

SECTION 303-01C: Engine — 7.3L Diesel 2000 F-Super Duty/Excursion/Motorhome Chassis Workshop Manual
SPECIFICATIONS

Procedure revision date: 09/30/2002

Engine Specifications

Bore and Stroke	Firing Order	Oil Pressure, Normal Operating Temperature @ 3,300 rpm kPa (PSI)	Engine Type and Number of Cylinders	Compression Ratio
4.11 in x 4.18 in	1-2-7-3-4- 5-6-8	276-482 kPa (40-70)	O.H.V. V-8	17.5 to 1

Drive Belt Tension

Tensioning Method	Belt Tension
Automatic	378 N (85 Lbs.) Min

Cylinder Head

Valve Guide Bore Diameter		Valve Seat Width		Valve Seat Runout TIR — Maximum	Valve Arrangement Front to Rear	Gasket Surface Flatness	Deck to Deck Dimension
Intake	Exhaust	Intake	Exhaust				
0.3141 in- 0.3151 in ^a	0.3141 in- 0.3151 in ^a	1.651-2.413 mm (0.065 in- 0.095 in) ^b	1.651-2.413 mm (0.065 in- 0.095 in) ^b	0.05 mm (0.002 in)	LH I-E-I-E-I-E-I-E RH E-I-E-I-E-I-E-I	0.025 mm (0.001 in) in Any 2 in 0.10 mm (0.004 in) Overall	129.41- 129.67 mm (5.095 in- 5.105 in)

^a Maximum 0.3180 in.

^b Valve seat angle — intake 30° and exhaust 37.5°.

Rocker Arm Shaft, Push Rods and Valve Tappets

Type	Push Rod Runout TIR Maximum	Valve Tappet or Lifter			Collapsed Tappet Gap (Clearance)
		Standard Diameter	Clearance to Bore	Hydraulic Lifter Leak-Down Rate	
Hydraulic Roller Follower	0.5 mm Max. (0.02 in)	23.391- 23.411 mm (0.9209 in- 0.9217 in)	0.027- 0.086 mm (0.0011 in- 0.0034 in) ^a	18-90 Sec. for 3.17 mm (0.125 in) Travel ^b	4.69 mm (0.185 in) Max. ^c

^a Service limit — 0.005.

^b Time required for plunger to move 0.125 in. under load of 50 lbs. with test fluid at room temperature.

^c Measured at valve tip to rocker arm.

Valve Springs

--	--	--	--	--

Valve Spring Compression Pressure Lbs. @ Specified Height		Valve Spring Free Length (Approximate)		Valve Spring Assembled Height		Valve Spring Out of Square — Maximum
Intake	Exhaust	Intake	Exhaust	Intake	Exhaust	
32-35 kg @ 46.55 mm (71-79 lbs. @ 1.833 in) 102-112 kg @ 34.35 mm (225-249 lbs. @ 1.352 in)	32-35 kg @ 46.55 mm (71-79 lbs. @ 1.833 in) 102-112 kg @ 34.35 mm (225-249 lbs. @ 1.352 in)	52.70 mm ± 3.8 mm (2.075 in ± 0.150 in)	52.70 mm ± 3.8 mm (2.075 in ± 0.150 in)	44.881 mm (1.767 in)	46.558 mm (1.833 in)	1.981 mm (0.078 in)

Valves

Valve Stem-to-Guide Clearance (Max.)		Valve Face Angle		Valve Face Runout — TIR Maximum
Intake	Exhaust	Intake	Exhaust	
0.140 mm (0.0055 in) ^a	0.140 mm (0.0055 in) ^a	30 Degrees	37.5 Degrees	0.050 mm (0.002 in)

^a Service clearance — .0055.

Valves (Continued)

Minimum Valve Face Margin — Intake Valves	Minimum Valve Face Margin — Exhaust Valves	Valve Stem Diameter	Valve Head Recession Relative to Deck Surface	
			Intake	Exhaust
1.67 mm (0.066 in)	1.37 mm (0.054 in)	7.921-7.939 mm (0.31185-0.31255 in)	1.17-1.47 mm (0.046-0.058 in)	1.32-1.63 mm (0.052-0.064 in)

Camshaft

End Play	Camshaft Journal to Bearing Clearance	Intake — Lobe Lift	Exhaust — Lobe Lift	Camshaft Thrust Plate Thickness	
				Thrust Area	Outside of Thrust Area
0.051-0.203 mm (0.002-0.008 in)	0.051-0.165 mm (0.002-0.006 in)	6.44 mm (0.2535 in) Max.	6.43 mm (0.2531 in) Max.	3.910-3.961 mm (0.154-0.156 in)	3.784-3.987 mm (0.149-0.157 in)

Camshaft Drive

Camshaft Bearing Inside Diameter					Camshaft Front Bearing Location	Gear Backlash
No. 1	No. 2	No. 3	No. 4	No. 5		
53.39-	53.39-	53.39-	53.39-	53.39-	0.020-0.050 Inch ^b	0.140-0.256 mm

53.48 mm (2.102- 2.105 in) a	53.48 mm (2.102- 2.105 in)	53.48 mm (2.102- 2.105 in)	53.48 mm (2.102- 2.105 in)	53.48 mm (2.102- 2.105 in)	(0.0055-0.0101 in)
--	-------------------------------------	-------------------------------------	-------------------------------------	-------------------------------------	-----------------------

^a All camshaft journals are 53.31-53.34 mm (2.099-2.100 in).

^b Distance in inches that front edge of the bearing is installed below the front face of the cylinder block.

Cylinder Block

Cylinder Bore Diameter	Main Bearing Inside Diameter	Head Gasket Surface Flatness	Bore Size
Standard ^a	84.206-84.231 mm (3.3152-3.3162 in) ^b	0.001 in Any 6 in 0.004 in Overall	104.384-104.402 mm (4.1096-4.1103 in)
0.010 Oversize	84.206-84.231 mm (3.3152-3.3162 in)	0.001 in Any 6 in 0.004 in Overall	104.502 mm (4.11425 in)
0.020 Oversize	84.206-84.231 mm (3.3152-3.3162 in)	0.001 in Any 6 in 0.004 in Overall	104.756 mm (4.12425 in)
0.030 Oversize	84.206-84.231 mm (3.3152-3.3162 in)	0.001 in Any 6 in 0.004 in Overall	105.010 mm (4.13425 in)

^a Maximum out-of-round — 0.051 mm (0.002 in); maximum taper — 0.076 mm (0.003 in).

^b With bearing caps tightened in place.

Crankshaft and Flywheel

Crankshaft Diameter	Main Bearing Journal Diameter	Main Bearing Journal Out-of-Round Maximum	Main Bearing Thrust Face Runout TIR Maximum	Main Bearing Journal Taper Maximum per Inch	Thrust Bearing Journal Width	Main and Rod Bearing Journal Finish RMS Maximum	Main Bearing Thrust Face Finish RMS Maximum
Standard	79.139- 79.340 mm (3.1228- 3.1236 in)	0.0056 mm (0.00022 in)	0.025 mm (0.001 in)	0.0038 mm (0.00015 in)	31.509- 31.585 mm (1.2405- 1.2435 in)	10	20
0.010 Undersize	79.065- 79.085 mm (3.1128- 3.1136 in)	0.0056 mm (0.00022 in)	0.025 mm (0.001 in)	0.0038 mm (0.00015 in)	31.509- 31.585 mm (1.2405- 1.2435 in)	10	20
0.020 Undersize	78.811- 78.831 mm (3.1028- 3.1036 in)	0.0056 mm (0.00022 in)	0.025 mm (0.001 in)	0.0038 mm (0.00015 in)	31.509- 31.585 mm (1.2405- 1.2435 in)	10	20
0.030 Undersize	78.557- 78.577	0.0056 mm (0.00022 in)	0.025 mm (0.001 in)	0.0038 mm (0.00015 in)	31.509- 31.585	10	20

	mm (3.0928- 3.0936 in)				mm (1.2405- 1.2435 in)	
--	------------------------------	--	--	--	---------------------------------	--

Crankshaft and Flywheel (Continued)

Crankshaft Diameter	Connecting Rod Journal Diameter	Connecting Rod Journal Taper per Inch Maximum	Crankshaft End Play	Flywheel and Ring Gear Runout	Flywheel and Ring Gear Concentricity
Standard	63.45-63.47 mm (2.4980-2.4990 in) ^a	0.0066 mm (0.00026 in)	0.063-0.216 mm (0.0025-0.0085 in) ^b	0.203 mm (0.008 in)	0.203 mm (0.008 in)
0.010 Undersize	63.20-63.22 mm (2.488-2.489 in)	0.0066 mm (0.00026 in)	0.063-0.216 mm (0.0025-0.0085 in)	0.203 mm (0.008 in)	0.203 mm (0.008 in)
0.020 Undersize	62.94-62.96 mm (2.478-2.479 in)	0.0066 mm (0.00026 in)	0.063-0.216 mm (0.0025-0.0085 in)	0.203 mm (0.008 in)	0.203 mm (0.008 in)
0.030 Undersize	62.69-62.71 mm (2.468-2.469 in)	0.0066 mm (0.00026 in)	0.063-0.216 mm (0.0025-0.0085 in)	0.203 mm (0.008 in)	0.203 mm (0.008 in)

^a Maximum out-of-round — 0.0056 mm (0.00022 in).

^b Service limit — 0.51 mm (0.020 in).

Crankshaft Bearings

Connecting Rod Bearing to Crankshaft Clearance	Main Bearing to Crankshaft Clearance
0.038-0.114 mm (0.0015-0.0045 in)	0.046-0.117 mm (0.0018-0.0046 in)

Connecting Rod

Rod Bearing I.D.	Rod Length Center to Center	Connecting Rod Alignment Maximum Total Difference		Rod to Crankshaft Assembled Side Clearance
		Twist/Inch	Bend/Inch	
63.513-63.564 mm (2.5005-2.5025 in) ^a , ^b	181.10 mm (7.130 in)	0.05 mm (0.002 in)	0.025 mm (0.001 in)	0.30-0.61 mm (0.012-0.024 in)

^a Connecting rod bearing bore maximum out-of-round — 0.0005 and maximum bore taper — 0.0005.

^b With bearing caps tightened in place.

Connecting Rod (Continued)

Engine	Piston Pin Bushing I.D.	Crankpin Bearing Bore Diameter	Bearing Bore	
			Max. Out-of-Round	Max. Taper per Inch
7.3L	33.23-33.25 mm (1.308-1.309 in)	68.339-68.364 mm (2.6905 in-2.6915 in)	0.013 mm (0.0005 in)	0.013 mm (0.0005 in)

Piston

Available Pistons	Skirt Diameter ^{a b}	Piston Pin Bore Diameter	Piston Height Above Crankcase
Standard	104.26065 mm (4.10475 in)	33.235-33.248 mm (1.3085-1.3088 in)	0.254-0.787 mm (0.010-0.031 in)
0.010 in Oversize	104.51465 mm (4.11475 in)	33.235-33.248 mm (1.3085-1.3088 in)	0.254-0.787 mm (0.010-0.031 in)
0.020 in Oversize	104.76865 mm (4.12475 in)	33.235-33.248 mm (1.3085-1.3088 in)	0.254-0.787 mm (0.010-0.031 in)
0.030 in Oversize	105.02265 mm (4.13475 in)	33.235-33.248 mm (1.3085-1.3088 in)	0.254-0.787 mm (0.010-0.031 in)

^a Service piston specifications are all +/- 0.00635 mm (0.00025 in).

^b Measured at 90° to the pin, at 42.77 mm (1.684 in) below the oil ring groove at room temperature.

Piston Pin

Length	Diameter	To Piston Pin Bore Clearance	To Connecting Rod Bushing Clearance
75.9-76.2 mm (2.99-3.00 in)	33.220-33.226 mm (1.3079-1.3081 in)	0.007-0.018 mm (0.0003-0.0007 in) ^a	0.010-0.023 mm (0.0004-0.0009 in)

^a Selective fit.

Piston Rings

Ring Side Clearance (Second Ring Only)	Ring Gap			Oversize
	Compression		Oil	
	Top	Second		
—	0.35-0.61 mm (0.014-0.024 in)	1.57-1.83 mm (0.062-0.072 in)	0.30-0.61 mm (0.012-0.024 in)	0.010 in 4.120 in
0.05-0.10 mm (0.002-0.004 in)	0.35-0.61 mm (0.014-0.024 in)	1.57-1.83 mm (0.062-0.072 in)	0.30-0.61 mm (0.012-0.024 in)	0.020 in 4.130 in
0.05-0.10 mm (0.002-0.004 in)	0.35-0.61 mm (0.014-0.024 in)	1.57-1.83 mm (0.062-0.072 in)	0.30-0.61 mm (0.012-0.024 in)	0.030 in 4.140 in

Exhaust Manifold

Maximum Allowable Warpage	Maximum Allowable Removal of Material
0.13 mm (0.005 in) Between Ports 0.25 mm (0.010 in) Total	0.25 mm (0.010 in)

Drive Gear Backlash

mm	Inch
0.035-0.038	0.0012-0.0015

Oil Pump, Oil Cooler and Oil Capacity

Engine at Normal Operating Temperature		Engine Oil Capacity		Oil Pump Drive Gear Radial Clearance	Oil Pump Drive Gear End Clearance
Oil Pump Pressures		Liters	U.S. Qts.		
Curb Idle	3,300 rpm				
69 kPa (10 psi)	276-482 kPa (40-70 psi)	12.3	13.0 ^a	0.71-0.81 mm (0.028-0.032 in)	0.02-0.08 mm (0.001-0.003 in)

^a Add 2 U.S. quarts (1.9 liters) when installing a new oil filter. Install a new FL-1995 filter.

General Specifications

Item	Specification
Oils and Lubricants	
Ford Engine Assembly Lubricant D9AZ-19579-D	ESR-M99C80-A
Heavy Truck PAG Oil F4HZ-19577-A	WST-M1C231-B2
High Temperature Nickel Anti-Seize Lubricant F6AZ-9L494-AA	ESE-M12A4-A
Multi-Purpose Grease D0AZ-19584-AA	ESB-M1C93-B
Rust Penetrant and Inhibitor F2AZ-19A501-A	ESR-M99C56-A
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A	ESE-M1C171-A
Sealers and Adhesives	
Perfect Seal Sealing Compound F2AZ-19554-AA	ESR-M18P2-A and ESE-M4G115-A
Pipe Sealant with Teflon D8AZ-19554-A	ESR-M18P7-A
RTV Silicone Sealant F5TZ-19G204-AB	NAVSTR D15-5012 Type II

Threadlock® and Sealer
EOAZ-19554-AA

WSK-M2G351-A5

Torque Specifications

Description	Nm	lb-ft	lb-in
A/C manifold and tube retaining bolt	20	15	—
Air brake ABS module bracket assembly mounting nuts	20	15	—
Air cleaner housing mounting bolts	30	22	—
Air cleaner support bracket mounting nuts	28	21	—
Air compressor bracket mounting bolts	78	58	—
Air compressor mounting bolts	68	50	—
Air compressor mounting nuts	78	58	—
Belt tensioner mounting bolt	43	32	—
Camshaft position (CMP) sensor mounting bolt	24	18	—
Camshaft thrust plate retaining bolts	24	18	—
Connecting rod cap nuts	a	—	—
Cooling fan	101	74	—
Crankshaft rear oil seal retaining bolts	20	15	—
Crankshaft vibration dampener bolt	258	212	—
Cylinder head bolt	a	—	—
Drive gear access cover retaining bolts	27	20	—
Engine front cover bolts	20	15	—
Engine rear cover bolts	20	15	—
Exhaust bracket to engine support bracket mounting bolts	50	37	—
Exhaust manifold mounting pipe nuts and bolts	61	45	—
Engine support bracket mounting bolts	103	76	—
Front stabilizer bar mounting nuts	133	98	—
Front support bracket to engine mounting bolts	103	76	—
Front support bracket to number two crossmember mounting nuts	225	166	—
Fuel return hose	26	19	—
Fuel supply hose	50	37	—
Flexplate mounting bolt (automatic transmission)	121	89	—
Flywheel mounting bolt (manual transmission)	121	89	—
Flywheel housing mounting bolts	20	15	—
Generator and A/C compressor mounting bracket mounting bolts	49	36	—
High-pressure oil line connector (cylinder head)	26	19	—

High-pressure oil pump drive gear mounting bolt	129	95	—
High-pressure oil pump mounting bolts	24	18	—
High-pressure oil pump reservoir mounting bolts	24	18	—
Idler pulley mounting bolt	55	41	—
Intake manifold cover mounting bolts	24	18	—
Main bearing cap bolts	a	—	—
Muffler assembly mounting nuts	50	37	—
Number two crossmember mounting bolts	90	66	—
Oil cooler retaining bolts	24	18	—
Oil level indicator tube adapter nut	33	24	—
Oil pan mounting bolts	24	18	—
Oil pump body plate bolts	20	15	—
Oil pump screen cover and tube flange bolts	24	18	—
Oil pump screen cover and tube retaining nut	52	38	—
Parking brake cable bracket mounting bolt (automatic transmission)	28	21	—
Parking brake cable clamp mounting bolts (manual transmission)	28	21	—
Power steering pressure hose	33	24	—
Power steering pump mounting nuts	55	41	—
Rear bracket to frame mounting nuts	250	184	—
Rear support cap mounting nuts	144	106	—
Rocker arm pedestal attaching bolts	27	20	—
Slave cylinder lock nut	33	24	—
Slave cylinder interlock bracket mounting bolts	59	44	—
Starter motor mounting bolts	52	38	—
Transmission oil cooler hoses	28	21	—
Transmission shift lever housing mounting bolts	54	40	—
Turbocharger exhaust inlet pipe-to-exhaust manifold bolts	28	21	—
Turbocharger mounting bolts	24	18	—
Turbocharger pedestal assembly mounting bolts	24	18	—
Valve cover retaining bolts and nuts	11	8	—
Grade 5 UNC Fasteners			
1/4-inch	9	—	80
5/16-inch	20	15	—
Grade 5 UNF Fasteners			
1/4-inch	12	9	—
5/16-inch	23	17	—
Grade 8 UNC Fasteners			

3/8-inch	55	41	—
7/16-inch	90	66	—
1/2-inch	130	96	—
9/16-inch	190	140	—
5/18-inch	255	188	—
3/4-inch	460	339	—
7/8-inch	745	550	—
Grade 8 UNF Fasteners			
3/8-inch	60	44	—
7/16-inch	95	70	—
1/2-inch	150	111	—
9/16-inch	210	155	—
5/18-inch	290	214	—
3/4-inch	515	380	—
7/8-inch	825	616	—
Class 9.8 Metric Fasteners			
M4	3	—	27
M5	7	—	62
M6	11	8	—
M8	27	20	—
M10	52	38	—
M12	78	58	—
M14	125	92	—
M16	193	142	—
Class 10.9 Metric Fasteners			
M6	14	10	—
M8	35	26	—
M10	68	50	—
M12	100	74	—
M14	160	118	—
M16	248	183	—
M20	483	357	—
M24	835	618	—
Pipe Threads			
1/8x27	9	—	80
1/4x18	20	15	—
3/8x18	37	27	—
1/2x14	40	30	—

^a Refer to the procedure in this section.

