

Specifications

Engine

Item	Specification
Displacement	6.7L Diesel (409 cu in.)
No. of cylinders	8
Bore	3.9 in (99 mm)
Stroke	4.3 in (108 mm)
Firing order	1-3-7-2-6-5-4-8
Compression ratio	15.8:1
Engine weight - (without accessory drive components)	981.1 lb (445 kg)

Lubricants

Item	Specification
Motorcraft® SAE 10W-30 Super Duty Diesel Motor Oil	WSS-M2C171-F1
Motorcraft® SAE 5W-40 Full Synthetic Diesel Motor Oil	WSS-M2C171-F1
Motorcraft® SAE 15W-40 Super Duty Diesel Motor Oil	WSS-M2C171-F1

Engine Oil Capacity

Item	Specification
Service fill including oil filter	13 qt (12.3 L)

Oil Pressure

Item	Specification
Oil pressure (@ 1200 rpm after 15 seconds with engine at normal operating temperature and transmission in Park.) approximately	20 psi (137.9 kPa)
Oil pressure (@ 1200 rpm after 15 seconds with engine at normal operating temperature and transmission in Park. Oil Pressure Control Solenoid electrical connector disconnected.) approximately	45 psi (310.3 kPa)

Cylinder Block

Item	Specification
Cylinder bore diameter	3.898 â€³3.898 in (99 â€³99.018 mm)
Cylinder bore maximum taper	0.0063 in (.16 mm)
Cylinder bore maximum out-of-round	0.0063 in (.16 mm)
Main bearing bore inside diameter	3.380 â€³3.381 in (85.863 â€³85.879 mm)
Camshaft bearing bore inside diameter	2.514 â€³2.515 in (63.85 â€³63.875 mm)
Head gasket surface flatness (across cylinder bores)	0.025 mm (0.001 in) in any 25 mm (1 in) x 25 mm (1 in) area; 0.05 mm (0.002 in) in any 150 mm (6 in) X 150 mm (6 in) area; 0.1 mm (0.004 in) overall
Head gasket surface flatness (across sealing rail on valley side around pushrods/ lifters)	0.025 mm (0.001 in) in any 25 mm (1 in) x 25 mm (1 in) area; 0.06 mm (0.002 in) in any 150 mm (6 in) X 150 mm (6 in) area; 0.13 mm (0.005 in) overall

Piston

Item	Specification
Piston Diameter - standard size (major diameter)	3.8954 â€³3.8966 in (98.944 â€³98.974 mm)
Piston Diameter - 0.50 mm (0.019 in) oversize (major diameter)	3.9151 â€³3.9163 in (99.444 â€³99.474 mm)
Piston-to-cylinder bore clearance	0.001 â€³0.003 in (.026 â€³.074 mm)
Piston pin bore diameter	1.183 â€³1.183 in (30.045 â€³30.06 mm)

Piston Pin

Item	Specification
Piston pin diameter	1.1809 â€³1.1811 in (29.994 â€³30 mm)
Piston pin length	2.272 â€³2.283 in (57.7 â€³58 mm)
Piston pin-to-piston fit	0.0018 â€³0.0026 in (.045 â€³.066 mm)

Cylinder Head

Item	Specification
Cylinder head gasket surface flatness - overall	0.025 mm (0.001 in) in any 25 mm (1 in) x 25 mm (1 in) area; 0.05 mm (0.002 in) in any 150 mm (6 in) X 150 mm (6 in) area; 0.1 mm (0.004 in) overall
Valve arrangement (front to rear)	I-I-E-E-I-I-E-E-I-I-E-E-I-I-E-E
Valve seat width - intake, maximum service limit	0.098 in (2.5 mm)
Valve seat width - exhaust, maximum service limit	0.118 in (3 mm)
Valve seat runout (TIR Max)	0.002 in (.055 mm)

Item	Specification
Valve seat angle - intake (from deck face)	30.25 Å°
Valve seat angle - exhaust (from deck face)	45.25 Å°
Valve margin - intake (minimum)	0.035 in (.9 mm)
Valve margin - exhaust (minimum)	0.024 in (.6 mm)
Valve recession depth - intake	0.063 â€“0.071 in (1.6 â€“1.8 mm)
Valve recession depth - exhaust	0.071 â€“0.079 in (1.8 â€“2 mm)
Valve guide bore diameter	0.277 â€“0.278 in (7.035 â€“7.055 mm)

Valve

Item	Specification
Valve stem diameter - intake	0.2746 â€“0.2754 in (6.975 â€“6.995 mm)
Valve stem diameter - exhaust	0.274 â€“0.275 in (6.97 â€“6.99 mm)
Valve stem-to-guide clearance - intake	0.0016 â€“0.0031 in (.04 â€“.08 mm)
Valve stem-to-guide clearance - exhaust	0.0018 â€“0.0033 in (.045 â€“.085 mm)
Valve head diameter - intake	1.331 in (33.8 mm)
Valve head diameter - exhaust	1.195 in (30.35 mm)
Valve face runout (TIR Max)	0.001 in (.03 mm)
Valve face angle - intake (relative to top of head)	29.5 degrees +/- 0.25 degrees from stem axis
Valve face angle - exhaust (relative to top of head)	44.5 degrees +/- 0.25 degrees from stem axis

Valve Springs

Item	Specification
Valve spring free length - reference	2.020 in (51.3 mm)
Valve spring solid height - maximum	0.906 in (23 mm)
Valve spring compression pressure - installed	1.338 in @ 96.6 +/- 4.9 lbf (34.0 mm @ 430 +/- 22 N)
Valve spring compression pressure - valve open	0.964 in @ 153.3 +/- 6.9 lbf (24.5 mm @ 682 +/- 31 N)
Valve spring installed height - reference	1.319 â€“1.358 in (33.5 â€“34.5 mm)

Crankshaft

Item	Specification
Main bearing journal diameter - standard size	3.188 â€“3.189 in (80.977 â€“80.997 mm)
Main bearing journal diameter - 0.25 mm (0.009 in) undersize	3.178 â€“3.179 in (80.733 â€“80.753 mm)
Main bearing journal maximum taper	0.0003 in (.008 mm)

Item	Specification
Main bearing journal maximum out-of-round	0.0002 in (.005 mm)
Main bearing assembly clearance	0.001 $\pm$ 0.003 in (.03 $\pm$.086 mm)
Connecting rod journal diameter - standard size	2.834 $\pm$ 2.835 in (71.983 $\pm$ 72.003 mm)
Connecting rod journal diameter - 0.25 mm (0.009 in) undersize	2.824 $\pm$ 2.825 in (71.733 $\pm$ 71.753 mm)
Connecting rod journal maximum taper	0.0003 in (.008 mm)
Connecting rod journal maximum out-of-round	0.0002 in (.005 mm)
Crankshaft end play	0.004 $\pm$ 0.012 in (.1 $\pm$.31 mm)

Rings

Item	Specification
Piston ring end gap - top compression	0.010 $\pm$ 0.016 in (.25 $\pm$.4 mm)
Piston ring end gap - lower compression	0.035 $\pm$ 0.043 in (.9 $\pm$ 1.1 mm)
Piston ring end gap - oil control	0.006 $\pm$ 0.014 in (.15 $\pm$.35 mm)
Top piston ring groove width (measured over 2.4 mm (0.094 in) gauge pins) - upper limit	3.819 $\pm$ 3.841 in (96.995 $\pm$ 97.555 mm)
Piston ring-to-groove clearance - lower	0.001 $\pm$ 0.003 in (.03 $\pm$.07 mm)
Piston ring-to-groove clearance $\pm$ oil control ring	0.003 $\pm$ 0.004 in (.07 $\pm$.09 mm)

Hydraulic lash adjuster

Item	Specification
Diameter	1.173 $\pm$ 1.174 in (29.797 $\pm$ 29.812 mm)
Clearance to bore	0.001 $\pm$ 0.003 in (.019 $\pm$.072 mm)
Collapsed lash adjuster gap - at valve tip	0.028 $\pm$ 0.118 in (.7 $\pm$ 3 mm)

Camshaft

Item	Specification
Gear backlash - camshaft gear to fuel injection pump	0.001 $\pm$ 0.007 in (.02 $\pm$.19 mm)
Gear backlash - camshaft gear to crankshaft gear	0.001 $\pm$ 0.006 in (.023 $\pm$.154 mm)
Lobe lift - intake	0.2240 in (5.69 mm)
Lobe lift - exhaust	0.232 in (5.9 mm)
Allowable lobe lift loss	0.002 in (.05 mm)
Journal diameter	2.361 $\pm$ 2.362 in (59.97 $\pm$ 59.998 mm)
Camshaft journal bearing inside diameter	2.364 $\pm$ 2.365 in (60.0375 $\pm$ 60.0625 mm)
Camshaft journal-to-bearing clearance	0.001 $\pm$ 0.003 in (.025 $\pm$.075 mm)
Runout (TIR center journals relative to end journals, Max)	0.002 in (.06 mm)
End play	0.003 $\pm$ 0.007 in (.07 $\pm$.17 mm)

Connecting Rod

Item	Specification
Connecting rod-to-pin clearance	0.0009 $\pm$ 0.0017 in (.024 $\pm$.042 mm)
Connecting rod pin bore diameter	1.182 $\pm$ 1.183 in (30.024 $\pm$ 30.036 mm)
Connecting rod length (center-to-center)	7.660 in $\pm$ 0.004 in (194.57 mm $\pm$ 0.125 mm)
Connecting rod maximum allowed bend	0.0008 in (.02 mm)
Connecting rod maximum allowed twist	0.002 in (.04 mm)
Connecting rod bearing bore diameter	2.834 $\pm$ 0.0004 in (71.993 $\pm$ 0.01 mm)
Connecting rod bearing-to-crankshaft clearance	0.002 $\pm$ 0.004 in (.044 $\pm$.096 mm)
Connecting rod side clearance	0.005 $\pm$ 0.019 in (.125 $\pm$.475 mm)

Miscellaneous

Item	Specification
Exhaust manifold warpage - maximum allowable clearance (cold)	0.08 mm (0.003 in) over any individual surface, 0.15 mm (0.005 in) over any 2 consecutive surfaces, 0.25 mm (0.009 in) over 4 surfaces
Upper intake manifold warpage - free state	0.118 in (3 mm)
Upper intake manifold warpage - clamped	0.020 in (.5 mm)
Vibration damper face runout (Max)	0.010 in (.25 mm)
Vibration damper rubber bulging (Max)	0.098 in (2.5 mm)
Push rod runout (Max)	0.002 in (.05 mm)
Piston height above crankcase deck (protrusion)	0.017 $\pm$ 0.024 in (.42 $\pm$.62 mm)
CKP sensor air gap - minimum	0.008 in (.2 mm)
CKP sensor air gap - nominal	0.045 in (1.15 mm)
CKP sensor air gap - maximum	0.083 in (2.1 mm)
CMP sensor air gap - minimum	0.016 in (.4 mm)
CMP sensor air gap - nominal	0.047 in (1.2 mm)
CMP sensor air gap - maximum	0.079 in (2 mm)
Trigger wheel runout - maximum	0.014 in (.35 mm)
Fuel injection pump drive gear backlash	0.001 $\pm$ 0.007 in (.02 $\pm$.19 mm)
Oil pump drive gear backlash	0.001 $\pm$ 0.007 in (.02 $\pm$.19 mm)
Rocker arm ration (all positions)	1.5:1