

**General**

<b>Manufacturer</b>	<b>TOYOTA</b>		
<b>Model/Year</b>	<b>1HD-T (80 Series)</b>	<b>1989 - 1995</b>	<b>Turbocharged</b>
<b>L/(CID)</b>	4,164cc DIESEL	<b>No. of Cylinders</b>	6
<b>Bore &amp; Stroke</b>	94.0mm X 100.0mm		
<b>Firing Order</b>	1 - 4 - 2 - 6 - 3 - 5		
<b>Compression Ratio</b>	18.6 : 1	<b>Idle Speed</b>	650 rpm manual
<b>Comp. Pressure @ RPM</b>	3.4 MPa @ 250 rpm	2.45 MPa min.	<490 kPa diff.
<b>Oil Pressure</b>	29 kPa min at idle	<b>Oil Capacity &amp; Grade</b>	9.6 ltr dry CC-CD
<b>Injection Timing</b>	0° BTDC	Plunger stroke -	1.29 - 1.35 mm

**Block**

<b>Bore Diameter Standard</b>	94.000 - 94.030 mm
<b>Maximum Overbore</b>	1.00 mm
<b>Liner Flange Height &amp; Fit</b>	N/A
<b>Crankshaft Housing Bore</b>	71.000 - 71.018 mm
<b>Camshaft Housing Bore</b>	38.000 - 38.02 mm
<b>Block Deck Height</b>	0.20 mm warp limit

**Pistons & Rings**

<b>Piston to Bore Clearance</b>	0.04 - 0.06 mm @ 65.7 mm down from the crown
<b>Piston Protrusion</b>	0.475 - 0.725 mm (Graded head gaskets - refer notes.)
<b>Gudgeon Pin Diameter</b>	33.000 - 33.012 mm
<b>Gudgeon Pin Clearance</b>	0.004 - 0.012 mm Limit: 0.03 mm
<b>Ring Equipment</b>	Top: 2.0 mm (½K), 2 <sup>nd</sup> : 2.0 mm, Oil: 4.00 mm
<b>Piston Ring End Gap</b>	Top: 0.27 - 0.54 mm, 2 <sup>nd</sup> : 0.40 - 0.62 mm, Oil: 0.20 - 0.52 mm
<b>Ring to Groove Clearance</b>	Top: 0.050 - 0.095 mm, 2 <sup>nd</sup> : 0.06 - 0.10 mm, Oil: 0.03 - 0.07 mm

**Connecting Rods**

<b>Big End Bore</b>	62.014 - 62.032 mm
<b>Pin End Bore</b>	36.000 - 36.030 mm
<b>Centre to Centre</b>	
<b>Big End Width</b>	
<b>Bush ID Finished</b>	33.008 - 33.020 mm
<b>Rod Side Clearance</b>	0.10 - 0.20 mm Limit: 0.30 mm
<b>Bend/Twist</b>	0.03 mm/100mm bend 0.15 mm/100 mm twist

**Camshaft**

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

## Crankshaft

<b>Main Journal Standard</b>	66.994 – 67.004 mm	
<b>Conrod Journal Standard</b>	58.994 – 59.004 mm	
<b>Harmonic Balancer Diam.</b>		
<b>Crank Gear Diameter</b>		
<b>Seal Diameter</b>		
<b>Thrust Thickness</b>	2.930 – 2.980 mm	
<b>Main Bearing Clearance</b>	0.036 – 0.054 mm std. Limit: 0.10 mm	
<b>Conrod Bearing Clearance</b>	0.036 – 0.054 mm std. Limit: 0.10 mm	
<b>Crankshaft End Play</b>	0.040 – 0.240 mm Limit: 0.30 mm	
<b>Journal Radius</b>	<b>Main</b>	<b>Conrod</b>

## Cylinder Head

<b>Tappet Clearance</b>	<b>Inlet</b>	0.15 – 0.25 mm Cold	<b>Exhaust</b>	0.35 – 0.45 mm Cold
<b>Head Height</b>	<b>New</b>		<b>Limit</b>	
<b>Warp Limit</b>		0.2 mm		
<b>Valve Seat Angle</b>	<b>Inlet</b>	45°	<b>Exhaust</b>	45°
<b>Valve Seat Width</b>	<b>Inlet</b>	1.5 – 1.9 mm	<b>Exhaust</b>	1.8 – 2.2 mm
<b>Valve Head Margin</b>	<b>Inlet</b>	1.1 mm min	<b>Exhaust</b>	1.2 mm min
<b>Valve Face Angle</b>	<b>Inlet</b>	44.5°	<b>Exhaust</b>	44.5°
<b>Valve Length</b>	<b>Inlet</b>	103.29 – 103.69 mm	<b>Exhaust</b>	103.14 – 103.54 mm
<b>Valve Stem Diameter</b>	<b>Inlet</b>	7.975 – 7.990 mm	<b>Exhaust</b>	7.960 – 7.975 mm
<b>Valve Guide Height</b>	<b>Inlet</b>	11.8 – 12.2 mm	<b>Exhaust</b>	11.8 – 12.2 mm
<b>Valve Guide Clear. Std.</b>	<b>Inlet</b>	0.020 – 0.055 mm	<b>Exhaust</b>	0.035 – 0.070 mm
<b>Valve Guide Clear. Limit</b>	<b>Inlet</b>	0.08 mm	<b>Exhaust</b>	0.10 mm
<b>Valve Spring Pressure</b>	<b>Yellow</b>	30.7 – 33.9 kg	<b>Blue</b>	30.7 – 33.9 kg
<b>Valve Spring Free Length</b>	<b>Yellow</b>	46.2 mm	<b>Blue</b>	49.14 mm
<b>Valve Spring Install. Height</b>	<b>Yellow</b>	37.0 mm	<b>Blue</b>	37.0 mm
<b>Precom. Chamber Protrus.</b>		N/A – Direct Injection		

## Torque Specifications

<b>Main Bolts</b>	10.5 kgf.m + 90° OILED    Outer bolts: 1.85 kgf.m		
<b>Conrod Bolts</b>	3.75 kgf.m + 90° OILED		
<b>Head Bolts</b>	7.0 kgf.m + 90° + 90° OILED		
<b>Camshaft Bearing Caps</b>	1: 2.5 kgf.m    2 – 7: 1.85 kgf.m		
<b>Manifold Bolts</b>	<b>Inlet</b>	2.0 kgf.m	<b>Exhaust</b> 4.0 kgf.m
<b>Flywheel Bolts</b>	13.0 kgf.m OILED		
<b>No.1 Crankshaft Pulley</b>	50.0 kgf.m	<b>No.2 Crankshaft Pulley: 2.5 kgf.m</b>	

## Torque Sequences

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