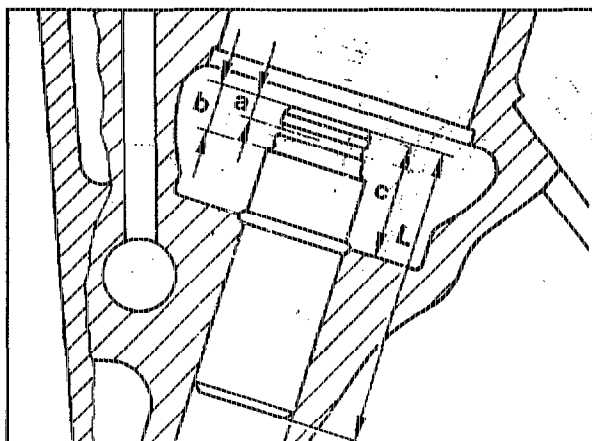


05-2850 Replacing valve guides

Preceding work:
Valve guides checked (05-2845).

A. Engine 119.960/97 with nonferrous metal valve guides



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Valve guides and basic bores

Engine 119.960 ¹⁾

	Standard size	Standard size I	Repair size I
Basic bore in cylinder head	13.50 – 13.51	13.53	13.70
Valve guide OD and colour code	13.52 – 13.53	13.52 – 13.53 grey – green 13.54 – 13.55 grey – brown	13.71 – 13.72 red
Overlap		0.012 – 0.031	
	Inlet		Exhaust
Valve guide ¹⁾ ID	8.000 – 8.015		9.000 – 9.015
Length l	35.5		37.9
Dimension a	2.7 – 2.9		2.7 – 2.9
b	5.4 – 5.6		5.4 – 5.6
c	10.8 – 11.2		8.2 – 8.6

¹⁾ Valve guides with ID inlet 8 mm and exhaust 9 mm up to engine end no. 119.960 12 011 930

Valve guides and basic bores

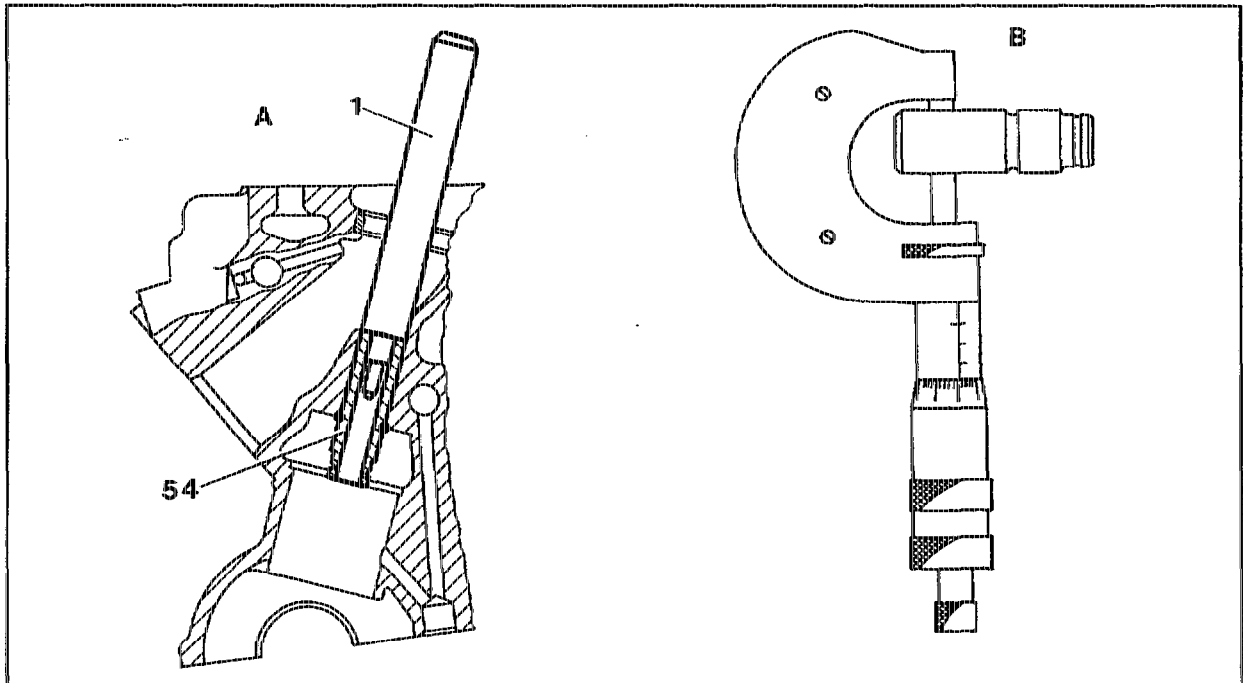
Engine 119.960 ²⁾

Engine 119.97 ²⁾

	Standard size	Standard size I	Repair size I
Basic bore in cylinder head	13.50 – 13.51	13.53	13.70
Valve guide OD and colour code	13.52 – 13.53	13.52 – 13.53 grey – green 13.54 – 13.55 grey – brown	13.71 – 13.72 red
Overlap		0.012 – 0.031	
	Inlet		Exhaust
Valve guide ²⁾ ID	7.000 – 7.015		7.000 – 7.015
Length l	35.5		40.5
Dimension a	2.7 – 2.9		2.7 – 2.9
b	5.4 – 5.6		5.4 – 5.6
c	10.8 – 11.2		10.8 – 11.2

²⁾ Valve guide with ID 7 mm, as of engine end no. 119.960 12 011 931 up to 119.960 12 035 320
 119.970 12 021 286
 119.971 12 010 034
 119.974 12 004 781
 119.975 12 004 281

Knocking out valve guide



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- A Knock out valve guide
- B Measure valve guide OD

Valve guide (54)

knock out with drift (1) from combustion chamber side.

Removal drift 103 589 03 15 inlet dia. 8 mm

Removal drift 103 589 02 15 inlet, exhaust dia. 7 mm and 9 mm with basic bore 13.5 mm

Measuring valve guide

OD

measure with micrometer.

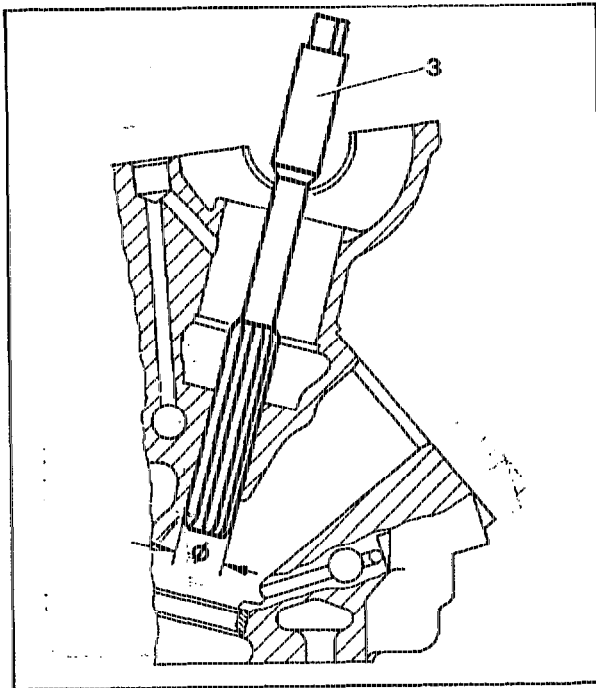
Determine which valve guide is installed. Match up next larger valve guide, see table.

Basic bore in cylinder head

ream to standard size I or to repair size I depending on matched valve guide.

Standard size I

(Ream basic bore with reamer)



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Basic bore

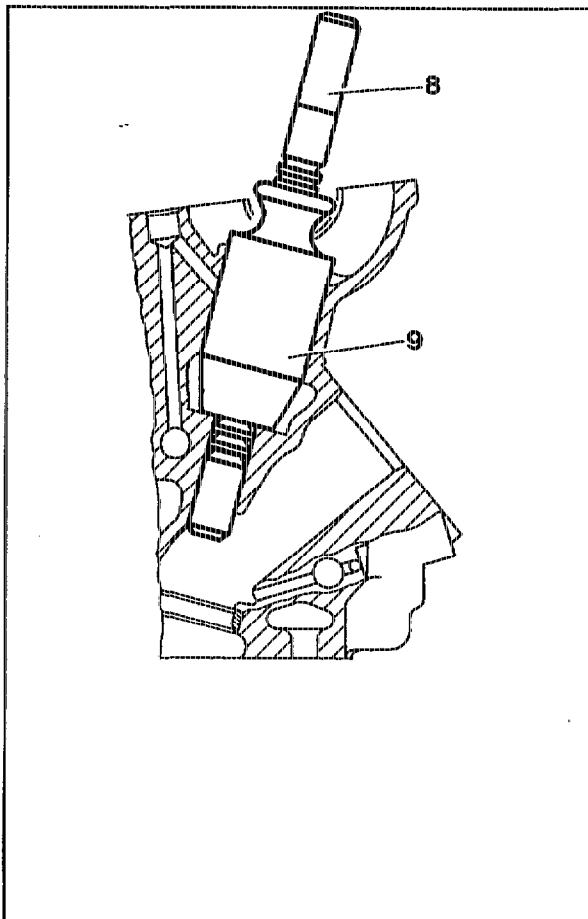
ream through with reamer (3).

Use reamer 104 589 00 53 00 for basic bore of 13.53 mm.

Note

Lubricate with petroleum. Ream with only a slight pressure and do not twist reamer (3). Clean blades of reamer before each reaming operation.

Repair size I
 (Ream basic bore with broaching tool)

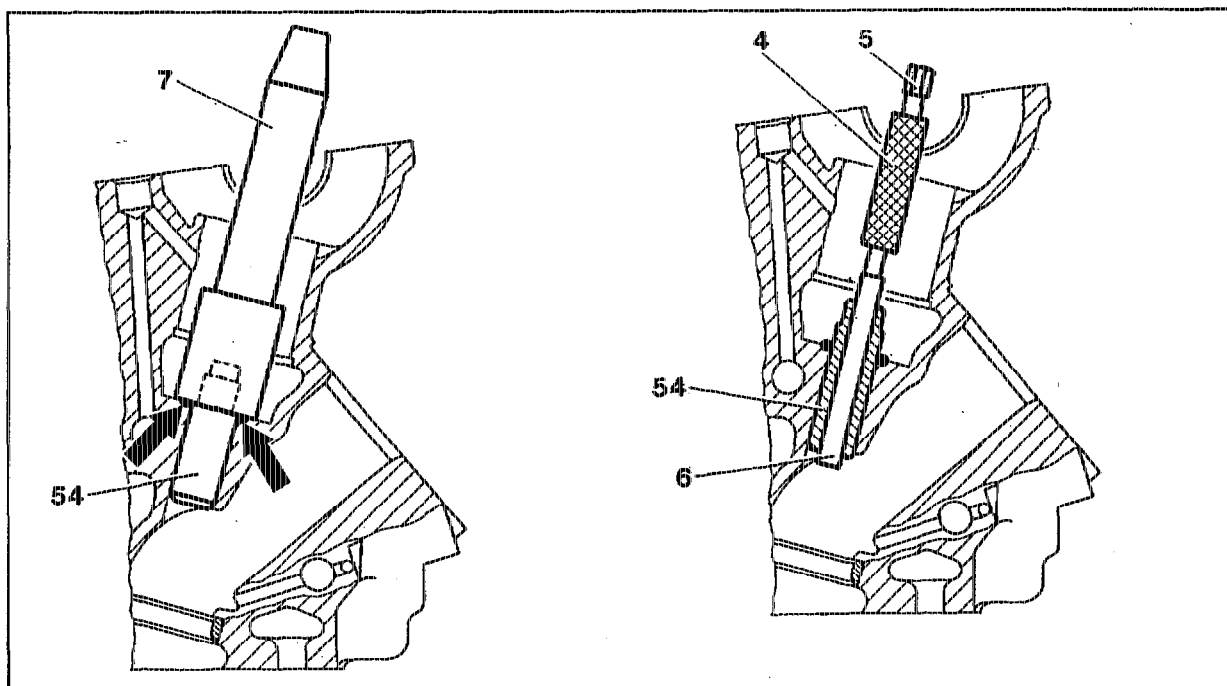


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- | | |
|---|---|
| Blades of broaching tool (8) | clean with compressed air or plastic brush before each broaching operation. |
| Guide sleeve (9) and broaching tool (8) | insert into bucket tappet basic bore. Use guide sleeve 104 589 01 63 00 and broaching tool 104 589 01 53 00 for basic bore 13.7 mm. |
| Broaching tool (8) | press through. |

Note
 Lubricate with petroleum. Clean broaching tool (8) with compressed air after each broaching operation.

Inserting valve guide, checking ID



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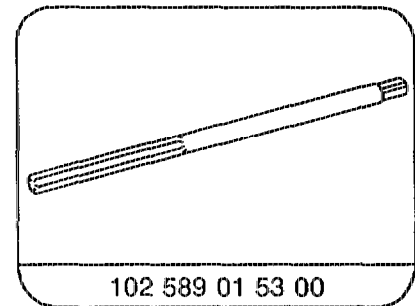
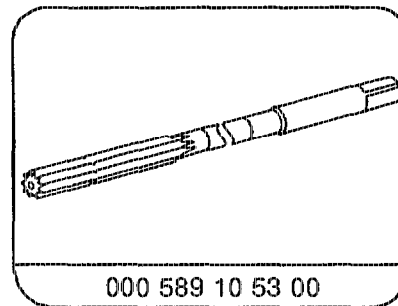
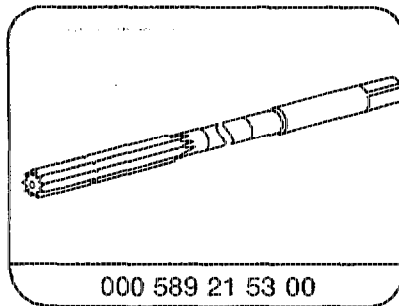
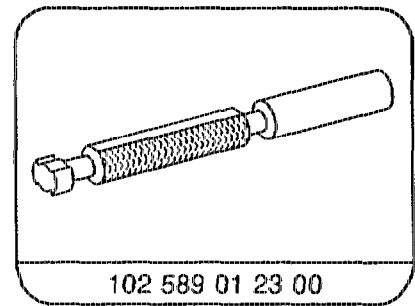
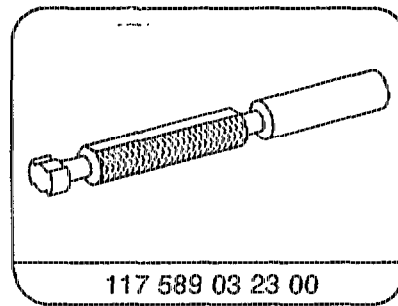
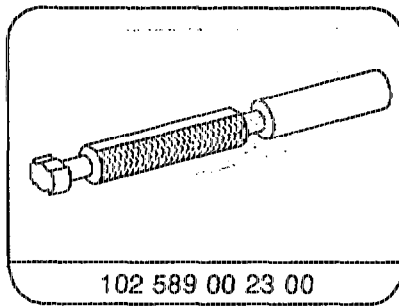
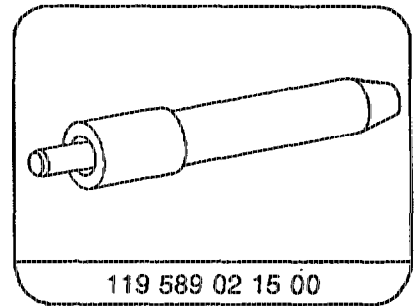
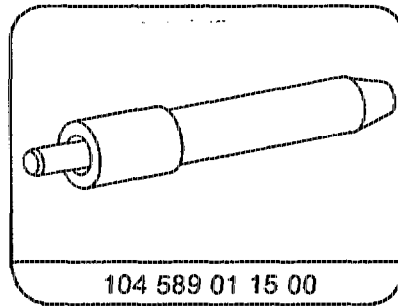
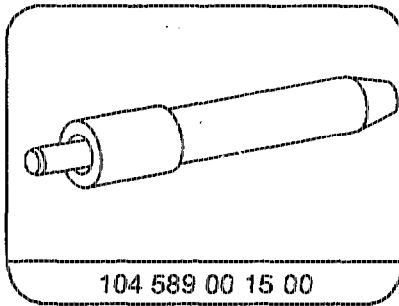
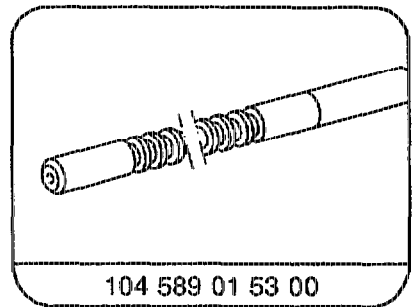
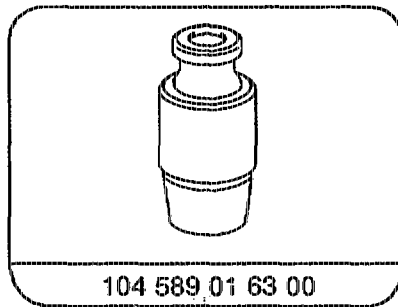
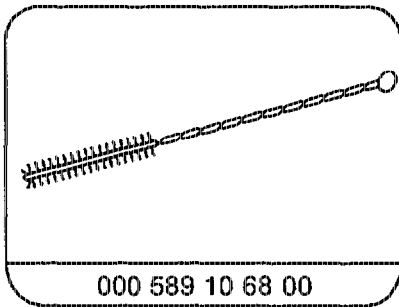
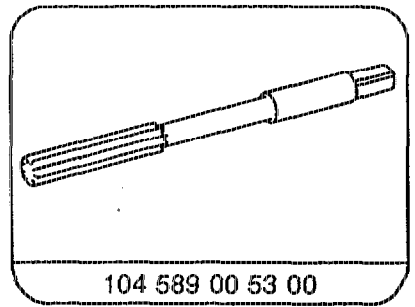
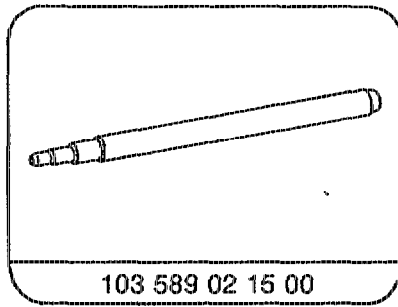
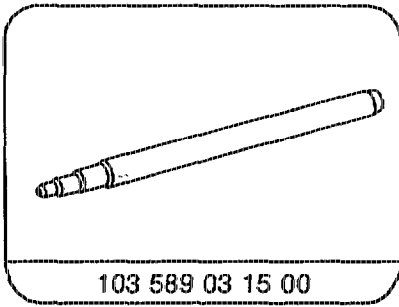
- Valve guide (54) supercool in liquid nitrogen (about 3 minutes).
- If no liquid nitrogen is available heat cylinder head in water bath to approx. 80 °C.

- Valve guide (54) knock in as far as stop (arrows) with insertion drift (7).
- Insertion drift 104 589 00 15 00 inlet
 Ø 8 mm.
- Insertion drift 104 589 01 15 00 exhaust
 Ø 9 mm.
- Insertion drift 119 589 02 15 00 inlet, exhaust
 Ø 7 mm.

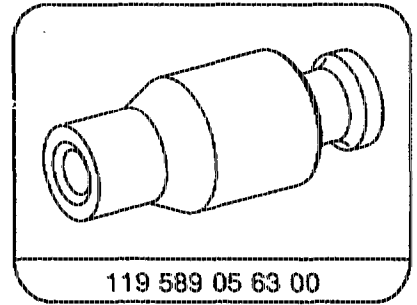
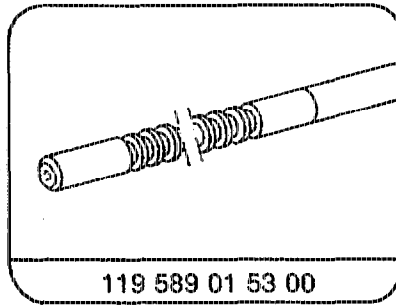
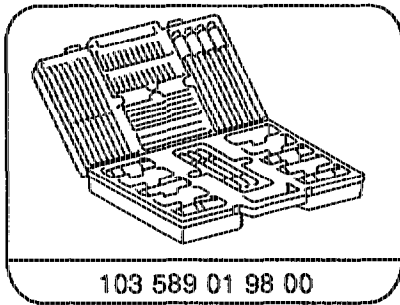
- Valve guide (54) check if tightly seated if cylinder cool.
- ID of valve guide (54) check with gauging drift (4).
- Gauging drift 102 589 00 23 00 inlet
 dia. 8 mm.
- Gauging drift 117 589 03 23 00 exhaust
 dia. 9 mm.
- Gauging drift 102 589 01 23 00 inlet, exhaust
 dia. 7mm.

- Go side (6) of gauging drift (4) must be possible to insert fully.
- ID ream with reamer, if necessary.
- Reamer 000 589 21 53 00 inlet dia. 8 mm.
- Reamer 000 589 10 53 00 exhaust dia. 9 mm.
- Reamer 102 589 01 53 00 inlet, exhaust
 dia. 7 mm.

Special tools



Special tools



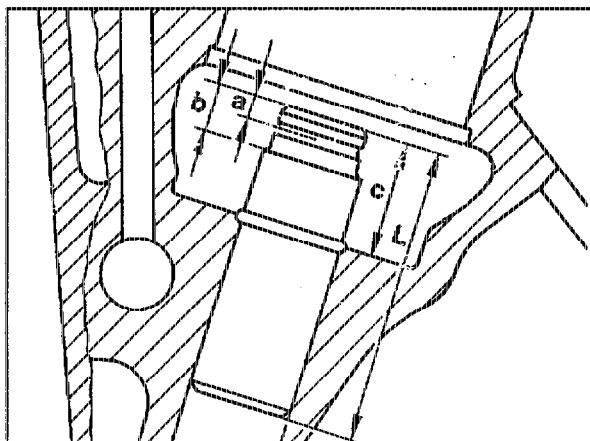
Commercially available tools

Cylinder head tensioning device

e.g. Hunger
D-8000 München 70
Order no. 221.60.000

Micrometer 0.25 mm

B. Engines 119.960/97/98 with sintered metal valve guides

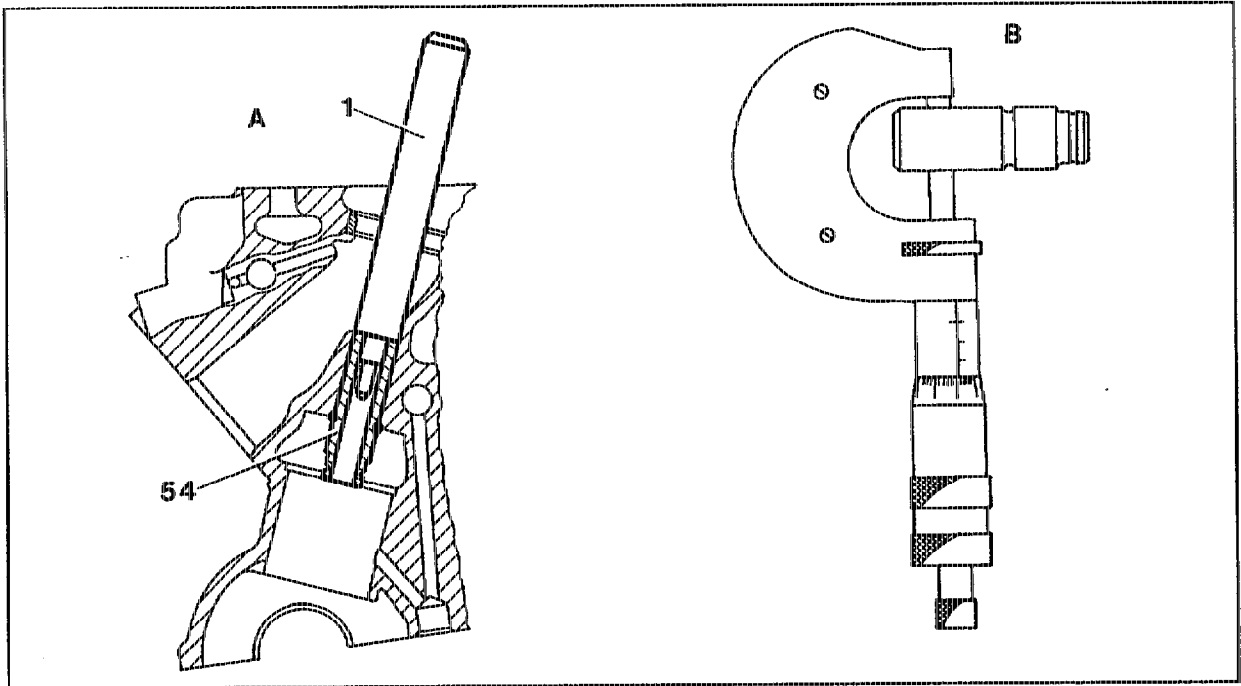


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Valve guides ¹⁾ and basic bores

	Standard size	Standard size I	Repair size I
Basic bore in cylinder head	12.50 – 12.51	12.53	12.70
Valve guide OD and colour code	12.54 – 12.55	12.56 – 12.57 grey	12.74 – 12.75 red
Overlap		0.029 – 0.051	
		Inlet / Exhaust	
Valve guide ID		7.000 – 7.015	
Length l		37.5	
Dimension a		–	
b		5.4 – 5.6	
c		10.2 – 10.4	

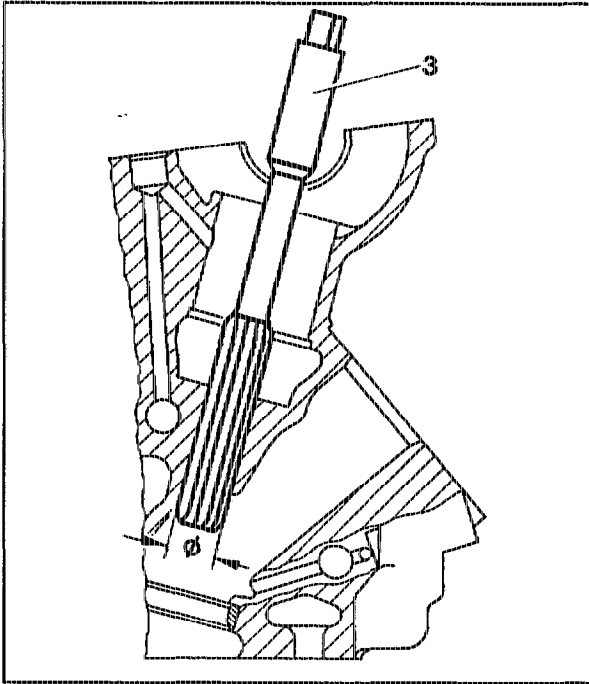
¹⁾ Sintered metal valve guides, without circlip and groove, as of engine no. 119.960 12 035 331
 119.970 12 021 287
 119.971 12 010 035
 119.972 as of start of production
 119.974 12 004 782
 119.975 12 004 282
 119.98 as of start of production



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Valve guide (54)	knock out with drift (1) from combustion chamber side.
	Removal drift 111 589 02 15 00 inlet, exhaust Ø 7 mm with basic bore of 12.5 mm.
Measuring valve guide	
OD	measure with micrometer.
	Determine which valve guide is installed. Match up next larger valve guide, see table.
Basic bore in cylinder head	ream to standard size I according to matched valve guide.
or	broach repair size I.

Standard size I
(Ream basic bore with reamer)



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Basic bore

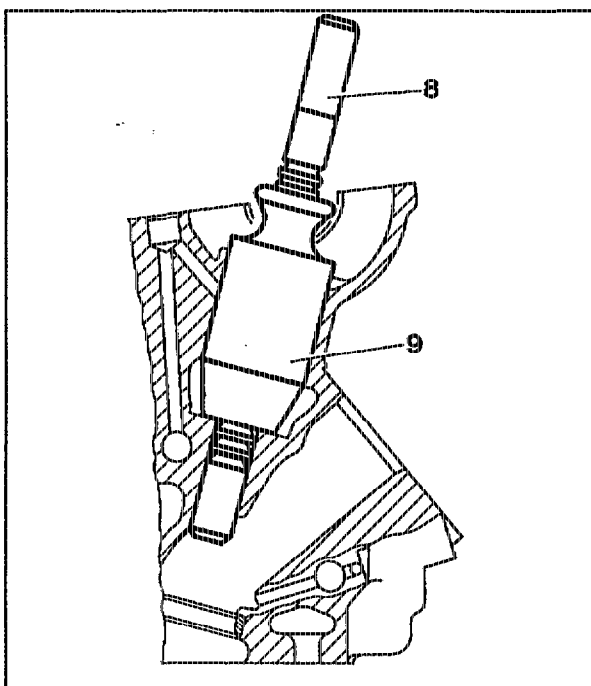
ream through with reamer (3).

Use reamer 119 589 00 53 00 for basic bore of 12.53 mm.

Note

Lubricate with petroleum. Ream with only a slight pressure and do not twist reamer (3). Clean blades of reamer before each reaming operation.

Repair size I
 (Rear basic bore with broaching tool)

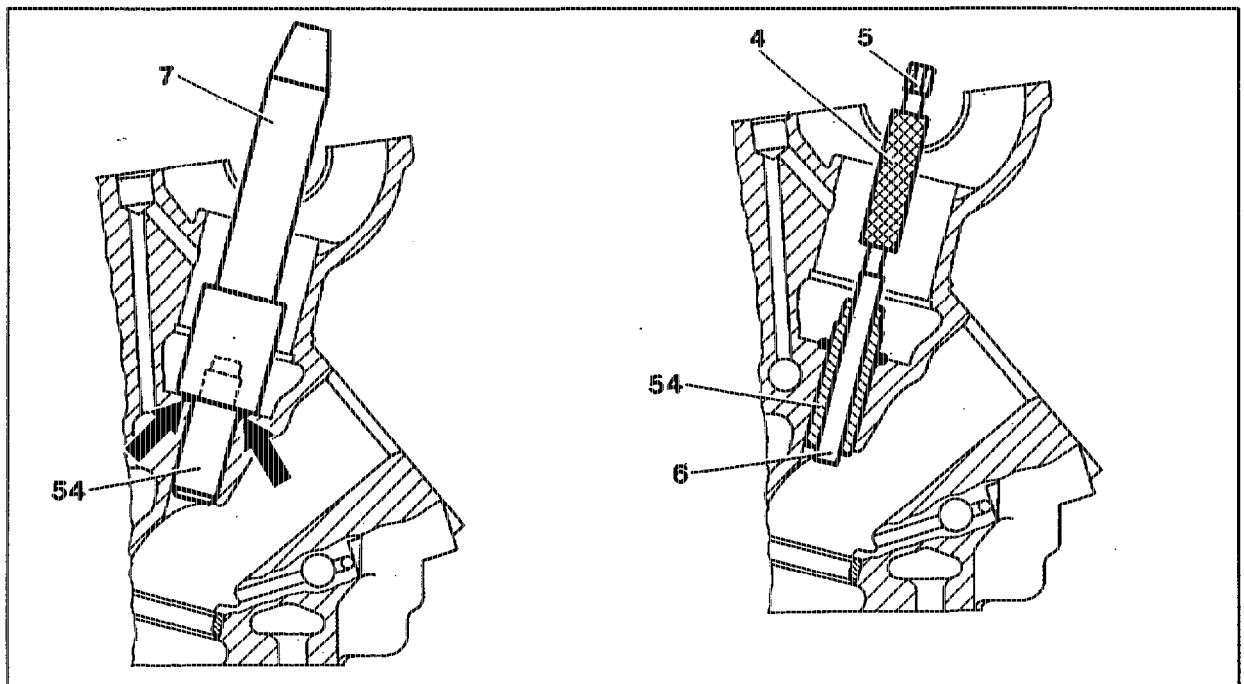


P05-5375-15

- | | |
|---|--|
| Blades of broaching tool (8) | clean with compressed air or plastic brush before each broaching operation. |
| Guide sleeve (9) and broaching tool (8) | insert into bucket tappet basic bore.
Use guide sleeve 119 589 05 63 00 and broaching tool 119 589 01 53 00 for basic bore 12.7 mm. |
| Broaching tool (8) | press through. |

Note
 Lubricate with petroleum. Clean broaching tool (8) with compressed air after each broaching operation.

Inserting valve guide, checking ID



P05-5389-55

- | | |
|--|--|
| Valve guide (54) | moisten on outside with oil. |
| | Note |
| | It is not necessary to heat the cylinder head or to cool the valve guide (54). |
| Valve guide (54) | knock in as far as stop (arrows) with insertion drift (7). |
| | Insertion drift 606 589 02 15 00 inlet, exhaust
Ø 7 mm. |
| | Note |
| | The circlip is not fitted to the sintered metal valve guides. The insertion depth is fixed by the insertion drift. |
| Installation depth (c) of valve guide (54) | check, correct if necessary. |
| Valve guide (54) | clean. |
| | Cylinder brush 000 589 10 68 00 |
| Valve guide (54) | check to ensure tight. |
| ID of valve guide (54) | check with inspection drift (4). |
| | Inspection drift 102 589 01 23 00 inlet, exhaust
Ø 7mm. |

Go side (6) of gauging drift (4) must be possible to insert fully.



If it is not possible to insert the gauge, the valve guide should be replaced as the material of the sintered metal versions is too hard for reaming.

Commercially available tools

Cylinder head clamping device

e. g. Hunger
D-8000 München 70
Order no. 221.60.000

Micrometer 0.25 mm

Special tools

