

SECTION 303-01B Engine — 5.0L (4V)

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SPECIFICATIONS

Material

Item	Specification	Fill Capacity
Motorcraft® Metal Surface Prep ZC-31-A	—	—
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C945-A	7.6 L (8.0 qt)
Motorcraft® Silicone Gasket Remover ZC-30	—	—
Motorcraft® Specialty Orange Engine Coolant VC-3-B (US); CVC-3-B (Canada); or equivalent	WSS-M97B44-D	12.4L (13.1 qt)
Multi-Purpose Grease XG-4 and/or XL-5, or equivalents	ESB-M1C93-B	—
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A	—
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4	—

General Specifications

Item	Specification
Engine	
Displacement	4.957 L (302 CID)
Number of cylinders	8
Bore	92.2 mm (3.629 in)
Stroke	92.7 mm (3.649 in)
Firing order	1-5-4-8-6-3-7-2
Spark plug	CYFS-12Y
Spark plug gap	1.25-1.35 mm (0.049-0.053 in)
Oil pressure at 2,000 rpm (engine at normal operating temperature)	—
Compression ratio	11.0:1
Engine weight	195.5 kg (431 lb)
Cylinder Head and Valve Train	
Combustion chamber volume	54.5-57.5 cc (3.33-3.51 cu in)
Valve stem diameter — intake	6.015-6.044 mm (0.2368-0.2379 in)
Valve stem diameter — exhaust	6.015-6.044 mm (0.2368-0.2379 in)
Valve stem-to-guide clearance — intake	0.020-0.069 mm (0.0008-0.0027 in)
Valve stem-to-guide clearance — exhaust	0.045-0.094 mm (0.0018-0.0037 in)
Valve head diameter — intake	37 mm (1.45 in)
Valve head diameter — exhaust	31 mm (1.22 in)
Valve face runout	0.05 mm (0.0019 in)
Valve face angle	3 angle
Valve seat width — intake	1.3-1.5 mm (0.051-0.059 in)
Valve seat width — exhaust	1.4-1.6 mm (0.059-0.063 in)
Valve seat runout	0.04 mm (0.0016 in)
Valve seat angle	121/91/61 degrees
Valve spring free length — intake	51.32 mm (2.02 in)

SPECIFICATIONS (Continued)**General Specifications (Continued)**

Item	Specification
Valve spring free length — exhaust	51.32 mm (2.02 in)
Valve spring perpendicularity — intake	3 mm (0.118 in)
Valve spring perpendicularity — exhaust	3 mm (0.118 in)
Valve spring compression force — intake	650 N
Valve spring compression force — exhaust	650 N
Valve spring installed height — intake	40 mm (1.5748 in)
Valve spring installed height — exhaust	40 mm (1.5748 in)
Valve spring installed force — intake	265 N
Valve spring installed force — exhaust	265 N
Roller follower ratio	2:1
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 mm (0.472 in)
Diameter — exhaust	12 mm (0.472 in)
Clearance-to-bore	0.018-0.050 mm (0.0007-0.0019 in)
Hydraulic leakdown rate — intake	0.45-3 seconds ^a
Hydraulic leakdown rate — exhaust	0.45-3 seconds ^a
Collapsed lash adjuster gap	0.35-0.85 mm (0.0137-0.0334 in)

Camshaft

Lobe lift — intake	5.963 mm (0.2348 in)
Lobe lift — exhaust	5.488 mm (0.2160 in)
Journal diameter	28.620 mm (1.1267 in)
Journal bore inside diameter	28.682-28.657 mm (1.1292-1.1282 in)
Journal-to-bearing clearance	0.025-0.075 mm (0.001-0.002 in)
Runout	0.04 mm (0.0016 in) (4 places)
End play	0.15 mm (0.0059 in)

Cylinder Block

Cylinder bore diameter	92.200-92.220 mm (3.6299-3.6307 in)
Cylinder bore maximum taper	0.013 mm (0.0005 in)
Cylinder bore maximum out-of-round	0.010 mm (0.0004 in)
Main bearing bore inside diameter	72.400-72.424 mm (2.850-2.851 in)
Head gasket surface flatness	0.0254 mm (0.001 in) across any 38.1 mm (1.5 in) square

Crankshaft

Main bearing journal diameter	67.481-67.505 mm (2.657-2.658 in)
Main bearing journal maximum taper	0.004 mm (0.0002 in)
Main bearing journal maximum out-of-round (circularity)	0.006 mm (0.0002 in) between cross sections
Main bearing journal-to-main bearing clearance	0.025-0.045 mm (0.0009-0.0018 in)
Connecting rod journal diameter	52.983-53.003 mm (2.086-2.087 in)
Connecting rod journal maximum taper	0.004 mm (0.0002 in)
Crankshaft maximum end play	0.28 mm (0.011 in)

Piston and Connecting Rod

Piston diameter	92.161-92.175 mm (3.6283-3.6289 in)
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SPECIFICATIONS (Continued)**General Specifications (Continued)**

Item	Specification
Piston-to-cylinder bore clearance (at grade size) ^b	0.025-0.059 mm (0.0009-0.0023 in)
Piston ring end gap — top	0.15-0.25 mm (0.0059-0.0098 in)
Piston ring end gap — intermediate	0.30-0.55 mm (0.0118-0.0216 in)
Piston ring gap — oil control	0.15-0.45 mm (0.0059-0.0177 in)
Piston ring groove width — top	1.220-1.250 mm (0.0480-0.0492 in)
Piston ring groove width — intermediate	1.220-1.240 mm (0.0480-0.0488 in)
Piston ring groove width — oil control	2.530-2.550 mm (0.0996-0.1003 in)
Piston ring width — top	1.17-1.19 mm (0.0460-0.0468 in)
Piston ring width — intermediate	1.17-1.19 mm (0.0460-0.0468 in)
Piston ring-to-groove clearance — top	0.030-0.080 mm (0.0019-0.0031 in)
Piston ring-to-groove clearance — intermediate	0.030-0.070 mm (0.0019-0.0028 in)
Piston pin bore diameter	22.004-22.010 mm (0.8663-0.8665 in)
Piston pin diameter	21.997-22.000 mm (0.8649-0.8661 in)
Piston pin length	60.7-61.0 mm (2.3897-2.4015 in)
Piston pin-to-piston fit (clearance)	0.004-0.013 mm (0.0002-0.0005 in)
Connecting rod-to-pin clearance	0.003-0.018 mm (0.0001-0.0007 in)
Connecting rod pin bore diameter	22.003-22.015 mm (0.8663-0.8667 in)
Connecting rod length (centerline bore-to-bore)	150.7 mm (5.933 in)
Connecting rod maximum allowed bend	0.038 mm (0.0015 in)
Connecting rod maximum allowed twist	0.050 mm (0.0019 in)
Connecting rod bearing-to-crankshaft clearance	0.028-0.069 mm (0.0011-0.0027 in)
Connecting rod side clearance (as assembled to crank) — standard play	0.325 mm (0.0128 in)
Connecting rod side clearance (as assembled to crank) — max. play	0.500 mm (0.0197 in)

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

b Before Grafal coating.

Torque Specifications

Description	Nm	lb-ft	lb-in
Accessory drive belt tensioner bolt	48	35	—
A/C compressor fitting nut	15	—	133
A/C compressor stud bolts	25	18	—
Camshaft bearing cap bolts ^a	—	—	—
Camshaft bearing mega cap bolts ^a	—	—	—
Camshaft Position (CMP) sensor bolt	10	—	89
Catalytic convertor-to-exhaust manifold nuts	40	30	—
Clutch pressure plate ^a	—	—	—
Connecting rod cap bolts ^a	—	—	—
Coolant outlet bolts	10	—	89
Coolant outlet pipe bolt	10	—	89
Coolant pump bolts	20	—	177
Coolant pump pulley bolts	20	—	177
Cooling fan assembly nut and bolt	9	—	80
Crankshaft main bearing cap bolts ^a	—	—	—
Crankshaft Position (CKP) sensor bolt	10	—	89

SPECIFICATIONS (Continued)**Torque Specifications (Continued)**

Description	Nm	lb-ft	lb-in
Crankshaft pulley bolt ^a	—	—	—
Crankshaft rear seal retainer plate bolts ^a	—	—	—
Cylinder head bolts ^a	—	—	—
Cylinder Head Temperature (CHT) sensor	11	—	97
Engine front cover bolts ^a	—	—	—
Engine oil filter ^b	—	—	—
Engine Oil Pressure (EOP) ^c	—	—	—
Engine support insulator bolts	55	41	—
Engine support insulator bracket bolts and stud bolts	55	41	—
Engine support insulator nuts	63	46	—
Engine-to-transmission bolts and stud bolts	48	35	—
Exhaust H-pipe clamp nuts	48	35	—
Exhaust manifold nuts ^a	—	—	—
Exhaust manifold studs	25	18	—
Flexplate ^a	—	—	—
Flexplate inspection cover bolts	35	26	—
Flywheel ^a	—	—	—
Front crossmember brace	48	35	—
Fuel rail bolts ^a	—	—	—
Generator B+ wire terminal nut	17	—	150
Generator bolt and nut	48	35	—
Ground strap-to-cowl bolt	10	—	89
Ground strap-to-RH engine support insulator nut	48	35	—
Heater hose support nuts	7	—	62
Hood bolts	12	—	106
Ignition coil-on-plug bolt	6	—	53
Intake manifold assembly bolts ^a	—	—	—
Knock Sensor (KS)	20	—	177
Lower underbody shield bolts	10	—	89
Oil filter adapter bolts ^a	—	—	—
Oil pan bolts ^a	—	—	—
Oil pan drain plug	26	19	—
Oil pan stud bolts ^a	—	—	—
Oil pan stud bolt bolt-to-wiring harness bracket nut	8	—	71
Oil pump bolts and stud bolts ^a	—	—	—
Oil pump screen and pickup tube bolts ^a	—	—	—
Oil pump screen and pickup tube spacer	25	18	—
Piston oil cooler bolts ^a	—	—	—
Primary timing chain tensioner bolts	10	—	89
Spark plugs	15	—	133

SPECIFICATIONS (Continued)**Torque Specifications (Continued)**

Description	Nm	lb-ft	lb-in
Steering column dash boot nuts	9	—	80
Steering intermediate shaft bolt	47	35	—
Strut tower cross brace	35	26	—
Subframe nuts and bolts	115	85	—
Thermostat housing bolts	10	—	89
Timing chain guide bolts	10	—	89
Torque converter nuts	40	30	—
Transmission fluid cooler tube bracket-to-flexplate inspection cover stud bolt nut	13	—	115
Transmission fluid cooler tube bracket-to-RH engine support insulator bracket stud bolt nut	48	35	—
Transmission fluid cooler tube clamp-to-fan shroud bolt	8	—	71
Underbody shield bolt	10	—	89
Valve cover bolts ^a	—	—	—
VCT assembly bolts ^a	—	—	—

a Refer to the procedure in this section.

b Do not lubricate O-ring seal, tighten to 16 Nm (142 lb-in).

c Tighten to 14 Nm (124 lb-in) plus an additional 180 degrees.