

ENGINE SPECIFICATIONS

GENERAL DESCRIPTION

DESCRIPTION	SPECIFICATION
Displacement 3.0L	3.0L (2987 cc) (182 CID)
Bore	83 mm (3.26 in.)
Stroke	92 mm (3.62)
Compression Ratio	16.5 :1
Valves Per Cylinder	4
Weight	229Kg (505 Lbs.)
Power Output	176 Kw (221 HP) @ 4000 RPM
Torque	540 N·m (398 Ft. Lbs.) @ 1600 RPM
Idle Speed - Warm	650 RPM
Max RPM in Gear	4200
Max RPM in Neutral	4800
Ribbed V-Belt Tension	Automatic Belt Tensioner Roller
Thermostat Opening	88°C (190°F)
Cooling System Capacity	4.6 Liters (4.9 Qt.)
Engine Oil Capacity	9.2L (9.7 Qt.) W/Filter Change
Timing System	Chain Driven Dual Overhead Camshafts
Air Intake	Dry Filter With Turbocharger and Charge Air Cooler
Fuel Supply	Electric Pump In The Fuel Tank
Fuel System	Direct Fuel Injection Common Rail System
Combustion Cycle	4 Stroke Diesel
Cylinder Compression Difference Between Cylinders	5 Bar (73 psi.)
Cooling System	Water Cooling
Engine Pre Heat	Glow Plug
Glow Plug Type	GPL2-4
Glow Plug Voltage	4.4 Volts
Emission Standards	Euro 5

DESCRIPTION	SPECIFICATION
Injector Opening Pressure	230 Bar (3,335 psi)
Injection Pressure	1800 Bar (26,106 psi)
Injection Pump	Bosch CP4.2, 2000 Bar (29008 psi)
Injection Order	1-4-2-5-3-6
Injector Type	CRI 2-18
Lubrication	Pressure Lubricated By Rotary Pump
Oil Pressure 80°C (176°F)	0.7 Bar (10 psi.) at Idle 2.5 Bar (36 psi) at 3800 RPM
Engine Rotation	Clockwise Viewed From Front Cover

CRANKSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Crankshaft Journal Diameter		
Tolerance Class A	67.500 - 67.494 mm	2.6574 - 2.6572 in.
Tolerance Class B	67.494 - 67.488 mm	2.6572 - 2.657 in.
Tolerance Class C	67.488 - 67.482 mm	2.657 - 2.6567 in.
Main Bearing Journal Diameter 1 - 4		
Tolerance Class A	73.958 - 73.952 mm	2.9117 - 2.9114 in.
Tolerance Class B	73.952 - 73.946 mm	2.9114 - 2.9112 in.
Tolerance Class C	73.946 - 73.940 mm	2.9112 - 2.9110 in.
Axial play of crankshaft	0.12 - 0.31 mm	0.004 - 0.0122 in.

CRANKSHAFT BEARINGS

Block Bearing Tolerance Class	Cylinder Block Bearing Diameter		Crankshaft Bearing diameter Tolerance Class	Crankshaft Bearing Diameter		Crankshaft Bearing Tolerance Class	Crankshaft Bearing Shell Thickness	
				mm	in.		mm	in.
A	78.000 - 78.006 mm	3.0708 - 3.0710	A	73.958 - 73.952 mm	2.9117 - 2.9114 in.	Red	1.982	0.0780
						Red	- 1.988	- 0.0782
			B	73.952 - 73.946 mm	2.9114 - 2.9112 in.	Red	1.982	0.0780
						Blue	- 1.988	- 0.0782
						1.988	0.0782	
						- 1.994	- 0.0785	

Block Bearing Tolerance Class	Cylinder Block Bearing Diameter		Crankshaft Bearing diameter Tolerance Class	Crankshaft Bearing Diameter		Crankshaft Bearing Tolerance Class	Crankshaft Bearing Shell Thickness	
			C	73.946 - 73.940mm	2.9112 - 2.9110 in.	Blue Blue	1.988 - 1.994 1.988 - 1.994	0.0782 - 0.0785 0.0782 - 0.0785
B	78.006 - 78.012	3.0710 - 3.0713	A	73.958 - 73.952 mm	2.9117 - 2.9114 in.	Red Blue	1.982 - 1.988 1.988 - 1.994	0.0780 - 0.0782 0.0782 - 0.0785
			B	73.952 - 73.946 mm	2.9114 - 2.9112 in.	Blue Blue	1.988 - 1.994 1.988 - 1.994	0.0782 - 0.0785 0.0782 - 0.0785
			C	73.952 - 73.946 mm	2.9112 - 2.9110 in.	Blue Yellow	1.988 - 1.994 1.994 - 2.000	0.0782 - 0.0785 0.0785 - 0.0787
C	78.012 - 78.018	3.0713 - 3.0715	A	73.958 - 73.952 mm	2.9117 - 2.9114 in.	Blue Blue	1.988 - 1.994 1.988 - 1.994	0.0782 - 0.0785 0.0782 - 0.0785
			B	73.952 - 73.946 mm	2.9114 - 2.9112 in.	Blue Yellow	1.988 - 1.994 1.994 - 2.000	0.0782 - 0.0785 0.0785 - 0.0787
			C	73.952 - 73.946 mm	2.9112 - 2.9110 in.	Yellow Yellow	1.994 - 2.000 1.994 - 2.000	0.0785 - 0.0787 0.0785 - 0.0787

CYLINDER HEAD

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Cylinder Head Height	133 ± 0.06 mm	5.236 ± 0.002 in.
Cylinder Head Flatness deformation Tolerance	0.1 - 0.04 mm	0.003 - 0.001 in.
Valve Seat Width in Cylinder Head		
Exhaust valve	0.7 - 1.1 mm	0.0276 — 0.0434 in.
Intake valve	1.0 - 1.4 mm	0.0394 — 0.0552 in.

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Cylinder Head Bolts		
Thread Diameter	14 x 1.5 mm	NA

HEAD GASKET SELECTION CHART

	Millimeters	Inches
PISTON CLEARANCE	0.130 - 0.220	0.0051 - 0.0086
CYLINDER HEAD GASKET THICKNESS	0.96	0.0377
GASKET IDENTIFICATION	NO HOLE	
PISTON CLEARANCE	0.221 - 0.310	0.0087 - 0.0122
CYLINDER HEAD GASKET THICKNESS	1.06	0.0417
GASKET IDENTIFICATION	ONE HOLE	
PISTON CLEARANCE	0.311 - 0.402	0.0122 - 0.0158
CYLINDER HEAD GASKET THICKNESS	1.16	0.0456
GASKET IDENTIFICATION	TWO HOLES	

CYLINDER BORE

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Cylinder Bore Diameter	82.995 - 83.025 mm	3.267 - 3.268 in.
Roundness Tolerance	0.006 mm	0.0002 in
Honing angle	40 - 60°	40 - 60°

CAMSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Cylinder Head On Right Valve Timing At 2 mm Valve Lift And A New Timing Chain		
Inlet valve opens after TDC	19.6°	19.6°
Inlet valve closes after BDC	5.6°	5.6°

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Outlet valve opens after TDC	17.9°	17.9°
Outlet valve closes after BDC	27.9°	27.9°
Cylinder Head On Right Valve Timing At 2 mm Valve Lift And Used Timing Chain		
Inlet valve opens after TDC	21.5°	21.5°
Inlet valve closes after BDC	3.7°	3.7°
Outlet valve opens after TDC	16.0°	16.0°
Outlet valve closes after BDC	26.0°	26.0°
Cylinder Head On Left Valve Timing At 2 mm Valve Lift And A New Timing Chain		
Inlet valve opens after TDC	20.7°	20.7°
Inlet valve closes after BDC	4.5°	4.5°
Outlet valve opens after TDC	16.8°	16.8°
Outlet valve closes after BDC	26.8°	26.8°
Cylinder Head On Left Valve Timing At 2 mm Valve Lift And Used Timing Chain		
Inlet valve opens after TDC	21.5°	21.5°
Inlet valve closes after BDC	3.7°	3.7°
Outlet valve opens after TDC	16.0°	16.0°
Outlet valve closes after BDC	26.0°	26.0°

VALVES

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Valve Disk Diameter		
Exhaust	25.3 - 25.5 mm	0.9961 — 1.004 in.
Intake	28.4 - 28.6 mm	1.1182 — 1.126 in.
Height Of Valve Disk		
Exhaust	1.4 - 1.6 mm	0.0552 — 0.063 in.
Intake	1.3 - 1.5 mm	0.0512 — 0.0591

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Valve Seat Face Angle		
Exhaust	45° (+ 0.5°)	45° (+ 0.5°)
Intake	45° (+ 0.5°)	45° (+ 0.5°)
Valve Seat Back-cut Angle		
Exhaust	30° (±15')	30° (±15')
Intake	30° (±15')	30° (±15')
Valve Stem Diameter		
Exhaust	5.945 - 5.975 mm	0.2341 — 0.2353 in.
Intake	5.960 - 5.975 mm	0.2347 — 0.2353 in.
Length Of Valve		
Exhaust	102.1 - 102.5 mm	4.0197 — 4.0355 in.
Intake	102.1 - 102.5 mm	4.0197 — 4.0355 in.

PISTONS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Piston Diameter		
Tolerance Class A	82.930 - 82.940 mm	3.2649 — 3.2653 in.
Tolerance Class B	82.940 - 82.950 mm	3.2653 — 3.2657 in.
Tolerance Class C	82.950 - 82.960 mm	3.2657 — 3.2661 in.

PISTON RINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
No 1 Piston Ring		
Height	2 -0.01 / -0.03 mm	-0.000 — -0.001 in.
Gap	0.32 — 0.45 mm	0.01259 — 0.01771 in.
Vertical Play	0.13 — 0.17 mm	0.0051 — 0.0066 in.
Piston Ring End Gap		
Groove 1	0.12 — 0.16 mm	0.0048 — 0.0063
Groove 2	0.065 — 0.110 mm	0.0026 — 0.0044

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Groove 3	0.03 — 0.07 mm	0.0012 — 0.0028
Dimensions Of The Piston Rings		
Keystone ring	NA	NA
Taper-faced ring	NA	NA
Bevel-edged ring	NA	NA
Piston Pin		
Diameter Bearing	29.975 - 29.980 mm	
Play in Piston	0.013 - 0.023 mm	in.

CONNECTING RODS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Connecting Rod Bolt		
Thread diameter	8 mm	0.315 in.
Shank length when new	47 mm	1.8504 in.
Maximum shank length	48 mm	1.8898 in.
Distance From Center Of Connecting Rod Bearing Bore To Connecting Rod Bushing Bore	167.97 - 168.03 mm	6.613 — 6.6154 in.
Width Of Connecting Rod At Connecting Rod Bearing Bore	17.90 - 18.10 mm	0.7048 — 0.7126 in.
Width Of Connecting Rod At Connecting Rod Bushing Bore	21.94 - 22.00 mm	0.8638 — 0.8662 in.
Connecting Rod Bushing Inner	30.038 - 30.044 mm	1.1826 — 1.1829 in.
Connecting Rod Bushing Outer Diameter	32.500 - 32.525 mm	1.2796 — 1.2806 in.
Piston Pin Play In Connecting Rod Bushing	0.028 - 0.034 mm	0.0012 — 0.0014 in.
Peak-To-Valley Height (Rz) Of Connecting Rod Bushing On Inside	5 mm	0.1969 in.
Connecting Rod Bearing Shell Basic Bore	67.600 - 67.614 mm	2.6615 — 2.662 in.
Permissible Out-Of-Roundness And Concentricity Of Basic Bore	0.020 mm	0.0008 in.

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Permissible Twist Of Connecting Rod Bearing Bore To Connecting Rod Bush Bore Over A Length Of 100 mm	0.1 mm	0.004 in.
Permissible Variation Of Axial Parallelism Of Connecting rod Bearing Bore To Connecting rod Bushing Bore Over A Length Of 100 mm	0.045 mm	0.0018 in.
Permissible Difference In Weight Of Complete Connecting Rod Of An Engine	2 grams	0.07 oz.