



# Beru glow plugs

Making your diesel start quicker with less pollution to the environment

Beru – The world's leading producer of glow plugs

perfection built in

Perfection  
built in





## What can we expect from



### **A diesel cannot run in cold conditions without glow plugs.**

Diesels are self-ignition engines, at least most of the time. At low temperatures and in winter the diesel needs a „heat boost“ so that the fuel can ignite. This major task is undertaken by glow plugs. Modern glow plugs should fulfil a series of other functions too.

### **High quality glow plugs are kind to both engine and environment!**

Defective or cheap glow plugs can often not carry out the tasks they were designed for. Beru glow plugs are long-lasting and fulfil all requirements because they are perfectly adapted for their role. As the world's leading producer of glow plugs, Beru has long been involved in engine development within the motor vehicle industry. And that pays dividends: Diesel fast-start in 2-7 seconds, reliable starting down to minus 30 °C, smooth, engine-friendly warm-up, up to 40% less soot emission during warm-up phase with post-heating plugs and long life. That's what can be expected of a Beru glow plug!



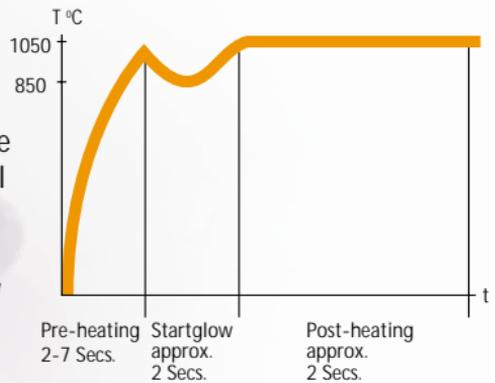
## a modern glow plug?

### The Beru glow plug type code: the short designation reveals the technology

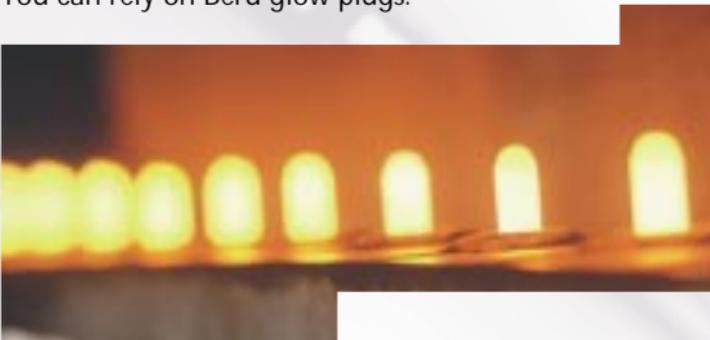
Conventional glow plugs (short designation: „GV“) only glow prior to and during the starting phase. The new glow plugs, which Beru offer under the designation „GN“, are post-heating glow plugs, that means they glow:

1. prior to starting (as „quick-start“ glow plugs they are only require 2-5 seconds),
2. during starting and
3. after starting (up to 180 seconds depending on requirement).

The innovative glow plug ensures that the diesel engine reaches the ideal ignition temperature faster. Combustion is therefore more complete, the dreaded „diesel knocking“ in the start phase is prevented. Modern glow systems use almost exclusively such post-heating glow plug types.



Every glow plug that leaves the Beru factory has undergone functional testing. The fact that very few plugs fail during testing is an indication of the continual quality assurance through every stage of production. You can rely on Beru glow plugs.



## Even glow plugs get old!

The life span of glow plugs will vary depending on regularity of use and climatic conditions. Regular cold starting will cause glow plugs to age faster. Generally, by the time the unsatisfactory operation of the glow plug is noticed, it is too late: At the first unexpected frost the diesel starts really badly, knocks loud and produces great clouds of smoke. Below minus 10 °C, it may not start at all. High time indeed to replace the glow plugs; preferably the whole set.

**Our tip:** Ask your workshop to test the pre-heating system with a glow plug quick-tester at the next servicing. It takes only a few minutes, without removal of plugs.

### Make your diesel environmentally fit!

Beru has retrofit sets for many vehicle models, to make that used diesel more environmentally friendly. These sets include new generation glow plugs and a modified glow phase control unit which can simply replace the existing system. The benefit of these retrofit sets is that the control unit facilitates glow plug pre-heating for up to 3 minutes after starting. This ensures that the fuel combustion is more complete and quieter during the warm-up phase. The engine starts quicker, smoother and with up to 40% less soot. That benefits the environment.

**What now:** When the time comes to replace the glow plugs, why not upgrade to the environmentally friendly retrofit set. Furthermore: This modern glow plug technology from Beru is fitted as standard on many new vehicles.

Exhaust gas clouding  
without and with  
environmentally  
friendly retrofit sets



*51% previously*



*32% with SR sets*

## Which diesels can be retrofitted?

The simply to fit Beru SR sets allow even older vehicles to benefit from the environmentally friendly Beru 3-phase glow system concept – bringing them back up to state-of-the-art.

Short pre-heating periods and post-heating of up to 180 seconds – that is environmentally and engine friendly!



### Environmentally friendly retrofit sets for diesel passenger cars

Type	Order No.	Contents	Application
SR-Set 002	0 120 000 002	GV 626 x 4	Mercedes (model W 115) Only for models with pull-switch and heater warning lights as pre-heating.
SR-Set 028	0 120 000 028	GN 857 x 4	Audi 80 diesel –7.91** Volkswagen Golf/Jetta/Passat/Bus diesel 7.91** On 5/6 cylinder models add 1 or 2 GN 857
SR-Set 030	0 120 000 030	GN 918 x 4	Ford Fiesta, Escort, Orion, 1,6 ltr. all models Escort, Orion, 1,8 ltr. all models
SR-Set 031	0 120 000 031	GN 954 x 4	Opel Ascona C 1,6 ltr., Astra 1,7 D (not turbo) 10.91–08.94***, Kadett D 10.80–09.84, Kadett E 10.84–09.91***, Vauxhall Astra all models
SR-Set 032	0 120 000 032	GN 954 x 4	Citroën BX 17 D, BX 19 09.83–12.87 XUD/ CX 25, 2,5 ltr. 07.82–12.92 M 25–660, Visa 04.84–03.91, 161 A, Xantia, ZX 1,9 ltr. 03.93– XUD/C 15, C 25 07.86– XUD/C 32, C 35 2,2 ltr. B 22 Fiat Ducato 10, 14, 18 Diesel + TD 2,5 ltr., Peugeot 205 D 10.83– XUD, 305 D 11.77–10.83 XID, 305 D 10.82–07.90 XUD, 309 D 06.86– XUD, 405 D 03.88– XUD, 504 D 07.84– XD, 505 DO 09.79–12.93 XD, 604 TD 02.79–06.86 XD/J 9 D 05.81– XD Talbot Express, Horizon, Solara 11.78– XUD, Tagora TD 09.81–06.83 Adapter cable AG 001 is required for control units which are fitted with 5-pin minitimer plugs.
SR-Set 039	0 120 000 039	GN 909 x 4 GR 049 x 1	Mercedes Benz W 123 D, W 126 D (USA), W 201 D → 01.89, G 460/461 D 01.89, 207 D, 209 D, 307 D, 309 D, 407 D, 409 D, 507 D, Sprinter 212 D, 312 D, 412 D
SR-Set 040	0 120 000 040	GN 858 x 4 GR 049 x 1	Mercedes Benz W 124 D (2-Ventiler), W 201 D 02.89 →, G 460/461 D 02.89 →, C 200 D, 208 D, 210 D, 308 D, 310 D, 406 D, 410 D, 508 D, Sprinter 208 D, 308 D, 408 D, Vito 108 D, 110 D, V 230 TD Ssang Yong Musso all models

\*\* 1.89–7.91 only vehicles without GZA-pre-heating

\*\*\* not ISUZU engines

## Causes for sheathed glow plug failure

The cause of a sheathed glow plug failure can often be identified at the heating element. A heating element showing signs of melting indicates for example an injection fault or a so called oil puller. Damage of this kind cannot be attributed to a defective glow plug.

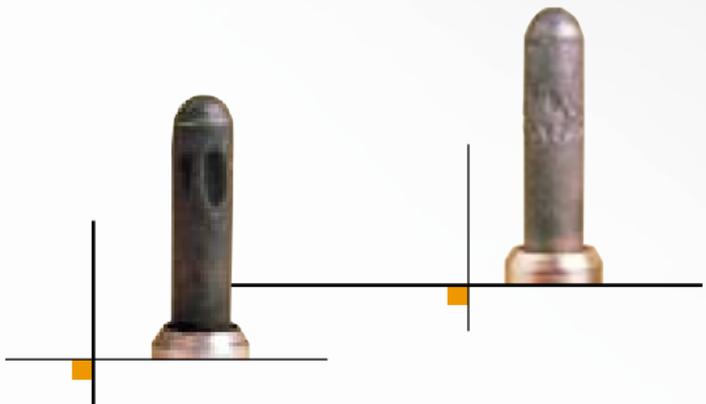
As the injection fault example shows, to simply replace the defective glow plug is not sufficient; the cause of the damage must also be rectified. The following illustrations show typical plug damage and the various causes. This diagnosis aid will in most cases enable faults to be quickly rectified.

### Wrinkled and dented heating elements

Causes:

Filament open-circuit due to:

- operation at excessive voltage, e.g. when jump starting
- power supplied too long due to a sticking relay
- incorrect post-heating with engine running
- post-heating glow plugs not used



Remedial action:

- jump start only with 12V vehicle system
- and c) test the pre-heating system, replace glow timer relay
- install post-heating glow plugs

– not a glow plug warranty case –

## Melting / melted away or broken off heating element

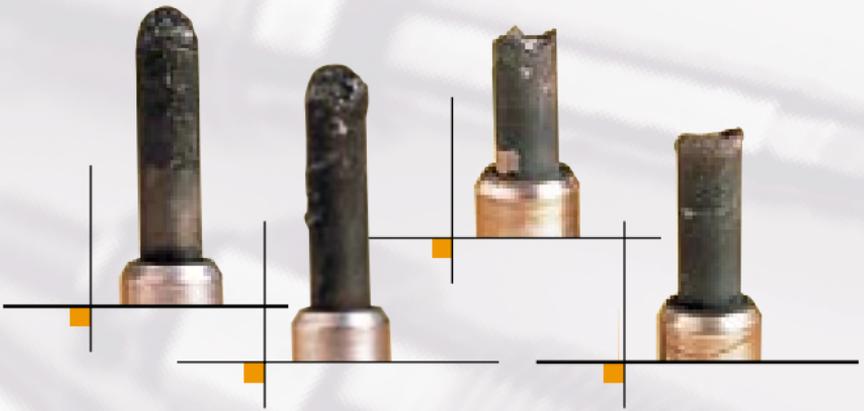
### Causes:

Overheating of heating element due to:

- a) injection start too advanced
- b) coked or worn nozzles
- c) dripping nozzles
- d) engine damage e.g. due to seizing, valve breakage, etc.
- e) sticking piston rings

### Remedial action:

- a) accurately adjust injection timing
  - b) replace complete injector
- not a glow plug warranty case –



## Connection stud broken off, hexagon damaged

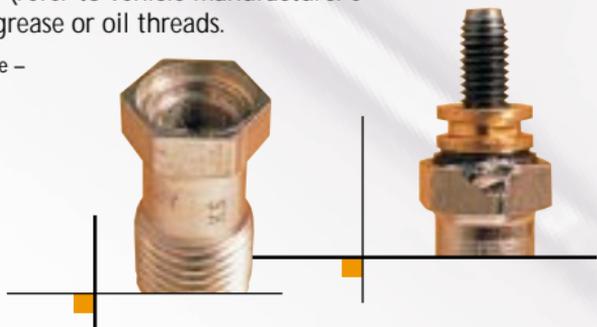
### Causes:

- a) Connection stud broken off: The power connection nut has been tightened with excessive torque.
- b) Damaged hexagon: Use of inappropriate tool; plug distorted and shorting out between casing and round nut.

### Remedial action:

- a) Tighten power connection nut using torque wrench Torque setting for M4 threads: max. 2 Nm, M5: max. 3 Nm; do not grease or oil threads.
- b) Tighten plug using suitable torque wrench; observe specified torque setting exactly (refer to vehicle manufacturer's instructions). Do not grease or oil threads.

– not a glow plug warranty case –



## Heating element tip damaged

### Causes:

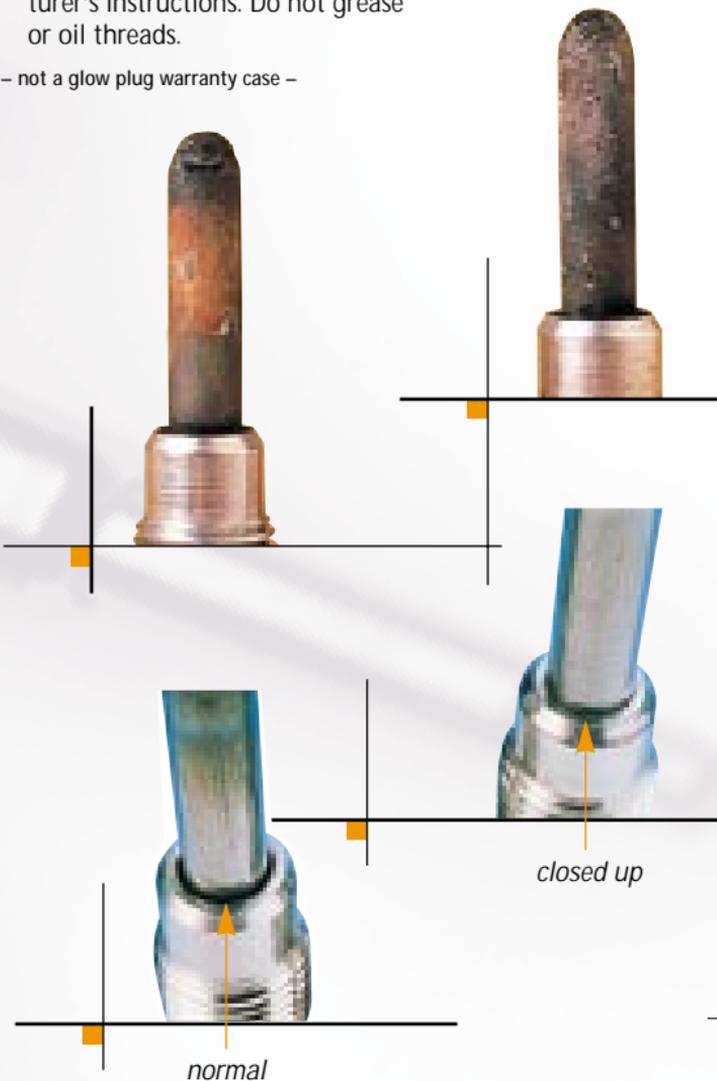
Overheating of heating element due to:

- injection start too advanced, causing heating element and heating filament to overheat; the heating filament becomes brittle and breaks.
- closed up annular gap between plug casing and heating element; consequentially too much heat flows away from heating element, the regulating filament remains cold and allows excessive current through to heating filament which then overheats.

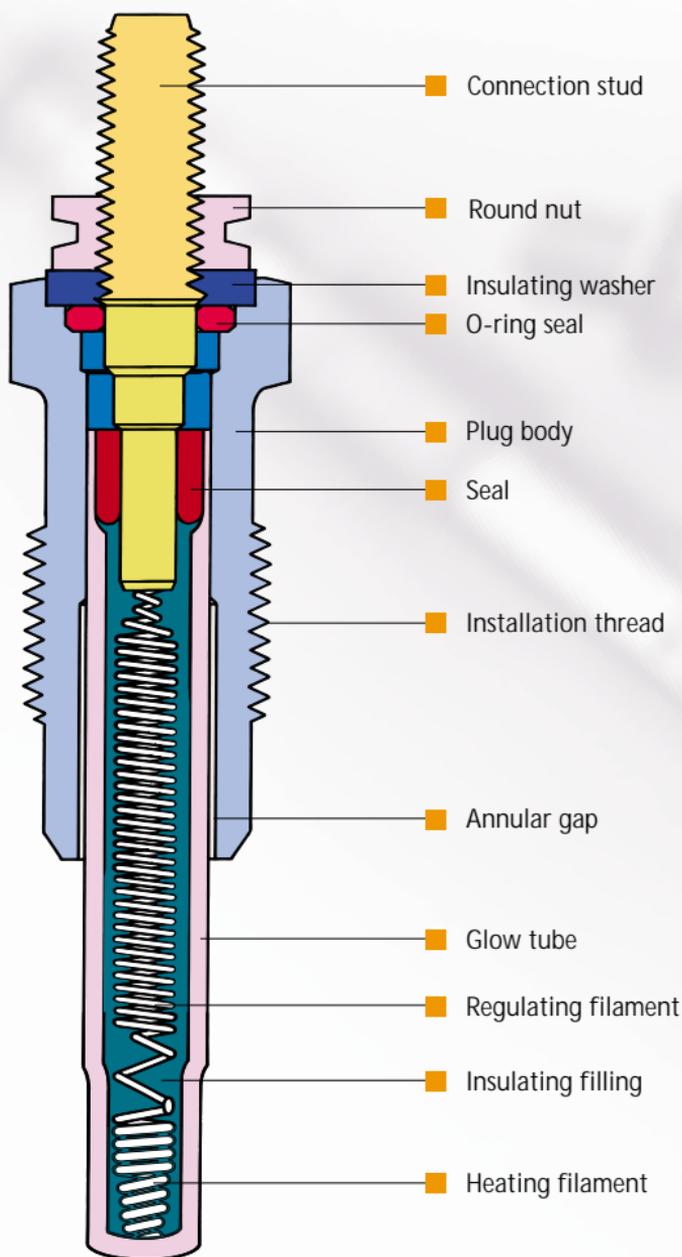
### Remedial action:

- Check injection system, accurately adjust injection timing.
- When fitting a glow plug, ensure to observe vehicle manufacturer's instructions. Do not grease or oil threads.

– not a glow plug warranty case –



## The construction of a pencil-type glow plug



**Note:** Plugs are difficult to access on certain engine models. Replacement of plugs may require partial removal and re-installation of fuel injection pressure lines. If you are not familiar with diesel equipment, it is recommended that replacement of glow plugs on your diesel engine be carried by a specialist workshop.

## Correct glow plug replacement

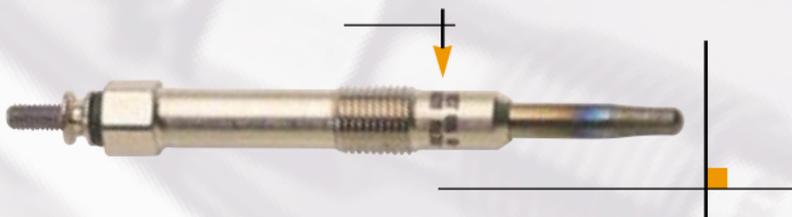
### Important when replacing:

#### Check type designation!

If the incorrect glow plugs are fitted, the consequences can be severe for the engine operation and the glow plugs themselves.

**Therefore:** Ensure that the replacement glow plugs are the correct type. The Beru application lists provide details on which glow plugs or environmentally friendly retrofit sets are suitable for which vehicles. Details are also provided of which third party glow plugs can be replaced by Beru plugs. Every Beru glow plug is marked with a 10-digit number and a voltage value. These can be clearly seen on the plug body.

#### Plug bodies with 10-digit number



### Two important rules when replacing glow plugs:

1. Only install glow plugs in OE quality, as supplied by Beru.
2. If the manufacturer specifies post-heating glow plugs, only use glow plugs with the designation „GN“.

### Ensure correct torque settings of glow plugs and power connection nuts!

When replacing glow plugs, three points in particular are to be observed:

- 1.) Under no circumstances must contamination around plug hole fall into combustion chamber.
- 2.) Glow plugs must be tightened to the correct torque.

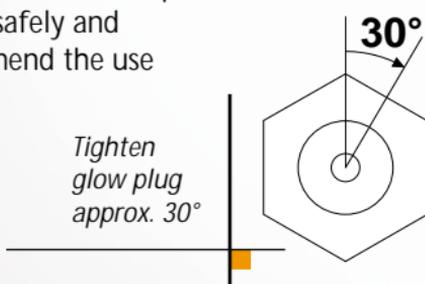
- 3.) Power connection nuts must be tightened to the correct torque. Excessive torque tightening can damage the glow plugs. This can result in their destruction (breakage of connection stud or overheating due to closed up annular gap).

**1** Installing glow plug with torque wrench:

Ensure to observe vehicle manufacturer's specifications. Do not grease or oil threads. Caution - observe maximum torque settings: M10 threads: 12-18 Nm, M12 threads: 25-30 Nm.

**2** Installing glow plug when torque wrench not available:

Screw glow plug into engine block until touching. Tighten approx. 30° using a suitable ring spanner. Do not grease or oil threads. Our tip: To carry out the task safely and accurately we recommend the use of a torque wrench.



**3** Tightening power connection nut:

The maximum torque setting for the power connection nuts must not exceed the following values: M4 threads max. 2 Nm, M5 threads max. 3 Nm. If glow plugs have plug connections, check these for corrosion.

**Economy tip: Replace glow plugs as sets!**

Experience shows that glow plugs reach their maximum wear levels in quick succession, and if connection lines and power rails are already removed it would be more economical to replace the complete set, rather than have to replace other plugs individually a short time later.

## From metal blank to precision component

Over twenty fully automated manufacturing and assembly stages are required to produce the Beru quick-heating sheathed glow plug. The precision of the individual components is continually checked during manufacture. Once assembled, the statistical leak-tightness check takes place followed by functional testing of each individual plug with automatic test result acquisition and documentation of measurement data. Consequently, an engine component is produced that fulfils the zero-fault requirement of the vehicle manufacturer. Beru, with its products, is an „A-supplier“ to the automobile industry. That means, 100% quality is guaranteed allowing the components to be delivered directly to the assembly lines without acceptance checks. Vehicle drivers also benefit from this standard of quality.

All Beru factories are DIN ISO 9001 certified, all German factories additionally fulfil the stringent requirements of the QS 9000 and VDA 6.1 as well as the environmental standard DIN ISO 14001.



Genuine Beru quality products feature in the OE specification of all leading international automobile manufacturers.

## Glow plug body manufacture

Raw material  
(hexagonal  
bars)



Auto-machining



Stamping  
designation



Galvanic coating of body,  
Glow plug body complete

Fit round nut, insulating  
washer and O-ring



Raw material (bars)



Cut, machine,  
de-burr



Forge-forming head



Form stamping



Final processing



### Heating element assembly

Caulking heating  
filament with inner pole



Welding heating filament  
and glow tube



Filling heating filament  
with magnesium oxide  
and fitting O-ring



### Heating element compression

Compressing heating  
element



Compressing heating  
tip (cylindrical)



Reducing cone at  
heating tip



Reducing sealing seat



### Final processing of heating element

Cut inner pole to length,  
machine surface and  
chamfer



Cut M5 thread, heating  
element complete



### Glow plug assembly



Fully assembled glow plug



## Glow tube manufacture



**BERU Aktiengesellschaft**  
**Mörikestraße 155**  
**D-71636 Ludwigsburg**  
**Telephone ++49-71 41-132-0**  
**Fax ++49-71 41-132-390**

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