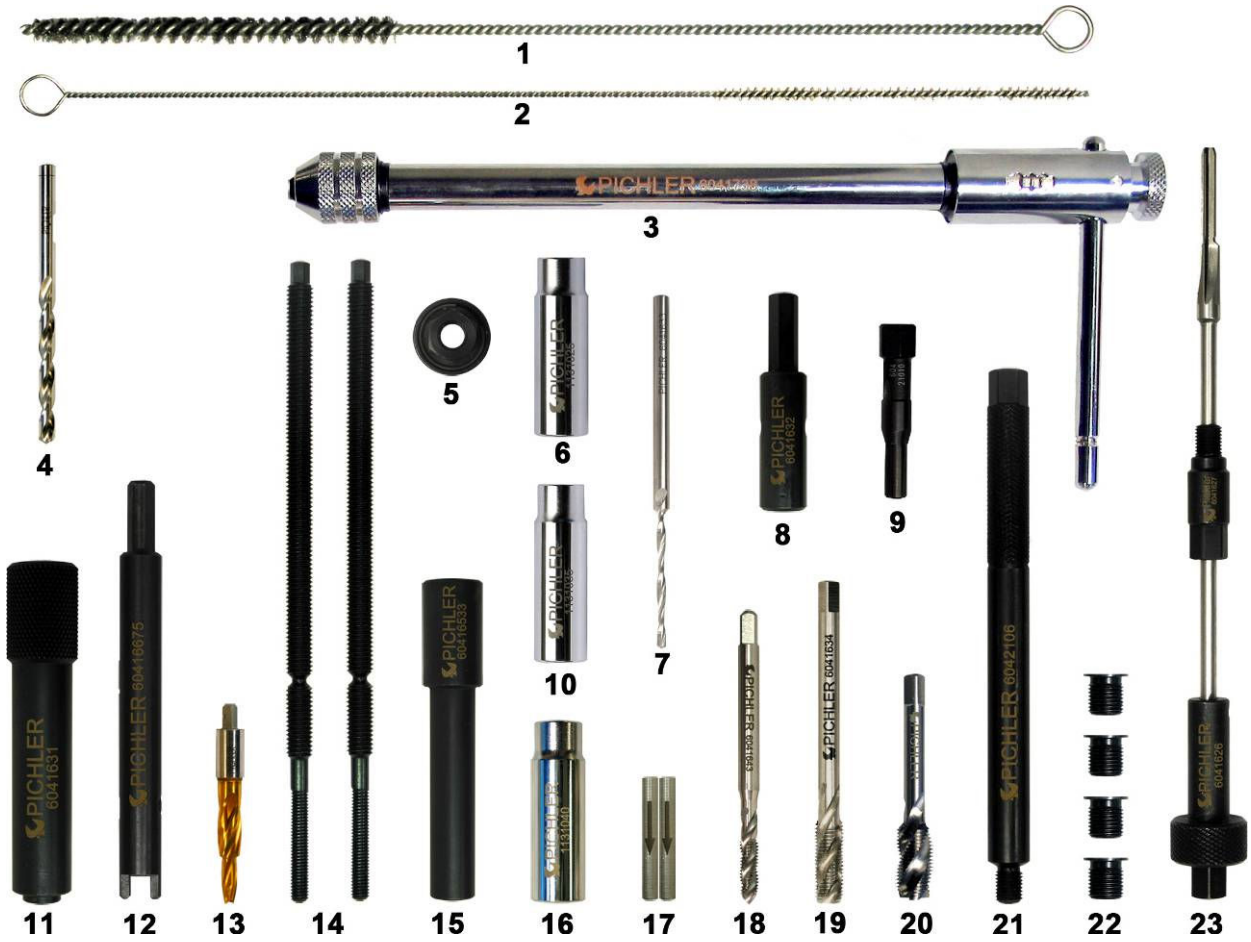
Work Instructions for the Glow Plug Repair-Set for Drilling out, Tread repair, Cleaning and Reaming of the Glow Plugs Shaft M8x1

p/n 60416300 / 60416305



Nr.	P/N	Description	60416300	60416305
1	6049027	Pipe Brush Cylindrical 300 x 100 x 7,0mm	1	1
2	6049024	Pipe Brush Cylindrical 300 x 100 x 4,7mm	1	1
3	6041738	Tool Holder with Ratchet "KEEPER" (long) M3 - M8	1	1
4	6041639	Special Drill Bit (4.5mm); for drilling the central electrode	1	1
5	60416536	Extraction Nut 4 -pcs with Bearing, Sleeve and Retaining Ring	1	1
6	1131025	Stud Puller Ø2,5mm, 1/4"	1	1
7	6041633	Special Drill Bit Ø2,6mm for drilling the central electrode	1	1
8	6041632	Adapter with a 6-sided external drive	1	1
9	60421010	Special Core Drill Ø9,0mm 51mm long	1	
10	1131035	Stud Puller Ø3,5mm, 1/4"	1	1
11	6041631	Drill Sleeve with inner thread M8x1	1	1
12	60416675	Tool Holder for the Special Drill	1	1
13	6041635	Shouldered Drill Ø7,0mm / Ø4,5mm	1	1
14	60416473	Spindle 180mm stepped M8 : UNF12	2	2
15	60416533	Support Sleeve	1	1
16	1131040	Stud Puller Ø4mm, 1/4"	1	1
17	6041641	Drill Sleeve Ø 2,7mm	2	2
18	6041643	Machine Tap UNF No. 12x28 HSSE	1	1
19	6041634	Machine Tap M8x1 HSSE DIN 374	1	1
20	6041874	Machine Tap M10x1	1	-
21	6042106	Insert Setting Tool for M8x1	1	-
22	6044080	Thread Insert M8x1x11	4	-
23	6041625	Reamer model 1, Shouldered Ø7,0mm : Ø4,6mm	1	-

Always refer to the OEM manufacturer's instructions and service manuals for the latest data and procedures.
This Work Instruction and the recommended tools shown are meant to serve as aides only.
This Extraction Kit is only suited for Glow Plugs with a screw thread of M8x1
In some cases, due to insufficient space at the rear cylinders, the engine or the cylinder head will need to be removed.
This tool kit is a special collection it has been tested and used successfully for several times
It is of the utmost importance to maintain the proper sequence.

<u>These tools should only be used by skilled technicians.</u>

Pictograms and their meanings:

	CAUTION	special caution or attention
	SPANNER	hint or recommendation
	SAFETY GOGGLES	wear safety goggles

Expendable items / consumable parts:

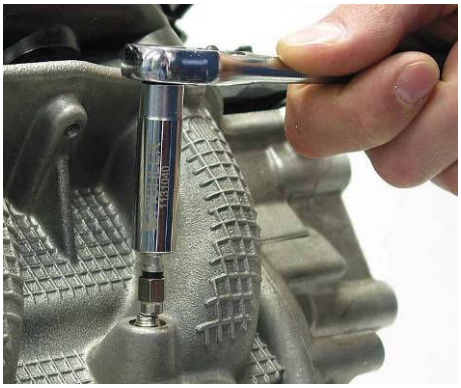
P/N	Description	Quantity
6044080	Thread Insert M8x1x11	1 pcs.
6044085	Thread Insert M8x1x11	6 pcs.
6041641	Drill Sleeve Ø2.7mm to immobilize the central electrode	1 pcs.
6041642	Drill Sleeve Ø2.7mm to immobilize the central electrode	5 pcs.

In preparation the glow plugs must be freed of all obstructions to the repair, all attachments e.g. the plastic cover, the cable loom across the valve cover, high pressure pipes from the rail to the injector, inlet manifold etc. have to be disassembled.

1. Removing the central electrode

Electrical Connection with a Plug

A) Place the **Stud Puller Ø4.0mm (p/n: 1131040)** for smooth connectors on to the central electrode and with a 1/4" ratchet break off the central electrode by turning it several times clockwise.



B) Remove the freed parts

Threaded Electrical connection

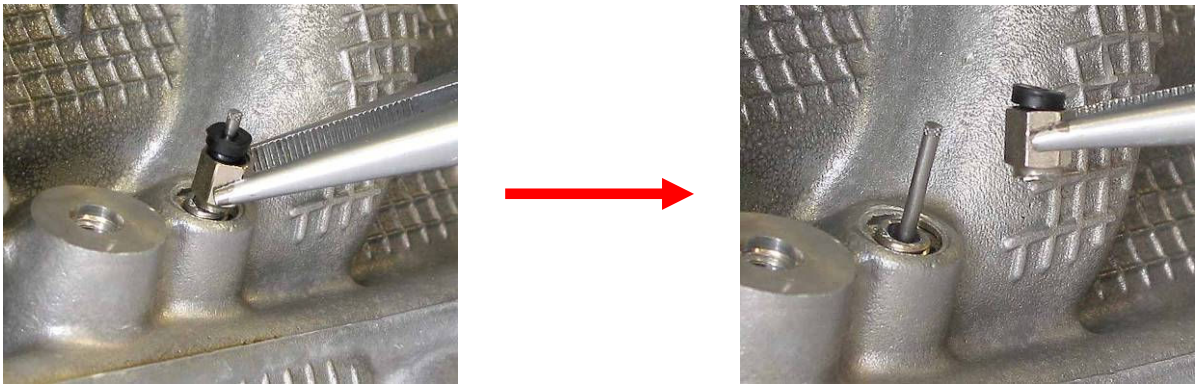
A) Place the **Stud Puller Ø3.5mm (p/n 1131035)** for threaded connectors on to the pin of the cap of the glow plug and hammer it on.

B) With a 1/4" ratchet break off the central electrode by turning it several times clockwise

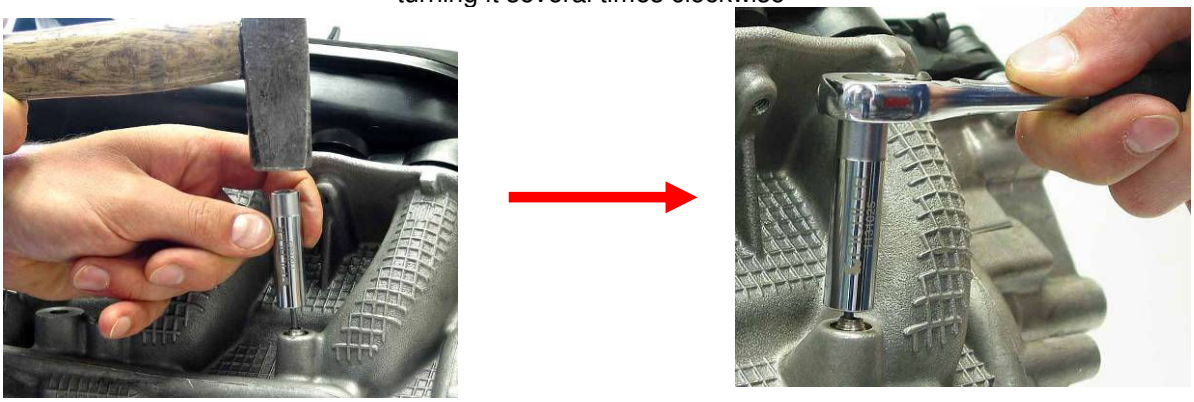
C) Remove the freed parts

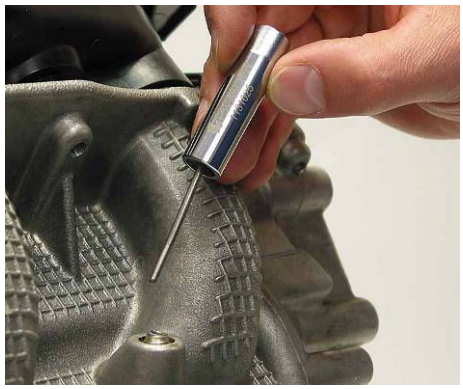
1.1 If the electrode breaks off directly behind the connector cap

Remove the freed parts



Hammer the **Stud Puller Ø2.5mm (p/n 1131025)** on the central electrode and break it off by turning it several times clockwise





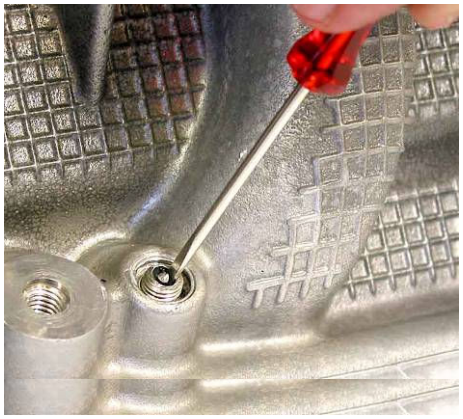
1.2 If the electrode does not break off at the bottom or working according §1.1 is not possible

If the glow plug has a protruding thread or not, determines which of the following different procedures is to be taken.

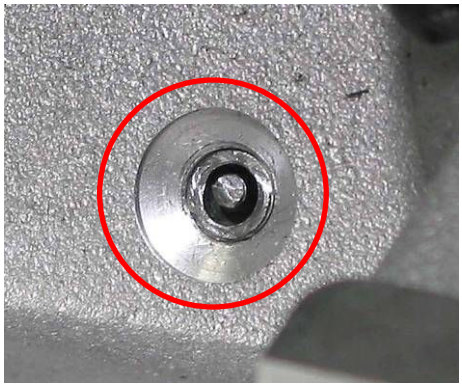
Glow plug with a protruding thread

A) Clean the **protruding thread** of the glow plug.

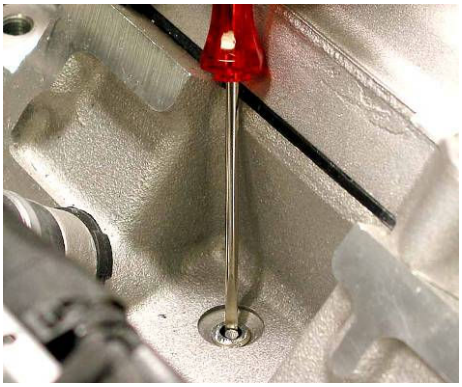
B) Remove the possible burr between glow plug and the central electrode.



Glow plug with no protruding thread



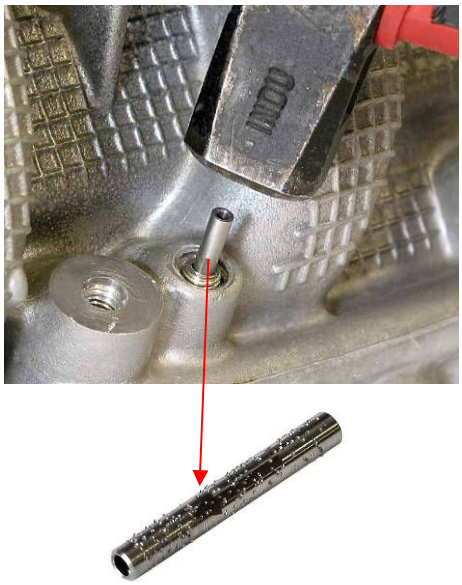
A) Remove the possible burr between glow plug and the central electrode.



B) Put the **Drill Sleeve (p/n 6041641)** on the central electrode.

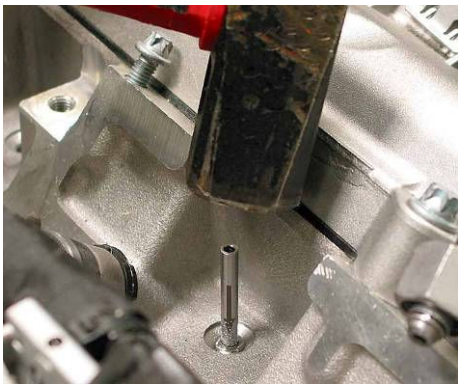
C) Put the **Drill Sleeve (p/n 6041641) on** the central electrode.

D) Hammer the **Drill Sleeve (p/n 6041641)** only half way in.
If the drill sleeve slides in to easy, is it necessary to rough it up.



E) Hammer the **Drill Sleeve (p/n 6041641)** now flush in.

C) Hammer the **Drill Sleeve (p/n 6041641)** only half way in.
If the drill sleeve slides in to easy, is it necessary to rough it up.



D) Clamp the **Special Drill Ø2.6mm (p/n 6041633)** depending upon space conditions into the **Tool Holder For Special Drills (p/n 60416675)** or directly into the drill

F) Screw the **Drill Sleeve With Inner Thread M8x1 (p/n 6041631)** on the protruding thread of the glow plug and tighten it by hand.

G) Clamp the **Tool Holder (p/n 60416675)**, with clamped in **Drill (p/n 6041635)**, in a power drill and grease it.

E) Drill out the central electrode till the drill shaft touches the drill sleeve.

IMPORTANT: Remove the drill again and again from the sleeve to avoid a chip build up!

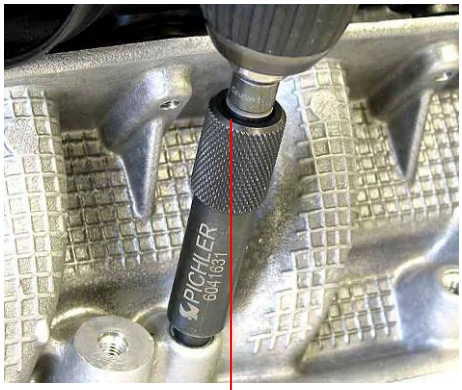
F) With a magnet or compressed air free the sleeve of swarf.

G) Hammer the **Drill Sleeve (p/n 6041641)** so far in that it sticks out for only ca.6 - 7mm .

Again drill out the central electrode till the drill shaft touches the drill sleeve.

IMPORTANT: remove the drill again and again from the sleeve to avoid a chip build up!

H) Drill out the centre electrode ***maximally*** to the bottom of the marker and withdraw the drill repeatedly during the drilling.



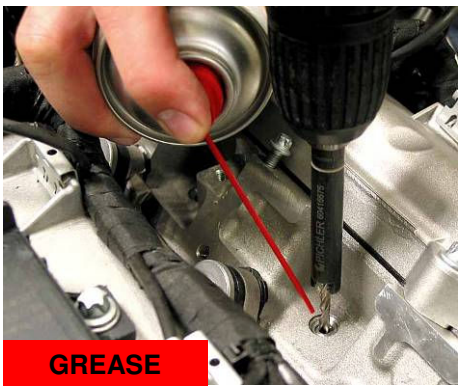
Maximum depth

I) With a magnet or compressed air free the sleeve of metal swarf.

H) With a magnet or compressed air free the sleeve of metal swarf.

I) Remove the sleeve with a pair of pliers

J) Clamp the **Drill Ø4,5mm (p/n 6041639)** in the **Tool Holder (p/n 60416675)** and grease it.

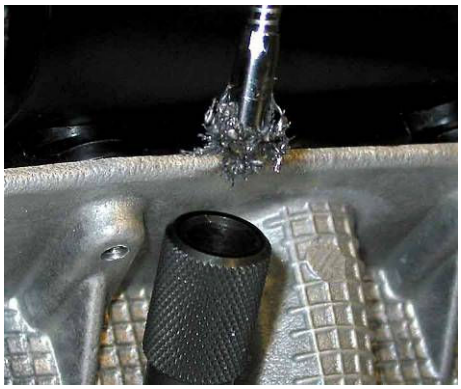


GREASE

J) Clamp the **Drill Ø4,5mm (p/n 6041639)** in the **Tool Holder (p/n 60416675)** and drill till the stop of the sleeve and withdraw the drill repeatedly.

IMPORTANT: remove the drill again and again from the sleeve to avoid a chip build up!

K) With a magnet or compressed air free the sleeve of metal swarf.



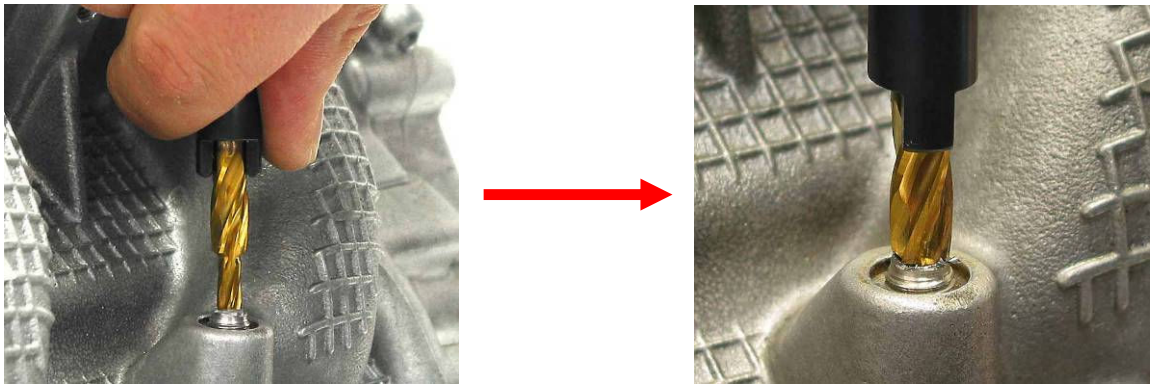
K) While withdrawing the drill repeatedly, drill till the stop on the cylinder head or till a clear resistance is perceptible.

IMPORTANT: remove the drill again and again from the sleeve to avoid a chip build up!

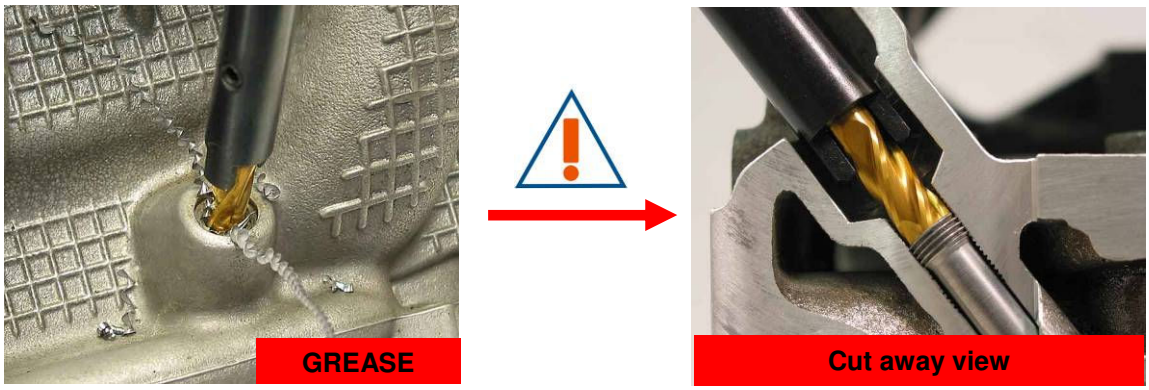
L) With a magnet or compressed air free the hole of metal swarf.

2. Drilling out the glow plug thread and cutting a No.12x28 UNF thread in the glow plug

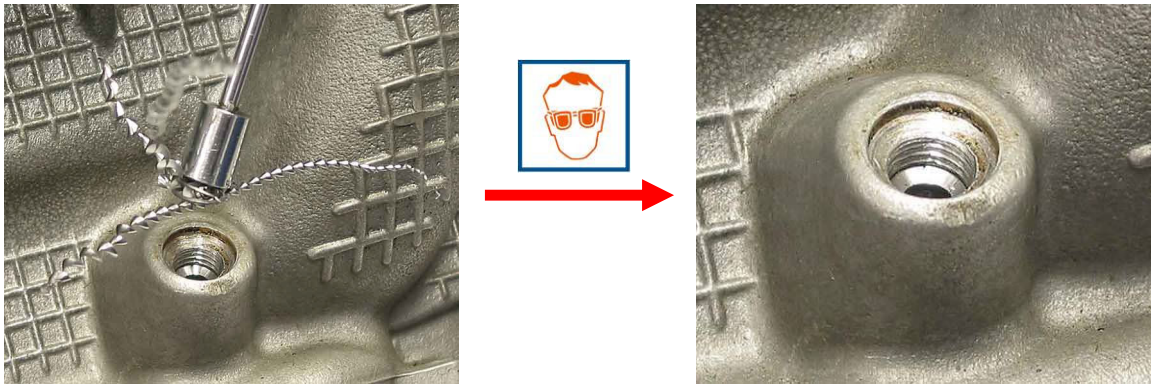
Clamp the **Drill Ø4.5mm (p/n 6041635)** in the **Tool Holder (p/n 60416675)** and in 3-4 revolutions chamfer the glow plug by hand.



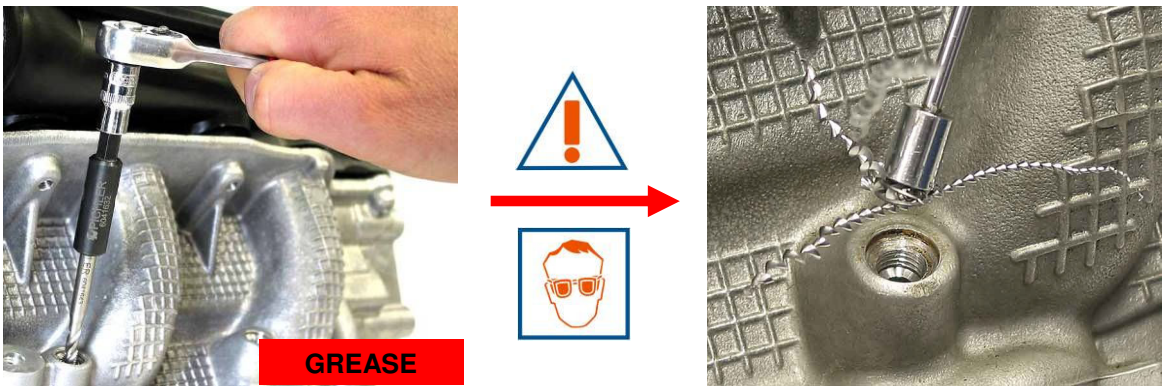
Clamp the **Drill Ø4.5mm (p/n 6041635)** with the **Tool Holder (p/n 60416675)** in a electric drill and drill about 4-5mm into the glow plug thread.



With a magnet or compressed air free the glow plug shaft of metal swarf.



Clamp the **Tap UNF No.12x28 (p/n 6041643)** into the **Adapter (p/n 6041632)** or in the tool holder **Keeper (p/n 6041738)** and cut with feeling, as deeply as possible, a thread in the glow plug.



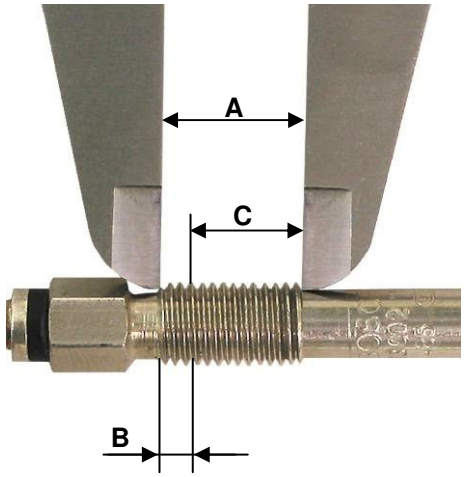
3. Determining and drilling out the remaining length of thread.

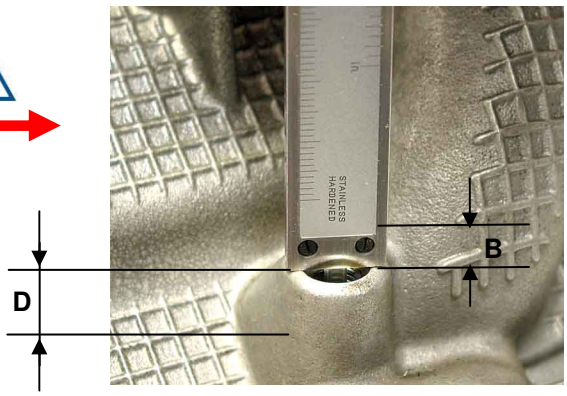
1. First measure the **thread length *A*** of a built in or a new glow plug and write it down.

2. If thread of the installed glow plug protrudes from the glow plug shaft, then this **protrusion *B*** must be the subtracted from the total **length *A***

A – B = C

3. Now measure the remaining thread **depth *D***.





No protrusion: *A* – *D* = yet to be drilled depth
protrusion: *C* – *D* = yet to be drilled depth

Now drill out the previously calculated length of thread, while withdrawing the drill repeatedly

IMPORTANT: Occasionally re-measuring avoids that the glow plug is drilled too **deep** or too **short**!

Free the sleeve of metal swarf with a magnet or compressed air.

4. Tapping a thread UNF No.12x28 into the glow plug and measure

Clamp the **Tap UNF No.12x28 (p/n 6041643)** into the **Adapter (p/n 6041632)** or in the **Tool Holder Keeper (p/n 6041738)** and cut with feeling, as deeply as possible, a thread in the glow plug.

With a magnet or compressed air free the sleeve of metal swarf

Again, measure the depth ***D*** and write it down.

5. Extracting the glow plug

Screw the **Extraction Spindle 180mm (p/n 60416473)** in the glow plug.

Place the **Support Sleeve (p/n 60416533)** over the **Extraction Spindle (p/n 60416473).**

Screw the **Extraction Nut (p/n 60416536)** onto the **Extraction Spindle (p/n 60416473)** and start the extraction procedure.

IMPORTANT: Stop the spindle on the hexagon during rotating the Extraction Nut!

5.1 With extremely fixed glow plugs or a extraction spindle is broken off.

If there is no tangible release of the glow plug to be observed, remove the **Extraction Spindle (p/n 60416473)** with **Support Sleeve (p/n 60416533)** and measure the depth ***D*** to determine if the spindle has been stretched or that the glow plug has moved.

Should the glow plug have moved a little, then hammer it back with a punch Ø3.5 to Ø4mm and re-start the extraction procedure. Repeat the process until the glow plug is removed.

6. Cleaning the glow plug shaft

Clear the now vacant glow plug shaft, first with the **Pipe Brush Cylindrical Ø7mm (p/n 6049027)**, then with the **Pipe Brush Cylindrical Ø4.7mm (p/n 6049024)** of soot and debris.

7. Prepare the rest of glow plug as a sealing plug

Shorten the removed glow rest on drilled away end by ca.25mmt, cut the No.12x28 UNF thread deeper and clean it with a file or emery cloth.

Place this cleaned part now back in the glow plug shaft as a plug.

8. Cleaning the thread in the cylinder head

Clamp the **Tap M8x1 (p/n 6041634)** into the **Adapter (p/n 6041632)** or in the **Tool Holder Keeper (p/n 6041738),** coat the tap with grease and clean the thread in the cylinder head.

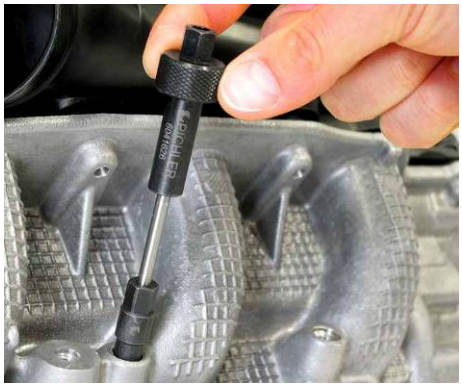
Remove the plug, using a magnet or the extraction spindle, from the glow plug shaft.

9. Cleaning the sealing seat with the shouldered reamer

Check with a lamp the sealing seat for cleanliness and damage.

Insert the **Glow Plug Reamer (p/n 6041625)** into the glow plug shaft and rub the sealing seat.

IMPORTANT: During the cleaning no metal should be removed!
Use the Reamer for just 2-3 revolutions, clockwise and without pressure!



Clear the glow plug shaft of soot and debris.

Install the new glow plug with torque as indicated by manufacturer specification.

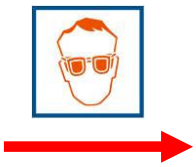
Should the thread in the cylinder head M8x1 have got damaged
or the indicated torque can not be reached, then the thread has to be renewed.

10. Repair of the thread in the cylinder head

Place the plug (made of the rest of the old glow plug) again in the glow plug shaft.

Insert the **Special Reamer Ø9 (p/n 60421010)** into the glow plug shaft.

Drill with the **Special Reamer Ø9 (p/n 60421010)** and a appropriate tool deep enough (approximately 14mm) into the glow plug shaft and remove the swarf.



Clamp the **Tap M10x1 (p/n 6041874)** into the **Adapter (p/n 6041632)** or in the **Tool Holder Keeper (p/n 6041738)** and cut with feeling, as deeply as possible, a thread in the cylinder head.

With a magnet or compressed air free the sleeve of swarf.

Remove the plug, using a magnet or the extraction spindle, from the glow plug shaft.

Screw the **Thread Insert M8x1 (p/n 6044080)** on the **Insert Setting Tool (p/n 6042106)**.

Coat the Thread Insert with a thread locking adhesive

Screw using the **Insert Setting Tool (p/n 6042106)** the **Thread Insert M8x1 (p/n 6044080)** in the cylinder head.

Remove the **Insert Setting Tool (p/n 6042106)** and install the new glow plug with torque as indicated by manufacturer specification.

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