)
Valve spring installed pressure	320 newtons
Roller follower ratio	1.98:1
Camshaft	
Theoretical valve lift @ 0 lash	12 mm
Lobe lift	6.584 mm (0.259 in)
Allowable lobe lift loss	0.127 mm (0.005 in)
Journal diameter	27.935-27.96 mm (1.099-1.101 in)
Camshaft journal bore inside diameter	28.0-28.03 mm (1.102-1.104 in)
Camshaft journal-to-bearing clearance	0.04-0.095 mm (0.002-0.004 in)
Runout	0.05 mm (0.002 in)
End play	0.075-0.185 mm (0.0003-0.007 in)
Cylinder Block	
Cylinder bore diameter	100.4 mm (3.953 in)
Cylinder bore maximum taper	0.025 mm (0.001 in)
Cylinder bore maximum out-of-round	0.025 mm (0.001 in)
Main bearing bore inside diameter	60.620-60.634 mm (2.387-2.387 in)
Head gasket surface flatness	0.1 mm (0.004 in) overall
Crankshaft	
Main bearing journal diameter	56.980-57.0 mm (2.243-2.244 in)
Main bearing journal maximum taper	0.008 mm (0.0003 in)
Main bearing journal maximum out-of-round	0.008 mm (0.0003 in)
Main bearing journal-to-cylinder block clearance	0.008-0.062 mm (0.0003-0.0024 in)
Connecting rod journal diameter	53.98-54.0 mm (2.125-2.126 in)
Connecting rod journal maximum taper	0.008 mm (0.0003 in)
Connecting rod journal maximum out-of-round	0.008 mm (0.0003 in)
Crankshaft maximum end play	0.05-0.32 mm (0.002-0.0126 in)
Main Bearings	
Clearance to crankshaft	0.021-0.039 mm (0.0008-0.0015 in)
Clearance to crankshaft allowable	0.013-0.048 mm (0.0005-0.002 in)
Bearing wall thickness	1.8-1.806 mm (0.0709-0.0711 in)
Piston and Connecting Rod	
Piston diameter - coded standard	100.380-100.400 mm (3.952-3.9528 in)
Piston diameter - coded 0.5	100.880-100.900 mm (3.971-3.972 in)
Piston diameter - coded 1.0	101.350-101.370 mm (3.990-3.991 in)
Piston-to-cylinder bore clearance	0.030-0.050 mm (0.0012-0.002 in)
Piston ring end gap - top	0.200-0.450 mm (0.008-0.018 in)
Piston ring end gap - bottom	0.40-0.60 mm (0.015-0.024 in)
Piston ring groove width - top	1.23-1.25 mm (0.0484-0.0492 in)
Piston ring groove width - bottom	1.52-1.54 mm (0.0598-0.0606 in)
Piston ring groove width - oil ring	3.01-3.03 mm (0.1185-0.1193 in)
Piston ring width - top	

	1.175-1.190 mm (0.0463-0.0469 in)
Piston ring width - bottom	1.475-1.490 mm (0.0581-0.0587 in)
Piston ring-to-groove clearance - top	0.040-0.075 mm (0.0016-0.0030 in)
Piston ring-to-groove clearance - bottom	0.030-0.065 mm (0.0012-0.0026 in)
Piston pin bore diameter	23.958-23.976 mm (0.943-0.944 in)
Piston pin diameter (red)	23.994-23.997 mm (0.0002-0.0003 in)
Piston pin diameter (blue)	23.997-24.000 mm (0.9447-0.9449 in)
Piston pin length	72.0-72.8 mm (2.835-2.866 in)
Piston pin-to-piston fit	0.01-0.016 mm (0.0004-0.0006 in)
Piston pin-to-connecting rod clearance	0.01-0.016 mm (0.0004-0.0006 in)
Connecting rod pin bore diameter	23.958-23.976 mm (0.943-0.944 in)
Connecting rod length (center-to-center)	145.965-146.035 mm (5.746-5.749 in)
Connecting rod maximum allowed bend	0.0125 mm (0.00049 in) per 25.4 mm (1.000 in)
Connecting rod maximum allowed twist	0.038 mm (0.0015 in) per 25.4 mm (1.000 in)
Connecting rod bearing bore diameter	56.82 mm - 56.84 mm (2.237 in - 2.238 in)
Connecting rod bearing-to-crankshaft clearance	0.008-0.061 mm (0.0003-0.0024 in)
Connecting rod side clearance	0.092-0.268 mm (0.0036-0.0106 in)
Accessory Drive Belt	
Drive belt	6 ribs
(1) The addition of Motorcraft Cooling System Stop Leak Pellets, VC-6, darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.	

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Description	Nm	lb-ft	lb-in
A/C compressor manifold bolt	20	15	-
A/C hose bracket nut	20	15	-
A/C tube-to-condenser nut	8	-	71
A/C tube-to-accumulator nut	8	-	71
Accessory drive bracket bolts	42	31	-
Accessory drive belt tensioner bolt	47	35	-
Accessory drive belt idler pulley bolt	47	35	-
Balance shaft bolts	27	20	-
Balance shaft chain guide bolts	10	-	89
Balance shaft chain tensioner bolts	29	21	-
Battery cable retainer bracket nut	15	11	-
Battery cable-to-power	12	9	-

distribution box nut			
Camshaft bearing cap bolts (1)	-	-	-
Camshaft position (CMP) sensor bolt	6	-	53
Camshaft sprocket bolt	85	63	-
Camshaft sprocket bolt (w/SST)	61	45	-
Cassette and sprocket-to-jackshaft bolt ⁽¹⁾	-	-	-
Cassette bolt, LH	19	14	-
Cassette bolt, RH	12	9	-
Connecting rod bolts ⁽¹⁾	-	-	-
Converter-to-muffler bolts	40	30	-
Coolant pump bolts	10	-	89
Crankshaft position (CKP) sensor bolts	10	-	89
Crankshaft pulley bolt ⁽¹⁾	-	-	-
Crossmember bolts	70	52	-
Cylinder head bolts ⁽¹⁾	-	-	-
Driveshaft-to-front differential flange bolts	30	22	-
Driveshaft-to-pinion shaft bolts	112	83	-
Driveshaft-to-transfer case flange bolts	112	83	-
Driveshaft U-joint strap bolts	18	13	-
Electrical harness-to-rear of engine bolts	47	35	-
Engine electrical connector	6	-	53
Engine front cover bolts	19	14	-
Engine lifting eye bolts (service)	37	27	-
Engine mount through bolt	103	76	-
Exhaust manifold-to-exhaust gas recirculation (EGR) system module tube fittings	34	25	-
EGR system module bolts	25	18	-
Exhaust manifold-to-EGR system module tube bracket bolts	10	-	89
Exhaust manifold nuts	22	16	-
Exhaust manifold plug (LH)	40	30	-

Exhaust manifold-to-converter nuts	40	30	-
Flexplate bolts ⁽¹⁾	-	-	-
Front cassette bolt	19	14	-
Front cylinder head bolts ⁽¹⁾	-	-	-
Fuel injection supply manifold bolts	24	18	-
Fuel injection temperature and pressure sensor	6	-	53
Fuel tube bracket-to-valve cover bolt	6	-	53
Generator bracket bolts	42	31	-
Generator wire nut	8	-	71
Ground wire bolt	10	-	89
Ground wire nut	9	-	80
Heat shield bolts	20	15	-
Heater hose bracket bolts	23	17	-
Heater hose bracket nut	15	11	-
Hood hinge bolts	12	9	-
Hydraulic camshaft tensioner, LH ⁽¹⁾	-	-	-
Hydraulic camshaft tensioner, RH ⁽¹⁾	-	-	-
Ignition coil bracket bolts	10	-	89
Intake manifold bolts	10	-	89
Jackshaft chain guide bolts	19	14	-
Jackshaft chain tensioner bolts	10	-	89
Jackshaft rear sprockert bolt ⁽¹⁾	-	-	-
Jackshaft front sprocket bolt ⁽¹⁾	-	-	-
Jackshaft thrust plate bolt	11	8	-
Knock sensor (KS) bolt	20	15	-
Ladder frame bolts and nuts (outside)	10	-	89
Ladder frame bolts (inside) ⁽¹⁾	-	-	-
Ladder frame Torx ^o bolts	8	-	71
Ladder frame inserts	3	-	27
Lower engine mount bracket nuts	90	66	-
Lower engine mount bracket bolts	80	59	-
Main bearing cap bolts	97	72	-

Oil filter	13	10	-
Oil cooler insert bolt	57	42	-
Oil filter adapter bolt	57	42	-
Oil level indicator tube bracket bolt	10	-	89
Oil pan bolts	9	-	80
Oil pan drain plug	26	19	-
Oil pressure switch	13	10	-
Oil pump bolts	19	14	-
Oil pump drive bolt	19	14	-
Oil pump screen cover and tube bolts	10	-	89
Plastic shield-to-crossmember nuts	9	-	80
Powertrain control module (PCM) electrical connector bolt	6	-	53
Powertrain control module (PCM) ground wire nut	10	-	89
Power steering pressure (PSP) tube fitting	65	48	-
PSP hose bracket bolt	11	8	-
Power steering pump pulley bolts	25	18	-
Radiator fan shroud bolts	7	-	62
Radiator support bracket bolts	12	9	-
Rear cassette bolt	12	9	-
Spark plug	20	15	-
Thermostat housing bolts	11	8	-
Transmission cooler tube bracket nut	19	14	-
Transmission cooler tube fittings	35	26	-
Transmission mount-to-transmission bolts	90	66	-
Transmission mount-to-crossmember nuts	90	66	-
Transmission-to-engine bolts	47	35	-
Transmission-to-frame cable bracket bolts	40	30	-
Transmission shift cable bracket bolt	40	30	-
Transmission solenoid electrical connector screw	5	-	44

(1) Refer to the applicable procedure in ASSEMBLY.