

PART 8 SPECIFICATIONS

	Engine Model Year	
	1984 to 1988	1989-
General Specifications		
VSG-411	4 Cylinder — 1.1 Liter	
VSG-413	4 Cylinder — 1.3 Liter	
Bore and Stroke		
1.1L	73.96 and 64.98 mm	68.68 and 75.48 mm
1.3L	73.96 and 75.48 mm	
Firing Order	1-2-4-3	
Idle Speed	750-850 rpm	700-800 rpm
Rated Engine Speed — Maximum	Full Load 2800 rpm	
	No Load 3050 rpm	
Cylinder Block		
Number of Main Bearings	1.1L-3, 1.3L-5	
Cylinder Bore Diameter		
1.1L	73.94-73.98 mm	68.68-68.710 mm
1.3L	73.94-73.98 mm	73.94-73.97 mm
Out-of-Round Maximum	0.038 mm	
Wear Limit	0.127 mm	
Taper Maximum	0.0254 mm	
Wear Limit	0.254 mm	
Main Bearing Bore — Standard	60.623-60.636 mm	
	Oversize 61.003-61.016 mm	
Camshaft Bearing Bore	42.888-42.918 mm	
	Oversize 43.396-43.420 mm	
Cylinder Block Liner Bore Diameter		
1.1L	77.086-77.112 mm	71.826-71.852 mm
1.3L	77.086-77.112 mm	
Deck Height (Oil Pan Rail to Head Deck)		
1.1L	183.62 +0.00/-0.13	194.6 ± 0.065 mm
1.3L	205.84 ± 0.065 mm	194.6 ± 0.065 mm
⌀ of Crankshaft Above Oil Pan Rail 1.1L & 1.3L	2.578 ± 0.115 mm	
Crankshaft		
Main Bearing Journal Dia. 1.1L		
Standard	56.99-57.00 mm	
Yellow	56.98-56.99 mm	
Main Bearing Journal Dia. 1.3L		
Standard	56.980-57.000 mm	
Yellow	—	
Main Bearing Clearance 1.1L	0.009-0.046 mm	
Main Bearing Clearance 1.3L	0.009-0.056 mm	
Rod Bearing Journal Dia. 1.1L		
Standard	42.99-43.01	
Green	42.74-42.76 mm	
Rod Bearing Journal Dia. 1.3L		
Standard	40.99-41.01 mm	
Green	40.74-40.76 mm	

All specifications are in millimeters.

For Conversion Factors see page 8-05.

PART 8 SPECIFICATIONS (Cont.)

	Engine Model Year	
	1984 to 1988	1989-
Crankshaft (Continued)		
Rod Bearing Clearance 1.1L and 1.3L	0.006-0.060 mm	
End Play 1.1L and 1.3L	0.075-0.285 mm	
Camshaft		
Journal Diameter 1.1 and 1.3L	39.615-39.636 mm	
Bearing I.D. 1.1 and 1.3L	39.662-39.713 mm	
Bearing Clearance (Standard Bearing) 1.1 and 1.3L	0.0254-0.058 mm	0.026-0.067 mm
Wear Limit	0.0762 mm	
Camshaft Thrust Plate Thickness 1.1L and 1.3L	4.457-4.508 mm	
End Play	0.02-0.19 mm	
Cam Lift 1.1L		
Intake	5.30 mm	5.15 mm
Exhaust	5.30 mm	4.92 mm
Camshaft Lift 1.3L		
Intake	5.30 mm	5.70 mm
Exhaust	5.30 mm	5.76 mm
Drive 1.1 and 1.3L	Chain	
Connecting Rod		
Piston Pin Bore 1.1L	20.589-20.609 mm	
Rod Bearing Bore 1.1L	46.685-46.705 mm	
Piston Pin Bore 1.3L	17.99-18.01 mm	
Rod Bearing Bore 1.3L	43.99-44.01 mm	
Maximum Twist or Bend	0.10 mm	
End Play 1.1 and 1.3L	0.10-0.25 mm	
Piston		
Diameter 1.1L	73.930-73.955 mm	68.71-68.72 mm
Diameter 1.3L	73.930-73.995 mm	
Piston to Bore Clearance	0.015-0.050 mm	
Piston Pin		
Diameter 1.1L	20.622-20.625 mm	18.026-18.029 mm
Diameter 1.3L	20.622-20.625 mm	18.026-18.029 mm
Length 1.1L	54.6-55.4 mm	58.6-59.4 mm
Length 1.3L	63.0-63.8 mm	63.6-64.4 mm
Interference Fit in Rod at 21°C 1.1 and 1.3L	0.013-0.045 mm	0.013-0.048 mm
Clearance in Piston at 21°C 1.1 and 1.3L	0.005-0.011 mm	0.008-0.014 mm
Piston Rings		
Top Compression Ring Thickness 1.1 and 1.3L	1.578-1.590 mm	1.503-1.505 mm
Bottom Compression Ring Thickness 1.1 and 1.3L	1.978-1.990 mm	1.75 mm $\left(\begin{array}{l} -.010 \text{ mm} \\ -.022 \text{ mm} \end{array} \right)$
Top Compression Ring Side Clearance 1.1 and 1.3L	.043-.080 mm	.013-.027 mm
Bottom Compression Ring Side Clearance 1.1 and 1.3L	.035-.076 mm	.005-.042 mm
Compression Ring Side Clearance — Wear Limit	0.15 mm	
Oil Ring Thickness 1.1 and 1.3L	3.955-3.980 mm	3.0 mm $\left(\begin{array}{l} -.010 \text{ mm} \\ -.022 \text{ mm} \end{array} \right)$

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PART 8 SPECIFICATIONS (Cont.)

	Engine Model Year	
	1984 to 1988	1989-
Piston Rings (Continued)		
Oil Ring Side Clearance 1.1 and 1.3L	.023-.073 mm	0-.032 mm
Top Compression Ring — Standard Bore — Ring Gap ^{b/}	0.25-0.45 mm	
Bottom Compression Ring — Standard Bore — Ring Gap ^{b/}	0.25-0.45 mm	
Oil Ring — Standard Bore — Ring Gap ^{b/}	0.20-0.40 mm	
Cylinder Head		
Maximum permissible cylinder head distortion 1.1 and 1.3L: Measured over a distance of 26 mm	0.04 mm	
Measured over a distance of 152 mm	0.08 mm	
Measured over the entire length	0.15 mm	
Valve Stem Bore 1.1 and 1.3L	7.907-7.938 mm	7.063-7.094 mm
Valve Seat Angle	45°	
Valve Seat Insert Exhaust Diameter (Standard Size) 1.1L and 1.3L ^{c/}	31.500 mm (+0.015 and -0 mm)	
1.1 and 1.3L Valve Seat Insert Intake Diameter ^{c/} Standard	Not Available	1.1L 34.00 mm ^{e/} 1.3L 36.500 mm ^{e/}
Service Repair Exhaust Insert Only ^{c/} 1.1 and 1.3L	31.900-31.915 mm	Not Available
Combustion Chamber Volume 1.1	25.55-27.55 cc	27.24-29.24 cc
Combustion Chamber Volume 1.3	27.00-29.00 cc	31.79-33.79 cc
Reface cylinder head mating surface: The following minimum combustion chamber depth must be left after skimming — 1.1/1.3	9.67 mm	14.4 mm
Valve Mechanism		
Lash Intake — Cold	0.22 mm	
Exhaust — Cold	0.59 mm	0.32 mm
Stem Diameter Intake	7.868-7.886 mm	7.025-7.043 mm
Exhaust	7.846-7.864 mm	6.999-7.017 mm
Stem to Guide Clearance Intake	0.021-0.070 mm	0.021-0.690 mm
Exhaust	0.043-0.092 mm	0.043-0.091 mm
Length Intake	105.45-106.45 mm	103.70-104.40 mm
Exhaust	106.04-107.04 mm	104.02-104.72 mm
Head Diameter Intake 1.1L	32.89-33.15 mm	32.90-33.10 mm
Exhaust 1.1L	29.01-29.27 mm	28.90-29.10 mm
Head Diameter Intake 1.3L	38.02-38.28 mm	34.40-34.60 mm
Exhaust 1.3L	29.01-29.27 mm	28.90-29.10 mm
Seat Angle 1.1 and 1.3L	44.0°-44.5°	

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^{b/}Ring Gap may exceed these specifications by 0.15 mm when measurement is made in the block.

^{c/}Insert must be chilled in liquid nitrogen or dry ice prior to assembly.

^{e/}+0.015 mm

- -0.000 mm

PART 8 SPECIFICATIONS (Cont.)

	Engine Model Year	
	1984 to 1988	1989-
Valve Mechanism (Continued)		
Spring Free Length 1.1L, Intake/Exhaust	41.2 mm	41.0 mm
Spring Free Length 1.3L, Intake/Exhaust	42.4 mm	41.0 mm
Spring Assembled Height (Pad to Retainer)	32.08 mm	33.216 mm
Spring Load at Assembled Height	230 newtons	270 newtons
Tappet Diameter	13.081-13.094 mm	
Block Bore	13.110-13.143 mm	
Clearance to Block	0.016-0.062 mm	
Rocker Shaft — Diameter	15.82-15.85 mm	
Rocker Bore	15.875-15.913 mm	
Shaft Clearance in Rocker	0.02-0.09 mm	
Lubrication		
Oil Type — Motorcraft Super Engine Oil, API SG	ESE M2C-153-E	
Oil Capacity With Filter (FL 400)	3.25 Liters (3.5 qts.)	
Without Filter	2.75 Liters (2.9 qts.)	
Oil Pressure — Hot at 2000 rpm (minimum)	1.5 Bars	
Relief Valve Opens	2.41-2.96 Bars	
Oil Pump Outer Rotor to Housing Clearance	0.14-0.26 mm	
Inner to Outer Rotor Gap	0.051-0.127 mm	
End Play — Rotors to Pump Cover	0.025-0.06 mm	
Ignition System		
Firing Order	1-2-4-3	
Distributor Rotation	Counterclockwise	N/A
Initial Timing (with 89 Octane Regular Gasoline) 1.1 and 1.3L	6°BTDC	N/A
DIS ^d (with 87 Octane Unleaded Gasoline) 1.1 and 1.3L	N/A	Fixed
Spark Plugs — AGSF 22C Gap	0.75 mm	1.0 mm
Breaker Type		
Distributor Point Gap	0.40-0.50 mm	N/A
Dwell Angle	48°-52°	N/A
Dwell Variation	Max. 4°	N/A
Coil Primary Resistance (Ohms)	1.20-1.40 (75°F)	N/A
Secondary Resistance (Ohms)	5.000-9.000 (75°F)	N/A
Primary External Resistor (Ohms)	1.50	N/A
Condenser — (Micro Farads)	0.21-0.25	N/A
Solid State Type		
Coil, Ignition Primary Resistance (Ohms)	0.72-0.88	N/A
Secondary Resistance (Ohms)	4500-7000	N/A
Coil, Trigger — Resistance (Ohms)	1000-1200	N/A
Wire, Spark Plug Leads — Resistance Max. per Lead	3000 Ohms	N/A

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For Conversion Factors see page 8-05.

^dDistributorless Ignition System

PART 8 SPECIFICATIONS (Cont.)

	Engine Model Year	
	1984 to 1988	1989-
Distributorless Type		
Coil Type	N/A	High Output DIS Coil
Coil Output	N/A	37.0 KV Minimum
Primary Resistance (at the Coil Tower)	N/A	0.50-1.00 Ohm
High Tension Leads	N/A	30,000 Ohms Max. per Lead
Belt Tension		
Alternator		
New	79-101 lbs.	
Used-Reset (Minimum)	56-75 lbs.	
Governor		
New	75 lbs.	
Used-Reset (Minimum)	50 lbs.	
Fuel System		
1.1 and 1.3L Regular 1984-1985	89 Octane	—
1.1 and 1.3L Unleaded 1986-	—	87 Octane
Pump Delivery Pressure	0.24-0.38 Bar (3.5-5.5 PSI)	
Starter — Current Draw		
Normal Engine Cranking	175 amps	
Maximum Load — at Stall	410 amps	
No Load	35 to 55 amps	

All specifications are in millimeters.

DISTRIBUTOR ADVANCE CHARACTERISTICS

All figures quoted below are spark advance in degrees crankshaft and do not include initial advance setting.

Advance at 2000 rpm (Engine Speed with No Load)	Mechanical	Vacuum	Total
(84/89) 1.1 Liter	3.0° to 9.0°	12.0° to 21.0°	15.0° to 30.0°
(84/89) 1.3 Liter	5.0° to 9.0°	14.0° to 20.0°	19.0° to 29.0°

SPECIAL SERVICE TOOLS

21-007 Installer — Valve Stem Seal — Intake
 21-046 Installer — Crankshaft Seal — Front-Timing Cover
 21-059A Installer — Rear Crankshaft Seal
 21-096 Remover — Crankshaft Oil Seals
 T81P-6513-A Valve Spring Compressor
 Call Owatonna Tool Company
 1-800-533-5338
 Ask for Ford Order Desk

CONVERSION FACTORS

Bars x 14.5 = Pounds per Square Inch
 Cubic Centimeter x 0.155 = Cubic Inches
 Foot/Lbs x 1.3558 = Newton/Meter (Torque)
 Inches x 25.4 = Millimeter
 Kilogram x 2.2046 = Pounds per Square Inch

Liter x 61.024 = Cubic Inches
 Liter x 1.0567 = Quarts
 Millimeter x 0.03937 = Inches
 Newton x 0.2248 = Pounds (Force)
 Newton/Meter x 0.7336 = Ft/Lbs (Torque)

TORQUE SPECIFICATIONS

Item	1984 to 1988		1989-	
	Nm	Ft-Lb	Nm	Ft-Lb
Main Bearing Cap	88 to 102	64-75	88-102	64-75
Connecting Rod Bolts	29 to 36	21-27	①	
Rear Oil Seal Carrier	16 to 20	12-15	16 to 20	12-15
Flywheel	64 to 70	47-52	64 to 70	47-52
Clutch Pressure Plate, 165 mm Dia. 1.1 and 1.3L	9 to 11	6.6-8.1	24 to 35	17.6-25.7
190 mm Dia. 1.1 and 1.3L	16 to 20	11.7-14.7	24 to 35	17.6-25.7
All After 87 M.Y.	24 to 35	17.6-25.7	24 to 35	17.6-25.7
Chain Tensioner	24 to 25	17-18	24 to 25	17-18
Camshaft Thrust Plate	7 to 9	5-7	7 to 9	5-7
Camshaft Sprocket	16 to 20	12-15	16 to 20	12-15
Timing Cover	7 to 10	5-7.5	7 to 10	5-7.5
Water Pump	7 to 10	5-7.5	7 to 10	5-7.5
Crankshaft Pulley 1.1 and 1.3L 84/88 M.Y.	100 to 115	74-85		
Crankshaft Pulley 1.1 and 1.3L 89/M.Y.			100 to 115	74-85
Water Pump Pulley	8.5 to 10.6	6.3-7.8	100-120	73.4-88
Starter Motor	35 to 45	26-33	35 to 45	26-33
Fuel Pump	16 to 20	12-15	16 to 20	12-15
Distributor Retaining Bolt	7 to 10	5-7.5	7 to 10	5-7.5
Distributor Clamp Bolt	3 to 4	2-2.5	3 to 4	2-2.5
Oil Pump	16 to 20	12-15	16 to 20	12-15
Oil Pump Cover	8 to 12	6-9	8 to 12	6-9
Oil Pump Pickup Tube Bracket	20 to 25	15-18	20 to 25	15-18
Oil Pan — Step 1 Alphabetical	6 to 8	5-6	6 to 8	5-6
— Step 2 Numerical	8 to 11	6-8	8 to 11	6-8
— Step 3 Alphabetical	8 to 11	6-8	8 to 11	6-8
Retorque after engine has warmed up (15 minutes at 1000 rpm)				
Oil Pan Plug	21 to 28	15-20	21 to 28	15-20
Oil Pressure Switch	13 to 15	10-11	13 to 15	10-11
Temperature Sender	4 to 8	3-6	4 to 8	3-6
Rocker Shaft Pedestals	40 to 46	30-34	40 to 46	30-34
Cylinder Head Bolts — Step 1	10 to 15	7.5-11	STEP 1-30	22
— Step 2	40 to 50	30-37	STEP 2-Turn	90° More
— Step 3	80 to 90	60-66	STEP 3-Turn	90° More
— Step 4 (after 10 to 20 mins)	100 to 110	74-81		
Rocker Cover	4 to 5	3-4	4 to 5	3-4
Exhaust Manifold	21 to 25	15-18	21 to 25	15-18
Inlet Manifold	16 to 20	12-15	16 to 20	12-15
Carburetor	17 to 21	12.5-15	17 to 21	12.5-15
Thermostat Housing	17 to 21	12.5-15	17 to 21	12.5-15
Spark Plugs	15 to 20	11-15	15 to 20	11-15

① Step One Torque to 4NM, Step Two Turn 90° more.