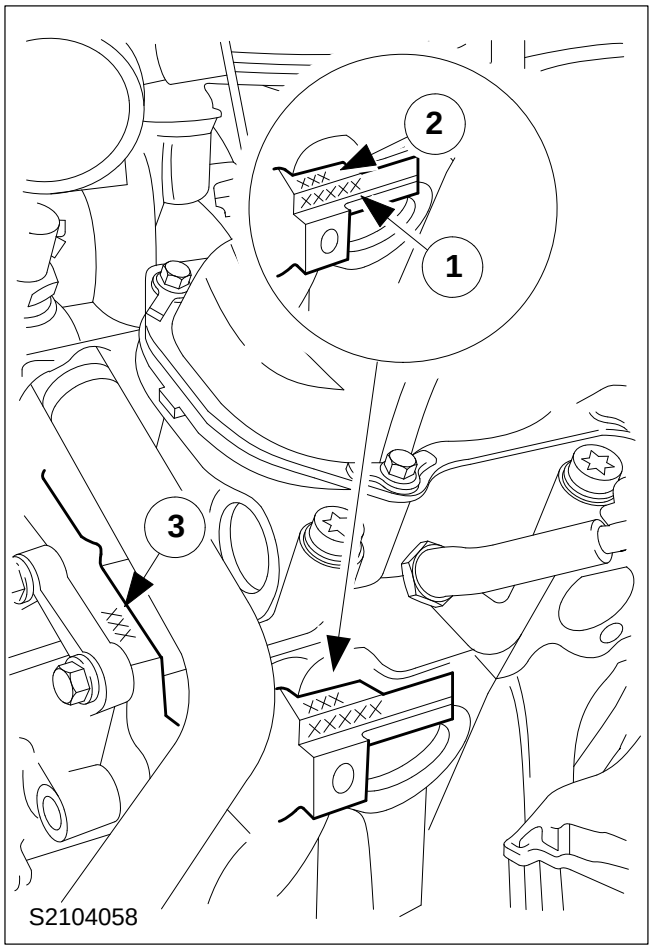
General Specifications

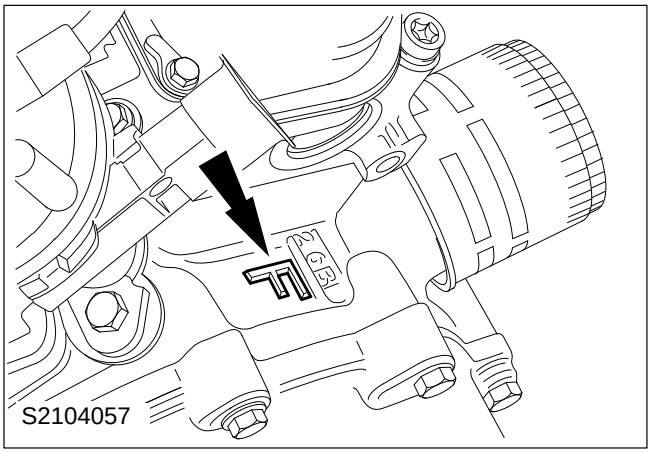
Engine Data

General		
Emission standard		93EEC
Identification code		BRG
Firing order		1-4-2-5-3-6
Bore		93,03
Stroke	mm	71,99
Cubic capacity	cc	2936
Compression ratio		9,0 : 1
Power output (EEC)	kW	107
	PS	145
	at rev/min	5500
Torque (EEC)	Nm	168
	at rev/min	2500
Max. permissible engine speed	Continuous rev/min	5800
	Intermittent rev/min	5800
Spark plugs		AGRF 32C1



Engine identification code

1. Engine serial number
2. Engine code
3. Build date
   - 1st number: Year (e.g. 4 = 1994, 6 = 1996)
   - Letter: Month (A = January to M = December)
   - 2nd number: Day (1 to 31)



Cast mark

– The cast mark is located in the proximity of cylinder no. 3.
– “F” = 2,9 V6 12V engine

Dimensions

Cylinder block		
Cast mark		F
Cylinder bore diameter, standard class 1	mm	93,010 – 93,020
Cylinder bore diameter, standard class 2	mm	93,020 – 93,030
Cylinder bore diameter, standard class 3	mm	93,030 – 93,040
Cylinder bore diameter, standard class 4	mm	93,040 – 93,050
Cylinder bore diameter, oversize class A	mm	93,520 – 93,530
Cylinder bore diameter, oversize class B	mm	93,530 – 93,540
Cylinder bore diameter, oversize class C	mm	93,540 – 93,550
Cylinder bore diameter, service standard	mm	93,040 – 93,050
Cylinder bore diameter, oversize 0,5	mm	93,540 – 93,550
Cylinder bore diameter, oversize 1,0	mm	94,040 – 94,050
Fitted main bearing shells, vertical diameter, standard	mm	57,008 – 57,042
Fitted main bearing shells, vertical diameter, undersize 0,254	mm	56,754 – 56,788
Centre main bearing width	mm	22,610 – 22,660
Number of main bearings		4
Main bearing parent bore diameter, standard	mm	60,620 – 60,634
Main bearing parent bore diameter, oversize 0,38	mm	61,000 – 61,014
Camshaft bearing parent bore diameter, front	mm	47,025 – 47,060
Camshaft bearing parent bore diameter (without bearing bushes), middle 1	mm	46,645 – 46,680
Camshaft bearing parent bore diameter, middle 2	mm	46,265 – 46,300
Camshaft bearing parent bore diameter, rear	mm	45,885 – 45,920

Dimensions

Crankshaft		
Main bearing journal diameter, standard	mm	56,980 – 57,000
Main bearing journal diameter, undersize 0,254	mm	56,726 – 56,746
Main bearing journal to shell clearance	mm	0,008 – 0,056
Centre main bearing shoulder width, standard	mm	26,390 – 26,440
Centre main bearing shoulder width, oversize 0,38	mm	26,771 – 26,821

Flanged bearing shell width, standard	mm	26,190 – 26,260
Flanged bearing shell width, oversize 0,38	mm	26,570 – 26,640
End float	mm	0,080 – 0,240
Big-end bearing journal diameter, standard	mm	53,980 – 54,000
Big-end bearing journal diameter, undersize 0,254	mm	53,726 – 53,746
Big-end bearing journal to shell clearance	mm	0,006 – 0,064

Dimensions

Pistons		
Piston diameter, standard 1	mm	92,972 – 92,982
Piston diameter, standard 2	mm	92,982 – 92,992
Piston diameter, standard 3	mm	92,992 – 93,002
Piston diameter, standard 4	mm	93,002 – 93,012
Piston diameter, service standard	mm	93,000 – 93,020
Piston diameter, service oversize 0,5	mm	93,500 – 93,520
Piston diameter, service oversize 1,0	mm	94,000 – 94,020
Piston clearance in bore (unused)	mm	0,028 – 0,048
Piston ring gaps (fitted), top	mm	0,030 – 0,050
Piston ring gaps (fitted), middle	mm	0,030 – 0,050
bottom		0,400 – 1,400
Ring gap position, top (from the expander ring gap)		150˚
Ring gap position, middle		150˚ from the expander ring gap (opposite the top compression ring)
Lower oil control ring, top intermediate ring		25 mm from the expander ring gap
Expander		opposite the marked side of the piston
Lower intermediate ring		25 mm from the expander ring gap (opposite the top intermediate ring)

Dimensions

Piston Pins		
Pin diameter, red	mm	23,994 – 23,997
Pin diameter, blue	mm	23,997 – 24,000
Clearance in piston	mm	0,005 – 0,011
Interference fit in small-end bore	mm	0,018 – 0,042

Dimensions

Connecting rods		
Bore diameter (without bearing shells), big end	mm	56,820 – 56,840
Bore diameter (without bearing shells), small end	mm	23,958 – 23,976
Fitted big-end bearing shells, vertical inside diameter, standard	mm	54,006 – 54,046
Fitted big-end bearing shells, vertical inside diameter, oversize	mm	53,752 – 53,792

Dimensions

Cylinder head		
Cast mark		K
Upper correction angle (production), inlet/exhaust		75˚ / 65˚
Service correction cutter		75˚ / -
Lower correction angle (production), inlet		18˚
Service correction cutter		15˚
Stem bore (inlet and exhaust valve), standard	mm	8,063 – 8,088
Stem bore (inlet and exhaust valve), oversize 0,2	mm	8,263 – 8,288
Stem bore (inlet and exhaust valve), oversize 0,4	mm	8,463 – 8,488
Stem bore (inlet and exhaust valve), oversize 0,6	mm	8,663 – 8,688
Stem bore (inlet and exhaust valve), oversize 0,8	mm	8,863 – 8,888

Dimensions

Camshaft		
Drive		Single roller chain 3/8’’
Valve timing, inlet opens BTDC		30˚
Valve timing, inlet closes ABDC		66˚
Valve timing, exhaust opens BBDC		76˚
Valve timing, exhaust closes ATDC		20˚
Cam lift, inlet	mm	6,54
Cam lift, exhaust	mm	6,54
Cam length (between heel and toe), inlet	mm	36,215 – 36,405
Cam length (between heel and toe), exhaust	mm	36,215 – 36,405
Thickness of camshaft thrust plate	mm	4,020 – 4,050
Camshaft end float	mm	0,065 – 0,165
Number of camshaft bearings		4
Bearing diameter – camshaft bearing journal, front	mm	43,903 – 43,923
Bearing diameter – camshaft bearing journal, middle 1	mm	43,522 – 43,542
Bearing diameter – camshaft bearing journal, middle 2	mm	43,141 – 43,161
Bearing diameter – camshaft bearing journal, rear	mm	42,760 – 42,780
Bearing bush inside diameter, front	mm	43,948 – 43,968
Bearing bush inside diameter, middle 1	mm	43,567 – 43,587
Bearing bush inside diameter, middle 2	mm	43,186 – 43,206
Bearing bush inside diameter, rear	mm	24,805 – 42,825

Dimensions

Valves		
Valve tappet diameter	mm	22,200 – 22,212
Tappet clearance in housing	mm fitted mm	0,023 – 0,060
Free valve spring height	mm	53
Spring force, valve open	N	800 – 867
Spring force, valve closed	N	417 – 467

Dimensions

Inlet valve		
Valve head diameter	mm not fitted mm	41,85 – 42,24
Valve length	mm	104,65 – 105,35
Valve stem diameter, standard	mm	8,025 – 8,043
Valve stem diameter, oversize 0,2	mm	8,225 – 8,243
Valve stem diameter, oversize 0,4	mm	8,425 – 8,443
Valve stem diameter, oversize 0,6	mm	8,625 – 8,643
Valve stem diameter, oversize 0,8	mm	8,825 – 8,843
Valve stem clearance in guide	mm	0,020 – 0,063
Valve lift, at zero valve clearance	mm	9,54
Viton oil control ring		Part No. 86 TM 6571 AB

Dimensions

Exhaust valve		
Valve head diameter	mm	35,83 – 36,21
Valve length	mm	104,60 – 105,60
Valve stem diameter, standard	mm	7,999 – 8,017
Valve stem diameter, oversize 0,2	mm	8,199 – 8,217
Valve stem diameter, oversize 0,4	mm	8,399 – 8,417
Valve stem diameter, oversize 0,6	mm	8,599 – 8,617
Valve stem diameter, oversize 0,8	mm	8,799 – 8,817
Valve stem clearance in guide	mm	0,046 – 0,089
Valve lift at zero valve clearance	mm	9,54
Viton oil control ring		Part No. 86 TM 6571 AB

Dimensions

Oil pump		
Rotor/housing clearance	mm	0,154 – 0,304
Inner/outer rotor clearance	mm	0,050 – 0,200
Rotor end float at mating face	mm	0,035 – 0,100

Lubricants, Adhesives and Sealers

Description	Ford Specification
Sealer for vibration damper bolt, joint between the cylinder head ventilation plenum and the cylinder block, cylinder head cover flange mating faces	SPM-2G-3121-A
Sealer, crankshaft main bearing caps to the cylinder block, sump to cylinder block, coolant pump and timing cover to cylinder block (Loctite 518)	ESKM-4G-269-A
Sealer for contact faces of the cylinder block and cylinder heads and the inlet manifold flange (Wellseal)	SPM-4G-9112-F
Spark plug thread lubricant (Never Seez)	ESE-M1244-A
High-temperature grease for torque converter guide bore	ESDM-1C220-A

Motor oil

Ambient temperature	Designation	Specification
-20 to over 40 ˚C	Ford Multigrade Super Motor Oil	SAE 10W30 API/SH/CD EC
If engine oils of other brands are used, it is imperative to ensure that these conform to API SH/CD or better in the particular viscosity class.		

Capacity

Description	Litres
Engine oil, initial fill	4,8
Oil change excl. filter	4,0
Oil change, incl. filter	4,25

Torques

General	Nm	lbf.ft.
Engine hood hinges	23	17
Wiring loom bracket to fender apron panel	10	7

Torques

Inlet Manifold	Nm	lbf.ft
Inlet manifold, stage 1	6	4
Inlet manifold, stage 2	12	9
Inlet manifold, stage 3	18	13
Inlet manifold, stage 4	23	17
after a 15 min. warm-up at 1000 rev/min Stage 5	23	17
Fuel rail to inlet manifold	12	9
Intake air temperature (IAT) sensor.	15	11
Inlet air plenum chamber to inlet manifold	9	7

Torques

Exhaust manifold	Nm	lbf.ft
Exhaust manifold to cylinder head	28	21
Heat shield to exhaust manifold	9	7
Exhaust pipe to exhaust manifold	47	35
Exhaust pipe to catalytic converter	45	33

Torques

Alternator	Nm	lbf.ft
Alternator bracket	25	18
Alternator to bracket	25	18

Torques

Transmission	Nm	lbf.ft
Flange bolts (all)	44	32
Torque converter to drive plate	44	32
Starter motor to transmission	44	32

Torques

Air conditioning system	Nm	lbf.ft
Belt tensioner for drive belt of air conditioning compressor	41	30
Air conditioning compressor to cylinder block	44	32

Torques

Coolant circuit	Nm	lbf.ft
Coolant pump	9	7
Belt pulley to coolant pump	25	18
Thermostat housing/bypass connector	10	7
Engine coolant temperature (ECT) sensor	15	11
Coolant temperature sender unit	6	4
Coolant drain plug	23	17

Torques

Steering	Nm	lbf.ft
Power steering pump to bracket	25	18
Power steering pump pulley	25	18
Intermediate shaft to steering shaft	18	13

Torques

Oil circuit	Nm	lbf.ft
Oil intake pipe to oil pump	11	8
Oil pump to cylinder block	19	14
Oil pump cover	11	8
Sump, stage 1	5	4
Sump, stage 2	8	6

Torques

Oil baffle	19	14
Oil drain plug	25	18
Oil pressure switch	27	20
Oil filter	15	11
Bracket – oil dipstick tube	44	32

Torques

Front axle	**Nm**	**lbf.ft**
Transverse brace to front axle	80	59
Front axle to side member	80	59
Suspension arm to spindle carrier	83	61
Link rod to stabiliser bar	47	35
Track rod to spindle carrier	63	46
Lower engine mounting to crossmember	50	37

Torques

Cylinder block	**Nm**	**lbf.ft**
Camshaft sprocket	64	47
Camshaft thrust plate	11	8
Chain guide to cylinder block	11	8
Timing chain tensioner to cylinder block	10	7
Vibration damper bolt to crankshaft, stage 1	45	33
Vibration damper bolt to crankshaft, stage 2	85˚	85˚
Timing cover to cylinder block	19	14
Main bearing caps	97	72
Big-end bearing caps (connecting rods and big-end bearing bolts, identification codes 6AA and KX 110 respectively)	30	22
Big-end bearing caps (connecting rods and big-end bearing bolts, identification codes 5AB and KX 900 respectively), stage 1	20	15
Big-end bearing caps, stage 2	90˚	90˚
Spark plugs	32	24
Distributor retaining plate	19	14
Flywheel pressure plate to crankshaft, stage 1	30	22
Flywheel pressure plate to crankshaft, stage 2	85˚	85˚
Clutch pressure plate to flywheel	23	17
Bracket with engine mounting bracket to cylinder block	50	37

Torques

Cylinder Head	**Nm**	**lbf.ft**
Thermostat housing/bypass connector	10	7
Cylinder head (internal Torx bolts), stage 1	38	28
Cylinder head (internal Torx bolts), stage 2	73	54
Cylinder head (internal Torx bolts), stage 3	90˚	90˚
Cylinder head cover	7	5

Torques

Rocker shaft, stage 1	32	24
Rocker shaft, stage 2	90˚	90˚
Exhaust manifold to cylinder head	28	21
Heat shield to exhaust manifold	9	7