

## Section E3

## Dimensional data

Description	Dimension	Permissible worn dimensions	Remarks
<b>Crankcase and Cylinders</b>			
Cylinder liner bore grading	S. 10,4150 cm. to 10,4164 cm. (4.10040 in. to 4.10095 in.)  T. 10,4164 cm. to 10,4178 cm. (4.10095 in. to 4.10150 in.)  X. 10,4181 cm. to 10,4191 cm. (4.1016 in. to 4.1020 in.)	0,1016 mm. (0.004 in.) wear	If these measurements are exceeded a new assembly of liner and piston must be fitted
Cylinder liner 'nip'	0,051 mm. to 0,076 mm. (0.002 in. to 0.003 in.)		New liners must be selectively fitted or ground on the end to give this dimension
<b>Pistons</b>			
Piston grading	S. 10,4102 cm. to 10,4115 cm. (4.0985 in. to 4.0990 in.)  T. 10,4115 cm. to 10,4130 cm. (4.0990 in. to 4.0996 in.)  X. 10,4130 cm. to 10,4148 cm. (4.0996 in. to 4.1003 in.)		Piston clearance in the bore 0,03429 mm. to 0,06223 mm. (0.00135 in. to 0.00245 in.) measured between 33,325 mm. and 39,700 mm. (1.312 in. and 1.563 in.) from the bottom of the skirt across the thrust axis.
Compression ring groove widths	2,049 mm. to 2,075 mm. (0.0807 in. to 0.0817 in.)		
Compression ring widths	1,973 mm. to 1,998 mm. (0.0777 in. to 0.0787 in.)		The rings should be assembled with staggered gaps
Clearance	0,051 mm. to 0,1016 mm. (0.002 in. to 0.004 in.)	0,127 mm. (0.005 in.)	
Compression rings closed gap	0,33 mm. to 0,64 mm. (0.013 in. to 0.025 in.)		
Scraper ring groove width	4,000 mm. to 4,025 mm. (0.1575 in. to 0.1585 in.)		
Scraper ring closed gap	0,381 mm. to 1,143 mm. (0.015 in. to 0.045 in.)		

Description	Dimension	Permissible worn dimensions	Remarks
<b>Gudgeon pins</b>			
Bore diameter in piston	2,5408 cm. to 2,5410 cm. (1.0003 in. to 1.0004 in.)	Green	Colour code marked on the underside of the piston boss
	2,5410 cm. to 2,5413 cm. (1.0004 in. to 1.0005 in.)	Red	
Gudgeon pin diameter	2,5402 cm. to 2,5405 cm. (1.0001 in. to 1.0002 in.)	Green	Colour code marked on the end of the gudgeon pin
	2,5405 cm. to 2,5407 cm. (1.0002 in. to 1.0003 in.)	Red	
Clearance in boss	0,0025 mm. to 0,0076 mm. (0.0001 in. to 0.0003 in.)		
<b>Crankshaft and Connecting rods</b>			
Connecting rod small-end bush internal diameter	2,5408 cm. to 2,5413 cm. (1.0003 in. to 1.0005 in.)		
Gudgeon pin clearance in small-end bush	Size to 0,0101 mm. (Size to 0.0004 in.)		At room temp. 20°C. to 22.2°C. (68°F. to 72°F.)
Big-end bearing housing, internal diameter	6,0833 cm. to 6,0846 cm. (2.395 in. to 2.3955 in.)		This diameter should be checked with the big-end bolts in position and the nuts torque tightened to 4,8 kgf.m. (35 lbf.ft.)
Big-end bearing shell, internal diameter	5,71627 cm. to 5,71881 cm. (2.2505 in. to 2.2515 in.)		
Crankpin diameter	5,71119 cm. to 5,71246 cm. (2.2485 in. to 2.249 in.)	5,70865 cm. (2.2475 in.)	
Clearance	0,0381 mm. to 0,0762 mm. (0.0015 in. to 0.003 in.)	0,1016 mm. (0.004 in.)	Clearance measured vertically.
Small-end bush housing, internal diameter	2,8956 cm. to 2,89687 cm. (1.140 in. to 1.1405 in.)		
Connecting rod twist	Maximum of 0,03 mm. per 10,00 mm. in length (0.003 in. per inch)		
Connecting rod vertical alignment	Maximum of 0,01 mm. per 10,00 mm. in length (0.001 in. per inch)		
Connecting rod and cap bolt holes diameter for location	9,525 mm. to 9,538 mm. (0.375 in. to 0.3755 in.)		On location diameter

Description	Dimension	Permissible worn dimensions	Remarks
<b>Crankshaft and Connecting rods continued</b>			
Connecting rod bolt diameter for location	9,512 mm. to 9,525 mm. (0.3745 in. to 0.375 in.)		On location diameter
Clearance	Size to 0,0254 mm. (Size to 0.001 in.)		
Connecting rod bolt interference on knurled diameter	Size to 0,175 mm. (Size to 0.0069 in.)		Bolts should not be removed from rods unless they are to be renewed
Connecting rod end-float	0,203 mm. to 0,432 mm. (0.008 in. to 0.017 in.)		Controlled by clearance between rods and crankpin end faces
Main bearing diametral clearance	0,028 mm. to 0.066 mm. (0.0011 in. to 0.0026 in.)	0,0889 mm. (0.0035 in.)	
Crankshaft end-float	0,1016 mm. to 0,25 mm. (0.004 in. to 0.010 in.)	0,31 mm. (0.012 in.)	
Connecting rod bolt stretch			Refer to Section E6
Crankshaft bow		0,25 mm. (0.010 in.)	Regrind crankshaft if this figure is exceeded
Crankshaft journals and crankpins ovality		0,025 mm. (0.001 in.)	Regrind crankshaft if this figure is exceeded.

Crankshaft size	Crankshaft journal	Main shell bearing
<b>Early engines</b>		
Crankshaft grinding dimensions Standard	6,35 cm. - 0,0127 mm. (2.500 in. - 0.0005 in.)	6,35254 cm.+ 0,0254 mm. (2.501 in.+ 0.001 in.)
0,254 mm. undersize (0.010 in. undersize)	6,3246 cm. - 0,0127 mm. (2.490 in. - 0.0005 in.)	6,32714 cm.+ 0,0254 mm. (2.491 in.+ 0.001 in.)
0,508 mm. undersize (0.020 in. undersize)	6,299 cm. - 0,0127 mm. (2.480 in. - 0.0005 in.)	6,30174 cm.+ 0,0254 mm. (2.481 in.+ 0.001 in.)
<b>Late engines</b>		
Crankshaft grinding dimensions Standard	6,70 cm. - 0,0127 mm. (2.6378 in. - 0.0005 in.)	6,7025 cm.+ 0,0254 mm. (2.6388 in.+ 0.001 in.)
0,254 mm. undersize (0.010 in. undersize)	6,6746 cm. - 0,0127 mm. (2.6278 in. - 0.0005 in.)	6,6771 cm.+ 0,0254 mm. (2.6288 in.+ 0.001 in.)
0,508 mm. undersize (0.020 in. undersize)	6,6492 cm. - 0,0127 mm. (2.6178 in. - 0.0005 in.)	6,6517 cm.+ 0,0254 mm. (2.6188 in.+ 0.001 in.)

Crankshaft size	Crankpin	Big-end bearing
Crankshaft grinding dimensions Standard	5,7125 cm. - 0,0127 mm. (2.249 in. - 0.0005 in.)	5,7163 cm.+ 0,0254 mm. (2.2505 in.+ 0.001 in.)
0,254 mm. undersize (0.010 in. undersize)	5,6871 cm. - 0,0127 mm. (2.239 in. - 0.0005 in.)	5,6909 cm.+ 0,0254 mm. (2.2405 in.+ 0.001 in.)
0,508 mm. undersize (0.020 in. undersize)	5,6617 cm. - 0,0127 mm. (2.229 in. - 0.0005 in.)	5,6655 cm.+ 0,0254 mm. (2.2305 in.+ 0.001 in.)

Description	Dimension	Permissible worn dimensions	Remarks
<b>Main bearing housings</b>			
Bore diameter	<b>Early engines</b> 6,7704 cm. to 6,77164 cm. (2.6655 in. to 2.6660 in.) <b>Late engines</b> 7,2987 cm. to 7,2999 cm. (2.8735 in. to 2.8740 in.)		This diameter should be checked with the main bearing caps in position and the retaining nuts tightened to the following <b>Early engines</b> 6,2 kgf.m. to 6,9 kgf.m. (45 lbf.ft. to 50 lbf.ft.) <b>Late engines</b> 8,0 kgf.m. to 8,5 kgf.m. (58 lbf.ft. to 62 lbf.ft.)
<b>Main bearing cap</b>			
Width of cap	12,955 cm. to 12,957 cm. (5.1005 in. to 5.1010 in.)		
Crankcase location gap	12,954 cm. to 12,957 cm. (5.1000 in. to 5.1010 in.)		
Fit - Interference Clearance	0,0254 mm. (0.001 in.) 0,0127 mm. (0.0005 in.)		
<b>Valve gear</b>			
Camshaft timing gear backlash	0,0254 mm. to 0,1143 mm. (0.001 in. to 0.0045 in.)	0,152 mm. (0.006 in.)	
Camshaft gear face run-out	0,000 mm. to 0,051 mm. (0.000 in. to 0.002 in.)		
Camshaft end-float	0,051 mm. to 0,152 mm. (0.002 in. to 0.006 in.)		
Camshaft journal diameter	5,0737 cm. to 5,0749 cm. (1.9975 in. to 1.998 in.)	5,07111 cm. (1.9965 in.)	
Camshaft bearing bore	5,08 cm. to 5,0813 cm. (2.000 in. to 2.0005 in.)	5,0851 cm. (2.002 in.)	
Camshaft journal clearance	0,0508 mm. to 0,0762 mm. (0.002 in. to 0.003 in.)	0,1016 mm. (0.004 in.)	

Description	Dimension	Permissible worn dimensions	Remarks
<b>Valve gear - continued</b>			
Cam base circle (inlet and exhaust)	3,727 cm. to 3,739 cm. (1.467 in. to 1.472 in.)	3,701 cm. (1.457 in.)	Dimensions apply on centre line of cam at the small end
Height of cam (inlet and exhaust)	4,37 cm. (1.72 in.)		
Tappet block bore diameter			
Colour code white	22,981 mm. to 22,987 mm. (0.90475 in. to 0.9050 in.)		Groove(s) etched onto the top face of tappet barrel. Tappets marked with one groove should be used with tappet block bores colour coded white and tappets marked with two grooves should be used with tappet block bores colour coded red
Colour code red	22,987 mm. to 22,993 mm. (0.9050 in. to 0.90525 in.)		
Tappet external diameter			
One groove	22,962 mm. to 22,968 mm. (0.9040 in. to 0.90425 in.)		
Two grooves	22,968 mm. to 22,974 mm. (0.90425 in. to 0.9045 in.)		
Clearance	0,0127 mm. to 0,0254 mm. (0.0005 in. to 0.001 in.)	0,0381 mm. (0.0015 in.)	
Exhaust valve guide - external diameter	15,9385 mm. to 15,9512 mm. (0.6275 in. to 0.628 in.)		Standard Blue +0,051 mm. (0.002 in.) Green +0,127 mm. (0.005 in.) Yellow +0,254 mm. (0.010 in.)
Cylinder head bore diameter for exhaust valve guide	15,875 mm. to 15,9004 mm. (0.625 in. to 0.626 in.)		
Interference in head	0,0381 mm. to 0,0762 mm. (0.0015 in. to 0.003 in.)		
Exhaust valve guide - internal diameter	9,525 mm. to 9,54 mm. (0.375 in. to 0.3755 in.)	9,588 mm. (0.3775 in.)	Finish reamed after fitting. 'Bellmouth' at the lower end is permissible up to 0,1524 mm. (0.006 in.) for a depth of 9,4615 mm. (0.3725 in.)
Exhaust valve stem diameter	9,492 mm. to 9,499 mm. (0.37375 in. to 0.374 in.)	9,468 mm. (0.37275 in.)	
Clearance	0,025 mm. to 0,044 mm. (0.001 in. to 0.00175 in.)	0,089 mm. (0.0035 in.)	

Description	Dimension	Permissible worn dimensions	Remarks
<b>Valve gear continued</b>			
Exhaust valve spring compressed to 4,470 cm. (1.725 in.)	39,009 kgf. to 42,676 kgf. (86 lbf. to 94 lbf.)	36,287 kgf. (80 lbf.)	
Exhaust and inlet valve seat angle	45°		'Crown' with 30° cutter to avoid pocketing after re-grinding seat
Exhaust valve seat insert - external diameter	4,4552 cm. to 4,4564 cm. (1.7540 in. to 1.7545 in.)		Standard Green +0,127 mm. (0.005 in.) Yellow +0,254 mm. (0.010 in.) Blue +0,381 mm. (0.015 in.)
Cylinder head bore diameter for exhaust seat insert	4,445 cm. to 4,4475 cm. (1.750 in. to 1.751 in.)		
Interference	0,0762 mm. to 0,1143 mm. (0.003 in. to 0.0045 in.)		
Inlet valve seat insert - external diameter	5,1536 cm. to 5,1549 cm. (2.0290 in. to 2.0295 in.)		Standard Green +0,127 mm. (0.005 in.) Yellow +0,254 mm. (0.010 in.) Blue +0,381 mm. (0.015 in.)
Cylinder head bore diameter for inlet seat	5,1435 cm. to 5,1460 cm. (2.025 in. to 2.026 in.)		
Interference	0,0762 mm. to 0,1143 mm. (0.003 in. to 0.0045 in.)		
Inlet valve guide - external diameter	15,9385 mm. to 15,9512 mm. (0.6275 in. to 0.628 in.)		Standard Blue +0,051 mm. (0.002 in.) Green +0,127 mm. (0.005 in.) Yellow +0,254 mm. (0.010 in.)
Cylinder head bore diameter for inlet valve guide	15,875 mm. to 15,90 mm. (0.625 in. to 0.626 in.)		
Interference in head	0,0381 mm. to 0,0762 mm. (0.0015 in. to 0.003 in.)		
Inlet valve guide - internal diameter	9,525 mm. to 9,54 mm. (0.375 in. to 0.3755 in.)	9,588 mm. (0.3775 in.)	Finish reamed after fitting

Description	Dimension	Permissible worn dimensions	Remarks
<b>Valve gear continued</b>			
Inlet valve stem diameter	9,492 mm. to 9,499 mm. (0.37375 in. to 0.374 in.)	9,468 mm. (0.37275 in.)	
Clearance	0,025 mm. to 0,044 mm. (0.001 in. to 0.00175 in.)	0,089 mm. (0.0035 in.)	
Inlet valve spring compressed to 4,064 cm. (1.600 in.)	37,195 kgf. to 40,823 kgf. (82 lbf. to 90 lbf.)	32,205 kgf. (71 lbf.)	
Gland spring compressed to 1,27 cm. (0.5 in.)	10,9 kgf. to 13,17 kgf. (24 lbf. to 29 lbf.)	9,08 kgf. (20 lbf.)	
Exhaust valve - overall length	12,410 cm. to 12,435 cm. (4.886 in. to 4.896 in.)		
Inlet valve - overall length	12,489 cm. to 12,529 cm. (4.917 in. to 4.933 in.)		
Distributor gear backlash	0,0508 mm. to 0,2032 mm. (0.002 in. to 0.008 in.)	0,2286 mm. (0.009 in.)	
Rocker bore diameter	19,031 mm. to 19,044 mm. (0.74925 in. to 0.74975 in.)	19,075 mm. (0.751 in.)	
Rocker shaft diameter	19,006 mm. to 19,012 mm. (0.74825 in. to 0.7485 in.)		
Clearance	0,0191 mm. to 0,0331 mm. (0.00075 in. to 0.0015 in.)	0,089 mm. (0.0035 in.)	
Hydraulic brake pump push rod lift	13,26 mm. to 13,33 mm. (0.522 in. to 0.525 in.)		This measurement is taken from the top face of the mounting flange to the top of the push rod (see Fig. E49)
Hydraulic brake pump shim sizes	0,0762 mm. (0.003 in.) 0,1778 mm. (0.007 in.)		
<b>Oil pump</b>			
Driving shaft diameter	12,675 mm. to 12,687 mm. (0.4990 in. to 0.4995 in.)	12,624 mm. (0.4970 in.)	
Shaft bore diameter	12,70 mm. to 12,713 mm. (0.500 in. to 0.5005 in.)		
Shaft clearance in casing bore	0,0127 mm. to 0,038 mm. (0.0005 in. to 0.0015 in.)	0,076 mm. (0.003 in.)	
Stationary spindle diameter	12,675 mm. to 12,687 mm. (0.499 in. to 0.4995 in.)	12,637 mm. (0.4975 in.)	

Description	Dimension	Permissible worn dimensions	Remarks
<b>Oil pump continued</b>			
Driven gear internal diameter	12,70 mm. to 12,713 mm. (0.500 in. to 0.5005 in.)	12,738 mm. (0.5015 in.)	
Clearance on spindle	0,0127 mm. to 0,038 mm. (0.0005 in. to 0.0015 in.)	0,076 mm. (0.003 in.)	Permissible only when the radial clearance of the gears in the case exceeds this figure
Diametrical clearance between gears and side of chamber	0,0508 mm. to 0,089 mm. (0.002 in. to 0.0035 in.)	0,152 mm. (0.006 in.)	
Pump gears - backlash	0,0762 mm. to 0,1778 mm. (0.003 in. to 0.007 in.)	0,2159 mm. (0.0085 in.)	
Pump gears - end-float	0,0254 mm. to 0,1016 mm. (0.001 in. to 0.004 in.)	0,127 mm. (0.005 in.)	
Drive gear backlash	0,0254 mm. to 0,2032 mm. (0.001 in. to 0.008 in.)	0,305 mm. (0.012 in.)	
Drive gear end-float	0,0254 mm. to 0,1016 mm. (0.001 in. to 0.004 in.)	0,127 mm. (0.005 in.)	