

## 303-01 Engine - 2.3L EcoBoost (201kW/273PS)

## Specifications

2019 Ranger

Procedure revision date: 01/4/2019

## Specifications

## Materials

Name	Specification
Engine Oil - SAE 5W-30 - Synthetic Blend Motor Oil XO-5W30-Q1SP	WSS-M2C946-B1

## Engine

Item	Specification
Displacement	140 in <sup>3</sup> (2.3 L)
No. of cylinders	4
Bore	3.4449 in (87.5 mm)
Stroke	3.7008 in (94 mm)
Firing order	1-3-4-2
Compression ratio	10.0:1
Spark plug	12405
Spark plug gap	0.030 in (.75 mm)
Engine weight - (without accessory drive components and flexplate)	320 lb (145 kg)

## Lubricants

Item	Specification
Material: Engine Oil - SAE 5W-30 - Synthetic Blend Motor Oil / XO-5W30-Q1SP (WSS-M2C946-B1)	WSS-M2C946-B1, 5W30

## Engine Oil Capacity

Item	Specification
Service fill including oil filter	6.2 qt (5.9 L)

## Oil Pressure

Item	Specification
Oil pressure (hot @ 2,000 rpm)	29–60 psi (200–414 kPa)

## Cylinder Block

Item	Specification
Cylinder bore diameter	3.4449–3.4461 in (87.5–87.53 mm)
Cylinder bore maximum out-of-round	0.0003 in (.008 mm)
Main bearing bore diameter	2.245–2.246 in (57.018–57.04 mm)
Head gasket surface flatness	0.1 mm (0.0039 in) - 0.05 mm (0.002 in)/200 mm (7.874 in) x 200 mm (7.874 in)

## Piston

Item	Specification
Piston diameter	3.4438–3.4444 in (87.473–87.487 mm)
Piston-to-bore clearance	0.0009–0.0019 in (.0225–.0475 mm)
Piston ring groove width - compression (top)	0.0484–0.0492 in (1.23–1.25 mm)
Piston ring groove width - compression (bottom)	0.0484–0.0492 in (1.23–1.25 mm)
Piston ring groove width - oil	0.0799–0.0807 in (2.03–2.05 mm)
Piston skirt coating thickness	0.0004–0.0007 in (.009–.019 mm)

## Piston Pin

Item	Specification
Diameter	0.8857–0.8858 in (22.497–22.5 mm)
Length	2.1929–2.2047 in (55.7–56 mm)
Piston-to-pin clearance	0.0001–0.0005 in (.0035–.0115 mm)
Piston pin-to-connecting rod clearance	0.0004–0.0007 in (.01–.019 mm)
Piston ring width - compression (top)	0.05 in (1.2 mm)
Piston ring width - compression (bottom)	0.05 in (1.2 mm)
Piston ring width - oil	0.08 in (2 mm)
Piston ring gap (in bore) - compression (top)	0.0067–0.0106 in (.17–.27 mm)
Piston ring gap (in bore) - compression (bottom)	0.0177–0.0256 in (.45–.65 mm)
Piston ring gap (in bore) - oil	0.0059–0.0177 in (.15–.45 mm)
Connecting rod bearing-to-crankshaft clearance	0.0011–0.0020 in (.027–.052 mm)
Connecting rod bearing thickness	0.0589–0.0599 in (1.497–1.521 mm)
Connecting rod crankshaft bore diameter	2.1665–2.1670 in (55.028–55.042 mm)
Connecting rod pin bore diameter	0.8862–0.8865 in (22.51–22.516 mm)
Connecting rod length (center-to-center)	5.8787 in (149.32 mm)
Connecting rod side clearance (assembled-to-crankshaft)	0.1020–0.1453 in (2.59–3.69 mm)

Item	Specification
Axial clearance	0.0055–0.0142 in (.14–.36 mm)

## Crankshaft

Item	Specification
Main bearing journal diameter	2.0464–2.0473 in (51.978–52.002 mm)
Main bearing clearance	0.0006–0.0018 in (.016–.046 mm)
Connecting rod journal diameter	2.0464–2.0473 in (51.978–52.002 mm)
End play	0.0087–0.0177 in (.22–.45 mm)

## Cylinder Head

Item	Specification
Cylinder head flatness	0.08 mm (0.0031 in) maxim overall, a maximum of 0.05 mm (0.0020 in) within 150 mm (5.9055 in) and a maximum of 0.025 mm (0.0010 in) within 25 mm (0.9843 in)
Maximum valve lift @ zero lash (exhaust)	0.307 in (7.8 mm)
Maximum valve lift @ zero lash (intake)	0.3538 in (8.98638 mm)
Valve guide diameter	0.2169–0.2181 in (5.509–5.539 mm)
Valve seat width - intake	0.0551 ± 0.0079 in (1.4 ± .2 mm)
Valve seat width - exhaust	0.0709 ± 0.0079 in (1.8 ± .2 mm)
Valve seat angle	45°
Valve seat runout	0.030 in (.75 mm)
Valve tappet bore diameter	1.2205–1.2217 in (31–31.03 mm)
Cam bore diameter	0.9848–0.9858 in (25.015–25.04 mm)

## Valve

Item	Specification
Valve head diameter - intake	1.2795 in (32.5 mm)
Valve head diameter - exhaust	1.1811 in (30 mm)
Valve stem diameter - intake	0.2154–0.2159 in (5.47–5.485 mm)
Valve stem diameter - exhaust	0.2146–0.2154 in (5.45–5.47 mm)
Valve stem-to-guide clearance - intake	0.0009–0.0027 in (.024–.069 mm)
Valve stem-to-guide clearance - exhaust	0.0015–0.0035 in (.039–.089 mm)

Item	Specification
Valve face runout	0.002 in (.05 mm)
Valve face angle	45–45.5°

### Valve Spring □ Compression Pressure

Item	Specification
Intake and exhaust (installed)	52 lb (230 N)
Intake (valve open) 9.34 mm (0.3677 in) of lift	126 lb (560 N)
Exhaust (valve open) 9.34 mm (0.3677 in) of lift	126 lb (560 N)
Free length	1.8598 in (47.24 mm)
Assembled height	1.4921 in (37.9 mm)

### Valve Tappet

Item	Specification
Diameter	1.2197–1.2191 in (30.98–30.964 mm)
Tappet-to-valve clearance - intake	0.0075–0.0122 in (.19–.31 mm)
Tappet-to-valve clearance - exhaust	0.0118–0.0165 in (.3–.42 mm)
Tappet-to-bore clearance	0.0008–0.0026 in (.02–.066 mm)

### Camshaft

Item	Specification
Lobe lift - intake	0.3538 in (8.98638 mm)
Lobe lift - exhaust	0.3071 in (7.8 mm)
Runout	0.0012 in (.03 mm)
Thrust clearance	0.0035–0.0094 in (.09–.24 mm)
Journal diameter	0.9827–0.9835 in (24.96–24.98 mm)
Journal-to-bore clearance	0.0014–0.0031 in (.035–.08 mm)

### Torque Specifications

Engine oil pan drain plug - 27 Nm (20 lb-ft)

Engine oil filter - 8 Nm (71 lb-in) - plus an additional 180 degrees

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