

General Specifications

Engine Data

Description		Litres
Engine management		EEC V/SFI
Emission standard		96 EEC
Engine code		NSD
Firing order		1 - 3 - 4 - 2
Bore	mm	86,0
Stroke	mm	86,0
Cubic capacity	cm ³	1998
Compression ratio		9,8 : 1
Power output (EEC)	kW	85
Power output (EEC)	PS	115
Power output (EEC), at	1/min	5500
Torque (EEC)	Nm	167
Torque (EEC), at	1/min	2500
Idle speed	1/min	875
Maximum permissible engine speed, continuous	1/min	5950
Maximum permissible engine speed, intermittent	1/min	6175

Dimensions

Cylinder block		
Cast mark		20
Cylinder bore \varnothing , standard class 1	mm	86,000 - 86,010
Cylinder bore \varnothing , standard class 2	mm	86,010 - 86,020
Cylinder bore \varnothing , oversize 0,15	mm	86,160 - 86,170
Cylinder bore \varnothing , oversize 0,5	mm	86,500 - 86,510
Number of main bearings		5
Centre main bearing width (excl. thrust half rings)	mm	21,17 - 21,23
Fitted main bearing shells		
Vertical inside \varnothing , service standard (yellow)	mm	54,983 - 55,020
Vertical inside \varnothing , standard	mm	55,003 - 55,030
Vertical inside \varnothing , 1st undersize 0,05	mm	54,953 - 54,980
Vertical inside \varnothing , 2nd undersize 0,25	mm	54,753 - 54,780
Vertical inside \varnothing , 3rd undersize 0,50	mm	55,503 - 54,530
Main bearing parent bore \varnothing , standard	mm	59,287 - 59,300
Main bearing parent bore \varnothing , oversize 0,40 (black)	mm	59,687 - 59,700
Crankshaft		
End float	mm	0,093 - 0,303
Main bearing journal \varnothing , standard (yellow)	mm	54,98 - 54,99
Main bearing journal \varnothing , (red)	mm	54,99 - 55,00
Main bearing journal \varnothing , undersize 0,25 (green)	mm	54,73 - 54,75
Main bearing journal to shell clearance	mm	0,011 - 0,048
Big-end bearing journal \varnothing , standard	mm	50,89 - 50,91
Big-end bearing journal \varnothing , undersize 0,25 (green)	mm	50,64 - 50,66
Thrust half washer thickness, standard	mm	2,301 - 2,351
Thrust half washer thickness, oversize 0,38 (yellow)	mm	2,491 - 2,541
Width of centre main bearing journal, standard	mm	26,025 - 26,075
Width of centre main bearing journal, oversize 0,38 (yellow)	mm	26,405 - 26,455
Connecting rod		
Bore \varnothing , big-end	mm	53,890 - 53,910
Bore \varnothing , small end	mm	20,589 - 20,609
Fitted big-end bearing shells		
Vertical inside \varnothing , standard mm	mm	50,916 - 50,950
Vertical inside \varnothing , 1st undersize (0,25 mm)	mm	50,666 - 50,700
Vertical inside \varnothing , 2nd undersize (0,50 mm)	mm	50,416 - 50,150
Big-end bearing journal to shell clearance	mm	0,006 - 0,060
Big-end bearing end float	mm	0,09 - 0,31
Camshafts		
Number of camshaft bearings		2 x 5
Drive		Single roller chain, hydraulic chain tensioner
Camshaft end float	mm	0,02 - 0,26
Cam lift, inlet	mm	10,83
Cam lift, exhaust	mm	10,83

Dimensions

Cam length (between heel and toe), inlet	mm	52,71 - 52,94
Cam length (between heel and toe), exhaust	mm	52,71 - 52,94
Inlet valve opens before TDC	°	9
Inlet valve closes after BDC	°	51
Exhaust valve opens before BDC	°	51
Exhaust valve closes after TDC	°	9
Camshaft bearing journal \varnothing	mm	25,96 - 25,98
Bearing inside diameter	mm	26,00 - 26,03
Pistons		
Uncoated piston \varnothing (unused), service standard	mm	85,970 - 85,990
Uncoated piston \varnothing (unused), oversize 0,15	mm	86,120 - 86,140
Uncoated piston \varnothing (unused), oversize 0,50	mm	86,460 - 86,480
Piston clearance in bore (unused, uncoated piston), production	mm	0,03 - 0,05
Piston clearance in bore (unused, uncoated piston), service	mm	0,02 - 0,05
Coated piston \varnothing (unused), service standard	mm	85,990 - 86,030
Coated piston \varnothing (unused), oversize 0,15	mm	86,140 - 86,180
Coated piston \varnothing (unused), oversize 0,50	mm	86,480 - 86,520
Piston clearance in bore (unused, coated piston), production	mm	0,01 - 0,03
Piston clearance in bore (unused, coated piston), service	mm	0,02 - 0,03
Piston pin length	mm	63,4
Piston pin \varnothing , white	mm	20,622 - 20,625
Piston pin \varnothing , red	mm	20,625 - 20,628
Piston pin \varnothing , blue	mm	20,628 - 20,631
Clearance in piston (colour match)	mm	0,008 - 0,014
Interference fit in small end bore	mm	0,016 - 0,042
Piston ring gaps (fitted), top	mm	0,30 - 0,60
Piston ring gaps (fitted), middle	mm	0,50 - 0,80
Piston ring gaps (fitted), oil control ring (three part)	mm	0,40 - 1,50
Ring gap positions		Piston ring gaps should be distributed evenly around the piston circumference; this also applies to the gaps of the intermediate oil control rings in relation to the expander gap.
Valves		
Valve timing		DOHC
Valve clearances		Hydraulic tappets
Hydraulic tappet \varnothing	mm	42
Hydraulic tappet clearance in housing	mm	0,025 - 0,080
Valve length, inlet	mm	108,24 - 108,70
Valve length, exhaust	mm	108,68 - 109,20
Valve head \varnothing , inlet	mm	42,5 - 42,7
Valve head \varnothing , exhaust	mm	37,9 - 38,1
Valve stem \varnothing , standard (inlet)	mm	7,025 - 7,043

Dimensions

Valve stem \varnothing , standard (exhaust)	mm	6,999 - 7,017
Valve stem \varnothing , oversize 0,2 (inlet)	mm	7,255 - 7,243
Valve stem \varnothing , oversize 0,2 (exhaust)	mm	7,199 - 7,217
Valve stem \varnothing , oversize 0,4 (inlet)	mm	7,425 - 7,443
Valve stem \varnothing , oversize 0,4 (exhaust)	mm	7,399 - 7,417
Valve stem \varnothing , oversize 0,6 (inlet)	mm	7,625 - 7,643
Valve stem \varnothing , oversize 0,6 (exhaust)	mm	7,599 - 7,617
Valve stem \varnothing , oversize 0,8 (inlet)	mm	7,825 - 7,843
Valve stem \varnothing , oversize 0,8 (exhaust)	mm	7,799 - 7,817
Valve stem clearance in guide, inlet	mm	0,020 - 0,069
Valve stem clearance in guide, exhaust	mm	0,046 - 0,095
Colour code, outer spring		Green/Blue
Colour code, inner spring		Green/Blue
Free valve spring height, outer spring	mm	48,2
Free valve spring height, inner spring	mm	49,2
Valve spring inner \varnothing , outer spring	mm	24
Valve spring inner \varnothing , inner spring	mm	17,5
Valve spring wire (oval profile), outer spring	mm	4,1 x 4,95
Valve spring wire \varnothing , inner spring	mm	2,6
Number of turns, outer spring		6,83
Number of turns, inner spring		8,82
Lubrication		
Oil pressure at 875 rev/min (with SAE 10W/30 oil at a temperature of 80 °C)	bar	1,60
Oil pressure at 2000 rev/min (with SAE 10W/30 oil at a temperature of 80 °C)	bar	3,10
Pressure relief valve opens at	bar	3,70 - 4,60
Oil pressure warning light comes on at	bar	0,30 - 0,50
Oil pump rotor/housing clearance	mm	0,154 - 0,304
Inner/outer rotor clearance	mm	0,05 - 0,20
Rotor end float at mating face	mm	0,014 - 0,079
Cylinder head with valve seat inserts		
Cast mark		20
Upper correction angle (production), inlet/exhaust	°	25
Lower correction angle (production), inlet/exhaust	°	60
Valve seat angle	°	44,5 - 45
Valve seat width, inlet	mm	1,33 - 2,19
Valve seat width, exhaust	mm	1,68 - 2,54
Stem bore (inlet/exhaust valve), standard	mm	7,063 - 7,094
Camshaft bearing parent bore \varnothing (all)	mm	26,00 - 26,03

Shims for the sump

Range of adjustment	Available shims	Colour coding
0 to 0,25 mm	No adjustment	
0,26 to 0,29 mm	0,15 mm	Silver

0,30 to 0,44 mm	0,30 mm	Pale blue
0,45 to 0,59 mm	0,45 mm	Red
0,60 to 0,75 mm	0,60 mm	Black

Lubricants, Adhesives and Sealers

Description	Ford Specification
Transmission fluid	ESD-M2C186-A
Coolant	ESD-M97B49-A
Sealer for front oil seal carrier (Loctite 518)	WSK-M2G348-A5
Sealer for sump (Hylosil 502)	WSK-M4G320-A
Sealer for coolant pump angle connector, coolant temperature sender unit, oil pressure switch (Loctite 243)	WSK-M2G349-A7
Lubricant for O-ring of crankshaft position sensor (CKP)	SM1C-115-A
Lubricant for clutch release bearing guide sleeve	ESD-M1C-220-A
Lubricant for transmission input shaft splines	ESD-M1C-220-A
Power steering fluid	SQM-2C-9010-A
Thread-locking compound (Loctite 270)	SDM-M4G9107-A
Spark plug thread ("Never Seez")	ESE-M1244-A
Thread-locking compound, power steering pump to bracket (Loctite 270)	SDM-M4G9107-A

Capacity

Description	Litres
Engine oil, initial fill including filter	5,1
Engine oil, oil change with filter change	4,25
Engine oil, oil change without filter change	4,00
Coolant	7,9

Engine oil

Ambient temperature	Designation	Specification
-10 to over 40°C	Ford Multigrade Super Engine Oil	SAE 20W50 API/SG/CD
-15 to over 40°C		SAE 15W40 API/SH/CD
-20 to over 40°C		SAE 10W30 API/SH/CD EC
-20 to over 40°C	XR+ High-performance High-lubricity Engine Oil	SAE 10W40 API/SH/CD EC
-30 to over 40°C	Ford Formula S Synthetic Engine Oil	SAE 5W50 API/SG/CD
	Synthetic/Semi-synthetic Engine Oil	SAE 5W40 API/SH/CD EC
40 to below -30°C	Ford Multigrade Super Engine Oil	SAE 5W30 API/SG/CD
The engine oil to specification SAE 5W30 API/SG/CD has only been approved for use in northern European territories		
If engine oils of other brands are used, it is imperative to ensure that these conform to API SG/CD or better in the particular viscosity class.		

Torques

	Nm	lbf.ft
General		
Hose clips	4	3
Engine undershields to front crossmember	19	14
Rear axle reinforcing bar	49	36
Front axle reinforcing bar	80	59
Front axle to side members	80	59
Exhaust		
Exhaust system heat shield to cylinder head	7	5
Exhaust mounting to transmission	44	32
Exhaust mounting to transmission crossmember	47	35
Exhaust bracket to engine	47	35
Catalyst to exhaust manifold	47	35
Inlet manifold		
Studs (coated with microcapsules)	14	10
Inlet manifold nuts	23	17
Throttle housing	10	7
Idle air control (IAC) valve	10	7
Exhaust manifold		
Studs (coated with microcapsules)	17	13
Exhaust manifold nuts	23	17
Exhaust gas recirculation (EGR) valve	10	7
Transmission		
Earth lead to transmission	44	32
Starter motor	44	32
Engine/transmission flange bolts	44	32
Bolt - adaptor plate to transmission	11	8
Driveshaft to rear axle	66	49
Driveshaft centre bearing to floor assembly	21	15
Driveshaft to vibration damper	78	58
Oil dipstick tube	10	7
Transmission crossmember to floor assembly	36	27
Transmission crossmember to transmission	62	46
Air conditioning system		
Compressor to cylinder block	25	18
Coolant circuit		
Coolant pump	23	17
Coolant temperature gauge sender unit	6	4
Thermostat housing	10	7
Engine coolant temperature (ECT) sensor	12	9
Angle connector to water pump	14	10
Water pump blanking plug	16	12
Blanking cover for rear coolant outlet	20	15
Steering		

Torques

Intermediate shaft to steering shaft	18	13
Power steering pump to bracket	23	17
Power steering pump pulley	25	18
Engine mounting		
Engine mounting nuts	50	37
Oil circuit		
Oil drain plug	25	18
Oil pressure switch	27	20
Oil filter mounting	21	15
Oil filter	14	10
Oil cooler	60	44
Oil baffle to cylinder block	21	15
Oil pump	12	9
Oil intake pipe to cylinder block	13	10
Sump to cylinder block (studs and nuts)	12	9
Power steering		
Power steering pump to bracket	25	18
Cylinder block		
Lower timing chain cover	10	7
Rear oil seal housing	13	10
Front oil seal housing	26	19
Crankshaft position/speed sensor	4	3
Timing chain guide rail, M6	12	9
Timing chain guide rail, M8	26	19
Crankcase breather	9	7
Main bearing caps	97	72
Big-end bearing caps, stage 1	7	5
Big-end bearing caps, stage 2	16	12
Big-end bearing caps, stage 3	90°	90°
Crankshaft vibration damper, stage 1	52	38
Crankshaft vibration damper, stage 2	85°	85°
Flywheel	87	64
Clutch pressure plate	24	18
Oil pump chain tensioner arm	12	9
Oil pump sprocket	18	13
Cylinder Head		
Cylinder head, stage 1	40	30
Cylinder head, stage 2	55	41
Cylinder head, stage 3	90°	90°
Cylinder head, stage 4	90°	90°
Cylinder head bolts, stage 1	3	2
Cylinder head bolts, stage 2	9	7
Auxiliary cylinder head bolts (x3)	38	28
Upper timing case cover	11	8

Torques

Fuel rail	24	18
Fuel pressure regulator	10	7
Camshaft bearing caps	24	18
Camshaft sprockets	59	44
Engine lifting eyes	25	18
Studs to cylinder head (x20)	20	15
Blanking plugs	52	38
Blanking cover for rear coolant outlet	20	15
Spark plugs	18	13
Ignition coils	10	7