

## Glow plug

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1. First, pure air is drawn in.
2. The air drawn in is compressed to 30 to 55 bar, heating up to between 700 and 900°C as part of this process.
3. Diesel fuel is injected into the combustion chamber. The high temperature of the compressed air triggers combustion ignition. The internal pressure rises sharply and power is deployed to the engine.

Compared with petrol engines, combustion-ignition engines require more complex [link https: www.my-cardictionary.com mixture-preparation diesel-injection-system.html](https://www.my-cardictionary.com/mixture-preparation-diesel-injection-system.html) internen link in neuem>injection systems and engine designs. The first diesel engines did not provide a particularly comfortable or pleasurable ride. The harsh combustion process meant that they were very loud when cold. They were characterised by

- a higher power-to-weight ratio,
- low power output per litre and
- poor acceleration.



Unceasing development of the injection technology

and glow plugs has succeeded in overcoming all of these disadvantages. Today, diesel as a drive source is considered to be of equivalent if not higher quality.

## The function of glow plugs

The function of glow plugs in order for a diesel engine to reliably start at low outside temperatures and run with low noise and low emissions during the warm-up phase, glow plugs are fitted which protrude into the [engine cylinders](https://www.my-cardictionary.com/engine/cylinders.html). The glow plugs must very quickly make a high temperature available to assist the ignition process, subsequently maintaining this temperature regardless of boundary conditions or even adapting it to suit them.



During pre-heating, a high current initially flows via the connecting bolts and the regulator coil to the heater coil. The heater coil quickly heats up, causing the heater zone of the glow plug to glow. The glowing spreads rapidly. After between two and five seconds, the heater rod is glowing virtually right up to the plug body. This causes a further increase in the temperature of the regulator coil, which has already been heated by the current. As a result, the electrical resistance of the regulator coil rises and the current is reduced to a level that ensures that the glow rod is not at risk of damage. This prevents the glow plug from overheating. If the engine does not start, the glow plug is switched off by the glow time control unit after a certain stand-by time. Older style vehicles are usually fitted with glow plugs which only glow before and during the start phase.

## Post-glowing glow plugs

- Before starting
- During the start phase
- After starting
- Whilst the engine is in operation (in coasting mode)

The electronically controlled pre-heating phase starts when the ignition lock is turned. It lasts between approximately two and five seconds at normal outside temperatures, after which time the engine is ready to start. Post-glowing lasts for up to three minutes after the engine has started to minimise harmful substance and noise emissions. The operating state of the engine is identified by measuring the coolant temperature, for example. Post-glowing lasts until the coolant temperature reaches 70°C or

it is stopped once a time set in the characteristic map has expired. Post-glowing does not usually take place if the coolant temperature is above 70°C prior to the engine starting up.

### **Protection against overheating**

Self-regulating rod glow plugs protect themselves against overheating by limiting the current from the [battery](https://www.my-cardictionary.com/electrics/battery.html) to the plug as the temperature increases. However, when the engine is running, the voltage increases to such a level that glow plugs which are not designed for the very latest technology can burn out. Furthermore, the energised plugs are exposed to high combustion temperatures following starting and are thus heated up from inside and out. Post-glowing rod glow plugs are able to function at full alternator voltage. Although their temperature rises quickly, a new regulator coil establishes a steady-state temperature which is lower than that of plugs which do not support post-heating.

### **Quick start**

With post-glowing glow plugs, it has been possible to reduce the glow time to between two and five seconds. To achieve this, design engineers have reduced the diameter of the heater rod at its front end. As a result, the heater rod starts to glow very quickly in this zone. At a temperature of 0°C, it takes just 2 seconds to achieve readiness for starting. At lower temperatures, glow time regulation enables the system to adapt to requirements and increase the glow time accordingly (at -5 °C to approximately 5 s and at -10 °C to around 7 s).

## **Safety**

Safety Annual breakdown figures collated by the ADAC provide an overview of the main causes of accidents involving vehicles on Germany's roads. More than 3.9 million cases were analysed. [Electrics](https://www.my-cardictionary.com/electrics.html) and the ignition system continue to top the list, accounting for more than half of all recorded breakdowns. On account of the continued rise in the number of electronic components and their networking via bus systems, electromagnetic compatibility (EMC) has gained significantly in importance in recent years. As a consequence, it is absolutely essential that:

- All electronic components and also the glow system are resistant to external influencing factors under all specific operating conditions.
- Electronic components and the glow system must not interfere with other electrical systems.
- Electronic components and the glow system must support error-free radio reception both inside the vehicle and in the immediate surroundings.

# Environmental protection

Protection of the environment Close collaboration between manufacturers of glow plus and the automotive industry starts as early as the engine design stage. The result is environmentally-friendly diesel starting in two to five seconds, safe starting at temperatures as low as  $-30^{\circ}\text{C}$ , smooth engine starting without exposing the engine to excess stress and strain and a reduction of up to 40% in soot emissions during the warm-up phase in the case of post-heating plugs.

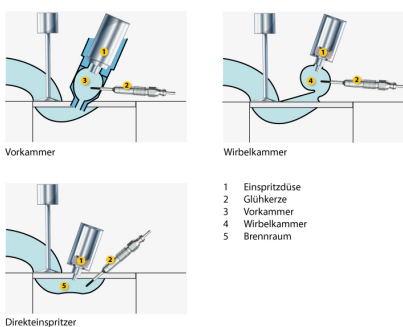
## Reduction in white/blue smoke

Until the ideal ignition temperature is reached, white or blue smoke puffs out of the exhaust. This smoke is attributable to incomplete fuel combustion as a result of the ignition temperature not being high enough. Post-heating ensures more complete and quieter combustion of diesel fuel during the warm-up phase. This reduces clouding of the exhaust gas by up to 40%.

# Depreciation

Depreciation Regular inspection of glow plugs helps to identify faulty glow plugs in good time so that they can be replaced. Consequential damage, difficulties starting and increased emissions of harmful substances are thus avoided. An [internen link in neuem](https://www.my-cardictionary.com/engine.html) engine can only reach operating temperature quickly with glow plugs that are in perfect working order. This protects the engine, makes for smoother running and prevents knocking. Fuel combustion is then more uniform and more complete.

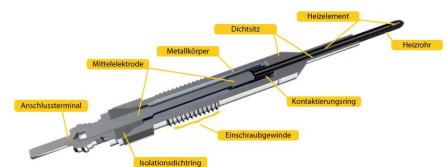
## Bilder



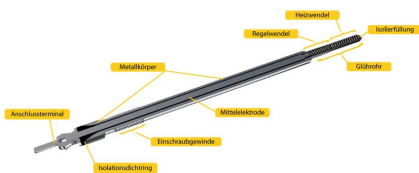
Glow plug installation (installation location)



Glow plug pre-heating



Cross-sectional view of ceramic glow plugs



Cross-sectional view of metal rod glow plugs

## Hersteller



DENSO Aftermarket



Herth+Buss



Niterra UK Ltd.



IGNITION PARTS



VEHICLE ELECTRONICS



Bosch



HELLA



DRiV



Valeo\_EN



Magneti Marelli\_EN

BORGWARNER

BorgWarner

Quelle:

<http://www.my-cardictionary.comhttps://www.my-cardictionary.com/cardictionary/electric/products/glow-plug.html>