



Beru spark plugs

To save money and protect
your catalytic converter

perfection built in

Perfection
built in



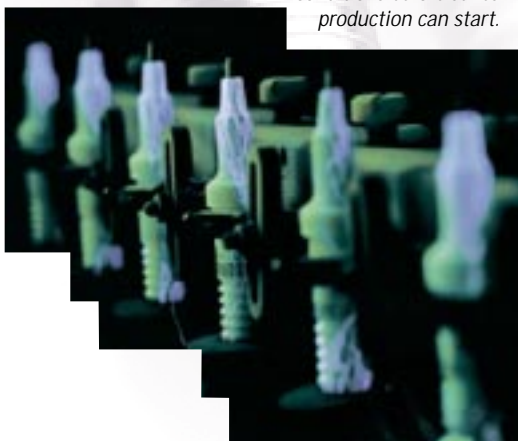
The spark plug – a high-performance

The demands on spark plugs are great!

Spark plugs must achieve high performance: In all operating situations they must spark, guarantee effective cold starting and fault-free operation – even under the highest loads – and play their part towards optimum, low-emission combustion.

In the combustion chamber temperatures reach up to 3000 °C and pressures up to 50 bar. In addition, ignition voltages reach up to 40 000 volts. Chemical influences also place heavy demands on the quality of the spark plugs. A tough task indeed, which the spark plugs must perform over many thousands of kilometres.

Insulation testing to 40 000 volts: Beru spark plugs must prove their reliability in test conditions before series production can start.



Prompt replacement of spark plugs saves money, protects the catalytic converter and the environment.

Spark plugs are expendable components which must be regularly replaced. If not, there is a danger of incomplete combustion. This in turn leads to greatly increased fuel consumption and harmful emissions. Misfiring leads to unburnt fuel in the catalytic converter which then burns there and heats up the catalytic converter elements. Repeated misfiring can completely destroy the catalytic converter and multiply harmful emissions up to ten fold.

Therefore: It is worth bearing the slight expense of replacing spark plugs promptly rather than incurring the high costs of replacement and installation of a new catalytic converter!

*Cracking and melting of ceramic carrier due to worn spark plugs.
Picture: HJS*



Take a closer look at the spark plug!

The spark plug is the heart of the engine.

It ignites the fuel-air mixture several thousand times a minute. This results in temperatures of approx. 4000 °C and pressure of over 100 bar. The spark plug is also subjected to sudden temperature changes and various chemical influences.

Faultless functioning of the spark plugs – even with such high demands – is largely dependent upon the adjustment of the mixture preparation system and the ignition as well as upon the fuel used. Another important factor when replacing spark plugs: Observe the correct heat value – or run the risk of engine damage.

1 Optimum
spark plug
face



Figure 1 shows the optimum spark plug face, using Beru Ultra as an example. Figures 2 to 9 show faces of worn or overloaded spark plugs, together with the possible fault causes and their remedies.

Note:

The examples shown apply only to 4-stroke engines. Before assessing the plug face, the vehicle should be driven several kilometres at an average performance level in order to prevent the formation of soot deposits.

Prolonged running at idle speed before removing spark plugs also leads to fouling, particularly if the engine is not warm from driving.



1 The insulation is coloured grey/white-grey/yellow to fawn brown. The electrode is only slightly burnt away. The heat value of the spark plug has been correctly selected. No thermal overload. The mixture and ignition adjustment is satisfactory, engine condition is in order.

Take a closer look at the spark plugs!

2

Cause: Incorrect mixture adjustment: Mixture too greasy, air filter heavily contaminated, defective coldstart device. Excessive use in slow-moving traffic. Heat value of spark plug too high.

Effect: Poor coldstart performance and misfiring due to tracking currents. Unburnt fuel can therefore enter the catalytic converter and damage it.

Remedy: Correctly adjust mixture and start device, check air filter. Install new genuine Beru quality spark plugs.

2 Fouled



3

Cause: Excessive oil in combustion chamber, oil level is too high, severely worn piston rings, cylinders and valve stem guides.

Effect: Misfiring or even short-circuit of spark plugs, total failure.

Remedy: Recondition engine, correct fuel-oil mixture, install new genuine Beru quality spark plugs.

4

Cause: Aggressive fuel and oil supplements, unfavourable air-flow conditions in combustion chamber (possibly due to deposits), engine knocking, thermal overload.

Effect: Misfiring, particularly when accelerating (insufficient ignition voltage for large electrode gap). Poor starting.

Remedy: Install new genuine Beru quality spark plugs.

4 Severe wear of electrodes



5

Cause: Thermal overload due to pre-ignition, e.g. due to advanced ignition timing, combustion residue in combustion chamber, defective valves, defective ignition distributor, poor fuel quality, incorrectly tightened spark plugs.

Effect: Before complete failure (engine damage) there is a loss of performance.

Remedy: Check engine, ignition and mixture adjustment, check tightening torque of spark plugs. Install new genuine Beru quality spark plugs.

5 Melted electrodes



3 Oiled-up



6 Glazing

7

Cause: Thermal overload due to pre-ignition, e.g. due to advanced ignition timing, combustion residue in combustion chamber, defective valves, defective ignition distributor, poor fuel quality, heat value possibly too low, tightening torque not observed.

Effect: Misfiring, loss of performance (engine damage).

Remedy: Check engine, ignition, mixture adjustment, tightening torque of spark plugs. Install new genuine Beru quality spark plugs with correct heat value.

7 Melted centre electrode



8

Cause: Alloying constituents, particularly from oil, can build up residues which deposit in combustion chamber and on spark plugs

Effect: Can lead to pre-ignition with loss of performance and to engine damage.

Remedy: Check engine adjustments. Install new genuine Beru quality spark plugs, if necessary change type of oil.

8 Deposits



Cause: Supplements to petrol and engine oil create ash-type deposits.

Effect: With too sudden full-load of engine these are liquefied and become electrically conductive .

Remedy: Accurately adjust fuel mixture, install new genuine Beru quality spark plugs.

9

Cause: Mechanical damage due to improper handling. Frequently detectable in early stages only as hair-line fracture. In borderline cases, insulator can be shattered due to deposits between centre electrode and insulation, particularly with prolonged operation. Knocking engine.

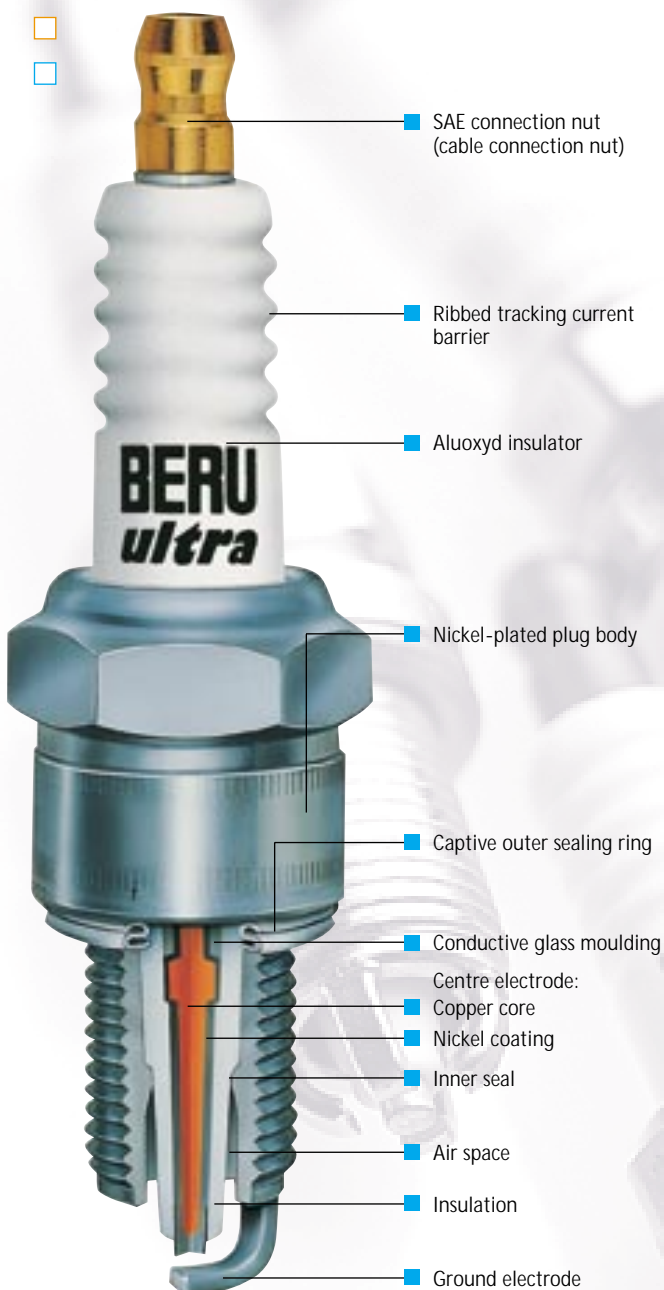
Effect: Misfiring, ignition spark jumps to places which are not effectively reached by fresh mixture.

Remedy: Install new genuine Beru quality spark plugs.

9 Broken insulation



Construction of spark plug



Our tip for the toughest demands: Beru Ultra X

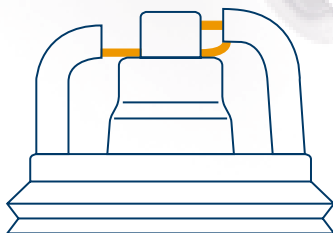
Filigree ground electrodes ensure better mixture distribution; the spark position which extends deep into the combustion chamber guarantees reliable combustion. The spark characteristics which remain constant over the entire life, even further improve ignition reliability of the Ultra X – with optimum engine performance. Ultra X meets the change intervals specified by automobile manufacturers.

Illustration shows an Ultra X, replaced during inspection: The insulation is free from deposits, ground and centre electrodes show only slight burning away.



The air/surface discharge electrode with nickel-coated copper core and 4 ground electrodes placed in pairs and arranged in an X shape provide the highest ignition reliability.

*Schematic illustration of spark paths with Ultra X:
The spark has a total of 6 opportunities to ignite the air-petrol mixture.*



Correct installation of spark plugs

Important when replacing: Check type designation and heat value.

If spark plugs are installed with an incorrect heat value, incorrect thread length, incorrect sealing seat or incorrect electrode gap, the consequences can be severe for the engine operation and for the spark plugs themselves. Therefore: when replacing, ensure that spark plugs are of the correct type. The Beru application lists provide information on which spark plugs are suitable for which vehicle models. Details are also provided of which third party spark plugs can be replaced by Beru quality spark plugs.

Every genuine Beru quality spark plug bears a distinctive type designation. This is clearly visible on the nickel-plated spark plug body.

Plug body with
type designation



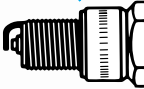

Correct installation of spark plugs

When replacing ensure correct tightening torque!

When replacing used spark plugs, two points in particular are to be observed: Firstly, under no circumstances must contamination around plug hole fall into combustion chamber. Secondly, plugs must be tightened to the correct torque. Excessive torque tightening can damage the plug, insufficient torque results in poor sealing and heat dissipation.

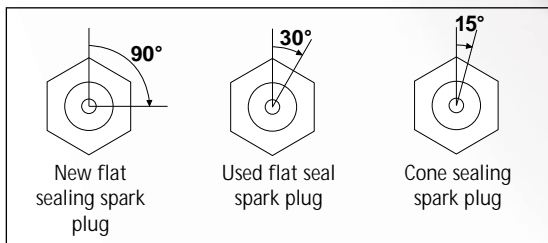
1 Installation with torque wrench:

Tightening torques in Nm, threads must not be greased

<i>Flat sealing plugs:</i>	Plug thread	Cylinder head	
		<i>Cast iron</i>	<i>Light alloy</i>
	M 12x1,25	15-25	12-20
	M 14x1,25	20-35	15-30
	M 18x1,5	30-45	20-35
<i>Cone sealing plugs:</i>			
	M 14x1,25	15-25	12-20
	M 18x1,5	15-30	15-25

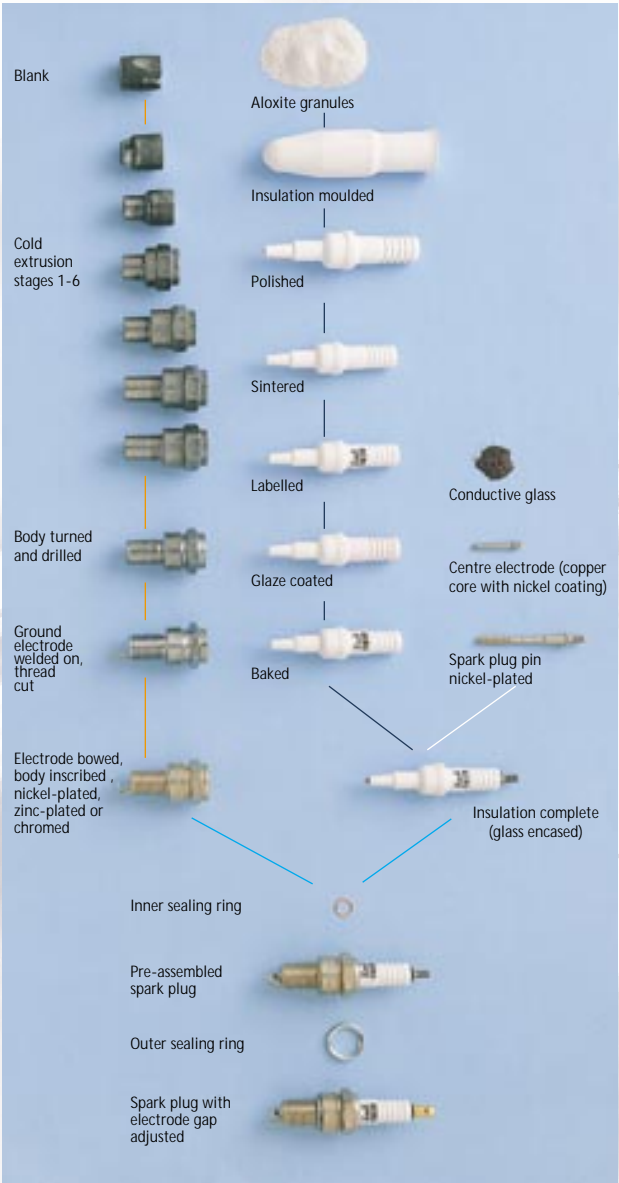
First screw in spark plugs as far as possible by hand using Beru spark plug fitting tool. Then, according to spark plug type, proceed as follows: Tighten new spark plugs with sealing ring a maximum of a quarter turn (approx. 90°) using a suitable spark plug wrench. Tighten used spark plugs with sealing ring to maximum 30° (as sealing ring is already compressed). Tighten plugs with cone seal only approx. 15°.

2 Installation without torque wrench:



Spark plug manufacture

From metal blank to precision component



What does Beru quality mean for you?

Our experience of almost 90 years, combined with the most up-to-date development, quality and production processes, make us, particularly with spark and glow plugs, an acknowledged OE-supplier to the automobile industry. Millions of satisfied motorists have genuine Beru quality products under their car bonnets. Products which reliably, economically and environmentally friendly fulfil their duties and which are only noticed when they are replaced, for safety's sake, at the specified service intervals.

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.



Benefit from the endurance tests of motorsport

From formula 1 to DTC – what proves itself in motorsport today, you use in your car tomorrow. Because when victory and high performance are pursued on the race tracks of the world, when technical know-how, ability and experience are called for, when extreme loads are placed on vehicle and engine components Beru engineers are there, exploiting the high demands of motorsport as an endurance and limit test for your future standard products.

The knowledge acquired gained here filters into the optimisation processes through which the genuine Beru quality products continually pass. Even today our (ignition) components are contributing to the future problem-free and reliable operation of your vehicle.

Beru ignition equipment is available from good vehicle component specialist suppliers and in workshops.





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