

303-01B Engine - 3.5L Duratec (202kW/275PS)
Specifications

2023 Transit

Procedure revision date: 12/12/2022

Specifications

Engine

Item	Specification
Displacement	3.5L (4V) (2214 CID)
No. of cylinders	6
Bore/stroke	92.5/86.7 mm (3.641/3.413 in)
Firing order	1-4-2-5-3-6
Spark plug	12405
Spark plug gap	1.25-1.35 mm (0.049-0.053 in)
Compression ratio	11.8:1
Engine weight (without accessory drive components)	390.2 lb (177 kg)

Lubricants, Fluids, Sealers and Adhesives

Specifications
<i>Material:</i> Motorcraft® SAE 5W-30 Motor Oil / XO-5W30-Q1SP, XO-5W30-Q1FS (WSS-M2C961-A1)

Engine Oil Capacity

Item	Specification
Service fill including oil filter	12.0 qt (11.36 L)

Oil Pressure

Item	Specification
Oil pressure @ 1,500 rpm with engine at normal operating temperature	21.8 psi (150 kPa)

Cylinder Head and Valve Train

Item	Specification
Cylinder head gasket surface flatness	Flat within 0.08 mm (0.003 in) length end to end, area 150 mm (5.9 in) x 150 mm (5.9 in) (or full width) should be less than 0.05 mm (0.002 in).
Valve tappet clearance - RH intake	0.0059–0.0098 in (0.15–0.25 mm)
Valve tappet clearance - LH intake	0.0071–0.0110 in (0.18–0.28 mm)
Valve tappet clearance - exhaust - Engine must be at room temperature before measuring	0.0142–0.0181 in (0.36–0.46 mm)
Valve guide bore inner diameter	0.217–0.218 in (5.519–5.549 mm)
Valve stem diameter - intake	0.2157–0.2164 in (5.479–5.497 mm)
Valve stem diameter - exhaust	0.2152–0.2159 in (5.466–5.484 mm)
Valve stem-to-guide clearance - intake	0.0009–0.0028 in (0.022–0.07 mm)
Valve stem-to-guide clearance - exhaust	0.0014–0.0033 in (0.035–0.083 mm)
Valve head diameter - intake	1.46 in (37 mm)
Valve head diameter - exhaust	1.22 in (31 mm)
Valve face runout	0.002 in (0.05 mm)
Valve face angle	45.25–45.75 °
Valve seat width - intake	0.051–0.063 in (1.3–1.6 mm)
Valve seat width - exhaust	0.067–0.079 in (1.7–2 mm)
Valve seat runout	0.002 in (0.04 mm)
Valve seat angle	44.5–45.5 °
Valve spring free length (approx.)	1.890 in (48 mm)
Valve spring compression pressure (N @ spec. length)	525 N @ 27.0 mm (114.7 lb @ 1.06 in)
Valve spring installed height	1.457 in (37 mm)
Valve spring installed height pressure (N @ spec. length)	235 N @ 37.0 mm (53 lb @ 1.45 in)
Valve spring installed pressure — service limit	5% force loss @ specified height

Camshaft

Item	Specification
Theoretical valve lift (intake) @ 0 lash	0.394 in (10 mm)
Theoretical valve lift (exhaust) @ 0 lash	0.39 in (10 mm)
Lobe lift - intake	0.394 in (10 mm)
Lobe lift - exhaust	0.39 in (10 mm)
Allowable lobe lift loss	0.0024 in (0.062 mm)
Camshaft journal bore inside diameter — 1st journal	1.537–1.538 in (39.0375–39.0625 mm)
Camshaft journal bore inside diameter — intermediate journals	1.023–1.024 in (25.9875–26.0125 mm)
Camshaft bearing outside diameter — 1st journal	1.535–1.536 in (38.99–39.01 mm)
Camshaft bearing outside diameter — intermediate journals	1.021–1.022 in (25.937–25.963 mm)
Camshaft journal-to-bearing clearance, 1st journal — service limit	0.0029 in (0.0725 mm)
Camshaft journal-to-bearing clearance, intermediate journals — service limit	0.0030 in (0.0755 mm)

Item	Specification
Runout	0.0016 in (0.04 mm)
End play - standard	0.0030–0.0065 in (0.075–0.165 mm)
End play - service limit	0.0075 in (0.19 mm)

Cylinder Block

Item	Specification
Cylinder bore diameter	3.642–3.761 in (92.5–95.52 mm)
Cylinder bore roundness	0.0005 in (0.013 mm)
Cylinder bore taper	0.0004 in (0.01 mm)
Block main bore roundness	0.0003 in (0.008 mm)
Main bearing bore inside diameter	2.850–2.851 in (72.4–72.424 mm)
Head gasket surface flatness	Flat within 0.150 mm (0.005 in) overall 0.050 mm (0.001 in) per 150 mm (5.905 in) x 150 mm (5.905 in) 0.025 mm (0.0009 in) per 25 mm (0.98 in) x 25 mm (0.98 in)

Crankshaft

Item	Specification
Main bearing journal diameter	2.657 in (67.5 mm)
Main bearing journal maximum taper	0.1575 in (0.004 m)
Main bearing journal maximum out-of-round	0.0002 in (0.006 mm)
Main bearing journal-to-main bearing clearance	0.0004–0.0001 in (0.011–0.0022 mm)
Connecting rod journal diameter	2.204–2.205 in (55.983–56.003 mm)
Connecting rod journal maximum taper	0.0002 in (0.004 mm)
Connecting rod journal maximum out-of-round	0.0002 in (0.006 mm)
Crankshaft end play	0.0002–0.0005 in (0.0041–0.0124 mm)

Piston and Connecting Rod

Item	Specification
Piston diameter - single grade	3.6396–3.6402 in (92.446–92.46 mm)
Piston-to-cylinder bore clearance	0.0016–0.0029 in (0.04–0.074 mm)
Piston ring end gap - compression (top, gauge diameter)	0.0091–0.0130 in (0.23–0.33 mm)
Piston ring end gap - compression (bottom, gauge diameter)	0.0157–0.0236 in (0.4–0.6 mm)
Piston ring end gap — oil ring (steel rail, gauge diameter)	0.0079–0.0276 in (0.2–0.7 mm)

Item	Specification
Piston ring groove width - compression (top)	0.0406–0.0413 in (1.03–1.05 mm)
Piston ring groove width — compression (bottom)	0.0406–0.0413 in (1.03–1.05 mm)
Piston ring groove width - oil ring	0.0799–0.0807 in (2.03–2.05 mm)
Piston ring width - upper compression ring	0.0382–0.0390 in (0.97–0.99 mm)
Piston ring width - lower compression ring	0.0382–0.0390 in (0.97–0.99 mm)
Piston ring-to-groove clearance (upper and lower compression rings)	0.0016–0.0031 in (0.04–0.08 mm)
Piston pin bore diameter	0.9057–0.9059 in (23.004–23.009 mm)
Piston pin diameter	0.9054–0.9055 in (22.997–23 mm)
Piston pin length	2.1654–2.1772 in (55–55.3 mm)
Piston pin-to-piston fit	0.0002–0.0005 in (0.004–0.012 mm)
Piston-to-connecting rod clearance	0.1 in (2.7 mm)
Connecting rod-to-pin clearance - standard	0.0001–0.0007 in (0.003–0.018 mm)
Connecting rod pin bore diameter	0.9056–0.9061 in (23.003–23.015 mm)
Connecting rod length (center-to-center)	6.01 in (152.68 mm)
Connecting rod maximum allowed bend	0.0015 in (0.038 mm)
Connecting rod maximum allowed twist	0.0020 in (0.05 mm)
Connecting rod bearing bore diameter - single grade	2.3570–2.3576 in (59.869–59.883 mm)
Connecting rod side clearance (assembled to crank) - standard	0.0069–0.0167 in (0.175–0.425 mm)
Connecting rod side clearance (assembled to crank) - service limit	0.0069–0.0167 in (0.175–0.425 mm)

Torque Specifications

Engine oil pan drain plug - 26 Nm (19 lb-ft)

Engine oil filter - Stage 1: Install to initial gasket contact

Engine oil filter - Stage 2: Tighten 3/4 to 1 turn