

Checking and Replacement of Valve Guides

Types 220 and 220a

Operation No.
M 26

Two designs of valve guides and valve packings are used:

- Former design with sealing ring or repair design with two oil wiper rings (Fig. M 26/00).
- Later design with bell (Fig. M 26/01).

If single valve guides are to be replaced, install guides of the same design. When exchanging all the valve guides, install guides of the later design depicted in Fig. M 26/01 together with bell-shaped packing (see Fig. M 26 b/02).

All valve guides used in an engine must be of the same design.

Dimensions of Valve Guides and Bores in Cylinder Head

in mm (in.)

Former design

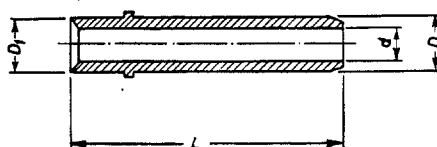


Fig. M 26/00

Table 14a

	Size	Bore in cylinder head	Valve guide				
			Colour code	Outer dia. D	Outer dia. D ₁	Inner dia. d	Length L
Intake valve	Standard size	<u>14.000</u> 14.018 (0.55118) (0.55189)	red	<u>14.008 (0.55149)</u> 13.997 (0.55106)	<u>13.800 (0.54331)</u> 13.789 (0.53898)	<u>9.000 (0.35433)</u> 9.015 0.35492)	69.5 (2.74)
		white	<u>14.012 (0.55165)</u> 14.001 (0.55122)				
	1st oversize	<u>14.200</u> 14.218 (0.55905) (0.55976)	red	<u>14.208 (0.55936)</u> 14.197 (0.55893)	<u>13.800 (0.54331)</u> 13.789 (0.53898)	<u>9.000 (0.35433)</u> 9.015 0.35492)	
Exhaust valve	Standard size	<u>14.000</u> 14.018 (0.55118) (0.55189)	red	<u>14.008 (0.55149)</u> 13.997 (0.55106)	<u>13.800 (0.54331)</u> 13.789 (0.53898)	<u>10.000 (0.39370)</u> 10.015 (0.39429)	48.5 (1.91)
		white	<u>14.012 (0.55165)</u> 14.001 (0.55122)				
	1st oversize	<u>14.200</u> 14.218 (0.55905) (0.55976)	red	<u>14.208 (0.55936)</u> 14.197 (0.55893)	<u>13.800 (0.54331)</u> 13.789 (0.53898)	<u>10.000 (0.39370)</u> 10.015 (0.39429)	

The overlap of the valve guide in relation to the bore in the cylinder head (cast iron) should be + 0.003 mm (0.00012"). In actual practice the overlap is not checked. When the valve guide is put on the bore, the valve guide should just touch.

Permissible play between valve stem and bore of valve guide:

Intake valve 0.003–0.065 mm (0.0012–0.0025") Exhaust valve 0.05–0.085 mm (0.002–0.0033")

Later design

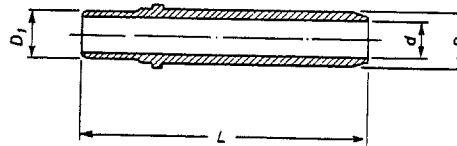


Fig. M 26/01

Table 14b

	Size	Bore in cylinder head	Valve guide				
			Colour code	Outer dia. D	Outer dia. D ₁	Inner dia. d	Length L
Intake valve	Standard size	$\frac{14.006}{14.012}$ (0.55142) (0.55165)	red	$\frac{14.013}{14.019}$ (0.55169) (0.55193)	$\frac{11.9}{12.1}$ (0.468) (0.476)	$\frac{9.000}{9.015}$ (0.35433) (0.35492)	73 (2.87)
		$\frac{14.012}{14.018}$ (0.55165) (0.55189)	white	$\frac{14.019}{14.025}$ (0.55193) (0.55216)			
	1st oversize	$\frac{14.200}{14.218}$ (0.55905) (0.55976)	red	$\frac{14.207}{14.225}$ (0.55932) (0.56003)	$\frac{11.9}{12.1}$ (0.468) (0.476)	$\frac{9.000}{9.015}$ (0.35433) (0.35492)	73 (2.87)
	2nd oversize	$\frac{14.400}{14.418}$ (0.56693) (0.56764)	white	$\frac{14.407}{14.425}$ (0.56720) (0.56791)	$\frac{11.9}{12.1}$ (0.468) (0.476)	$\frac{9.000}{9.015}$ (0.35433) (0.35492)	73 (2.87)
Exhaust valve	Standard size	$\frac{14.006}{14.012}$ (0.55142) (0.55165)	red	$\frac{14.013}{14.019}$ (0.55169) (0.55193)	$\frac{11.9}{12.1}$ (0.468) (0.476)	$\frac{10.000}{10.015}$ (0.39370) (0.39429)	58 (2.28)
		$\frac{14.012}{14.018}$ (0.55165) (0.55189)	white	$\frac{14.019}{14.025}$ (0.55193) (0.55216)			
	1st oversize	$\frac{14.200}{14.218}$ (0.55905) (0.55976)	red	$\frac{14.207}{14.225}$ (0.55932) (0.56003)	$\frac{11.9}{12.1}$ (0.468) (0.476)	$\frac{10.000}{10.015}$ (0.39370) (0.39429)	58 (2.28)
	2nd oversize	$\frac{14.400}{14.418}$ (0.56693) (0.56764)	white	$\frac{14.407}{14.425}$ (0.56720) (0.56791)	$\frac{11.9}{12.1}$ (0.468) (0.476)	$\frac{10.000}{10.015}$ (0.39370) (0.39429)	58 (2.28)

The overlap of the present valve guide design is + 0.003 mm (0.00012") in the case of a cast iron cylinder head and + 0.007 mm (0.00027") in the case of a light metal cylinder head. Select the valve guide bushing according to the bore in the cylinder head; if necessary, grind an oversize valve guide down to the required size. Make it a rule to check all guides for snug seat; this is of particular importance in light metal cylinder heads.

Permissible play between valve stem and bore of valve guide:

Intake valve 0.03–0.065 mm (0.0012–0.0026")

Exhaust valve 0.05–0.085 mm (0.002–0.003")

Special Tools:

Plug gauge for intake valve guide	636 589 00 21
Plug gauge for exhaust valve guide	187 589 01 21
Hand honing tool	000 589 01 67
Drift	136 589 00 39
Adjustable reamer	000 589 04 53
Pressing-in punch	187 589 10 39

Procedure:

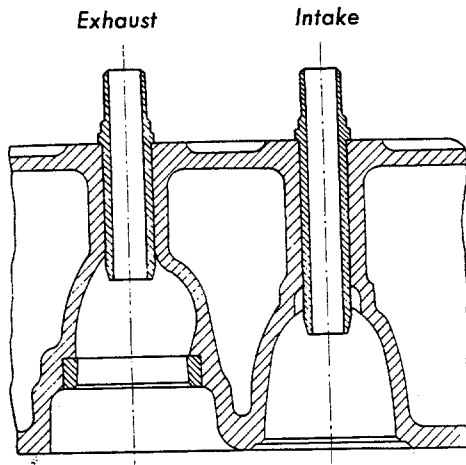


Fig. M 26/02

1. Clean valve guides with a cylindrical brush of 10 mm (0.4") diameter.
2. Check bores with the plug gauge. The gauge should just fall in on "go" side, but only touch slightly on "not go" side. If the plug gauge can be inserted on the "not go" side, the guide must be replaced.
3. Remove hardened oil carbon deposits in guides with a hone or wire brush.
4. Drive guides that are to be replaced out with drift 136 589 00 39.

5. Before driving in the new valve guide, check basic bore in cylinder head. The standard size of bore is 14.000 to 14.018 mm (0.55118 to 0.55189"). Upset spots must be smoothed.

If the standard size is exceeded, rework the basic bore to the next oversize.

Note: Rework the basic bore strictly perpendicular to the cylinder head mating surface.

6. Select valve guide so that the overlap will be + 0.003 mm (0.00012") in the case of a cast iron cylinder head and + 0.007 mm (0.00027") in the case of a light metal cylinder head. If no valve guide with the required overlap is available, regrind or return a guide with a larger outer diameter on an arbor to the required size and smooth it.

7. Before driving in the valve guide, coat it with tallow. To drive in the guide, use punch 187 589 10 39. The valve guide collar should sit snugly on the cylinder head surface.

Note: If possible, install guide in undercooled condition.

8. Check whether the valve guide is properly seated in the cylinder head by attempting to drive the guide out by means of a suitable plastic punch tapped **lightly** with a hammer. If the guide remains in its position, the overlap is correct. However, if the guide can be driven out by light taps it will be necessary to install a guide with a larger outer diameter.
9. After the valve guide has been pressed in, check bore with a plug gauge. Make sure that the guide is strictly perpendicular to the cylinder head mating surface.