

# SPECIFICATIONS

## MATERIAL SPECIFICATION

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Item	Specification	Fill Capacity
High Temperature 4x4 Front Axle and Wheel Bearing Grease XG-11	WSSM1C267-A1	-
Motorcraft® Metal Surface Prep ZC-31-A	-	-
Motorcraft® Premium Gold Engine Coolant with Bittering Agent (US); Motorcraft® Premium Gold Engine Coolant (Canada) VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)	WSSM97B51-A1	-
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	WSSM2C930-A	3.8L (4 qt) with filter change
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B	-
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A	-
Silicone Gasket and Sealant TA-30	WSEM4G323-A4	-
Silicone Gasket Remover ZC-30	-	-
Thread Sealant with PTFE TA-24	WSKM2G350-A2	-

## GENERAL SPECIFICATION

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Item	Specification
Displacement	2.3L
No. of cylinders	4
Bore/stroke	87.5/94.0
Firing order	1-3-4-2
Oil pressure (hot @ 2,000 rpm)	200-268 kPa (29-39 psi)
Engine weight (without accessory drive components)	133 kg (293 lb)
<b>Cylinder Block</b>	
Cylinder bore diameter	87.5-87.53 mm (3.444-3.445 in)
Out of round	0.008 mm (0.0003 in)
Main bearing bore diameter	57.020-57.038 mm (2.244-2.245 in)

Head face flatness	0.1 mm (0.004 in) maximum overall, 0.05 mm (0.002 in) in any 200 mm x 200 mm (7.87 in x 7.87 in) area
<b>Piston</b>	
Diameter (1)	87.5-87.51 mm (3.444-3.445 in)
Diameter (2)	87.51-87.52 mm (3.4452-3.4456 in)
Diameter (3)	87.52-87.53 mm (3.444-3.446 in)
Piston to bore clearance	0.025-0.045 mm (0.0009-0.0017 in)
Ring groove width - top	1.203-1.205 mm (0.0473-0.0474 in)
Ring groove width - 2nd	1.17-1.19 mm (0.0460-0.0468 in)
Ring groove width - oil	2.501-2.503 mm (0.0984-0.0985 in)
Piston skirt coating thickness	0.008-0.020 mm (0.0003-0.0007 in)
<b>Piston Pin</b>	
Diameter	20.995-21.0 mm (0.8266-0.8268 in)
Length	59.6-60.4 mm (2.346-2.377 in)
Piston to pin clearance	0.008-0.016 mm (0.0003-0.0006 in)
Pin to rod clearance	Press fit
<b>Cylinder Head</b>	
Exhaust valve lift (in @ zero lash)	7.4 mm (0.2913 in)
Intake valve lift (in @ zero lash)	7.9 mm (0.3110 in)
Valve guide diameter	5.509-5.539 mm (0.216-0.218 in)
Valve seat width - intake/exhaust	0.99-1.84 mm (0.038-0.072 in)
Valve seat angle	45 degrees
Valve seat runout	0.075 mm (0.0029 in)
Valve lash adjustor bore diameter	31.00-31.03 mm (1.220-1.221 in)
Cam bore diameter	25.015-25.040 mm (0.984-0.985 in)
Cylinder head flatness	0.08 mm (0.003 in) maximum overall, 0.05 mm (0.002 in) maximum in any 150 mm x 150 mm (6 in x 6 in) area
<b>Valve</b>	
Valve head diameter - intake	34.85-35.15 mm (1.372-1.383 in)
Valve head diameter - exhaust	29.85-30.15 mm (1.175-1.187 in)

Valve stem diameter - intake	5.470-5.485 mm (0.2153-0.2159 in)
Valve stem diameter - exhaust	5.465-5.480 mm (0.2151-0.2157 in)
Valve stem to guide clearance - intake	0.0027 mm (0.0009 in)
Valve stem to guide clearance - exhaust	0.0029 mm (0.0011 in)
Valve face runout	0.05 mm (0.001 in)
Valve face angle	45 degrees
<b>Valve Spring - Compression Pressure</b>	
Intake and exhaust (installed)	38.667 lb
Intake (valve open) 8.9 mm (0.35 in) of lift	97.032 lb
Exhaust (valve open) 7.4 mm of lift	93.338 lb
Free length	44.92 mm (1.768 in)
Assembled height	37.9 mm (1.492 in)
<b>Crankshaft</b>	
Main bearing journal diameter	51.980-52.000 mm (2.046-2.047 in)
Production repair	51.730-51.750 mm (2.036-2.037 in)
Main bearing clearance	0.017-0.047 mm (0.0007-0.0018 in)
Connecting rod journal diameter	49.980-50.000 mm (1.967-1.968 in)
Production repair	49.730-49.750 mm (1.957-1.958 in)
End play	0.22-0.43 mm (0.008-0.016 in)
<b>Rings</b>	
Width - top	1.17-1.185 mm (0.0460-0.0466 in)
Width - 2nd	1.197-1.199 mm (0.0471-0.0472 in)
Width - oil	2.38-2.45 mm (0.093-0.096 in)
Ring gap (in bore) - top	0.16-0.31 mm (0.006-0.012 in)
Ring gap (in bore) - 2nd	0.33-0.48 mm (0.012-0.018 in)
Ring gap (in bore) - oil	0.2-0.7 mm (0.007-0.027 in)
<b>Valve Tappet</b>	
Diameter	30.97-30.98 mm (1.2192-1.2196 in)

Tappet to valve clearance - intake	0.22- 0.28 mm (0.008-0.011 in)
Tappet to valve clearance - exhaust	0.27-0.33 mm (0.010-0.013 in)
Tappet to bore clearance	0.02-0.06 mm (0.0007-0.0023 in)
<b>Camshaft</b>	
Lobe lift - intake	8.24999 mm (0.324 in)
Lobe lift - exhaust	7.80007 mm (0.307 in)
Runout (1) <sup>(1)</sup>	0.03 mm (0.001 in)
Thrust clearance	0.09-0.24 mm (0.003-0.009 in)
Journal diameter	24.96-24.98 mm (0.982-0.983 in)
Journal to bore clearance	0.035-0.080 mm (0.001-0.003 in)
<b>Connecting Rod</b>	
Bearing clearance	0.027-0.052 mm (0.001-0.002 in)
Bearing thickness	1.496-1.520 mm (0.058-0.059 in)
Crank bore diameter	53.025-53.045 mm (2.087-2.088 in)
Pin bore diameter	20.965-20.985 mm (0.825-0.826 in)
Length (center to center)	154.8 mm (6.094 in)
Side clearance	1.95-3.05 mm (0.076-0.120 in)
Axial clearance	0.14-0.36 mm (0.005-0.014 in)
(1) No. 3 Journal - Supported by No. 1 and No. 5 Journals.	

All dimensions are in mm unless noted.

## TORQUE SPECIFICATION

### TORQUE SPECIFICATION

Description	Nm	lb-ft	lb-in
A/C compressor bolts	25	18	-
A/C manifold tube bolt	20	-	177
Accessory drive belt tensioner bolt	50	37	-
Battery cable nuts	12	-	106
Camshaft bearing caps <sup>(1)</sup>	-	-	-
Camshaft Position (CMP) sensor bolts	7	-	62
Camshaft sprocket bolts	72	53	-
Clutch pressure plate bolts	32	24	-
	-	-	-

Connecting rod bearing cap bolts <sup>(1)</sup>			
Coolant outlet (front) pipe bolts	25	18	-
Coolant outlet pipe bolts	10	-	89
Coolant pump bolts	10	-	89
Coolant pump pulley bolts	20	-	177
Coolant thermostat bolts	10	-	89
Coolant tube nuts	20	-	177
Crankcase vent oil separator bolts	10	-	89
Crankshaft oil seal retainer bolts <sup>(1)</sup>	-	-	-
Crankshaft Position (CKP) sensor bolts	7	-	62
Crankshaft pulley bolt <sup>(1)</sup>	-	-	-
Cylinder block coolant drain plug	55	41	-
Cylinder head bolts <sup>(1)</sup>	-	-	-
Cylinder Head Temperature (CHT) sensor	12	-	106
EGR outlet tube-to-cylinder head fitting	55	41	-
EGR outlet tube-to-intake manifold flange bolts	18	-	159
EGR tube support bracket bolt	10	-	89
EGR valve bolts	20	-	177
Engine front cover bolts <sup>(1)</sup>	-	-	-
Engine ground cable-to-cylinder head stud bolt	10	-	89
Engine lifting eye bolts	45	33	-
Engine Oil Pressure (EOP)	15	-	133
Engine support insulator-to-crossmember nuts	103	76	-
Engine support insulator-to-engine bracket nuts	102	75	-
Engine-to-transmission bolts	48	35	-
Engine wire harness connector bracket bolt	10	-	89
Exhaust manifold-to-cylinder head nuts	54	40	-
Exhaust manifold-to-cylinder head studs	17	-	150
Exhaust manifold-to-exhaust downpipe flange nuts	40	30	-
Flywheel or flexplate bolt <sup>(1)</sup>	-	-	-
Fuel rail bolts	25	18	-
Generator battery cable nut	12	-	106
Generator/A/C compressor support bracket bolts <sup>(1)</sup>	-	-	-
Ground strap bolt	10	-	89
Ignition coil bolts	6	-	53
Intake manifold bolts	18	-	159
Knock Sensor (KS) bolt	20	-	177
Main bearing beam bolts <sup>(1)</sup>	-	-	-
Motor mount bolts	49	36	-
Oil drain plug	28	21	-
Oil filter adapter bolts	25	18	-
Oil level indicator tube bolt	10	-	89
Oil pan bolts <sup>(1)</sup>	-	-	-

Oil pump assembly bolts <sup>(1)</sup>	-	-	-
Oil pump chain tensioner bolts	10	-	89
Oil pump pickup tube and screen bolts	10	-	89
Oil pump sprocket bolt	25	18	-
Oil squirters	4	-	35
PCM harness ground cable stud bolt	10	-	89
PCM harness retainer nut	4	-	35
Power Steering Pressure (PSP) tube nut	20	-	177
Power steering pump bolts	25	18	-
Solenoid control wire and nut	6	-	53
Spark plugs	12	-	106
Starter motor bolts	25	18	-
Starter wiring harness bolt	24	18	-
Throttle Body (TB) shield bolts	8	-	71
Timing chain guide bolts	10	-	89
Timing chain tensioner bolts	10	-	89
Timing peg plug	20	-	177
Torque converter-to-flywheel nuts	35	26	-
Transmission cooling tubes bracket bolt	28	21	-
Transmission dust shield bolts	10	-	89
Transmission-to-cylinder block bolts	48	35	-
Transmission-to-oil pan bolts	48	35	-
Transmission bracket-to-transmission bolts	90	66	-
Valve cover bolts <sup>(1)</sup>	-	-	-
Wiring harness bracket-to-transmission nut	10	-	89

(1) Refer to the appropriate procedure(s).