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<b>Distribution list</b> Jenbach, Subsidiaries, Service Providers		
<b>Service Technician Instruction</b>	<b>ST-133</b>	11 November 2014

Engine type                    **Type 6 engines (612...620F & 624G/H)**

Subject                        **Cleaning of Cylinder Head Exhaust Valve Guides**

**Service Technician Instruction ST-133 describes all the steps necessary to clean cylinder head exhaust valve guides in order to remove deposits and mitigate against valve sticking events.**

#### SCOPE OF THIS BULLETIN

**This bulletin must be followed/implemented at every modification of a cylinder head according to Service Technician Instruction ST-134 (milling an additional oil drain groove).**

#### DESCRIPTION OF THE CONTENT

While the engine is shut down and cooling circuit empty, the steps below should be followed on every cylinder head in order to remove deposits from the exhaust valve guides and stems.

#### REQUIRED TOOLS

- Valve disassembly and re-assembly tool (p/n 317585)
- Snap ring pliers
- Magnetic probe
- Battery powered drill (speed 1000-1400rpm)
- Metal rod – 30cm long by 8mm diameter
- Scraper
- Emery cloth 240 grain and 400 grain
- Scotch Brite pad
- Masking tape (adhesive tape)
- Brake cleaner or similar solvent
- Compressed air
- Engine oil

#### REQUIRED PARTS

- 2 O-rings per cylinder head for the exhaust valve guides (p/n 456738)

#### METHOD

1. Shut down the engine in accordance with Technical Instruction TA 1100-0105 and ensure that unauthorized persons cannot start the engine as per TA 2300-0010.
2. Always follow the safety instructions in TA 2300-0005.

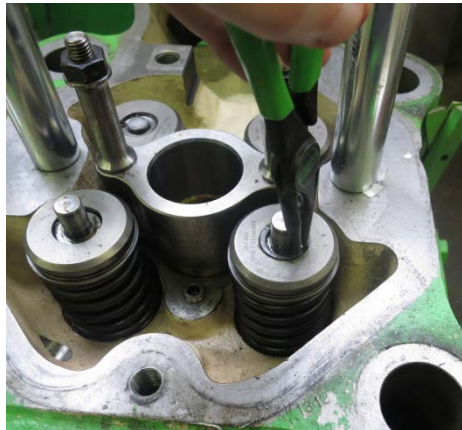
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3. Measure the valve wear. The cylinder head must be replaced if:  
...the cylinder head has  $\leq 15,000$  operating hours AND  
...at least one inlet or outlet valve shows  $\geq 2\text{mm}$  wear.  
Apart from this rule the plant-specific inspection and maintenance instructions remain valid.
4. Ensure to mark each component (left/right) in order to allow correct re-assembly.
5. Disassemble both exhaust valves by using special tool p/n 317585 (Picture 1). For disassembling valves remove the snap ring and the washer of the valve retainer (Picture 2). Install the tool as per Picture 3. Press down valve retainer with the tool to loosen the valve keys (Picture 4). Remove the valve keys by using a small magnet. Loosen the press piece of the tool and remove the retainer, the springs and the Rotocap. Remove valves from valve guide.



Picture 1 - Tool p/n 317585



Picture 2 - Removal of snap ring and washer



Picture 3 - Installation of tool



Picture 4 - Removal of valve keys by using a magnet

6. Check valve stems for any damage (bent valve, chips or scores), if any signs of damage are evident then the entire cylinder head should be replaced.
7. Clean the valve stems
  - Attach masking tape around the valve stem, above the scraper edge
  - Remove deposits by using a scraper, a 240 grain Emery cloth and a Scotch Brite pad



Picture 5 - Valve before cleaning



Picture 6 - Valve after cleaning



8. Fabricate guide machining tool as per Picture 7, length of rod should be approx. 30 centimetres with a diameter of 8mm. Length of cut should be 3mm less than the width of the Emery cloth that will be used (this means the top of the Emery cloth will sit above the end of the tool).  
REMARK: GE employees can obtain the tool at the Jenbacher Tooling Center. Since September 2013 it has also been attached to the 'Mobile milling machine for cylinder heads' (see ST-134).

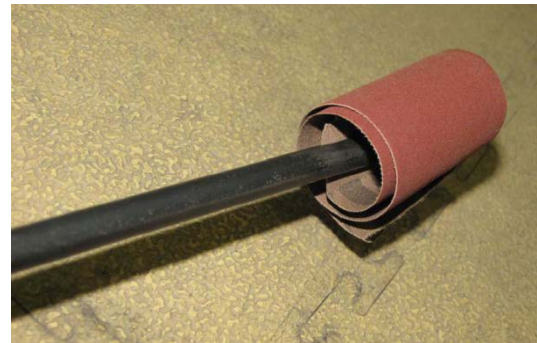


**Picture 7 – Valve guide machining tool**

9. Using 240 grain Emery cloth and attach to valve guide machining tool as per Pictures 8 and 9.

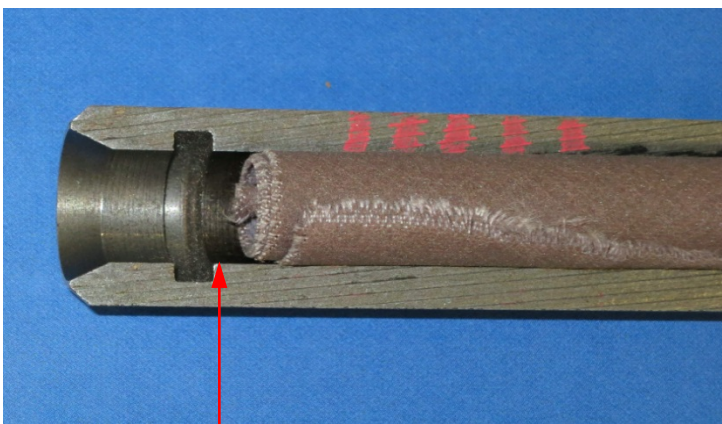


**Picture 8**



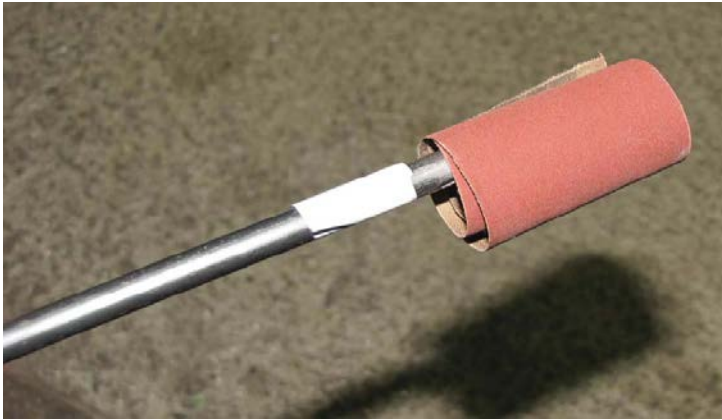
**Picture 9**

10. Insert tool into valve guide, locate tool so that the end of the tool stops before the O-ring located at the end of the valve guide (see Picture 10). Using adhesive tape mark the position of the tool in the valve guide. This then serves as a visual aid to avoid damaging the O-ring groove during the machining process (see Picture 11).



**Picture 10 – Tool stopping before O-ring groove**





Picture 11 – Self adhesive tape to mark depth of tool

11. Using a battery powered drill (speed 1000 – 1400rpm), see Picture 12. Insert the tool into the valve guide and move the tool in and out of the guide for 3 seconds. See Pictures 13 and 14.

**CAUTION:** During the machining process do not stop on a single point. Always move the tool in and out of the valve guide in a smooth movement.



Picture 12



Picture 13



Picture 14

12. Remove the tool and attach 400 grain Emery cloth and repeat the above machining step for 3 seconds.  
**CAUTION:** During the machining process do not stop on a single point. Always move the tool in and out of the valve guide in a smooth movement.
13. After machining of the guide is complete remove the O-ring in the valve guide. The guide and surrounding areas must be thoroughly flushed with brake cleaner or a similar solvent. Following this flushing procedure blow out the valve guide and surrounding area using compressed air.
14. Install new valve guide O-rings p/n 456738.
15. The valve should now be reassembled in reversed order of step 5, ensure valve stem is lubricated with engine oil prior to installation into the valve guide.  
**CAUTION:** Use only engine oil, do not use Grease. Each valve must be re-assembled into the seat it came from.
16. The cylinder position of the head should be recorded along with installation date and engine operating hours.

#### RELEVANT DOCUMENTS

All the relevant instructions are part of the plant documentation handed over to every customer on delivery of an engine. The latest versions of documents referred to here can be downloaded from the Jenbacher web portal at <http://information.jenbacher.com> under the heading "Technical Knowledge Base".

- Technical Instruction TA 1100-0105, Engine shut-down
- Technical Instruction TA 2300-0005, Safety instructions
- Technical Instruction TA 2300-0010, Guidelines for using the LOTO kit
- Service Technician Instruction ST-134, Fritz Winter cylinder heads – Modification by milling an additional oil drain groove

#### REVISION CODE

INDEX	DATE	DESCRIPTION / REVISION SUMMARY
03	Nov. 11, 2014	Changed the Scope of this Bulletin and aligned the valve wear related replacement interval for cylinder heads to the new scope definition
02	Oct. 02, 2013	Optimization of the organizational and technical procedure
01	Feb. 06, 2013	First version of this document

Table 01: Revision history