

Material

Item	Specification	Fill Capacity
Motorcraft® Metal Surface Prep ZC-31-A	—	—
Motorcraft® Premium Gold Engine Coolant with Bittering Agent (bittered in US only) VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)	WSS-M97B51-A1	—
Motorcraft® SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B	6.0L (6.5 qt) with filter
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A	—
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4	—
Silicone Gasket Remover ZC-30	—	—
Threadlock and Sealer TA-25	WSK-M2G351-A5	—

General Specifications

Item	Specification
Engine	
Displacement	5.4L (330 CID)
Number of cylinders	8
Bore	90.215 mm (3.552 in)
Stroke	105.8 mm (4.23 in)
Firing order	1-3-7-2-6-5-4-8
Oil pressure at 2,000 rpm (engine at normal operating temperature)	276-414 kPa (40-60 psi)
Compression ratio	8.4:1
Engine weight	288 kg (634 lb)
Cylinder Head and Valve Train	
Combustion chamber volume	42.45-45.45 cc (2.59-2.77 cu in)
Valve stem diameter — intake	7.015-6.995 mm (0.2762-0.2754 in)
Valve stem diameter — exhaust	7.00-6.98 mm (0.2756-0.2748 in)
Valve stem-to-guide clearance — intake	0.057-0.023 mm (0.0022-0.0009 in)
Valve stem-to-guide clearance — exhaust	0.072-0.038 mm (0.0028-0.0015 in)
Valve head diameter — intake	37.13-36.87 mm (1.462-1.4516 in)
Valve head diameter — exhaust	32.13-31.87 mm (1.2650-1.2547 in)

Valve face runout	0.05 mm (0.0019 in)
Valve face angle	45.75-45.25 degrees
Valve seat width — intake	1.4-1.2 mm (0.0551-0.0472 in)
Valve seat width — exhaust	1.6-1.4 mm (0.0630-0.0551 in)
Valve face runout	0.05 mm (0.0019 in)
Valve seat angle	45.00-44.50 degrees
Valve spring free length — intake	54.4 mm (2.1417 in)
Valve spring free length — exhaust	50.9 mm (2.0039 in)
Valve spring perpendicularity — intake	1.2 mm (0.0472 in)
Valve spring perpendicularity — exhaust	1.2 mm (0.0472 in)
Valve spring compression force — intake	815 N @ 31.82 mm (1.2528 in)
Valve spring compression force — exhaust	760 N @ 25.5 mm (1.0827 in)
Valve spring installed height — intake	43.00 mm (1.692 in)
Valve spring installed height — exhaust	39.5 mm (1.555 in)
Valve spring installed force — intake	310 N @ 43.00 mm (1.6929 in)
Valve spring installed force — exhaust	320 N @ 39.5 mm (1.555 in)
Roller follower ratio	1.81:1
Head gasket surface flatness	0.025 mm (0.001 in) in any 25 mm (1 in) x 25 mm (1 in) area; 0.050 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 — intake	12.000-11.989 mm (0.4724-0.4720 in)
Diameter — exhaust	16.000-15.9888 mm (0.6299-0.6295 in)
Clearance-to-bore	0.018-0.069 mm (0.0007-0.0027 in)
Service limit — intake	12.000-11.989 mm (0.4724-0.4720 in)
Service limit — exhaust	16.000-15.9888 mm (0.6299-0.6295 in)
Hydraulic leakdown rate — intake	0.45-3 seconds ^a
Hydraulic leakdown rate — exhaust	0.60-4 seconds ^a
Collapsed lash adjuster gap	0.450-0.850 mm (0.0177-0.0335 in)
Camshaft	
Lobe lift — intake	6.15674 mm (0.242391 in)
Lobe lift — exhaust	6.5958 mm (0.2597 in)
Journal diameter	26.962-26.936 mm (1.0615-1.0605 in)
Journal bore inside diameter	27.012-26.987 mm (1.0635-1.0625 in)
Journal-to-bearing clearance	0.076-0.025 mm (0.0030-0.0010 in)
Runout	0.09 mm (0.0035 in) (4 places)
End play	0.027-0.190 mm (0.0011-0.0075 in)
Cylinder Block	
Cylinder bore diameter	90.200-90.210 mm (3.5511-3.5515 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 (2.6567-2.6577 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-main bearing clearance	0.048-0.024 mm (0.0019-0.0009 in)
Connecting rod journal diameter	53.003-52.983 mm (2.0867-2.0859 in)
Connecting rod journal maximum taper	0.004 mm (0.0002 in)
Crankshaft maximum end play	0.075-0.377 mm (0.003-0.0148 in)
Piston and Connecting Rod	
Piston diameter	90.180 ± 0.005 mm (3.5504 ± 0.0002 in)
Piston-to-cylinder bore clearance (at grade size)	0.025-0.045 mm (0.0010-0.0018 in)
Piston ring end gap — top	0.13-0.28 mm (0.0051-0.0111 in)
Piston ring end gap — intermediate	0.25-0.40 mm (0.0098-0.0157 in)
Piston ring gap — oil control	0.15-0.65 mm (0.0059-0.0256 in)
Piston ring groove width — top	1.53-1.55 mm (0.0602-0.061 in)
Piston ring groove width — intermediate	1.52-1.54 mm (0.0598-0.0606 in)
Piston ring groove width — oil control	3.030-3.050 mm (0.1193-0.1201 in)
Piston ring width	1.49-1.46 mm (0.0587-0.0575 in)
Piston ring-to-groove clearance — top	0.030-0.050 mm (0.0012-0.0020 in)
Piston ring-to-groove clearance — intermediate	0.030-0.080 mm (0.0012-0.0031 in)
Piston pin bore diameter	22.008-22.014 mm (0.8665-0.8667 in)
Piston pin diameter	22.0005-22.0030 mm (0.8662-0.8663 in)
Piston pin length	61.8 mm (2.433 in)
Piston pin-to-piston fit (clearance)	0.005-0.0135 mm (0.0002-0.0005 in)
Connecting rod-to-pin clearance	0.009-0.0235 mm (0.0004-0.0093 in)
Connecting rod pin bore diameter	22.012-22.024 mm (0.8666-0.8671 in)
Connecting rod length (centerline bore-to-bore)	169.1 mm (6.6575 in)
Connecting rod maximum allowed bend	± 0.038 mm (0.0015 in)
Connecting rod maximum allowed twist	± 0.05 mm (0.0021 in)
Connecting rod bearing bore diameter (with assembled liners)	53.049-53.027 mm (2.0885-2.0877 in)
Connecting rod bearing-to-crankshaft clearance	0.064-0.026 mm (0.0025-0.001 in)

Connecting rod side clearance (as assembled to crank) — standard play	0.300 ± 0.175 mm (0.0118 ± 0.0069 in)
Connecting rod side clearance (as assembled to crank) — max. play	0.475 mm (0.0187 in)

^a Time required for the plunger to leak down 1.6 mm of travel with 222 N force and leak-down fluid in the lash adjuster.

Torque Specifications

Description	Nm	lb-ft	lb-in
A/C compressor stud bolts	25	18	—
Accessory drive belt idler pulley (smooth and grooved) bolt	25	18	—
Accessory drive belt tensioner bolt	25	18	—
Alternator bolts	50	37	—
Camshaft bearing cap bolts ^a	—	—	—
Camshaft drive sprocket bolts ^a	—	—	—
Camshaft Position (CMP) sensor bolt	10	—	89
Charge Air Cooler (CAC) bolts ^a	—	—	—
CAC coolant tube assembly bolts	10	—	89
Connecting rod cap bolts ^a	—	—	—
Coolant pump bolts	25	18	—
Coolant pump pulley bolt	25	18	—
Coolant tube assembly bolts	10	—	89
Coolant tube bracket nut	9	—	80
Cooling fan assembly bolts	9	—	80
Crankshaft Position (CKP) sensor bolt	10	—	89
Crankshaft pulley bolt ^a	—	—	—
Crankshaft rear seal retainer plate bolts ^a	—	—	—
Cylinder head bolts ^a	—	—	—
EGR system module bolts	25	18	—
EGR tube	40	30	—
Engine block drain plugs	14	—	124
Engine front cover bolts ^a	—	—	—
Engine support insulator bolts	55	41	—
Engine support insulator bracket bolts	63	46	—
Engine support insulator nuts	63	46	—
Exhaust manifold nuts ^a	—	—	—
Exhaust manifold studs	12	—	106
Flywheel ^a	—	—	—
Fuel rail bolts	10	—	89
Generator B+ wire terminal nut	8	—	71
Generator bolts and stud bolt	50	37	—
Ground wire-to-LH cylinder head bolt	10	—	89
Ground wire-to-RH engine support insulator nut	25	18	—
Hood bolts	12	—	106

Ignition coil-on-plug cover bolts	10	—	89
Intake Air Temperature 2 (IAT2) sensor	15	—	133
Intake manifold assembly bolts ^a	—	—	—
Intake manifold wiring harness bracket bolts	10	—	89
Intermediate steering shaft bolt	47	35	—
Lower intake manifold cover bolts ^a	—	—	—
Main bearing cap bolts ^a	—	—	—
Main bearing cap side bolts ^a	—	—	—
Oil cooler bolts ^a	—	—	—
Oil filter ^a	—	—	—
Oil filter adapter bolts ^a	—	—	—
Oil level indicator tube bolt	10	—	89
Oil pan bolts ^a	—	—	—
Oil pan drain plug	26	19	—
Oil pan stud bolt wire harness bracket retainer nut	10	—	89
Oil pan-to-engine front cover bolts	25	15	—
Oil pan-to-engine front cover stud bolt	25	18	—
Oil pump bolts ^a	—	—	—
Oil pump screen and pickup tube (large bolts)	25	18	—
Oil pump screen and pickup tube (small bolts)	10	—	89
Power Distribution Box (PDB) connector bolt	6	—	53
Power Steering Pressure (PSP) tube fitting	65	48	—
Power steering pump bolts	25	18	—
Power steering reservoir bracket bolts	25	18	—
Power steering tube bracket bolt	10	—	89
Power steering tube bracket nut	10	—	89
Radio interference capacitor nuts	10	—	89
Spark plugs	18	—	159
Starter B+ terminal nut	12	—	106
Starter bolts ^a	—	—	—
Starter S-terminal nut	5	—	44
Steering column dash boot nuts	9	—	80
Strut tower cross brace nuts	35	26	—
Subframe bolts	115	85	—
Subframe cross brace nut	48	35	—
Subframe nuts	115	85	—
Supercharger (SC) bolts ^a	—	—	—
<u>SC</u> drive belt heavy load idler (closest to centerline of engine) bolt	48	35	—
<u>SC</u> drive belt idler (smooth and grooved) bolts	25	18	—
<u>SC</u> drive belt tensioner bolt	48	35	—
Thermostat housing nuts	25	18	—
Throttle Body (TB) and spacer bolts	10	—	89
Timing chain guide bolts	10	—	89

Timing chain tensioner bolts (primary)	25	18	—
Timing chain tensioner bolts (secondary)	10	—	89
Valve cover bolts ^a	—	—	—
Windage tray nuts ^a	—	—	—

^a Refer to the procedure in this section.
