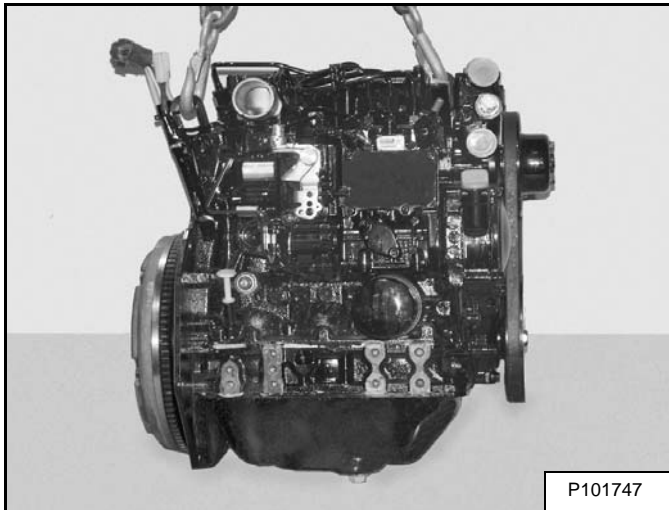


ENGINE INFORMATION

Description

The Yanmar 3TNM72 is a vertical, water cooled, 4-cycle, three cylinder diesel engine [Figure 50-10-1].

Figure 50-10-1



ENGINE INFORMATION (CONT'D)

Specifications

Cylinder Head

Item		Factory Specification	Allowable Limit	
Cylinder Warpage Limit			0,05 mm (0.002 in)	
Standard Height		97,92 mm (3.855 in)	-	
Compression Pressure		3,2 ± 0,10 MPa (32,4 ± 1 bar) (470 ± 15 psi)	2,6 ± 0,10 MPa (25,5 ± 1 bar) (370 ± 15 psi)	
Combustion Surface Distortion (Flatness)		0,05 mm (0.0020 in) or less	0,15 mm (0.0059 in)	
Valve Recession		Intake	0,4 - 0,6 mm (0.0157 - 0.0236 in)	0,9 mm (0.0354 in)
		Exhaust	0,4 - 0,6 mm (0.0157 - 0.0236 in)	0,8 mm (0.0315 in)
Valve Seat	Seat Angle	Intake	120°	
		Exhaust	90°	
	Seat Correction Angle	40°, 150°		

Valves

Item		Factory Specification	Allowable Limit
Valve Seat Contacting Width	IN.	0,7 mm (0.028 in)	1,4 mm (0.055 in)
	EX.	1,0 mm (0.039 in)	1,8 mm (0.071 in)
Valve (Margin Thickness)	IN.	1,0 mm (0.039 in)	0,8 mm (0.031 in)
	EX.	1,2 mm (0.047 in)	0,8 mm (0.031 in)
Valve Stem O.D.	IN.	5,960 - 5,985 mm (0.2346 - 0.2356 in)	5,900 mm (0.2323 in)
	EX.	5,945 - 5,970 mm (0.2341 - 0.2350 in)	5,900 mm (0.2323 in)
Valve (Stem Oil Clearance)	IN.	0,015 - 0,052 mm (0.0006 - 0.0020 in)	0,17 mm (0.0063 in)
	EX.	0,030 - 0,067 mm (0.0012 - 0.0026 in)	0,15 mm (0.0067 in)
Valve (Overall Length)	IN.	101,0 mm (3.976 in)	-
	EX.	101,2 mm (3.984 in)	-
Valve Guide I.D.		6,0 - 6,012 mm (0.2362 - 0.2367 in)	-
Valve Guide (Protrusion Above Head)		9,8 - 10,0 mm (0.3858 - 0.3937 in)	-
Valve Stem Bend	IN.		0,010 mm
	EX.		(0.0004 in)
Valve Stem Seal (Protrusion Above Head)		13,8 mm (0.543 in)	
Valve Clearance		0,15 - 0,25 mm (0.006 - 0.010 in)	

ENGINE INFORMATION (CONT'D)

Specifications (Cont'd)

Valve Springs

Item	Factory Specification	Allowable Limit
Valve Spring (Overall Length)	37,8 mm (1.4882 in)	
Valve Spring (Squareness)		1,3 mm (0.512 in)

Cylinder

Item	Factory Specification	Allowable Limit
Cylinder Surface Warpage Limit (Mating With Cylinder Head)	-	0,05 mm (0.0020 in)
Cylinder Bore	72,00 - 72,03 mm (2.8346 - 2.8358 in)	-
Cylinder Taper Limit	-	0,03 mm (0.0012 in)
Cylinder Out Of Round Limit	-	0,03 mm (0.0012 in)
Cylinder (Piston Clearance)	0,015 - 0,050 mm (0.0006 - 0.0020 in)	0,060 mm (0.0024 in)
Cylinder Boring Limit	72,200 mm (2,8425 in)	

Rocker Arms

Item	Factory Specification	Allowable Limit
Rocker Arm I.D.	12,000 - 12,020 mm (0.4724 - 0.4732 in)	12,07 mm (0.4752 in)
Rocker Shaft O.D.	11,966 - 11,984 mm (0.4711 - 0.4718 in)	11,94 mm (0.4701 in)
Rocker Shaft Oil Clearance	0,016 - 0,054 mm (0.0006 - 0.0021 in)	0,13 mm (0.0051 in)

Tappet

Item	Factory Specification	Limit
Tappet Bore (Block) Inside Diameter	21,000 - 21,021 mm (0.8268 - 0.8276 in)	21,041 mm (0.8284 in)
Tappet Stem Outside Diameter	20,927 - 20,960 mm (0.8239 - 0.8252 in)	20,907 mm (0.8231 in)
Oil Clearance	0,040 - 0,094 mm (0.0016 - 0.0037 in)	0,134 mm (0.0053 in)

Push Rod

Item	Factory Specification	Limit
Push Rod Bend	Less than 0,03 mm (0.0012 in)	0,03 mm (0.0012 in)

ENGINE INFORMATION (CONT'D)

Specifications (Cont'd)

Camshaft

Item			Factory Specification	Allowable Limit
Cam Lobe Height	IN.		34,535 - 34,665 mm (1.3596 - 1.3648 in)	32,287 mm (1.3499 in)
	EX.		34,535 - 34,665 mm (1.3596 - 1.3648 in)	32,287 mm (1.3499 in)
Shaft Outside Diameter / Bearing Inside Diameter	Gear End	Inside Diameter	40,000 - 40,025 mm (1.5748 - 1.5758 in)	40,100 mm (1.587 in)
		Camshaft Outside Diameter	39,940 - 39,960 mm (1.5724 - 1.5732 in)	39,906 mm (1.5711 in)
		Oil Clearance	0,04 - 0,085 mm (0.0016 - 0.0033 in)	0,154 mm (0.0061 in)
	Intermediate	Inside Diameter	40,000 - 40,025 mm (1.5748 - 1.5758 in)	39,875 mm (1.699 in)
		Camshaft Outside Diameter	39,910 - 39,935 mm (1.5713 - 1.5722 in)	39,875 mm (1.5699 in)
		Oil Clearance	0,065 - 0,115 mm (0.0026 - 0.0045 in)	0,225 mm (0.0089 in)
	Flywheel End	Inside Diameter	40,000 - 40,025 mm (1.5748 - 1.5758 in)	40,100 mm (1.5787 in)
		Camshaft Outside Diameter	39,940 - 39,960 mm (1.5724 - 1,5732 in)	39,906 mm (1.5711 in)
		Oil Clearance	0,040 - 0,085 mm (0.0016 - 0.0033 in)	0,154 mm (0.0061 in)

Piston

Item	Factory Specification	Allowable Limit
Outer Diameter (Std)	71,960 - 71,980 mm (2.8331 - 2.8343 in)	71,915 mm (2.8313 in)
Piston Diameter Measurement	10 - 13 mm (0.3937 - 0,5118 in)	-
Piston-to-Cylinder Clearance	0,010 - 0,070 mm (0.0004 - 0.0028 in)	-

ENGINE INFORMATION (CONT'D)

Specifications (Cont'd)

Piston Pin

Item	Factory Specification	Allowable Limit
Outer Diameter	21,995 - 22,0 mm (0.8659 - 0.8661 in)	21,965 mm(0.8648 in)
Bore Diameter	22,000 - 22,009 mm (0.8661 - 0.8665 in)	22,039 mm(0.8677 in)
Oil Clearance	0,000 - 0,014 mm(0.000 - 0.0006 in)	0,074 mm(0.0029 in)

Piston Rings

Item	Factory Specification	Allowable Limit	
Top Ring	Ring Groove Width	1,550 - 1,570 mm (0.0610 - 0.0618 in)	
	Ring Width	1,470 - 1,490 mm (0.0579 - 0.0587 in)	1,450 mm (0.0571 in)
	Side Clearance	0,060 - 0,100 mm (0.0024 - 0.0039 in)	
	End Clearance	0,100 - 0,250 mm (0.0039 - 0.0098 in)	0,034 mm (0.0013 in)
Second Ring	Ring Groove Width	1,580 - 1,595 mm (0.0622 - 0.0628 in)	1,695 mm (0.0667 in)
	Ring Width	1,470 - 1,490 mm (0.0579 - 0.0587 in)	1,450 mm (0.0571 in)
	Side Clearance	0,090 - 0,125 mm (0.0035 - 0.0049 in)	0,245 mm (0.0096 in)
	End Clearance	0,250 - 0,400 mm (0.0098 - 0.0157 in)	0,490 mm (0.0193 in)
Oil Ring	Ring Groove Width	3,010 - 3,025 mm (0.1185 - 0.1191 in)	3,130 mm (0.1232 in)
	Ring Width	2,970 - 2,990 mm (0.1170 - 0.1177 in)	2,950 mm (0.1161 in)
	Side Clearance	0,020 - 0,055 mm (0.0008 - 0.0022 in)	0,180 mm (0.0071 in)
	End Clearance	0,200 - 0,450 mm (0.0079 - 0.0177 in)	0,550 mm (0.0217 in)

ENGINE INFORMATION (CONT'D)

Specifications (Cont'd)

Idler Gear Shaft And Bushing

Item	Factory Specification	Limit
Shaft Outside Diameter	29,959 - 29,980 mm (1.1795 - 1.1803 in)	29,919 mm (1.1779 in)
Bushing Inside Diameter	30,000 - 30,025 mm (1.1811 - 1.1821 in)	30,066 mm (1.1837 in)
Oil Clearance	0,020 - 0,066 mm (0.0008 - 0.0026 in)	0,147 mm (0.0059 in)

Connecting Rod

Item	Factory Specification	Allowable Limit
Connecting Rod Small End I.D.	22,025 - 22,042 mm (0.8671 - 0.8678 in)	20,072 mm (0.7902 in)
Connecting Rod Small End Radial Clearance	0,0025 - 0,047 mm (0.0010 - 0.0019 in)	0,105 mm (0.0041 in)
Connecting Rod Big End Side Clearance	0,20 - 0,40 mm (0.0079 - 0.0157 in)	
Connecting Rod Big End Radial Clearance	0,020 - 0,058 mm (0.0008 - 0.0023 in)	0,110 mm (0.0043 in)

Crankshaft

Item	Factory Specification	Allowable Limit	
Bend	-	0,02 mm (0.0008 in)	
Roundness	0,01 mm (0.0004 in) or less	0,02 mm (0.0008 in)	
Connecting Rod Journals	Journal Outside Diameter	37,952 - 37,962 mm (1.4942 - 1.4946 in)	37,402 mm (1.4725 in)
	Bearing Inside Diameter	37,982 - 38,010 mm (1.4954 - 1.4965 in)	
	Bearing Insert thickness	1,503 - 1,509 mm (0.592 - 0.0594 in)	
	Oil Clearance	0,020 - 0,058 mm (0.0008 - 0.0023 in)	0,110 mm (0.0043 in)