E. Replacement of Valve Seat Rings

If a valve seat ring has to be replaced, the old valve seat ring must be carefully milled out. This can be done with Valve Seat Ring Turning Tool 000 589 01 69. Instructions for the use of this tool are given.

Dimensions of Bores in Cylinder Head and Valve Seat Rings

Inlet

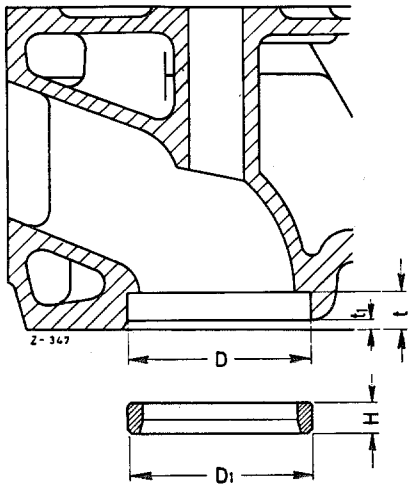

Fig. 01 — 5/8

Exhaust

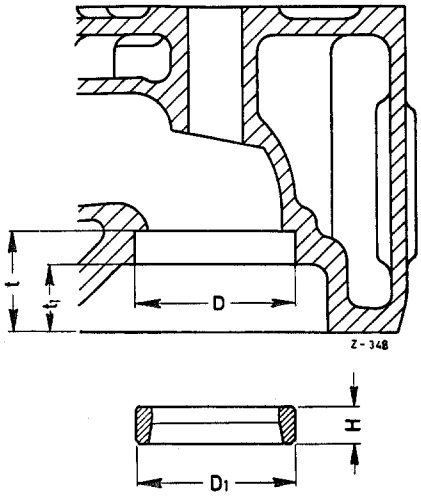

Fig. 01 — 5/9

Measurements in mm

	Overhaul stage	Milled-out well in cylinder head D	Diameter of valve seat ring D_1	Height of valve seat ring H	Depth in cylinder head t	Depth in cylinder head t_1
Inlet	Standard size	48.000 / 48.016	48.160 / 48.150	8.000 / 7.910	10.00 / 10.10	2
	1st Overhaul stage	48.500 / 48.516	(49.300)* / 48.660 / 48.650	8.000 / 7.910	10.00 / 10.10	2
Exhaust	Standard size	42.000 / 42.016	42.145 / 42.135	9.500 / 9.410	27.50 / 27.60	17.70 / 18.30
	1st Overhaul stage	42.500 / 42.516	(43.300)* / 42.645 / 42.635	9.500 / 9.410	27.50 / 27.60	17.70 / 18.30

* Rough-turning dimension

Force-fit oversize of the valve seat rings in cylinder head

Inlet = 0.134—0.160 mm
Exhaust = 0.119—0.145 mm

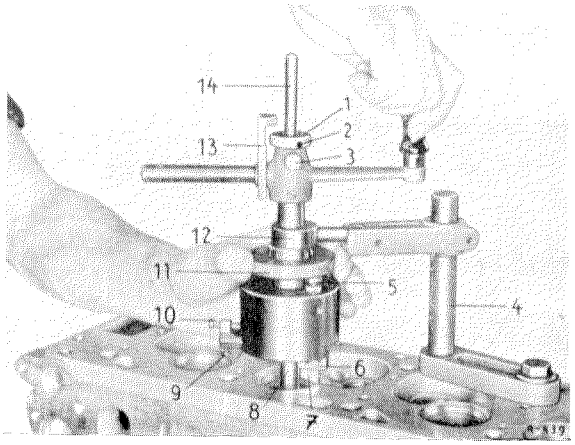

Fig. 01 — 5/10

1 Knurled nut for cut control
2 Locking screw
3 Locking screw
4 Holding stand
5 Rapid adjustment
6 Carriage
7 Cutter
8 Pilot with collet
9 Clamping screw
10 Stop screw
11 Feed control
12 Holding stand bearing
13 Stop
14 Contact mandrel

The turning tool is centered with the aid of a combined pilot (8) and bearing on which it is supported and it is held in position by means of a holding stand (4).

If the feed control (11) is held steady and the handle is turned, the carriage (6) moves from the inside to the outside with the cutter (7), describing a spiral path.

Movement in the radial direction is limited by the stop screw (10) which is locked by means of the clamping screw (9).

When the rapid adjustment (5) is turned, the carriage (6) returns to its original position.

After the cutter has been moved back, care must be taken to ensure that the lower nut of the rapid adjustment is tightened up again since otherwise the automatic feed control will be inoperative.

The cut control (determining the cutting depth) is operated by turning the knurled nut (1).

One graduation on the scale = 0.1 mm.

1. Clean and test the valve guide and if necessary, replace it (see Job No. 01 — 5, Section D).

2. Place the pilot with the collet (8) in the bore of the valve guide and fix it in position.

3. Screw the cutter (7) onto the carriage (6) with the aid of the carriage screw.

4. Set the cutter to the working diameter. The working diameter should be 0.6—0.8 mm smaller than the external diameter of the valve seat ring so that after the stock has been milled away, 0.3—0.4 mm remains.
   The working diameter is set by moving the carriage with the aid of the rapid adjustment (5). Release the lower nut and turn the upper nut until the required diameter is obtained. Then tighten up the lower nut again.
   After the working diameter has been set, the stop screw (10) is screwed in until it rests against the stop and is then locked by means of the clamping screw (9).
   Then once more release the lower nut of the rapid adjustment (5) and move the cutter inward by turning the upper nut.
   Once more fix the rapid adjustment in position by tightening up the lower nut.

5. Now push the turning tool over the pilot and adjust it for height. To do this, release the locking screw (2), press the contact mandrel downward and move the tool axially so that the cutter is approximately 0.5 mm below the upper edge of the valve seat ring. Then tighten up the locking screw; when this is done, the knurled nut (1) must be screwed downward and the locking screw (3) must be tightened.
   The stop nose (13) serves as a limiting stop to determine the milling depth.

6. Set up the holding stand (4) so that its bearing end is centrally located. Between the holding stand bearing (12) and the handle there must be a distance of at least 10 mm.

7. Now hold the feed control (11) steady and turn the handle. As soon as the stop screw (10) reaches its stop, release the feed control and give the handle one or two further turns.

8. Release the lower nut of the rapid adjustment (5) and, by turning the upper nut, once more move the cutter inward. Lock the rapid adjustment once more by tightening the lower nut.

9. Release the locking screw (3) and back out the knurled nut (1) about 5 graduations; this causes the cutter to be moved about 0.5 mm downward and thus a new cut can be made. This procedure should be repeated until the knurled nut (1) lies against the stop nose (13).

10. After finishing the milling process, take off the turning tool and the pilot and remove the remains of the valve seat ring.

11. Clean the valve seat ring recess and measure the diameter with Internal Micrometer 000 589 10 21 (Fig. 01 — 5/11).

    If the diameter lies within the specified tolerances — the permissible maximum increase in diameter is 0.02 mm — a valve seat ring of the same size may be installed again.

    An oversize fit of 0.12 mm in the case of the inlet valve and 0.10 mm in the case of the exhaust valve must be obtained in any case. If this fit is not obtained, the bore must be bored out to the next overhaul stage and a valve seat ring with a greater external diameter must be installed.

12. Heat the cylinder head to 60° C. and fit the valve seat ring, **preferably pre-cooled,** in the recess. Use a forcing drift with thrust collar to drive the ring home with light hammer taps. Tap the valve seat ring until it contacts the base of the bore all the way round.

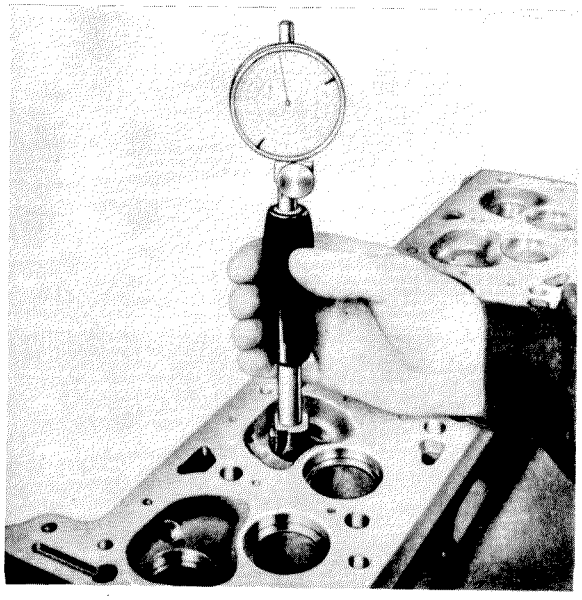

Fig. 01 — 5/11

Note: Liquid air or carbon dioxide snow may be used for pre-cooling the valve seat ring.

13. After a new valve seat ring has been pressed in, the ring should be carefully peened at three points.