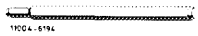
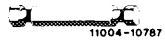
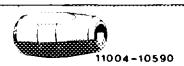
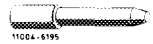
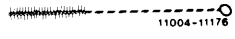
Valve guides

	Step adjustment and part no.	OD	Color code	Basic bore in cylinder head	Overlap[1])	Valve guide ID
Intake	Standard dimension 116 050 36 24	14.043—14.050	grey-brown	14.030—14.035	0.008—0.020	9.000—9.015
	Repair stage 116 050 37 24	14.214—14.222	red	14.198—14.203	0.011—0.024	
Exhaust	Normal dimension 116 050 41 24	15.043—15.050	grey-brown	15.030—15.035	0.008—0.020	11.000—11.018
	Repair stage 116 050 42 24	15.214—15.222	red	15.193—15.203	0.011—0.024	

[1]) Overlap should be between 0.007 and 0.025 mm.

Special tools

Plug gauge 9 mm dia. intake valve guide	 11004-6211	117 589 03 23 00
Plug gauge 11 mm dia. exhaust valve guide		117 589 04 23 00
Drive-out punch 9 mm dia. intake	 11004-6194	110 589 02 15 00
Drive-out punch 11 mm dia. exhaust		110 589 03 15 00
Plug gauge for valve guide basic bore	 11004-10787	117 589 05 23 00
Reamer 14.035 mm dia. intake	 11004-10587	110 589 03 53 00
Reamer 15.035 mm exhaust		110 589 02 53 00
Broach 14.2 mm dia. intake	 11004-6196	115 589 00 53 00
Broach 15.2 mm dia. exhaust		110 589 00 53 00
Guide sleeve for broach intake 14.2 mm dia.	 11004-10589	102 589 01 63 00
Guide sleeve for broach exhaust 15.2 mm dia.	 11004-10590	117 589 00 63 00
Drive-in punch 9 mm dia intake	 11004-6195	110 589 00 15 00
Drive-in punch 11 mm dia. exhaust		110 589 01 15 00
Reamer 8.99 mm dia. H 7 intake	 11004-6197	000 589 10 53 00
Reamer 10.99 mm dia. H 7 exhaust		000 589 15 53 00
Cylinder brush 20 mm dia.	 11004-11176	000 589 10 68 00

Association engines – guide sleeve – broaches

Engine	Valve	Valve guide basic bore mm	Guide sleeve part no.	Page	Broach part no.
116, 117	Intake	14.2	102 589 01 63 00	A	115 589 00 53 00
116, 117	Exhaust	15.2	117 589 00 63 00	B	110 589 00 53 00

Note

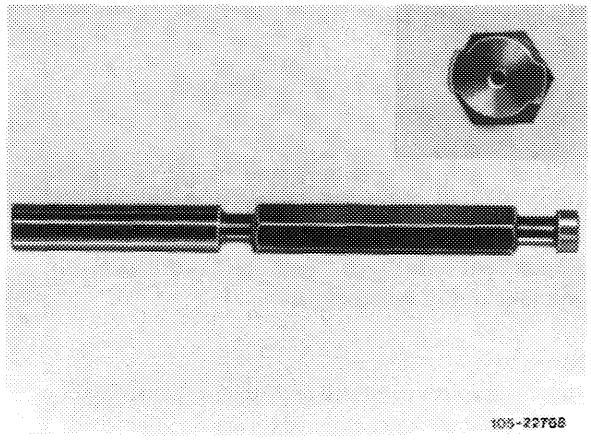
In the event of repairs, insert valve guides of normal dimension (gray-brown) into cylinder heads with standard normal dimension valve guides. First ream basic bores with reamers 14.035 mm dia. (intake) or 15.035 mm dia. (exhaust), so that the overlap will not be too high.
Basic bores in which no adequate force fit is attained with standard dimension valve guide (gray-brown) (minimum overlap 0.007 mm) must be reamed with reamers for repair stage valve guides (red).
Knock broaches through basic bores by means of a plastic hammer and with the aid of guide sleeves.

Checking valve guides

On disassembled cylinder head check both sides of valve guide by means of plug gauge, each time in longitudinal and transverse direction (4 measuring points). First clean bores of valve guides by means of cylinder brush.

Valve guides, into which the not-go plug with the limit wear dimension (+220) can be inserted at one point with its full height (5 mm) must be replaced.

Valve guides, which are worn outside at seat of valve stem seal, in such a manner that the valve stem seal is no longer firmly seated, should also be replaced.



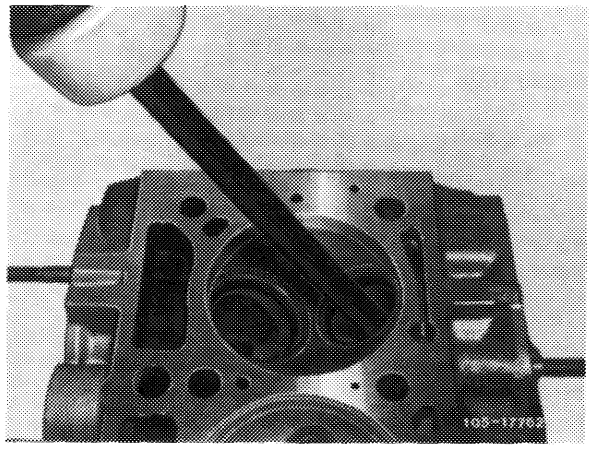
Renewing valve guides

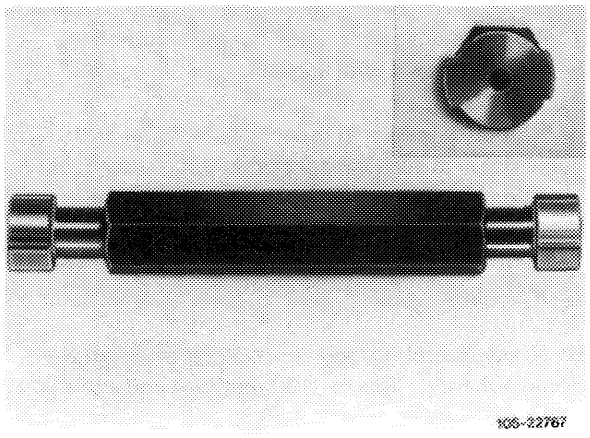
1 Knock-out valve guide by means of knocking-out punch from direction of combustion chamber.

2 Check valve guide basic bore by means of plug gauge in lengthwise and transverse direction at both bore ends.

Machine basic bores into which the measuring plug can be introduced at one point with its full height (8 mm) to repair stage.

If the plug gauge cannot be inserted fully or not completely, the basic bore may be reamed to normal valve guide dimension.



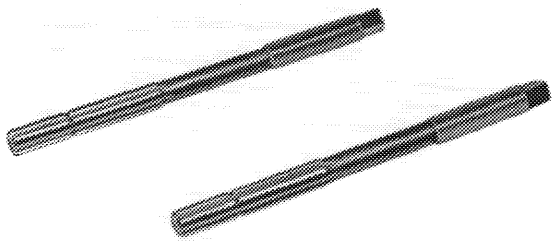


Machining basic bore

Normal dimension

3 Ream basic bore with reamer 14.035 mm dia. or 15.035 mm dia. while lubricating with kerosene. Ream at low pressure and do not cant reamer. Always turn reamer in forward direction **(never backward)** and take out of bore below.

Note:
Handle reamers carefully and store in protective sleeve, so that the cutting edges are not damaged.



105-21802

Machining basic bore

Repair stage

4 De-soot and clean cylinder head perfectly, in particular inside of valve seat rings.

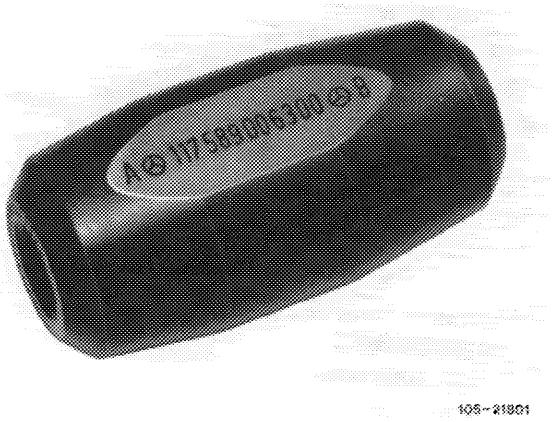
5 Clean cutting edges of broach from metal chips prior to each broaching step (use stiff plastic brush or the like).

6 Select correct guide sleeve (refer to table). Make sure that the guide sleeve is always centered at ID of respective valve seat ring only and is not coming into contact with residue soot, casting lubs, walls of intake and exhaust ducts etc.

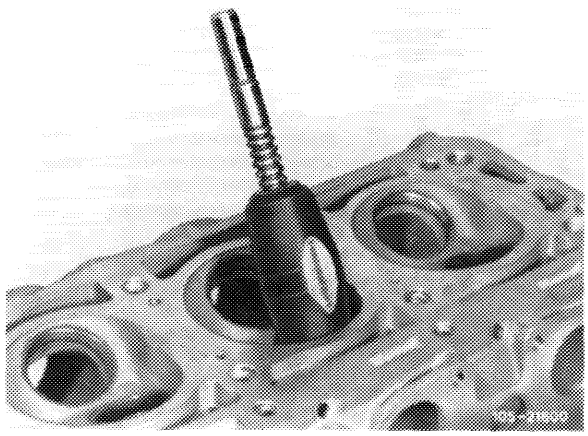
7 Provide guide sleeve, basic bore and complete broach generously with engine oil.

8 Introduce broach in broaching direction into guide sleeve in such a manner that upon subsequent insertion of guide sleeve into cylinder head the broach enters into the bore to be broached up to first cutting edge. Center sleeve by rotating motions in valve seat ring.

9 Knock broach through bore by means of an aluminium mandrel approx. 130 mm long and a plastic hammer weighing approx. 250 g.



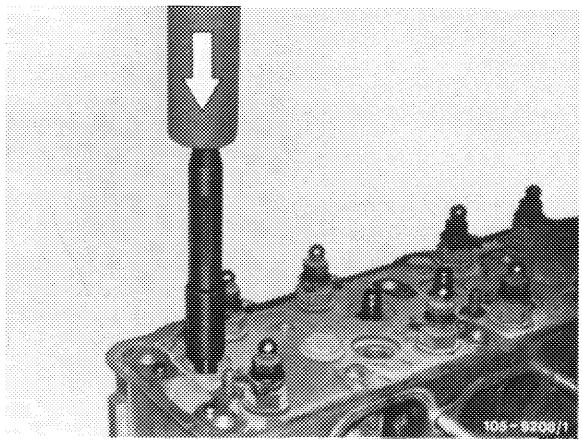
105-21801



Inserting valve guide

10 Undercool valve guide in liquid nitrogen (approx. 3 minutes) and insert.

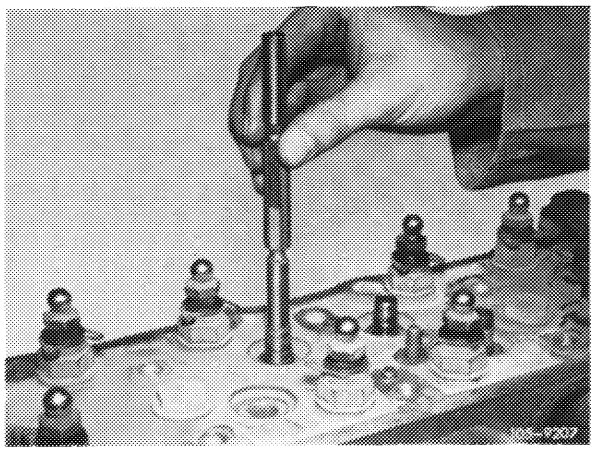
If no liquid nitrogen is available, heat cylinder head in a water bath to approx. 80 °C. Coat valve guide with tallow or oil and knock-in with knocking-in mandrel until the circlip rests against cylinder head.



11 Check valve guide for firm seat with cylinder head cooled down.

12 Check ID of valve guide by means of plug gauge.

The "go" end should completely slip in.



13 If required, ream ID with reamer.

14 Check valve seats for runout and refinish, if required.