

General Specifications

Engine Data

General		
Engine management		EEC V/SEFI
Emission standard		96 EEC
Engine code		N3A
Firing order		1-3-4-2
Bore	mm	86,0
Stroke	mm	86,0
Cubic capacity	cc	1998
Compression ratio		9,8:1
Power output (EEC)	kW	100
	(PS)	(136)
	at rev/min	6300
Torque (EEC)	Nm	175
	at rev/min	4200
Idle speed (with manual transmission)	rev/min	875
(with automatic transmission)	rev/min	800
Max. permitted engine speed	Continuous rev/min	6450
	Intermittent rev/min	6675
Spark plugs		AGPR22C1

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
Track main bearing width (excl. thrust half rings), standard,	mm	21,17 – 21,23
Fitted main bearing shells		
Vertical inner \varnothing , service engine standard (yellow)	mm	54,993 – 55,020
Standard	mm	55,003 – 55,030
Vertical inner \varnothing , 1st undersize 0,05	mm	54,953 – 54,980
Vertical inner \varnothing , 2nd undersize 0,25	mm	54,753 – 54,780
Vertical inner \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

Dimensions

Crankshaft		
End float	mm	0,093 – 0,303
Main bearing journal Ø, standard (yellow)	mm	54,98 – 54,99
Main bearing journal Ø, (red)	mm	54,99 – 55,00
Main bearing journal Ø, undersize 0,25 (green)	mm	54,73 – 54,75
Main bearing journal to shell clearance	mm	0,011 – 0,048
Big-end bearing journal Ø, standard	mm	50,89 – 50,91
Big-end bearing journal Ø, undersize 0,25 (green)	mm	50,64 – 50,66
Thrust half ring thickness, standard	mm	2,301 – 2,351
Thrust half ring, over-width 0,38 (yellow)	mm	2,491 – 2,541
Track bearing journal width, standard	mm	26,025 – 26,075
Track bearing journal width, oversize 0,38 (yellow)	mm	26,405 – 26,455

Dimensions

Connecting rods		
Bore Ø, large eye	mm	53,890 – 53,910
Bore Ø, small eye	mm	20,589 – 20,609
Fitted big-end bearing shells		
Vertical inner Ø, standard	mm	50,916 – 50,950
Vertical inner Ø, 1st undersize 0,25	mm	50,666 – 50,700
Vertical inner Ø, 2nd undersize 0,50	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

Dimensions

Camshafts		
Number of camshaft bearings		2 x 5
Drive		Single roller chain, hydraulic chain tensioner
Camshaft end float		0,02 – 0,26
Lift – cam, inlet	mm	9,99
Lift – cam, exhaust	mm	9,16
Cam length (between heel and tip), inlet	mm	51,87 – 52,10
Cam length (between heel and tip), exhaust	mm	51,04 – 51,27
Valve timing, inlet closes before TDC		9°
Valve timing, inlet closes after BDC		59°
Valve timing, exhaust opens before BDC		57°
Valve timing, exhaust closes after TDC		11°
Bearing journal Ø – camshaft	mm	25,96 – 25,98
Bearing inside diameter	mm	26,00 – 26,03

Dimensions

Pistons		
Piston Ø (not run), service engine standard	mm	85,980 – 86,000

Dimensions

Piston Ø (not run), oversize 0,15	mm	86,130 – 86,150
Piston Ø (not run), 0,50	mm	86,470 – 86,490
Piston installation clearance (not run), production	mm	0,02 – 0,04
Piston installation clearance (not run), service engine	mm	0,01 – 0,04
Piston pin length	mm	63,4
Piston pin Ø, white	mm	20,622 – 20,625
Piston pin Ø, red	mm	20,625 – 20,628
Piston pin Ø, blue	mm	20,628 – 20,631
Clearance in piston (colour match)	mm	0,008 – 0,014
Interference fit in small end bore	mm	0,018 – 0,039
Piston ring gap (installed), top	mm	0,30 – 0,60
Piston ring gap (installed), middle	mm	0,50 – 0,80
Piston ring gap (installed), oil ring (three-part)	mm	0,40 – 1,50
Ring gap position (piston ring gaps distributed equally around piston circumference; this also applies to gap of oil intermediate rings in relation to support spring gap.)		

Dimensions

Valves		
Valve timing		DOHC
Valve clearances		Hydraulic tappets
Hydraulic tappet Ø	mm	30
Hydraulic tappet clearance in housing	mm	0,025 – 0,071
Valve length, inlet	mm	111,67 – 112,13
Valve length, exhaust	mm	111,37 – 111,83
Valve head Ø, inlet	mm	33,5
Valve head Ø, exhaust	mm	30
Valve stem Ø standard, inlet	mm	7,025 – 7,043
Valve stem Ø standard, exhaust	mm	6,999 – 7,017
Valve stem Ø oversize 0,2, inlet	mm	7,225 – 7,243
Valve stem Ø oversize 0,2, exhaust	mm	7,199 – 7,217
Valve stem Ø oversize 0,4, inlet	mm	7,425 – 7,443
Valve stem Ø oversize 0,4, exhaust	mm	7,399 – 7,417
Valve stem guide clearance, inlet	mm	0,020 – 0,069
Valve stem guide clearance, exhaust	mm	0,046 – 0,095
Colour code – spring		Red
Free valve spring height	mm	44,8
Inlet and exhaust spring strengths are identical		
Spring strength, valve open	N	635
Spring strength, valve closed	N	210
Spring height (compressed), valve open	mm	28,0
Spring height (compressed), valve closed	mm	38,0
Valve spring inside Ø	mm	17,2
Valve spring wire Ø	mm	3,7
Number of turns		7,4

Dimensions

Lubrication		
Oil pressure (with SAE 10W/30 and 80°C oil temperature) at 800/min	bar	1,60
Oil pressure (with SAE 10W/30 and 80°C oil temperature) at 2000/min	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
Oil pump, inner/outer rotor gap	mm	0,05 – 0,20
Oil pump, sealing surface/rotor axial clearance	mm	0,039 – 0,104

Dimensions

Cylinder head with valve seat inserts*		
Cast mark		20
Upper correction angle (production), inlet/exhaust		15°/20°
Lower correction angle (production), inlet/exhaust		30°/30°
Valve seat angle		45° ± 30'
Valve seat width, inlet	mm	1,17 – 2,02
Valve seat width, exhaust	mm	1,34 – 2,19
Valve guide inner Ø (inlet/exhaust valve), standard	mm	7,063 – 7,094
Camshaft bearing parent bore Ø, (all)	mm	26,00 – 26,03

* The locations of the angles on the valve seat are explained in Description and Operation.

Shims for the sump

Range of adjustment	Available shims	Colour coding
0 0,25 mm	No adjustment	
0,26 0,29 mm	0,15 mm	Silver
0,30 0,44 mm	0,30 mm	Pale blue
0,45 0,59 mm	0,45 mm	red
0,60 0,75 mm	0,60 mm	black

Lubricants, Adhesives and Sealers

Description	Ford Specification
Transmission fluid	ESD-M2C186-A
Coolant	ESD-M97B49-A
Sealing compound, front crankshaft oil seal carrier, Loctite 518	WSK-M2G348-A5
Sealing compound, sump, Hylosil 502	WSK-M4G320-A
Adhesive sealing compound, coolant pump elbow flange, Loctite 243	WSK-M2G349-A7
Adhesive sealing compound, coolant temperature display sender, Loctite 243	WSK-M2G349-A7
Lubricant for O-ring of crankshaft position sensor (CKP) sensor	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 material, Loctite 270	SDM-M4G9107-A

Lubricants, Adhesives and Sealers

Spark plug thread, Never Seez	ESE-M1244-A
Thread locking compound, power steering pump to bracket, Loctite 270	SDM-M4G9107-A

Filling capacity

Description	Litres
Engine oil, first filling with filter	4,6
Engine oil, oil change, with filter change	4,25
Engine oil, oil change, without filter change	4,0
Coolant	7,5

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/SG/CD
-20 to over 40 °C		SAE 10W30 API/SG/CD
-20 to over 40 °C	XR+ High-performance High-lubricity Engine Oil	SAE 10W40 API/SG/CD
-30 to over 40 °C	Ford Formula S Synthetic Engine Oil	SAE 5W50 API/SG/CD
	Synthetic/Semi-synthetic Engine Oil	SAE 5W40 API/SG/CD
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 countries.		
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

General	Nm	lbf.ft
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

Torques

Exhaust gas recirculation (EGR)	Nm	lbf.ft
EGR tube to exhaust manifold	75	56
EGR tube bracket to cylinder head	23	17
Flange on connecting pipe to inlet manifold	23	17

Torques

Exhaust	Nm	lbf.ft
Exhaust system heat shield to cylinder head	7	5
Exhaust mounting to transmission	44	32

Torques

Exhaust mounting to transmission crossmember	47	35
Exhaust mounting to engine	47	35
Exhaust flange bolts	47	35
Catalytic converter to exhaust manifold	47	35
Catalytic converter to bracket	47	35
Catalytic converter heat shield	23	17

Torques

Inlet manifold	Nm	lbf.ft
Inlet manifold bracket	23	17
Studs	14	10
Retaining nuts	22	17
Throttle housing	10	7
Idle speed control (ISC) valve	10	7

Torques

Exhaust manifold	Nm	lbf.ft
Studs	14	10
Retaining nuts	23	17
Exhaust gas recirculation (EGR) valve	10	7

Torques

Alternator	Nm	lbf.ft
Alternator bracket to cylinder block	47	35

Torques

Transmission	Nm	lbf.ft
Earth lead to transmission	44	32
Torque converter to drive plate	47	35
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
Oil line bracket to engine mounting	50	37

Torques

Air Conditioning	Nm	lbf.ft
Air conditioning compressor to cylinder block	25	18
Air conditioning compressor bracket to cylinder block	47	35

Torques

Coolant circuit	Nm	lbf.ft
Water pump	23	17
Coolant temperature display sender	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

Torques

Steering	Nm	lbf.ft
Intermediate shaft to steering shaft	18	13
Power-assisted steering pump to bracket	23	17
Power-assisted steering pump pulley	25	18

Torques

Engine mounting	Nm	lbf.ft
Engine mounting nuts	50	37
Engine mounting bracket to cylinder block	47	35

Torques

Oil circuit	Nm	lbf.ft
Oil drain plug	25	18
Oil pressure switch.	27	20
Oil filter mounting	21	15
Oil filter	15	11
Oil baffle to cylinder block	21	15
Oil pump	12	9
Oil intake pipe to cylinder block	13	10
Sump to cylinder block (studs)	9	7
Sump to cylinder block (nuts and bolts)	11	8

Torques

Power steering	Nm	lbf.ft
Power-assisted steering pump to bracket	23	17
Pulley to power-assisted steering pump	25	18

Torques

Cylinder block	Nm	lbf.ft
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

Torques

Timing chain guide rail M8	26	19
Crankcase ventilation tube bracket	9	7
Main bearing caps	97	72
Big-end bearing cap, 1st stage	7	5
Big-end bearing cap, 2nd stage	16	12
Big-end bearing cap, 3rd stage	90°	90°
Crankshaft oscillation damper, 1st stage	52	38
Crankshaft oscillation damper, 2nd stage	85°	85°
Flywheel	87	64
Oil pump chain tensioner arm	12	9
Oil pump sprocket	18	13
Clutch pressure plate	24	18

Torques

Cylinder head	Nm	lbf.ft
Cylinder head, 1st stage	40	30
Cylinder head, 2nd stage	55	41
Cylinder head, 3rd stage	90°	90°
Cylinder head, 4th stage	90°	90°
Cylinder head cover, 1st stage	3	2
Cylinder head cover, 2nd stage	9	7
Ignition coil covers	5	4
Auxiliary cylinder head bolts (x3)	38	28
Upper timing chain cover	11	8
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
Rear blanking cover for rear coolant outlet	20	15
Spark plugs	18	13