

Connecting Rods

Types 220 and 220a

Operation No.
M 4h

The connecting rod bearing shells are also supplied ready for installation. They are available in four sizes (see Tables 1 and 4).

It is not permitted to rework the mating surfaces of connecting rod, cap and bearing shells. To install the bearings, proceed as described in connection with the crankshaft bearings. Finish connecting rod bushing after it has been pressed in. In special cases the bushing can also be supplied with an outer diameter that is larger by 0.5 mm (0.02").

The tables below show the connecting rod dimensions as well as side and end play.

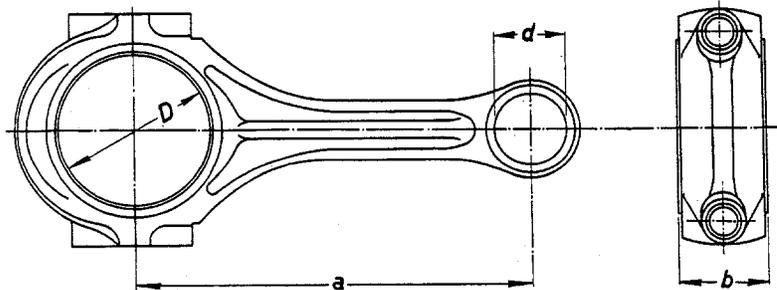


Fig. M 4h/00

Connecting Rod Dimensions in mm (in.)

Table 6

Basic bore D		Basic bore d		Dimension a		Width b	
54.000	(2.12598)	25.000	(0.98425)	134.95	(5.3130)	29.890	(1.17677)
54.019	(2.12673)	25.021	(0.98508)	135.05	(5.3169)	29.857	(1.17546)

Tighten connecting rod bolts without securing to an expansion of 0.1 mm (0.004"), which corresponds to a torque of 3.75 to 3.80 mkg (27 to 27.5 ft.lb.). After the nut has been loosened, the bolt must again reach its original length. Small deviations of up to 0.01 mm (0.0004") are permissible both with bolt tightened to the prescribed torque and after the nut has been loosened.

If the deviation is greater, this indicates that the bolt has been overexpanded. In this case the connecting rod bolt and nut must be replaced.

As a rule the connecting rod bolts are only tightened to expansion. In exceptional cases the nuts may be tightened with a torque wrench. Be sure to provide the threads of both connecting rod bolt and nut liberally with "Auto-Kollag" or graphite oil, before you attempt to tighten the bolt. Make sure that head of connecting rod bolt does not project beyond the connecting rod but is properly seated in the recess (see also Fig. M 4i/6c).

To ensure that the connecting rod bolts fit snugly into their holes, the tolerance of the shank diameter has been subdivided (not painted: 10.001 to 10.008 mm = 0.39374 to 0.39411"; white: 10.009 to 10.016 mm = 0.39405 to 39433"). The head of the connecting rod bolt having the larger diameter is marked with white paint.

Connecting Rod Side and End Play in mm (in.)

Table 7

Side play	End play	Overlap of bearing shells
0.055 -0.075 (0.0022-0.0029)	New: 0.110 -0.227 (0.0043-0.00894) Reconditioned: up to 0.5 (0.02)	+ 0.01 (0.0004)

Note: The side play given in the table represents an average value and must be strictly adhered to.

Due to the regrinding of the crankshaft bearing surfaces and the reconditioning of the connecting rods the end plays will increase. An increase of up to 0.5 mm (0.02") can be safely tolerated. The difference in the weight of the six connecting rods in an engine should not be more than 5 g (0.18 oz.). To keep within the permissible piston pin play of 0.010 to 0.016 mm (0.0004 to 0.00063"), use connecting rods, piston pins and pistons of the same colour (see Table 8).

Colour Code for Connecting Rod, Piston Pin and Piston Assemblies
in mm (in.)

Table 8

Colour	Bore of connecting rod bushing	Piston pin dia.	Play	dia. of piston pin boss	
				Mahle pistons	Nüral pistons
Black	<u>22.007</u>	<u>21.997</u>	0.010 -0.016 (0.0004-0.00063)	<u>21.995</u>	<u>21.994</u>
	22.010 (0.86642) (0.86653)	21.994 (0.86602) (0.86590)		21.992 (0.86594) (0.86583)	21.997 (0.86590) (0.86602)
White	<u>22.010</u>	<u>22.000</u>	0.010 -0.016 (0.0004-0.00063)	<u>21.995</u>	<u>21.997</u>
	22.013 (0.86653) (0.86665)	21.997 (0.86614) (0.86602)		21.998 (0.86594) (0.86606)	22.000 (0.86602) (0.86614)