1. General Description

A: SPECIFICATIONS

	Model			2.5 Q		
	Туре			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine		
	Valve arrangement			Belt driven, double overhead camshaft, 4-valve/cylinder		
	Bore × Stroke		mm (in)	99.5 × 79.0 (3.92 × 3.11)		
	Piston displacement		cm ³ (cu in)	2,457 (149.94)		
	Compression ratio			8.	8.2	
	Compression pres- sure (at 200 — 300 rpm)	kF	^D a (kgf/cm ² , psi)	981 — 1,177 (10 — 12, 142 — 171)		
	Number of piston ring	s		Pressure ring	: 2, Oil ring: 1	
	Intake valve timing	Opening	Max. retard	ATDC 5°		
		Opening	Min. advance	BTDC 15°		
Engine		Closing	Max. retard	ABDC 65°		
Lingine			Min. advance	ABDC 45°		
	Exhaust valve timing Opening			BBDC	C 55°	
	g	Closing		ATD	C 5°	
	Valve clearance	Intake	mm (in)	0.20 ^{+0.04} _0.06 (0.0079 ^{+0.0016} _0.0024)		
		Exhaust	mm (in)	0.35±0.05 (0.0138±0.0020)		
	Idling speed		No load	MT: 70 AT: 70	0±100 0±100	
	[At neutral position on range on AT]	[At neutral position on MT, or "P" or "N" range on AT] rpm		A/C Refrigerant pressure (LOW)	MT: 725±100 AT: 750±100	
	rpm			A/C Refrigerant pressure (HIGH)	MT: 800±100 AT: 825±100	
	Firing order			$1 \rightarrow 3 -$	$\rightarrow 2 \rightarrow 4$	
	Ignition timing	Ignition timing		17°±1()°/700	
	ignition unning BTDC/tptt		AT model	17°±10)°/700	

NOTE:

STD: Standard I.D.: Inner Diameter O.D.: Outer Diameter OS: Oversize US: Undersize

Space r O.D. Transioner bush LD. 17.955 = 17.975 mm (0.7087 - 0.711 km) Belt ten- sioner Clearance between spacer and bush STD 18.0 - 18.08 mm (0.0010 - 0.0049 lm) Side clearance of spacer D 0.22 - 0.155 mm (0.0010 - 0.0049 lm) Side clearance of spacer D 0.2 - 0.55 mm (0.0079 - 0.0217 lm) Limit 0.175 mm (0.0091 m) 0.0217 m) Thrust clearance Limit 0.020 mm (0.0079 m) Thrust clearance STD 0.0068 - 0.116 mm (0.0027 m) Cam lobe height Intake STD 46.55 - 46.85 mm (1.843 m) Journal O.D. STD 46.75 - 46.85 mm (1.843 m) 1.837 m) Limit 0.037 - 0.072 mm (0.0015 - 0.0028 in) 1.870 m 1.837 m) Journal O.D. STD STD 0.037 - 0.072 mm (0.0015 - 0.0028 in) Oil clearance STD 0.037 - 0.072 mm (0.0015 - 0.0028 in) 1.881 mm (1.837 m) Surface warpage limit 0.037 - 0.072 mm (0.0015 - 0.0028 in) 1.178 m (0.0639 in) 1.178 m (0.026 in) Valve seat Surface warpage limit STD 1.0 mm (0.039 in) 1.178 mm (0.0261 in)	Belt ten- sion adjuster	Protrusion of adjuster rod			5.2 — 6.2 mm (0.205 — 0.244 in)		
Belt tensioner Tensioner bush LD. 18.0 - 18.06 mm (0.7087 - 0.7116 in)) Glearance between spacer and bush side clearance of spacer STD 0.025 - 0.125 mm (0.0010 - 0.0049 in) Side clearance of spacer STD 0.2 - 0.55 mm (0.0079 - 0.0217 in) Bend limit 0.81 mm (0.0319 in) 0.81 mm (0.0319 in) Camshaft Thrust clearance STD 0.026 - 0.116 mm (0.0027 - 0.0046 in) Cam lobe height Intake STD 0.068 - 0.116 mm (0.0027 - 0.0046 in) Cam lobe height Exhaust STD 46.55 - 46.65 mm (1.833 - 1.837 in) Journal O.D. STD 46.75 - 64.68 mm (1.841 - 0.1344 in) Journal O.D. STD Center 29.946 - 29.963 mm (1.739 - 1.1796 in) Oil clearance STD 0.037 - 0.072 mm (0.0015 - 0.0028 in) Limit 0.037 - 0.072 mm (0.0015 - 0.0028 in) Surface grinding limit 0.037 - 0.072 mm (0.0015 - 0.0028 in) Surface grinding limit 1.17 mm (0.063 in) 1.17 mm (0.063 in) Surface grinding limit 1.0 mm (0.039 in) 1.11 mm (0.067 in) Surface grinding limit 1.15 mm (0.058 in) 1.17 mm (0.067 in)		Spacer O.D.			17.955 — 17.975 mm (0.7069 — 0.7077 in)		
		Tensioner bush I.D.			18.0 — 18.08 mm (0.7087 — 0.7118 in)		
Side of the space of space and bush Limit 0.175 mm (0.069 in) Side clearance of space (Limit) STD 0.2 - 0.55 mm (0.0079 - 0.0217 in) Bend limit 0.81 mm (0.0319 lin) 0.020 mm (0.0079 - 0.0217 in) Thrust clearance STD 0.068 - 0.116 mm (0.0079 - 0.0046 in) Limit 0.0175 mm (0.0079 - 0.0046 in) 0.0168 - 0.116 mm (0.0079 - 0.0046 in) Camshaft Intake STD 0.068 - 0.116 mm (0.0079 - 0.0046 in) Camshaft Intake STD 0.068 - 0.116 mm (0.0057 in) Camshaft Intake STD 46.55 - 46.65 mm (1.833 - 1.837 in) Journal O.D. STD Center rear 29.946 - 29.963 mm (1.1790 - 1.1796 in) Journal O.D. STD Center rear 29.946 - 29.963 mm (1.1790 - 1.1796 in) Oil clearance STD Contacting width Limit 0.037 - 0.072 mm (0.0015 - 0.0028 in) Valve seat Surface grinding limit 0.037 - 0.072 mm (0.0020 in) 1.5 mm (0.020 in) Valve seat Intake STD 1.0 mm (0.039 in) 1.5 mm (0.027 in) Valve seat Intake STD 1.0 mm (0.039 in) <td>Belt ten-</td> <td></td> <td></td> <td>STD</td> <td>0.025 — 0.125 mm (0.0010 — 0.0049 in)</td>	Belt ten-			STD	0.025 — 0.125 mm (0.0010 — 0.0049 in)		
Side clearance of spacer STD $0.2 - 0.55 \text{ mm} (0.0079 - 0.0217 \text{ in})$ Bend limit $0.81 \text{ mm} (0.0079 \text{ in})$ 0.023 in in Thrust clearance STD $0.020 \text{ mm} (0.0079 \text{ in})$ Thrust clearance Intake STD $0.068 - 0.116 \text{ mm} (0.0027 - 0.0046 \text{ in})$ Camshaft Thrust clearance Intake STD $0.64.65 \text{ mm} (1.833 - 1.837 \text{ in})$ Cam lobe height Intake STD $46.55 - 46.65 \text{ mm} (1.833 - 1.837 \text{ in})$ Jaurnal O.D. STD $46.75 - 46.85 \text{ mm} (1.833 - 1.837 \text{ in})$ Journal O.D. STD Front $37.946 - 37.963 \text{ mm} (1.431 - 1.844 \text{ in})$ Journal O.D. STD Front $37.946 - 37.963 \text{ mm} (1.431 - 1.844 \text{ in})$ Oil clearance STD 0.037 - 0.072 mm (0.0015 - 0.0028 \text{ in}) Jurnal O.D. STD STD 0.037 - 0.072 mm (0.0015 - 0.0028 \text{ in}) Staface warpage limit STD 0.037 - 0.072 mm (0.0015 - 0.0028 \text{ in}) Stafacr height Intake STD 1.03 mm (0.0029 \text{ in}) Valve seat Surface grinding limit STD 1.04 mm (0.039 \text{ in})	sioner	Clearance between space	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$				
Side clearance of spacer Limit 0.81 mm (0.031 mm (0.037 m)) Eard limit 0.020 mm (0.0079 m) 0.0079 m) Thrust clearance STD 0.068 – 0.116 mm (0.0027 m) Limit 0.14 mm (0.0055 m) 0.016 mo (1.0079 m) Cam lobe height Intake STD 46.55 – 46.65 mm (1.833 – 1.837 m) Limit 44.64 mm (1.829 m) 0.0079 m) 0.0079 m) Journal O.D. STD 46.75 – 46.65 mm (1.833 – 1.837 m) Journal O.D. STD 46.75 – 46.65 mm (1.837 m) Journal O.D. STD 7.946 – 37.963 mm (1.439 m) – 1.4946 in) Center 29.946 – 29.963 mm (1.1790 – 1.1796 in) Journal O.D. STD STD Staface warpage limit 0.037 – 0.072 mm (0.0015 – 0.0028 in) Staface grinding limit 0.037 – 0.072 mm (0.0015 – 0.0028 in) Staface grinding limit 0.037 – 0.072 mm (0.0015 m) Staface grinding limit 0.03 mm (0.012 m) Valve seat Intake STD Contacting width Intake STD Head and height STD 1.0 mm (0.039 in)				5.2 - 6.2 mm (0.205 - 0.244 in) 17.955 - 17.975 mm (0.7069 - 0.7077 in) 18.0 - 18.08 mm (0.7087 - 0.7118 in) Ind bush STD 0.025 - 0.125 mm (0.0010 - 0.0049 in) Itimit 0.175 mm (0.069 in) STD 0.2 - 0.55 mm (0.0079 - 0.0217 in) Limit 0.020 mm (0.0079 - 0.0217 in) Limit 0.81 mm (0.0319 in) OL20 mm (0.0027 - 0.0046 in) Limit 0.165 mm (0.0027 - 0.0046 in) Limit 0.16 mm (0.0025 m) Limit 0.14 mm (0.0055 in) Limit 0.16 mm (1.833 - 1.837 in) Limit 1.46.65 mm (1.841 - 1.844 in) Limit 1.4946 in) STD 1.037 mm (0.0015 - 0.0028 in) Limit 1.4946 in) STD 0.037 - 0.072 mm (0.0015 - 0.0028 in) Limit 0.037 mm (0.012 in) Limit 0.16 mm (0.039 in) Limit			
Bend limit 0.020 mm (0.0079 in) Thrust clearance STD 0.068 — 0.116 mm (0.0027 - 0.0046 in) Limit 0.14 mm (0.0027 - 0.0046 in) Limit Camshaft Bend limit 0.14 mm (0.0027 - 0.0046 in) Limit 0.46.55 — 46.65 mm (1.833 - 1.837 in) Limit 46.55 — 46.65 mm (1.841 - 1.844 in) Limit 46.65 mm (1.837 in) Journal O.D. STD 46.65 mm (1.837 in) Journal O.D. STD Front 37.946 - 37.963 mm (1.4939 - 1.4946 in) Cylinder Surface warpage limit Center 29.946 - 29.963 mm (1.1790 - 1.1796 in) Surface grinding limit 0.010 mm (0.00039 in) Umit 0.100001 - 0.0028 in) Surface grinding limit 0.03 mm (0.012 in) Standard height 127.5 mm (0.026 in) Surface grinding limit 0.3 mm (0.020 in) 90° 90° Valve seat Inner diameter STD 1.0 mm (0.039 in) Contacting width Intake STD 1.0 mm (0.039 in) Limit 0.10 mm (0.039 in) 127.5 mm (0.037 in) Protrusion above head Inta		Side clearance of spacer		Limit	$\begin{array}{ $		
$ \begin{array}{ c c c c c c } \medskip \\ \hline \begin{tabular}{ c c c c } \hline \begin{tabular}{ c c c c c } \medskip \\ \hline \begin{tabular}{ c c c c c } \medskip \\ \hline \begin{tabular}{ c c c c c } \medskip \\ \hline \begin{tabular}{ c c c c c } \medskip \\ \hline \begin{tabular}{ c c c c c c } \medskip \\ \medskip \\ \hline \begin{tabular}{ c c c c c c c } \medskip \\ \medskip \\ \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		Bend limit		2	0.020 mm (0.0079 in)		
				STD	0.068 - 0.116 mm (0.0077 - 0.0046 in)		
$ \begin{tabular}{ c c c c c c c } \hline Cam lobe height & \begin{tabular}{ c c c c c c c } \hline Cam lobe height & \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		Thrust clearance		Limit	0.14 mm (0.0055 in)		
$ \begin{tabular}{ c c c c c c } \label{eq:cambbe} $$ A $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$				STD	46.55 - 46.65 mm (1.833 - 1.837 in)		
Camshaft Cam lobe height Initial STD 46.75 -0.48.55 mm (1.281 - 1.844 in) Journal O.D. STD Front 37.946 - 37.963 mm (1.483 - 1.844 in) Journal O.D. STD Front 37.946 - 37.963 mm (1.4939 - 1.4946 in) Oil clearance STD Center rear 29.946 - 29.963 mm (1.1930 - 1.1796 in) Oil clearance STD 0.037 - 0.072 mm (0.0015 - 0.0028 in) Oil clearance Limit 0.10 mm (0.0039 in) Surface warpage limit 0.037 - 0.072 mm (0.015 - 0.0028 in) Surface grinding limit 0.03 mm (0.012 in) Standard height 10.3 mm (0.020 in) Refacing angle STD 1.0 mm (0.039 in) Contacting width Intake STD 1.0 mm (0.028 in) Contacting width Intake STD 1.0 mm (0.0281 in) Valve guide Inner diameter STD 1.0 mm (0.0281 in) Potrusion above head Intake STD 1.2 mm (0.047 in) Limit 0.8 mm (0.031 in) STD 1.2 mm (0.027 - 0.2367 in) Valve Stem oil clearance			Intake	Limit	46.45 mm (1.820 in)		
Camshaft Exhaust OTD 40.75 = 4.0.3 mm (1.493 mm (1.493 m)) Journal O.D. STD Front 37.946 - 37.963 mm (1.4939 - 1.4946 in) Journal O.D. STD Center rear 29.946 - 29.963 mm (1.1790 - 1.1796 in) Oil clearance STD 0.037 - 0.072 mm (0.0015 - 0.0028 in) Limit 0.10 mm (0.0039 in) Surface warpage limit 0.3 mm (0.012 in) Surface grinding limit 0.3 mm (0.012 in) Standard height 117.5 mm (0.029 in) Standard height 10.10 mm (0.039 in) Contacting width Intake Exhaust STD 1.0 mm (0.039 in) Limit 1.7 mm (0.067 in) Valve guide Inner diameter STD Protrusion above head Intake STD Freader STD 1.0 mm (0.037 in) Valve guide Intake STD 1.2 mm (0.047 in) Head edge thickness Intake STD 1.2 mm (0.047 in) Limit 0.8 mm (0.031 in) STD 1.5 mm (0.0239 in) Limit 0.8 mm (0.031 in)		Cam lobe height		STD	$\begin{array}{r} 46.45 \text{ mm (1.829 in)} \\ 46.75 - 46.85 \text{ mm (1.841 - 1.844 in)} \\ 46.65 \text{ mm (1.837 in)} \\ 37.946 - 37.963 \text{ mm (1.4939 - 1.4946 in)} \\ 29.946 - 29.963 \text{ mm (1.1790 - 1.1796 in)} \\ 0.037 - 0.072 \text{ mm (0.0015 - 0.0028 in)} \\ 0.10 \text{ mm (0.0039 in)} \end{array}$		
$ \begin{array}{ c c c c } \medskip \meds$	Camshaft		Exhaust	Jimit	40.75 - 40.85 mm (1.841 - 1.844 m)		
$ \begin{tabular}{ c c c c c c } \hline Profile & 37.946 - 37.946 & 1.939 + 1.939 & 11.939 + 1.199 & 11.994 & 11.99$				Limit	40.03 (1)(1.03/ 1))		
$\begin{tabular}{ c c c c c } \hline label{eq:rear} & 29.946 - 29.963 mm (1.1790 - 1.1796 in) \\ \hline \mbox{rear} & 29.946 - 29.963 mm (1.1790 - 1.1796 in) \\ \hline \mbox{rear} & 29.946 - 29.963 mm (1.1790 - 1.1796 in) \\ \hline \mbox{old} & STD & 0.037 - 0.072 mm (0.0015 - 0.0028 in) \\ \hline \mbox{Limit} & 0.10 mm (0.0039 in) \\ \hline \mbox{Limit} & 0.05 mm (0.0020 in) \\ \hline \mbox{Surface warpage limit} & 0.3 mm (0.012 in) \\ \hline \mbox{Surface marpage limit} & 0.3 mm (0.012 in) \\ \hline \mbox{Standard height} & 127.5 mm (5.020 in) \\ \hline \mbox{Standard height} & 127.5 mm (5.020 in) \\ \hline \mbox{Standard height} & 127.5 mm (0.039 in) \\ \hline \mbox{Contacting width} & \hline \mbox{Int} & 1.7 mm (0.067 in) \\ \hline \mbox{Contacting width} & \hline \mbox{Int} & 1.7 mm (0.067 in) \\ \hline \mbox{Contacting width} & \hline \mbox{Int} & 1.7 mm (0.067 in) \\ \hline \mbox{Contacting width} & \hline \mbox{Int} & 1.7 mm (0.0282 - 0.2367 in) \\ \hline \mbox{Contacting width} & \hline \mbox{Int} & 1.7 mm (0.0282 - 0.2367 in) \\ \hline \mbox{Contacting width} & \hline \mbox{Int} & 1.7 mm (0.0282 - 0.2367 in) \\ \hline \mbox{Valve guide} & \hline \mbox{Protusion above head} & \hline \mbox{Int} & 1.5 mm (0.0282 - 0.2367 in) \\ \hline \mbox{Valve guide} & \hline \mbox{Int} & 1.5 mm (0.0282 - 0.638 in) \\ \hline \mbox{Limit} & 0.8 mm (0.031 in) \\ \hline \mbox{Limit} & 0.88 mm (0.031 in) \\ \hline \mbox{Limit} & 0.88 mm (0.031 in) \\ \hline \mbox{Limit} & 0.040 - 0.067 mm (0.0016 - 0.0026 in) \\ \hline \mbox{Limit} & - & 0.15 mm (0.0059 in) \\ \hline \mbox{Limit} & - & 0.015 mm (0.0016 - 0.0026 in) \\ \hline \mbox{Limit} & - & 0.015 mm (0.0016 - 0.0026 in) \\ \hline \mbox{Limit} & - & 0.015 mm (0.0016 - 0.0026 in) \\ \hline \mbox{Limit} & - & 0.015 mm (0.0016 - 0.0026 in) \\ \hline \mbox{Limit} & - & 0.015 mm (0.0016 - 0.0026 in) \\ \hline \mbox{Limit} & - & 0.015 mm (0.0016 - 0.0026 in) \\ \hline \mbox{Limit} & - & 0.015 mm (0.0016 - 0.0026 in) \\ \hline \mbox{Limit} & - & 0.015 mm (0.0016 - 0.0026 in) \\ \hline \mbox{Limit} & - & 0.015 mm (0.0016$			OTD	Front	37.946 — 37.963 mm (1.4939 — 1.4946 ln)		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Journal O.D.	SID	Center rear	29.946 — 29.963 mm (1.1790 — 1.1796 in)		
		SI degrapas		STD	0.037 — 0.072 mm (0.0015 — 0.0028 in)		
		Oli clearance		Limit	0.10 mm (0.0039 in)		
	Culindan	Surface warpage limit			0.05 mm (0.0020 in)		
Standard height 127.5 mm (5.02 in) Valve seat Refacing angle 90° Valve seat Intake STD 1.0 mm (0.039 in) Contacting width Intake STD 1.0 mm (0.067 in) Valve guide Inner diameter STD 1.5 mm (0.059 in) Valve guide Inner diameter 6.000 - 6.012 mm (0.2362 - 0.2367 in) Protrusion above head Intake STD 1.5 mm (0.047 in) Head edge thickness Intake STD 1.2 mm (0.047 in) Limit 0.8 mm (0.031 in) STD 1.5 mm (0.059 in) Valve Stem diameter Intake STD 1.5 mm (0.027 - 0.2350 in) Stem diameter Exhaust S1D 1.5 mm (0.031 in) Imit 0.8 mm (0.031 in) Intake 5.955 - 5.970 mm (0.2374 - 0.2350 in) Stem diameter STD Intake 5.945 - 5.960 mm (0.2341 - 0.2366 in) Imit 0.400 - 0.067 mm (0.0016 - 0.0026 in) Intake Stem diameter STD Intake 0.040 - 0.067 mm (0.0016 - 0.0026 in) Limit - <td>Cylinder</td> <td>Surface grinding limit</td> <td></td> <td></td> <td>0.3 mm (0.012 in)</td>	Cylinder	Surface grinding limit			0.3 mm (0.012 in)		
Valve seatRefacing angle90°Valve seatContacting widthIntakeSTD1.0 mm (0.039 in)Limit1.7 mm (0.067 in)ExhaustSTD1.5 mm (0.059 in)Limit2.2 mm (0.087 in)Valve guideInner diameter6.000 - 6.012 mm (0.2362 - 0.2367 in)Protrusion above head15.8 - 16.2 mm (0.023 in)Head edge thicknessIntakeSTDLimit0.8 mm (0.031 in)ExhaustSTD1.5 mm (0.059 in)ExhaustSTD1.2 mm (0.047 in)Limit0.8 mm (0.031 in)Stem diameterIntakeSTDExhaustSTD1.5 mm (0.059 in)Limit0.8 mm (0.031 in)Intake5.955 - 5.970 mm (0.2374 - 0.2350 in)Exhaust5.945 - 5.960 mm (0.2341 - 0.2346 in)Intake0.030 - 0.057 mm (0.0012 - 0.0022 in)Exhaust5.945 - 5.970 mm (0.02341 - 0.2346 in)Intake0.040 - 0.067 mm (0.0016 - 0.0026 in)Limit-0.15 mm (0.0059 in)Overall lengthIntake104.65 mm (4.110 in)Valve springFree lengthExhaust104.65 mm (4.120 in)Valve springFree length2.5°, 2.1 mm (0.083 in)Valve springIntake1.25°, 2.1 mm (0.083 in)Valve springIntake1.05 - 2.35 N (20.9 - 24.0 kgf, 46.1 - 52.8 lb)/ 36.0 mm (1.417 in)Lift426 - 490 N (43.4 - 50.0 kgf, 95.8 - 110 lb)/ 26.50 mm (1.043 in)	neau	Standard height			127.5 mm (5.02 in)		
Valve seat Intake STD 1.0 mm (0.039 in) Valve seat $Contacting width$ $Intake$ STD 1.5 mm (0.067 in) Valve guide Inner diameter STD 1.5 mm (0.059 in) Valve guide Inner diameter $6.000 - 6.012 \text{ mm} (0.0362 - 0.2367 in)$ Protrusion above head $15.8 - 16.2 \text{ mm} (0.622 - 0.638 in)$ Valve guide Intake STD $1.2 \text{ mm} (0.047 \text{ in})$ Head edge thickness Intake STD $1.2 \text{ mm} (0.031 \text{ in})$ Valve Exhaust STD $1.5 \text{ mm} (0.031 \text{ in})$ Stem diameter Intake STD $1.5 \text{ mm} (0.031 \text{ in})$ Stem oil clearance STD Intake $5.945 - 5.960 \text{ mm} (0.2374 - 0.2350 \text{ in})$ Stem oil clearance STD Intake $0.040 - 0.057 \text{ mm} (0.0012 - 0.0022 \text{ in})$ Overall length $ 0.15 \text{ mm} (0.0016 - 0.0026 \text{ in})$ Valve spring Free length $ 0.15 \text{ mm} (0.0059 \text{ in})$ Valve spring height Intake $0.040 - 0.67 \text{ mm} (4.120 \text{ in})$		Refacing angle		rear 29.946 — 29.963 mm (1.1790 — 1.179 STD 0.037 — 0.072 mm (0.0015 — 0.002) Limit 0.10 mm (0.0039 in) 0.05 mm (0.0020 in) 0.3 mm (0.012 in) 127.5 mm (5.02 in) 90° STD 1.0 mm (0.039 in) Limit 1.7 mm (0.039 in) Limit 1.7 mm (0.039 in) Limit 1.7 mm (0.067 in) STD 1.5 mm (0.059 in) Limit 2.2 mm (0.087 in) 6.000 — 6.012 mm (0.2362 — 0.236	90°		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				STD	1.0 mm (0.039 in)		
$\begin{tabular}{ c c c c c c } \hline Contacting width & Exhaust & STD & 1.5 mm (0.059 in) \\ \hline Exhaust & STD & 1.5 mm (0.059 in) \\ \hline Limit & 2.2 mm (0.087 in) \\ \hline 2.2 mm (0.0236 - 0.2367 in) \\ \hline 1.5 mm (0.2362 - 0.2367 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.622 - 0.638 in) \\ \hline 15.8 - 16.2 mm (0.047 in) \\ \hline 10.8 mm (0.031 in) \\ \hline 11.8 mm (0.031 in) \\ \hline 11.8 mm (0.059 in) \\ \hline 11.8 mm (0.031 in) \\ \hline $	Valve seat		Intake	Limit	1.7 mm (0.067 in)		
Valve guide Inner diameter Exhaust Limit $2.2 \text{ mm} (0.087 \text{ in})$ Valve guide Inner diameter $6.000 - 6.012 \text{ mm} (0.2362 - 0.2367 \text{ in})$ $15.8 - 16.2 \text{ mm} (0.622 - 0.638 \text{ in})$ Valve guide Protrusion above head $15.8 - 16.2 \text{ mm} (0.047 \text{ in})$ Head edge thickness Intake STD $1.2 \text{ mm} (0.047 \text{ in})$ Limit 0.8 mm (0.031 in) 0.047 in Valve Stem diameter STD $1.5 \text{ mm} (0.059 \text{ in})$ Stem diameter Intake $5.955 - 5.970 \text{ mm} (0.2374 - 0.2350 \text{ in})$ Stem oil clearance STD Intake $5.945 - 5.960 \text{ mm} (0.2341 - 0.2346 \text{ in})$ Stem oil clearance STD Intake $0.040 - 0.067 \text{ mm} (0.0012 - 0.0022 \text{ in})$ Stem oil clearance STD Exhaust $0.040 - 0.067 \text{ mm} (0.0016 - 0.0026 \text{ in})$ Uainit - $0.15 \text{ mm} (0.0059 \text{ in})$ Intake $104.4 \text{ mm} (4.110 \text{ in})$ Overall length Intake $104.4 \text{ mm} (4.120 \text{ in})$ 2.5° , $2.1 \text{ mm} (0.083 \text{ in})$ 2.5° , $2.1 \text{ mm} (0.083 \text{ in})$ Valve Squareness 2.5° , 2.1		Contacting width		STD	1.5 mm (0.059 in)		
		E	Exhaust	Limit	2.2 mm (0.087 in)		
Valve guide Protrusion above head 15.8 - 16.2 mm (0.622 - 0.638 in) Valve Head edge thickness STD 1.2 mm (0.047 in) Head edge thickness Intake STD 1.5 mm (0.059 in) Valve Exhaust STD 1.5 mm (0.031 in) Stem diameter Intake 5.955 - 5.970 mm (0.2374 - 0.2350 in) Stem diameter Exhaust 5.945 - 5.960 mm (0.2341 - 0.2346 in) Stem oil clearance STD Intake 0.030 - 0.057 mm (0.012 - 0.0022 in) Exhaust 5.945 - 5.960 mm (0.0341 - 0.2346 in) Intake 0.040 - 0.067 mm (0.0012 - 0.0022 in) Stem oil clearance STD Intake 0.040 - 0.067 mm (0.0016 - 0.0026 in) Uaint - 0.15 mm (0.0059 in) Intake Intake 104.4 mm (4.110 in) Exhaust 104.4 mm (4.110 in) Overall length Intake 104.45 mm (4.120 in) Exhaust Squareness 2.5°, 2.1 mm (0.083 in) 205 - 235 N (20.9 - 24.0 kgf, 46.1 - 52.8 lb)/ Squareness 205 - 235 N (20.9 - 24.0 kgf, 46.1 - 52.8 lb)/ 36.0 mm (1.417 in) Tension/spring height Ket </td <td></td> <td colspan="2">Inner diameter</td> <td></td> <td>6.000 — 6.012 mm (0.2362 — 0.2367 in)</td>		Inner diameter			6.000 — 6.012 mm (0.2362 — 0.2367 in)		
$\begin{tabular}{ c c c c c c c } \hline Valve $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$$	Valve guide	Protrusion above head			15.8 — 16.2 mm (0.622 — 0.638 in)		
Valve Intake Limit $0.8 \text{ mm} (0.031 \text{ in})$ Stem diameter STD $1.5 \text{ mm} (0.059 \text{ in})$ Valve Stem diameter Intake $5.955 - 5.970 \text{ mm} (0.2374 - 0.2350 \text{ in})$ Stem oil clearance Intake $5.945 - 5.960 \text{ mm} (0.2341 - 0.2346 \text{ in})$ Stem oil clearance STD Intake $0.031 - 0.0224 \text{ in}$ Unit $0.040 - 0.057 \text{ mm} (0.0012 - 0.0022 \text{ in})$ Intake $0.040 - 0.067 \text{ mm} (0.0016 - 0.0026 \text{ in})$ Unit - $0.15 \text{ mm} (0.0059 \text{ in})$ Intake $0.040 - 0.067 \text{ mm} (0.0016 - 0.0026 \text{ in})$ Valve Stem oil clearance STD Intake $0.040 - 0.067 \text{ mm} (0.0016 - 0.0026 \text{ in})$ Unit - $0.15 \text{ mm} (0.0059 \text{ in})$ Intake $104.40 \text{ mm} (4.110 \text{ in})$ Overall length Intake $104.45 \text{ mm} (4.120 \text{ in})$ Exhaust $104.65 \text{ mm} (4.120 \text{ in})$ Valve Squareness $2.5^\circ, 2.1 \text{ mm} (0.083 \text{ in})$ $2.5^\circ, 2.1 \text{ mm} (0.083 \text{ in})$ Valve Tension/spring height Set $205 - 235 \text{ N} (20.9 - 24.0 \text{ kgf}, 46.1 - 52.8 \text{ lb})/$ $36.0 \text{ mm} (1.417 \text{ in})$				STD	1.2 mm (0.047 in)		
Valve Head edge thickness STD 1.5 mm (0.059 in) Valve Stem diameter Intake $0.8 \text{ mm} (0.031 \text{ in})$ Stem diameter Intake $5.955 - 5.970 \text{ mm} (0.2374 - 0.2350 \text{ in})$ Exhaust $5.945 - 5.960 \text{ mm} (0.2341 - 0.2346 \text{ in})$ Stem oil clearance Intake $0.030 - 0.057 \text{ mm} (0.0012 - 0.0022 \text{ in})$ Stem oil clearance STD Intake $0.040 - 0.067 \text{ mm} (0.0016 - 0.0026 \text{ in})$ Limit - $0.15 \text{ mm} (0.0059 \text{ in})$ Overall length Intake $104.40 - 0.067 \text{ mm} (0.0016 - 0.0026 \text{ in})$ Free length - $0.15 \text{ mm} (0.0059 \text{ in})$ Valve Free length Intake $104.40 \text{ mm} (4.110 \text{ in})$ Squareness $2.5^\circ, 2.1 \text{ mm} (0.083 \text{ in})$ $2.5^\circ, 2.1 \text{ mm} (0.083 \text{ in})$ Valve Tension/spring height Set $205 - 235 \text{ N} (20.9 - 24.0 \text{ kgf}, 46.1 - 52.8 \text{ lb})/$ Set $36.0 \text{ mm} (1.417 \text{ in})$ $36.0 \text{ mm} (1.417 \text{ in})$			Intake	Limit	0.8 mm (0.031 in)		
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		Head edge thickness		STD	1.5 mm (0.059 in)		
Valve Intervention Intake 5.955 - 5.970 mm (0.2374 - 0.2350 in) Stem diameter Intake $5.945 - 5.960 mm (0.2374 - 0.2346 in)$ Stem oil clearance STD Intake $0.030 - 0.057 mm (0.0012 - 0.0022 in)$ Stem oil clearance STD Intake $0.040 - 0.067 mm (0.0016 - 0.0026 in)$ Limit - $0.040 - 0.067 mm (0.0059 in)$ Overall length Intake $104.40 - 0.067 mm (4.110 in)$ Free length Intake $104.40 - 0.065 mm (4.120 in)$ Free length 47.32 mm (1.863 in) 2.5° , 2.1 mm (0.083 in) Squareness 2.5° , 2.1 mm (0.083 in) 2.5° , 2.1 mm (0.083 in) Valve spring Set $205 - 235$ N ($20.9 - 24.0$ kgf, $46.1 - 52.8$ lb)/ Mathematical set $36.0 mm (1.417 in)$ $36.0 mm (1.417 in)$			Exhaust	$ \frac{\text{STD}}{\text{Limit}} = \begin{array}{c} 0.2 - 0.55 \text{ mm} (0.0079 - 0.0217 \text{ in}) \\ \hline \text{Limit} = 0.020 \text{ mm} (0.0079 \text{ in}) \\ \hline 0.008 - 0.116 \text{ mm} (0.0027 - 0.0046 \text{ in}) \\ \hline \text{Limit} = 0.146 \text{ mm} (0.0027 - 0.0046 \text{ in}) \\ \hline \text{Limit} = 0.146 \text{ mm} (0.0027 - 0.0046 \text{ in}) \\ \hline \text{Limit} = 0.146 \text{ mm} (0.0027 - 0.0046 \text{ in}) \\ \hline \text{Limit} = 0.146 \text{ mm} (0.0027 - 0.0046 \text{ in}) \\ \hline \text{Limit} = 0.146 \text{ mm} (0.0027 - 0.0046 \text{ in}) \\ \hline \text{Limit} = 0.146 \text{ mm} (0.1833 - 1.837 \text{ in}) \\ \hline \text{STD} = 0.46.55 - 46.85 \text{ mm} (1.833 - 1.837 \text{ in}) \\ \hline \text{Limit} = 0.46.55 - 46.85 \text{ mm} (1.839 - 1.4946 \text{ in}) \\ \hline \text{Center} = 29.946 - 37.963 \text{ mm} (1.4939 - 1.4946 \text{ in}) \\ \hline \text{Center} = 29.946 - 29.963 \text{ mm} (1.1790 - 1.1796 \text{ in}) \\ \hline \text{Center} = 29.946 - 29.963 \text{ mm} (0.0015 - 0.0028 \text{ in}) \\ \hline \text{Limit} = 0.037 - 0.072 \text{ mm} (0.0015 - 0.0028 \text{ in}) \\ \hline \text{Limit} = 0.037 - 0.072 \text{ mm} (0.0015 - 0.0028 \text{ in}) \\ \hline \text{Limit} = 0.05 \text{ mm} (0.0020 \text{ in}) \\ \hline \text{Limit} = 0.05 \text{ mm} (0.012 \text{ in}) \\ \hline \text{STD} = 0.037 - 0.072 \text{ mm} (0.0012 \text{ in}) \\ \hline \text{Limit} = 0.05 \text{ mm} (0.029 \text{ in}) \\ \hline \text{Limit} = 0.05 \text{ mm} (0.029 \text{ in}) \\ \hline \text{Limit} = 0.05 \text{ mm} (0.029 \text{ in}) \\ \hline \text{Limit} = 0.05 \text{ mm} (0.039 \text{ in}) \\ \hline \text{Limit} = 0.05 \text{ mm} (0.039 \text{ in}) \\ \hline \text{Limit} = 0.27 \text{ mm} (0.027 \text{ mm} (0.2362 - 0.2367 \text{ in}) \\ \hline \text{STD} = 1.5 \text{ mm} (0.027 \text{ in}) \\ \hline \text{Limit} = 0.8 \text{ mm} (0.031 \text{ in}) \\ \hline \text{Limit} = 0.8 \text{ mm} (0.031 \text{ in}) \\ \hline \text{Limit} = 0.8 \text{ mm} (0.031 \text{ in}) \\ \hline \text{Limit} = 0.8 \text{ mm} (0.031 \text{ in}) \\ \hline \text{Exhaust} = 5.955 - 5.970 \text{ mm} (0.0274 - 0.2350 \text{ in}) \\ \hline \text{Exhaust} = 0.040 - 0.067 \text{ mm} (0.0012 - 0.0022 \text{ in}) \\ \hline \text{Exhaust} = 0.040 - 0.067 \text{ mm} (0.0012 - 0.0022 \text{ in}) \\ \hline \text{Exhaust} = 0.040 - 0.067 \text{ mm} (0.0012 - 0.0022 \text{ in}) \\ \hline \text{Exhaust} = 0.040 - 0.067 \text{ mm} (4.110 \text{ in}) \\ \hline \text{Exhaust} = 0.44 \text{ sm} (4.120 \text{ in}) \\ \hline \text{Exhaust} = 0.44 \text{ sm} (4.$			
Valve Stem diameter Intake 0.000				Intake	5.955 - 5.970 mm (0.2374 - 0.2350 in)		
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Valve	Stem diameter		Fxhaust	5.945 - 5.960 mm (0.2341 - 0.2346 in)		
Stem oil clearance STD Intake 0.000 0.001 0.0012 0.0023 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001	Tarro			Intake	0.030 - 0.057 mm (0.0012 - 0.0022 in)		
Valve spring Free length Limit — 0.000 = 0.001 mm (0.0010 = 0.0020 m) Valve spring Free length Intake 104.4 mm (4.110 in) Valve spring Free length 2.5°, 2.1 mm (0.083 in) Valve spring Set 205 - 235 N (20.9 - 24.0 kgf, 46.1 - 52.8 lb)/ 36.0 mm (1.417 in) Lift 426 - 490 N (43.4 - 50.0 kgf, 95.8 - 110 lb)/ 26.50 mm (1.043 in)		Stem oil clearance	STD	Exhaust	0.000 - 0.067 mm (0.0012 - 0.0022 in)		
Initial Initial <thinitial< th=""> <th< td=""><td></td><td>Otem on clearance</td><td>Limit</td><td></td><td>0.040 - 0.007 mm (0.0059 in)</td></th<></thinitial<>		Otem on clearance	Limit		0.040 - 0.007 mm (0.0059 in)		
Overall length Intake 104.4 mm (4.110 m) Exhaust 104.65 mm (4.120 in) Exhaust 104.65 mm (4.120 in) Free length 47.32 mm (1.863 in) Squareness 2.5°, 2.1 mm (0.083 in) Tension/spring height Set Lift 426 - 490 N (43.4 - 50.0 kgf, 95.8 - 110 lb)/ 26.50 mm (1.043 in)			Linin		104.4 mm (4.110 in)		
Free length 47.32 mm (1.863 in) Valve spring Squareness 2.5°, 2.1 mm (0.083 in) Tension/spring height Set 205 - 235 N (20.9 - 24.0 kgf, 46.1 - 52.8 lb)/ 36.0 mm (1.417 in) Lift 426 - 490 N (43.4 - 50.0 kgf, 95.8 - 110 lb)/ 26.50 mm (1.043 in)		Overall length		Tubouot	104.4 (100 in)		
Squareness 2.5°, 2.1 mm (0.083 in) Valve 205 - 235 N (20.9 - 24.0 kgf, 46.1 - 52.8 lb)/ Spring Set Tension/spring height Set Lift 426 - 490 N (43.4 - 50.0 kgf, 95.8 - 110 lb)/ 26.50 mm (1.043 in)		Europhan atta		Exhaust	104.65 mm (4.120 m)		
Squareness 2.5°, 2.1 mm (0.083 in) Valve spring Tension/spring height Set 205 - 235 N (20.9 - 24.0 kgf, 46.1 - 52.8 lb)/ 36.0 mm (1.417 in) Lift 426 - 490 N (43.4 - 50.0 kgf, 95.8 - 110 lb)/ 26.50 mm (1.043 in)					47.32 mm (1.863 in)		
valve spring Set 205 - 235 N (20.9 - 24.0 kgt, 46.1 - 52.8 lb)/ 36.0 mm (1.417 in) Tension/spring height Lift 426 - 490 N (43.4 - 50.0 kgf, 95.8 - 110 lb)/ 26.50 mm (1.043 in)) (ali ia	Squareness			2.5°, 2.1 mm (0.083 in)		
Lift 426 — 490 N (43.4 — 50.0 kgf, 95.8 — 110 lb)/ 26.50 mm (1.043 in)	vaive spring	Tension/spring beight		Set	205 — 235 N (20.9 — 24.0 kgt, 46.1 — 52.8 lb)/ 36.0 mm (1.417 in)		
				Lift	426 — 490 N (43.4 — 50.0 kgf, 95.8 — 110 lb)/ 26.50 mm (1.043 in)		

MECHANICAL

	Surface warpage limit (mating with cylinder head)			0.05 mm (0.0020 in)		
	Surface grinding limit			0.1 mm (0.004 in)		
	Standard height			201.0 mm (7.91 in)		
	Cylinder boro	етр	A	99.505 — 99.515 mm (3.9175 — 3.9179 in)		
	Cyllinder bore	510	В	99.495 — 99.505 mm (3.9171 — 3.9175 in)		
Cylinder	Tanar	t (mating with cylinder head) 0.05 mm (0.0020 in) 0.1 mm (0.004 in) 201.0 mm (7.91 in) A 99.505 - 99.515 mm (3.9175 - 3.917 B 99.9495 - 99.505 mm (3.9171 - 3.917 STD 0.015 mm (0.0020 in) Emit 0.050 mm (0.0020 in) 0.57 D 0.010 mm (0.0012 in) 0.57 D 0.010 mm (0.0012 in) 0.57 D 0.050 mm (0.0012 in) 0.57 mm (0.0020 in) Emit 0.050 mm (0.0012 in) 0.57 mm (0.0020 in) 0.57 mm (0.0020 in) 0.57 mm (0.0020 in) 0.57 mm (0.0098 in) 0.50 mm (0.0197 in) 0.50 mm (0.00197 in) 0.50 mm (0.00	0.015 mm (0.0006 in)			
block	Taper		Limit	0.050 mm (0.0020 in)		
Cylinder Diston Piston pin Piston ring Connecting Connecting Connecting Connecting Connecting			STD	0.010 mm (0.0004 in)		
	Out-of-roundness		Limit	0.050 mm (0.0020 in)		
	Distant distant		STD	-0.010 — 0.010 mm (-0.0004 — 0.0004 in)		
	Piston clearance		Limit	0.030 mm (0.0012 in)		
	Enlarging (boring) limit			$\begin{array}{c} 0.05 \mm (0.0020 \mm in) \\ 0.1 \mm (0.004 \mm in) \\ 201.0 \mm (7.91 \mm in) \\ 99.505 - 99.515 \mm (3.9175 - 3.9179 \mm in) \\ 99.495 - 99.505 \mm (3.9171 - 3.9175 \mm in) \\ 0.015 \mm (0.0006 \mm in) \\ 0.050 \mm (0.0020 \mm in) \\ 0.050 \mm (0.0020 \mm in) \\ 0.050 \mm (0.0020 \mm in) \\ 0.050 \mm (0.0004 - 0.0004 \mm in) \\ 0.050 \mm (0.0020 \mm in) \\ 0.030 \mm (0.0012 \mm in) \\ 0.030 \mm (0.0012 \mm in) \\ 0.030 \mm (0.0012 \mm in) \\ 99.505 - 99.515 \mm (3.9175 - 3.9179 \mm in) \\ 99.505 - 99.505 \mm (3.9171 - 3.9175 \mm in) \\ 99.505 - 99.505 \mm (3.9177 - 3.9175 \mm in) \\ 99.495 - 99.505 \mm (3.9270 - 3.9278 \mm in) \\ 99.995 - 100.015 \mm (3.9368 - 3.9376 \mm in) \\ 0.004 - 0.008 \mm (0.0002 - 0.0003 \mm in) \\ 0.020 \mm (0.0008 \mm in) \\ 1.0 \mm (0.039 \mm in) \\ 0.20 - 0.25 \mm (0.0079 - 0.0098 \mm in) \\ 1.0 \mm (0.039 \mm in) \\ 0.20 - 0.52 \mm (0.0079 - 0.020 \mm in) \\ 1.5 \mm (0.059 \mm in) \\ 0.040 - 0.080 \mm (0.0016 - 0.0031 \mm in) \\ 0.030 - 0.070 \mm (0.0012 - 0.0028 \mm in) \\ 0.15 \mm (0.0059 \mm in) \\ 0.030 - 0.070 \mm (0.0012 - 0.0028 \mm in) \\ 0.015 \mm (0.0039 \mm in) \\ 0.015 \mm (0.0028 - 0.0130 \mm in) \\ 0.15 \mm (0.0059 \mm in) \\ 0.017 - 0.045 \mm (0.0079 - 0.0018 \mm in) \\ 0.057 \mm (0.0028 - 0.0130 \mm in) \\ 0.15 \mm (0.0059 \mm in) \\ 0.15 \mm (0.0028 - 0.0130 \mm in) \\ 0.15 \mm (0.0029 \mm in) \\ 0.15 \mm (0.0028 - 0.0130 \mm in) \\ 0.15 \mm (0.0029 \mm in) \\ 0.15 \mm (0.0028 - 0.0130 \mm in) \\ 0.15 \mm (0.0029 \mm in) \\ 0.15 \mm (0.0059 \mm in) \\ 0.15 \mm (0.0590 \$		
		070	Α	99.505 — 99.515 mm (3.9175 — 3.9179 in)		
		SID	В	99.495 — 99.505 mm (3.9171 — 3.9175 in)		
Piston	Outer diameter	0.25 mm (0 OS	0.0098 in)	99.745 — 99.765 mm (3.9270 — 3.9278 in)		
		0.50 mm (0 OS	0.0197 in)	99.995 — 100.015 mm (3.9368 — 3.9376 in)		
	Standard clearance betwee	en piston	STD	0.004 — 0.008 mm (0.0002 — 0.0003 in)		
Piston pin	pin and hole in piston		Limit	$\begin{array}{c} 99.995 - 100.015 \text{ mm} (3.9368 - 3.9376 \text{ ln}) \\ \hline 0.004 - 0.008 \text{ mm} (0.0002 - 0.0003 \text{ in}) \\ \hline 0.020 \text{ mm} (0.0008 \text{ in}) \\ \hline \end{array}$ Piston pin must be fitted into position with thumb at 20°C (68°F). 0.20 - 0.25 mm (0.0079 - 0.0098 in) 1.0 mm (0.039 in) \\ \hline 0.37 - 0.52 \text{ mm} (0.015 - 0.020 \text{ in}) \\ \hline \end{array}		
Piston pin	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).		
	Piston ring gap	Top ring	STD	0.20 — 0.25 mm (0.0079 — 0.0098 in)		
			Limit	1.0 mm (0.039 in)		
		Second	STD	0.37 — 0.52 mm (0.015 — 0.020 in)		
		ring	Limit	1.0 mm (0.039 in)		
Piston ring		Oil ring	STD	0.20 — 0.50 mm (0.0079 — 0.020 in)		
1 istori ning		On mig	Limit	$\begin{array}{c c} 0.5 \ \mathrm{mm} \ (0.020 \ \mathrm{in}) \\ \hline 99.505 - 99.515 \ \mathrm{mm} \ (3.9175 - 3.9179 \ \mathrm{in}) \\ \hline 99.495 - 99.505 \ \mathrm{mm} \ (3.9171 - 3.9175 \ \mathrm{in}) \\ \hline 99.745 - 99.765 \ \mathrm{mm} \ (3.9270 - 3.9278 \ \mathrm{in}) \\ \hline 99.995 - 100.015 \ \mathrm{mm} \ (3.9368 - 3.9376 \ \mathrm{in}) \\ \hline 0.004 - 0.008 \ \mathrm{mm} \ (0.0002 - 0.0003 \ \mathrm{in}) \\ \hline 0.020 \ \mathrm{mm} \ (0.0008 \ \mathrm{mn}) \\ \hline 0.020 \ \mathrm{mm} \ (0.0008 \ \mathrm{in}) \\ \hline 0.020 \ \mathrm{mm} \ (0.0008 \ \mathrm{in}) \\ \hline 0.020 \ \mathrm{mm} \ (0.0079 - 0.0008 \ \mathrm{in}) \\ \hline 0.20 - 0.25 \ \mathrm{mm} \ (0.0079 - 0.020 \ \mathrm{in}) \\ \hline 1.0 \ \mathrm{mm} \ (0.039 \ \mathrm{in}) \\ \hline 0.37 - 0.52 \ \mathrm{mm} \ (0.0079 - 0.020 \ \mathrm{in}) \\ \hline 1.0 \ \mathrm{mm} \ (0.039 \ \mathrm{in}) \\ \hline 0.20 - 0.50 \ \mathrm{mm} \ (0.0079 - 0.020 \ \mathrm{in}) \\ \hline 1.5 \ \mathrm{mm} \ (0.0079 - 0.020 \ \mathrm{in}) \\ \hline 1.5 \ \mathrm{mm} \ (0.0079 - 0.020 \ \mathrm{in}) \\ \hline 0.15 \ \mathrm{mm} \ (0.0079 - 0.0028 \ \mathrm{in}) \\ \hline 0.030 - 0.070 \ \mathrm{mm} \ (0.0016 - 0.0031 \ \mathrm{in}) \\ \hline 0.15 \ \mathrm{mm} \ (0.0059 \ \mathrm{in}) \\ \hline 0.10 \ \mathrm{mm} \ (0.0039 \ \mathrm{in}) \\ \hline 0.10 \ \mathrm{mm} \ (0.0039 \ \mathrm{in}) \\ \hline 0.10 \ \mathrm{mm} \ (0.0039 \ \mathrm{in}) \\ \hline 0.10 \ \mathrm{mm} \ (0.0039 \ \mathrm{in}) \\ \hline 0.017 - 0.330 \ \mathrm{mm} \ (0.0079 - 0.0018 \ \mathrm{in}) \\ \hline 0.05 \ \mathrm{mm} \ (0.0020 \ \mathrm{in}) \\ \hline 1.490 - 1.502 \ \mathrm{mm} \ (0.0587 - 0.0591 \ \mathrm{in}) \end{array}$		
		Top ring	STD	0.040 — 0.080 mm (0.0016 — 0.0031 in)		
	ring and piston ring		Limit	0.15 mm (0.0059 in)		
	groove	Second	STD	0.030 — 0.070 mm (0.0012 — 0.0028 in)		
		ring	Limit	0.15 mm (0.0059 in)		
Connecting	Bend twist per 100 mm (3.94 in) in length		Limit	0.10 mm (0.0039 in)		
rod	Sido dooronoo		STD	0.070 — 0.330 mm (0.0028 — 0.0130 in)		
	Side clearance		Limit	0.4 mm (0.016 in)		
	Oil clearance		STD	0.017 — 0.045 mm (0.0007 — 0.0018 in)		
	Oli clearance		Limit	0.05 mm (0.0020 in)		
			STD	1.490 — 1.502 mm (0.0587 — 0.0591 in)		
0 "			0.03 mm (0.0012	1.504 — 1.512 mm (0.0592 — 0.0595 in)		
Connecting rod bearing	Thickness at center portior	STD 0.004 — 0.008 mm (0.0002 — 0.0003 in) id hole in piston Limit 0.020 mm (0.0008 in) e of fit Piston pin must be fitted into position with thumb at 20°C (68°F). n ring gap Top ring STD 0.20 — 0.25 mm (0.0079 — 0.0098 in) Second STD 0.37 — 0.52 mm (0.015 — 0.020 in) Imit 1.0 mm (0.039 in) 1.0 mm (0.039 in) Second STD 0.20 — 0.50 mm (0.0079 — 0.020 in) Limit 1.0 mm (0.039 in) 1.0 mm (0.039 in) ance between piston STD 0.20 — 0.50 mm (0.0016 — 0.0021 in) Limit 1.5 mm (0.0059 in) 1.5 mm (0.0059 in) ance between piston Top ring STD 0.040 — 0.080 mm (0.0012 — 0.0028 in) Limit 0.15 mm (0.0059 in) Limit 0.15 mm (0.0059 in) twist per 100 mm (3.94 in) in Limit 0.10 mm (0.0028 — 0.0130 in) Limit 0.107 — 0.330 mm (0.0028 — 0.0130 in) Limit clearance STD 0.017 — 0.045 mm (0.0077 — 0.0018 in) arrance STD 0.017 — 0.045 mm (0.0027 — 0.0591 in) 0.03 mm (0.0020 in) STD				
			0.25 mm (0.0098 in) US	1.614 — 1.622 mm (0.0635 — 0.0639 in)		
Connecting	Clearance between piston	pin and	STD	0 — 0.022 mm (0 — 0.0009 in)		
rod bushing	bushing		Limit	0.030 mm (0.0012 in)		

	Bend limit			0.035 mm (0.0014 in)		
	Crank pin and crank jour-	Out-of-roun	dness	0.005 mm (0.0002 in) or less		
	nal	Grinding lin	nit	0.25 mm (0.0098 in)		
		•	STD	51.984 — 52.000 mm (2.0466 — 2.0472 in)		
	Crank pin outer diameter		0.03 mm (0.0012 in) US	51.954 — 51.970 mm (2.0454 — 2.0461 in)		
			0.05 mm (0.0020 in) US	51.934 — 51.950 mm (2.0447 — 2.0453 in)		
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm (2.0368 — 2.0374 in)		
			STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)		
	Crank journal outer diam- eter	#1, #3, #5	0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)		
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)		
Crankshaft			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)		
Crankshaft		#2, #4	STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)		
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)		
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)		
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)		
	Thrust cloarance		STD	0.030 — 0.115 mm (0.0012 — 0.0045 in)		
			Limit	0.25 mm (0.0098 in)		
		#1	STD	0.003 — 0.030 mm (0.00012 — 0.0012 in)		
		#1	Limit	0.040 mm (0.0016 in)		
		# 0	STD	0.012 — 0.033 mm (0.0004 — 0.0012 in)		
		π ∠	Limit	0.045 mm (0.0018 in)		
	Oil clearance	#3	STD	0.003 — 0.030 mm (0.00012 — 0.0012 in)		
			Limit	0.040 mm (0.0016 in)		
		# Δ	STD	0.012 — 0.033 mm (0.0004 — 0.0012 in)		
		#4	Limit	0.045 mm (0.0018 in)		
		#5	STD	0.010 — 0.031 mm (0.0004 — 0.0012 in)		
	#5	"0	Limit	0.040 mm (0.0016 in)		

			STD	1.998 — 2.011 mm (0.0787 — 0.0792 in)
			0.03 mm	
			(0.0012	2.017 — 2.020 mm (0.0794 — 0.0795 in)
			in) US	
		#1, #3	0.05 mm	
			(0.0020	2.027 — 2.030 mm (0.0798 — 0.0799 in)
			in) US	
	Crankshaft bearing thick- ness		0.25 mm	
			(0.0098	2.127 — 2.130 mm (0.0837 — 0.0839 in)
Crankshaft			in) US	
bearing			STD	2.000 — 2.013 mm (0.0787 — 0.0793 in)
			0.03 mm	
			(0.0012	2.019 — 2.022 mm (0.0795 — 0.0796 in)
			in) US	
		#2 #4 #5	0.05 mm	
		<i>"_, " , "</i> , <i>"</i> o	(0.0020	2.029 — 2.032 mm (0.0799 — 0.0800 in)
			in) US	
			0.25 mm	
			(0.0098	2.129 — 2.132 mm (0.0838 — 0.0839 in)
			in) US	

B: COMPONENT

1. TIMING BELT



- (1) Timing belt cover No. 2 (RH)
- (2) Timing belt guide
- (3) Crank sprocket
- (4) Timing belt cover No. 2 (LH)
- (5) Tensioner bracket
- (6) Automatic belt tension adjuster ASSY
- (7) Belt idler
- (8) Exhaust cam sprocket (RH)
- (9) Intake cam sprocket (RH)
- (10) Intake cam sprocket (LH)

- (11) Exhaust cam sprocket (LH)
- (12) Timing belt
- (13) Belt idler No. 2
- (14) Belt idler
- (15) Timing belt cover (LH)
- (16) Front belt cover
- (17) Timing belt cover (RH)
- (18) Crank pulley

- Tightening torque: N·m (kgf-m, ft-lb)
 - T1: 5 (0.5, 3.6)
 - T2: 10 (1.0, 7.2)
 - T3: 25 (2.5, 18.1)
 - T4: 39 (4.0, 28.9)
 - T5: <Ref. to ME(H4DOTC)-58, INSTALLATION, CAM SPROCKET.>
 - T6: <Ref. to ME(H4DOTC)-48, INSTALLATION, CRANK PULLEY.>
- T7: 6.4 (0.65, 4.7)

2. CYLINDER HEAD AND CAMSHAFT



- (1) Rocker cover (RH)
- (2) Rocker cover gasket (RH)
- (3) Camshaft cap (Front RH)
- (4) Intake camshaft cap (Rear RH)
- (5) Intake camshaft (RH)
- (6) Oil flow control solenoid valve
- (7) Exhaust camshaft cap (Rear RH)
- (8) Gasket
- (9) Oil return cover
- (10) Exhaust camshaft (RH)
- (11) Cylinder head bolt
- (12) Oil seal
- (13) Cylinder head (RH)
- (14) Cylinder head gasket

- (15) Cylinder head (LH)
- (16) Intake camshaft (LH)
- (17) Exhaust camshaft (LH)
- (18) Camshaft cap (Front LH)
- (19) Intake camshaft cap (Rear LH)
- (20) Exhaust camshaft cap (Rear LH)
- (21) Rocker cover gasket (LH)
- (22) Rocker cover (LH)
- (23) Oil filler cap
- (24) Gasket
- (25) Oil filler duct
- (26) O-ring
- (27) Oil pipe (LH)
- (28) Gasket

- (29) Oil pipe (RH)
- (30) Stud bolt

Tightening torque: N⋅m (kgf-m, ft-lb)

- T1: <Ref. to ME(H4DOTC)-67, INSTALLATION, CYLINDER HEAD ASSEMBLY.>
- T2: 8 (0.8, 5.9)
- T3: 10 (1.0, 7.2)
- T4: 6.4 (0.65, 4.7)
- T5: 20 (2.0, 14.5)
- T6: 29 (3.0, 21.4)

3. CYLINDER HEAD AND VALVE ASSEMBLY



- (2) Intake valve
- Cylinder head (3)
- Valve spring seat (4)
- (6) Valve spring
- Retainer (7)
- Retainer key (8)

- Exhaust valve oil seal (10)
- Intake valve guide (11)
- Exhaust valve guide (12)

4. CYLINDER BLOCK



MECHANICAL

- (1) Oil pressure switch
- (2) Cylinder block (RH)
- (3) Service hole plug
- (4) Gasket
- (5) Oil separator cover
- (6) Water by-pass pipe
- (7) Oil pump
- (8) Front oil seal
- (9) Rear oil seal
- (10) O-ring
- (11) Service hole cover
- (12) Cylinder block (LH)
- (13) Water pump
- (14) Baffle plate

- (15) Adapter
- (16) Oil cooler
- (17) Waster by-pass pipe
- (18) Connector
- (19) Oil strainer
- (20) Gasket
- (21) Oil pan
- (22) Drain plug
- (23) Metal gasket
- (24) Oil level gauge guide
- (25) Oil filter
- (26) Gasket
- (27) Water pump hose
- (28) Plug

Tightening torque: N·m (kgf-m, ft-lb)

- T1: 5 (0.5, 3.6)
- T2: 6.4 (0.65, 4.7)
- T3: 10 (1.0, 7.2)
- T4: 25 (2.5, 18.1)
- T5: <Ref. to ME(H4DOTC)-78, INSTALLATION, CYLINDER BLOCK.>
- T6: 70 (7.1, 50.6)
- T7: First 12 (1.2, 8.7) Second 12 (1.2, 8.7)
- T8: 16 (1.6, 11.6)
- T9: 44 (4.5, 33)
- T10: 25 (2.5, 18.1)
- T11: 54 (5.3, 39)
- T12: 45 (4.6, 33)

5. CRANKSHAFT AND PISTON



- (1) Flywheel (MT model)
- (2) Ball bearing (MT model)
- (3) Reinforcement (AT model)
- (4) Drive plate (AT model)
- (5) Top ring
- (6) Second ring
- (7) Oil ring
- (8) Piston

- (9) Piston pin
- (10) Circlip
- (11) Connecting rod bolt
- (12) Connecting rod
- (13) Connecting rod bearing
- (14) Connecting rod cap
- (15) Crankshaft
- (16) Woodruff key

- (17) Crankshaft bearing #1, #3
- (18) Crankshaft bearing #2, #4
- (19) Crankshaft bearing #5

Tightening torque: N⋅m (kgf-m, ft-lb) T1: 52 (5.3, 38.4) T2: 72 (7.3, 52.8)

6. ENGINE MOUNTING



Front cushion rubber (2)

Front engine mounting bracket

Tightening torque: N·m (kgf-m, ft-lb) T1: 35 (3.6, 25.8) T2: 42 (4.3, 30.9) T3: 85 (8.7, 62.7)

C: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.

• Remove contamination including dirt and corrosion before removal, installation or disassembly.

• Keep the disassembled parts in order and protect them from dust or dirt.

• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.

• Be careful not to burn your hands, because each part in the vehicle is hot after running.

• Be sure to tighten fasteners including bolts and nuts to the specified torque.

• Place shop jacks or safety stands at the specified points.

• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

• All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.

• Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.

• Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.

• All removed parts, if to be reused, should be reinstalled in the original positions and directions.

• Bolts, nuts and washers should be replaced with new ones as required.

• Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.

• Remove or install the engine in an area where chain hoists, lifting devices, etc. are available for ready use.

• Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.

• Prior to starting work, prepare the following: Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.

• Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	498267600	CYLINDER	Used for replacing valve guides.
		HEAD TABLE	• Used for removing and installing valve springs.
\sim			
ST-498267600			
	498457000	ENGINE STAND	Used with ENGINE STAND (499817000).
		ADAPTER RH	
ST-498457000			
	498457100	ENGINE STAND	Used with ENGINE STAND (499817000).
		ADAPTER LH	
ST-498457100			
	498497100	CRANKSHAFT	Used for stopping rotation of flywheel when loos-
		STOPPER	ening and tightening crank pulley bolt, etc.
(m)			
ST-498497100			

MECHANICAL	
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	498747300	PISTON GUIDE	Used for installing piston in cylinder for 2.5 L engine.
ST-398744300			
	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve quide oil seals.
ST-498857100			
	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connect- ing rod.
O Mar			
ST-499017100			
	499037100	CONNECTING BOD BUSHING	Used for removing and installing connecting rod bushing.
		REMOVER & INSTALLER	Subming.
ST-499037100			

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
OFFIL			
ST-499097700			
	499207400	CAMSHAFT SPROCKET WRENCH	Used for removing and installing exhaust cam sprocket. (RH side)
S1-499207400	400077500	CAMSHAFT	Lised for removing and installing intake cam
	499977300	SPROCKET WRENCH	sprocket. (LH side)
ST-499977500			
ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	 Used for installing crankshaft oil seal. Used with CRANKSHAFT OIL SEAL GUIDE (499597100).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	499597100	CRANKSHAFT OIL SEAL GUIDE	 Used for installing crankshaft oil seal. Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).
ST-499597100			
	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
ST-499718000			
ST18251AA020	18251AA020	VALVE GUIDE ADJUSTER	Used for installing intake and exhaust valve guides.
5116251AA020	499767200	VALVE GUIDE	Used for removing valve guides.
ST-499767200		REMOVER	

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.
O			
ST-499767400			
	499817000	ENGINE STAND	• Stand used for engine disassembly and assem-
A			Used with ENGINE STAND ADAPTER RH
			(498457000) & LH (498457100).
ST-499817000			
	499977100	CRANK PULLEY	Used for stopping rotation of crank pulley when
olax			
ST-499977100	499987500	CRANKSHAFT	Used for rotating crankshaft.
		SOCKET	
ST-499987500			

MF	СНА		CAL
		11 11 (ᇧᆫ

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	18332AA000	OIL FILTER WRENCH	Used for removing and installing the oil filter. (Outer diameter: 68 mm (2.68 in))
ST18332AA000			
	18332AA010	OIL FILTER WRENCH	Used for removing and installing the oil filter. (Outer diameter: 65 mm (2.56 in))
ST18332AA010			
	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
ST-499587100			
	499587600	OIL SEAL INSTALLER	Used for installing camshaft oil seal for DOHC engine.
ST-499587600	1	1	

MECHANICAL

GENERAL DESCRIPTION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	499597200	OIL SEAL GUIDE	Used for installing camshaft oil seal for DOHC
			engine. • Lised with OIL SEAL GLIIDE (499587600)
\sim			
ST-499597200	408277200		Lised for installing automatic transmission assem-
	490277200	STOFFEN SET	bly to engine.
ST-498277200			
	24082AA230	CARTRIDGE	Troubleshooting for electrical systems.
ST24082AA230			
	22771AA030	SUBARU	Troubleshooting for electrical systems.
		SELECT MONI-	
		TOR KIT	
ST22771AA030			

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Compression Gauge	Used for measuring compression.

E: PROCEDURE

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from the vehicle.

- V-belt
- Timing Belt
- Camshaft
- Cylinder Head