

SPECIFICATIONS

MATERIAL

MATERIAL SPECIFICATIONS CHART

Item	Specification	Fill Capacity
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B	-
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)	WSS-M2C945-A	7.33 L (7.75 qt)
Motorcraft® Silicone Gasket Remover ZC-30	-	-
Motorcraft® Specialty Orange Engine Coolant VC-3-B (US); CVC-3-B (Canada)	WSS-M97B44-D	-
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4	-
Threadlock 262 TA-26	WSK-M2G351-A6	-

GENERAL SPECIFICATIONS

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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 idle (engine at normal operating temperature)	69 kPa (10 psi)-103 Kpa (15 psi)
Oil pressure at 2,000 RPM (engine at normal operating temperature)	207 kPa (30 psi)-276 kPa (40 psi)
Compression ratio	10.5: 1
Engine weight	197.3 kg (435 lb)
Cylinder Head and Valve Train	
Combustion chamber volume	54.5-57.5 cc (3.33-3.51 Cu in)
Valve stem diameter - intake	5.975-5.995 mm (0.2352-0.2360 in)
Valve stem diameter - exhaust	5.950-5.970 mm (0.2342-0.2350 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	45 degrees
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	120/90/60 degrees
Valve spring free length - intake	51.32 mm (2.02 in)
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	11.89-12.00 mm (0.4681-0.472 in)
Diameter - exhaust	11.89-12.00 mm (0.4681-0.472 in)
Clearance-to-bore	0.018-0.050 mm (0.0007-0.0019 in)
Hydraulic leakdown rate - intake	0.45-3 seconds ⁽¹⁾
Hydraulic leakdown rate - exhaust	0.45-3 seconds ⁽¹⁾
Collapsed lash adjuster gap	0.35-0.85 mm (0.0137-0.0334 in)
Camshaft	
Lobe lift - intake	5.258 mm (0.2070 in)
Lobe lift - exhaust	5.488 mm (0.2160 in)
Journal diameter	28.607-28.633 mm (1.1262-1.1272 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	0.008 mm (0.0003 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)
Piston-to-cylinder bore clearance (at grade size) ⁽²⁾	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)
(1) Time required for the plunger to leak down 1.6 mm of travel with 222 N force and leakdown fluid in the lash adjuster.	
(2) Before Grafal coating.	

TORQUE SPECIFICATIONS

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Description	Nm	lb-ft	lb-in
Accessory drive belt tensioner bolt	48	35	-
A/C compressor stud bolts	25	18	-
Camshaft bearing cap bolts ⁽¹⁾	-	-	-
Camshaft bearing mega cap bolts ⁽¹⁾	-	-	-
Camshaft Position (CMP) sensor bolt	10	-	89
Catalytic convertor-to-exhaust manifold nuts	40	30	-
Connecting rod cap bolts ⁽¹⁾	-	-	-
Coolant outlet bolts	10	-	89
Coolant outlet pipe bolt	10	-	89
Coolant pump bolts	20	-	177
Coolant pump pulley bolts	20	-	177
Crankshaft main bearing cap bolts ⁽¹⁾	-	-	-
Crankshaft Position (CKP) sensor bolt	10	-	89
Crankshaft pulley bolt ⁽¹⁾	-	-	-
Crankshaft rear seal retainer plate bolts ⁽¹⁾	-	-	-
Cylinder head bolts ⁽¹⁾	-	-	-
Cylinder Head Temperature (CHT) sensor	11	-	97
Engine front cover bolts ⁽¹⁾	-	-	-
Engine front cover-to-oil filter adapter jackscrew ⁽¹⁾	-	-	-
Engine oil filter ⁽²⁾	-	-	-
Engine Oil Pressure (EOP) ⁽³⁾	-	-	-
Engine support insulator bracket bolts	63	46	-
Engine support insulator through bolts	350	258	-

Engine support insulator bolts ⁽¹⁾	-	-	-
Engine support insulator nuts	175	129	-
Engine support insulator studs	15	-	133
Engine-to-transmission bolts and stud bolts	48	35	-
Exhaust H-pipe clamp nuts	48	35	-
Exhaust manifold nuts ⁽¹⁾	-	-	-
Exhaust manifold studs	25	18	-
Flexplate ⁽¹⁾	-	-	-
Flexplate inspection cover bolts	35	26	-
Fuel rail bolts ⁽¹⁾	-	-	-
Generator B+ wire terminal nut	17	-	150
Generator bolt and nut	48	35	-
Ground strap-to-cowl bolt	10	-	89
Ground strap-to-frame bolt	12	-	106
Hood bolts	12	-	106
Ignition coil-on-plug bolt	6	-	53
Intake manifold assembly bolts ⁽¹⁾	-	-	-
Knock Sensor (KS)	20	-	177
Oil filter adapter bolts ⁽¹⁾	-	-	-
Oil pan bolts ⁽¹⁾	-	-	-
Oil pan drain plug	26	19	-
Oil pan stud bolts ⁽¹⁾	-	-	-
Oil pump bolts and stud bolts ⁽¹⁾	-	-	-
Oil pump screen and pickup tube bolts ⁽¹⁾	-	-	-
Oil pump screen and pickup tube spacer	25	18	-
Piston cooling jet bolts ⁽¹⁾	-	-	-
Primary timing chain tensioner bolts	10	-	89
Skid plate	48	35	-
Spark plugs	15	-	133
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 mount-to-crossmember nut	25	18	-
Valve cover bolts ⁽¹⁾	-	-	-
VCT assembly bolts ⁽¹⁾	-	-	-
Wiring harness-to-frame bracket bolt	20	-	177

(1) Refer to the procedure in this article.

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

(2)

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