



ENGINE SPECIFICATIONS

May 2020 ES-TOY12R4

General

Manufacturer	TOYOTA	80 Series L/Cruiser	
Model/Year	1HD-T	2/1990 – 12/1997	Turbocharged
L/(CID)	4,164cc DIESEL	No. of Cylinders	6 Direct Injection
Bore & Stroke	94.0mm X 100.0mm		
Firing Order	1 – 4 – 2 – 6 – 3 – 5		
Compression Ratio	18.6 : 1	Idle Speed	650 rpm manual
Comp. Pressure @ RPM	3.4 MPa @ 250 rpm	2.45 MPa min.	<490 kPa diff.
Oil Pressure	29 kPa min at idle	Oil Capacity & Grade	9.6 ltr dry CC-CD
Injection Timing @ crank pulley/timing groove	2/1990 – 8/1992	Plunger stroke - 1.29 – 1.35 mm	
	8/1992 – 12/1997	Plunger stroke - 1.18 – 1.24 mm	

Block

Bore Diameter Standard	94.000 – 94.030 mm
Maximum Overbore	1.00 mm
Liner Flange Prot. & Fit	N/A
Crankshaft Housing Bore	71.000 – 71.018 mm
Block Deck Height	0.20 mm warp limit
Main Cap Bolt Diameters	11.800 – 12.000 mm with min. 11.50 mm @ 20 mm below top of thread.

Pistons & Rings

Piston to Bore Clearance	0.04 – 0.06 mm @ 15 mm up from bottom of skirt.
Piston Protrusion	0.475 – 0.725 mm (Graded head gaskets – refer notes.)
Gudgeon Pin Diameter	33.000 – 33.012 mm Thumb press @ 80°C
Ring Equipment	Top: 2.0 mm (½K), 2 nd : 2.0 mm, Oil: 4.00 mm
Piston Ring End Gap	Top: 0.27 – 0.54 mm, 2 nd : 0.40 – 0.62 mm, Oil: 0.20 – 0.52 mm
Ring to Groove Clearance	Top: 0.050 – 0.095 mm, 2 nd : 0.06 – 0.10 mm, Oil: 0.03 – 0.07 mm

Connecting Rods

Big End Bore	62.014 – 62.032 mm
Pin End Bore	36.000 – 36.030 mm
Gudgeon Pin Clearance	0.004 – 0.012 mm Limit: 0.03 mm
Bush ID Finished	33.008 – 33.020 mm
Rod Side Clearance	0.10 – 0.20 mm Limit: 0.30 mm
Bend/Twist	0.03 mm/100mm bend 0.15 mm/100 mm twist
Conrod Bolt Diameters	8.300 – 8.400 mm with min. 7.95 mm on shank.

Camshaft

Journal Diameters	1: 34.969 – 34.985 mm 2 – 7: 27.986 – 27.998 mm
End Play	0.10 – 0.20 mm Limit: 0.30 mm
Oil Clearance	1: 0.022 – 0.074 mm 2 – 7: 0.030 – 0.066 mm Limit: 0.1 mm
Lobe Height	Inlet 54.45 mm Exhaust 55.95 mm Limit In 53.9 & Ex 55.4 mm
Bend Limit	0.10 mm circle runout

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Crankshaft

Main Journal Standard	66.982 – 67.000 mm							
Conrod Journal Standard	58.982 – 59.000 mm							
Seal Diameters	Front	59	75	9	Rear	95 115 10	Cam	32 46 6
Thrust Thickness	2.930 – 2.980 mm							
Main Bearing Clearance	0.030 – 0.053 mm std. Limit: 0.10 mm							
Conrod Bearing Clearance	0.036 – 0.077 mm std. Limit: 0.10 mm							
Crankshaft End Play	0.040 – 0.240 mm Limit: 0.30 mm							
Journal Radius	Main	2.70 – 2.80 mm			Conrod	3.50 – 3.60 mm		

Cylinder Head

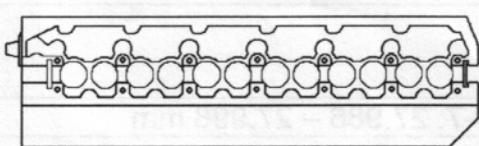
Tappet Clearance	Inlet	0.15 – 0.25 mm Cold	Exhaust	0.35 – 0.45 mm Cold
Head Height (Limit)	133.50 mm		Warp Limit	0.2 mm
Camshaft Housing Bore	38.000 – 38.020 mm			
Valve Seat Angle	Inlet	45°	Exhaust	45°
Valve Seat Width	Inlet	1.5 – 1.9 mm	Exhaust	1.8 – 2.2 mm
Valve Head Recess	Inlet	0.89 – 1.35 mm	Exhaust	0.89 – 1.35 mm
Valve Head Margin (Limit)	Inlet	1.6 mm (1.1 mm)	Exhaust	1.7 mm (1.2 mm)
Valve Face Angle	Inlet	44.5°	Exhaust	44.5°
Valve Length	Inlet	103.29 – 103.69 mm	Exhaust	103.14 – 103.54 mm
Valve Stem Diameter	Inlet	7.975 – 7.990 mm	Exhaust	7.960 – 7.975 mm
Valve Guide Height	Inlet	11.8 – 12.2 mm	Exhaust	11.8 – 12.2 mm
Valve Guide Clear. Std.	Inlet	0.020 – 0.055 mm	Exhaust	0.035 – 0.070 mm
Valve Guide Clear. Limit	Inlet	0.08 mm	Exhaust	0.10 mm
Valve Spring Pressure	Yellow	30.7 – 33.9 kg	Blue	30.7 – 33.9 kg
Valve Spring Free Length	Yellow	46.2 mm	Blue	49.14 mm
Valve Spring Install. Height	Yellow	37.0 mm	Blue	37.0 mm
Head Bolt Diameters	10.800 – 11.000 mm with min. 10.55 mm @ 20 mm below top of thread.			

Torque Specifications

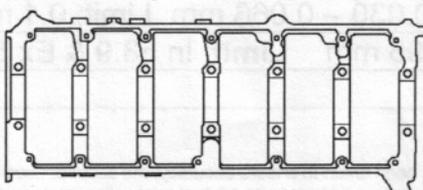
Main Bolts	1: 103 N.m 2: +90° OILED			Outer bolts: 18 N.m
Conrod Bolts	1: 39 N.m 2: +90° OILED			
Head Bolts	1: 69 N.m 2: +90° 3: +90° OILED			
Camshaft	Bearing Caps	1: 25 N.m 2 – 7: 18 N.m	Pulley Bolt	98 N.m
Manifold Bolts	Inlet	20 N.m	Exhaust	39 N.m
Oil Pan Bolts	10 N.m			
Flywheel Bolts	127 N.m OILED			
No.1 Crankshaft Pulley	490 N.m		No.2 Crankshaft Pulley:	25 N.m
Injector Nozzle Clamp	39 N.m		Oil Squirter Check Valve	27 N.m

Torque Sequences

12 8 4 2 6 10 14



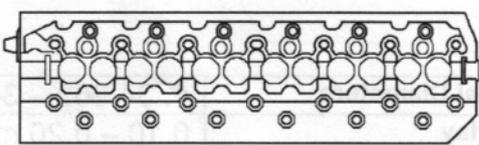
11 7 3 1 5 9 13



12 8 4 2 6 10 14

←

25 19 17 11 9 3 1 6 8 14 16 22 24



23 21 15 13 7 5 2 4 10 12 18 20 26

Head Gasket Selection from Piston Protrusion

Piston Protrusion	Gasket Grade	Gasket Size
0.475 – 0.525 mm	Grade 1	1.15 – 1.25 mm
0.526 – 0.625 mm	Grade 3	1.25 – 1.35 mm
0.626 – 0.725 mm	Grade 5	1.35 – 1.45 mm

Timing Gear Layout

