SPECIFICATIONS

GENERAL SPECIFICATIONS

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Item	Specification
Lubricants and Sealants	
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
Motorcraft Premium Gold Engine Coolant with Bittering Agent (US only) VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)	WSS-M97B51-A1
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Gasket Remover ZC-30	-
Threadlock 262 TA-26	WSK-M2G351-A6
PAG Refrigerent Compressor Oil (R-134a Systems) YN-12-D	WSH-M1C231-B
Engine	
Displacement	5.4L (330 CID)
Number of cylinders	8
Bore	90.2 mm (3.55 in)
Stroke	105.8 mm (4.17 in)
Firing order	1-3-7-2-6-5-4-8
Oil pressure at 2,000 rpm (engine at normal operating temperature)	275-517 kPa (40-75 psi)
Oil capacity	6.6 liters (7.0 quarts) with filter
Compression ratio	9.8:1
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	0.020-0.045 mm (0.001-0.002 in)
Valve stem-to-guide clearance - exhaust	0.069-0.094 mm (0.003-0.004 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 degrees
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 degrees
Valve spring free length	55.7 mm (2.19 in)
Valve spring compression pressure	350 N (79 lbs) ± 17.5 N (4 lbs) @ 42.04 mm (1.66 in)
Valve spring installed height	42.04 mm (1.66 in)
Valve spring installed pressure	350 N (79 lbs) ± 17.5 N (4 lbs) @ 42.04 mm (1.66 in)
Roller follower ratio	-
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	-
Hydraulic leakdown rate	5-25 seconds[a]
Collapsed lash adjuster gap	0.45-0.85 mm (0.017-0.033 in)
Camshaft	
Theoretical valve lift @ 0 lash - intake	11.1 mm (0.437 in)
Theoretical valve lift @ 0 lash - exhaust	11.0 mm (0.433 in)
Lobe lift - intake	5.520 mm (0.217 in)
Lobe lift - exhaust	5.506 mm (0.217 in)
Allowable lobe lift loss	0.127 mm (0.005 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	0.075-0.185 mm (0.003-0.007 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)
Crankshaft	
Main bearing journal diameter	67.481-67.505 mm (2.6568-2.6576 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	0.048-0.024 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)
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)	90.175-90.165 mm (3.5502-3.5498 in)
Piston diameter - Grade 2 (at right angle to pin bore)	90.185-90.175 mm (3.5506-3.5502 in)
Piston diameter - Grade 3 (at right angle to pin bore)	90.195-90.185 mm (3.5510-3.5506 in)
Piston-to-cylinder bore clearance (at grade size)	0.025-0.045 mm (0.0010-0.0018 in)
Piston ring end gap - top	0.15-0.30 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	1.52-1.55 mm (0.0598-0.0610 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 - top and intermediate	1.50-1.47 mm (0.0590-0.0578 in)
Piston ring-to-groove clearance - top	0.020-0.080 mm (0.0008-0.0031 in)
Piston ring-to-groove clearance - intermediate	0.030-0.070 mm (0.0012-0.0028 in)
Piston pin bore diameter	22.008-22.014 mm (0.8665-0.8667 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	0.005-0.0130 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 (center-to-center)	169.1 mm (6.6575 in)
Connecting rod maximum allowed bend	± 0.038 mm (0.0015 in)
Connecting rod maximum allowed twist[b]	± 0.05 mm (0.0020 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 (0.0025-0.0010 in)
Connecting rod side clearance	0.475-0.125 mm (0.0187-0.0049 in)

[a] The time required for the plunger to leak down 1.6 mm (0.062 in) of travel with 222 N force and leak-down fluid in the lash adjuster.

[b] 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	-
A/C compressor manifold tube nut	8	-	71
A/C manifold and tube assembly support bracket nut	25	18	-
Accessory drive belt idler pulley bolt	25	18	-
Accessory drive belt tensioner bolts	25	18	-
Axle housing mounting bolts	89	66	-

Camshaft bearing cap bolts[a]	-	-	-
Camshaft position (CMP) sensor bolt	10	-	89
Camshaft phaser sprocket bolt[a]	-	-	-
Charge motion control valve (CMCV) stud and bolts	10	-	89
Connecting rod bolts[a]	-	-	-
Cooling fan shroud bolts	10	-	89
Coolant pump bolts	25	18	-
Coolant pump pulley bolts	25	18	-
Coolant tube support stud	10	-	89
Crankshaft position (CKP) sensor bolt	10	-	89
Crankshaft damper pulley bolt[a]	-	-	-
Crankshaft main bearing cap bolts (cross-mounted)[a]	-	-	-
Crankshaft main bearing cap bolts (vertical)[a]	-	-	-
Crankshaft rear seal retainer bolts	10	-	89
Cylinder block drain plug	24	18	-
Cylinder head temperature sensor (CHT)	26	19	-
Cylinder heads bolts[a]	-	-	-
Engine front cover bolts[a]	-	-	-
Engine oil pressure (EOP) sensor	14	10	-
Engine support insulator bracket-to-engine support insulator bolts	72	53	-
Engine support insulator bracket-to-cylinder block bolts	63	46	-
Engine support insulator through bolt (LH)[a]	350	258	-
Engine support insulator nuts (RH)	250	184	-
Engine wiring harness retainer nut	10	-	89
Exhaust manifold-to-catalytic converter nuts	40	30	-
Exhaust support bracket bolt	25	18	-
Exhaust system support bracket bolts	40	30	-
Exhaust manifold flange nuts	40	30	-
Exhaust manifold studs	12	9	-
Exhaust manifold nuts	25	18	-
Flexplate bolts[a]	-	-	-
Flexplate inspection cover bolts	34	25	-
Frame crossmember bolts	102	75	-
Front drive shaft flange-to-front axle pinion flange bolts	111	82	-
Fuel rail bolts	10	-	89
Generator support bracket bolts	10	-	89
Generator lower mounting bolts	25	18	-
Ground strap nut	10	-	89
Heated oxygen sensor (HO2S)	46	34	-
Ignition coil	6	-	53
Intake manifold bolts[a]	-	-	-
Knock sensor (KS)	20	15	-

Oil filter	16	12	-
Oil filter adapter bolts	25	18	-
Oil level indicator tube bolt	10	-	89
Oil pump screen and pickup tube-to-oil pump bolts	10	-	89
Oil pan bolts[a]	-	-	-
Oil pan drain plug	14	10	-
Oil pump bolts	10	-	89
Oil pump screen and pickup tube-to-spacer bolt	25	18	-
Oil pump screen and pickup tube spacer bolt	25	18	-
Positive crankcase ventilation (PCV) heater element bolts	6	-	53
Power steering reservoir support bracket bolt	25	18	-
Power steering reservoir support bracket nut	10	-	89
Power steering pump bolts	25	18	-
Power steering pressure tube fitting	65	48	-
Power steering pressure tube support bracket nut	40	30	-
Power steering reservoir bolts	11	8	-
Radio ignition interference capacitor nut	10	-	89
Shift cable bracket bolts	25	18	-
Skid plate bolts	25	18	-
Spark plugs	34	25	-
Suction accumulator-to-A/C compressor manifold tube stud	**8**	**-**	**71**
Sway bar nuts	30	22	-
Thermostat housing bolts	10	-	89
Throttle body bolts[a]	-	-	-
Throttle body spacer bolts	10	-	89
Timing chain guide bolts	10	-	89
Timing chain hydraulic tensioner bolts	25	18	-
Transmission-to-engine bolts	60	44	-
Torque converter-to-flexplate nuts	36	27	-
Transmission mount nuts	103	76	-
Transmission filler tube bolt	20	15	-
Transmission cooler tube support bracket nut	10	-	89
Upper radiator hose support bracket nut	10	-	89
Valve cover bolts[a]	-	-	-
Variable camshaft timing (VCT) sprocket assembly bolts[a]	-	-	-
VCT housing bolts	10	-	89

[a] Refer to the procedure in this article.