



## **New bercoweld<sup>®</sup> alloy**

optimizes welding and brazing processes

**bedra**  
intelligent wires

# Optimization of welding and brazing processes with new bercoweld® alloy

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Zinc-coated steel sheets are used worldwide in the automotive industry. Initially, the automotive manufacturers and their suppliers applied a copper-plated steel wire to join these zinc-coated sheets, but it was soon replaced by a copper-based wire of the SG-CuSi3Mn type. The reasons were obvious: The copper-based alloy minimizes reworking on the car body and saves time and costs.

### **S3: The most widely used copper based alloy electrode**

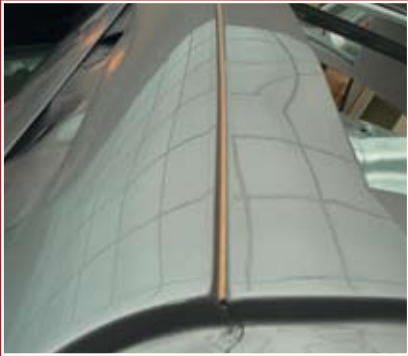
This SG-CuSi3Mn electrode carrying the designation **bercoweld® S3** from Berkenhoff is currently the most widely used copper based alloy for joining zinc-coated sheets. It was optimized as compared to the standard by Berkenhoff, for sophisticated application in automotive engineering and has, upon recommendation of DVS (German Association for welding and related processes), a highly limited silicon content in the alloy. This effects that the electrode material and subsequently also the joint seam is more ductile and has a lower tendency to embritt-

lement than comparable CuSi3Mn wire electrodes on the market. A Si-content of below 3 % significantly improves the phosphate and paint adhesion.

**bercoweld® S3** is used for all joining processes – from standard MIG-arc process to laser and plasma brazing. Electrodes with wire diameters from 0,8 to 1,6 mm are applied. Typical applications in the car body construction are the joining of:

- roof-/side body parts
- tailgates
- sealing strips
- crash boxes
- plug welds, slot welds, lap welds

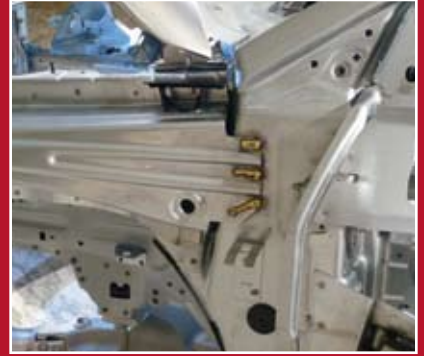
# Sophisticated application in automotive engineering



Roof seam



tailgate



side body part



brazing seam



plug brazing



lap weld



sealing strip tailgate



roof-/side parts

## New trends in car body construction

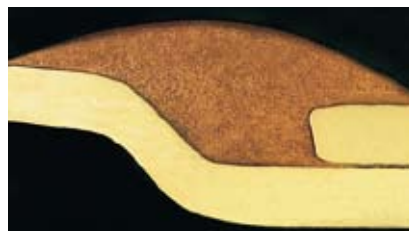
High temperature brazing with **bercoweld**® S3 electrodes has proved successful in these applications for many years. This method, utilizing **bercoweld**® S3 has become the standard practice for many companies. However, there is always the customer's request for improvement and the manufacturer's aim to stay ahead of the competition through ongoing innovation. And since the joining of zinc-coated steel sheets is an essential process step in car body construction, it seems reasonable to tailor new developments that coincide with the technical and economical trends in modern car body construction.

First, there is the competitive pressure among the different material groups to be noted: It is no longer a given that a car body is made of steel. The steel producers are permanently working to realize new materials such as higher strength steels with improved crash properties. New production processes such as hot forming are used to match the properties of the respective component perfectly to the specific requirements. At the same time, demands on quality and visual appearance are constantly increasing: The bodyshell of the vehicle must have a perfect finish – while the pressure on manufacturers to reduce costs is steadily mounting.

## Objective: Significant improvement of the joining result

In relation to the joining processes this means, the filler metal must be able to bridge wide gaps, when, for example, components of differing dimensional accuracy have to be joined. Furthermore, it is important that parts can be joined at a high process speed: cost and time saving is always a major issue in the automotive industry.

Bearing this in mind, Berkenhoff's research & development team has intensively worked to make specific improvements to **bercoweld**® S3. The result is now presented to the market: the new alloy composition of the brazing wire electrode, **bercoweld**® S2 or called COMAS will bring about noticeably better joining results.



The benefits of **bercoweld**® S2 at a glance:

- optimized flowing properties
- better gap bridging and adhesion
- higher processing speed
- high corrosion resistance

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## Improved flowing properties, better adhesion, less rework

Thanks to its improved flowing properties, the new brazing wire electrode **bercoweld® S2** allows for producing material closure joints even when bridging wide gaps. Furthermore, corrosion resistance and adhesion to

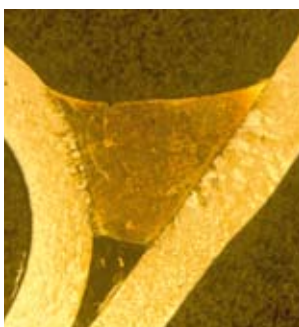
the zinc-coated steel could be improved. There is a low tendency to porosity and the formation of spatter could be further reduced.

### Comparison of brazing properties

Side effects:	Filler metals:	CuSi3	bercoweld S2
Pore formation		2	1 – 2
Spatter formation		2	1 – 2
Burn-off of the coating in the joining area		1 – 2	1
Seam geometry		A – B	A
Smoke and dust development		3	3
Destruction of the coating on the backside of the sheets		1 – 2	2
Gap bridging		1 – 2	1
Corrosion of the seam		1	1

Key: 1 none, 2 few, 3 some, 4 many, 5 a great deal, A = very good, B = good, C = sufficient

The cross section comparison also clearly shows the improvement of the properties:



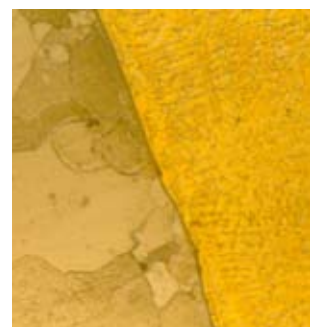
bercoweld S3 V 25:1



bercoweld S3 V 500:1



bercoweld S2 V 25:1



bercoweld S2 V 500:1

## Suitable for all joining methods – at no extra cost

The new electrode material is suitable for all standard brazing processes, even for joining high-strength steels which has become more frequently utilized in crash box and side member applications. The user will ask: “What are the downsides or are there exclusion criteria?”

Berkenhoff gives a clear answer: “**bercoweld**® S2 can be applied wherever **bercoweld**® S3 or another Cu-based wire electrode has been used so far. The change-over will not present any problems or risks and testing will require very little effort: The user only needs to insert the wire and make minimal changes to the parameters of the “welding inverter”. The Berkenhoff product management team will be available to support the user with this minor modification.

The second crucial question the user will ask is: “What extra costs will we incur to utilize these advantages?”

Here again, the answer is most gratifying: “**bercoweld**® S2 is available at about the same purchase cost as is **bercoweld**® S3, and since production costs are lower, there is, in addition to the technical advantages, also a cost benefit”.

### Positive practical experiences

**bercoweld**® S2 is already being used by an automotive manufacturer and a renowned car body contract manufacturer. Their experiences substantiate all the results of the laboratory tests. Including the above benefits, the key qualities of **bercoweld**® S3 are maintained. In comparing of the two electrodes, the results can be summarized as follows, “S2 is the better S3”.

### High-level expertise well utilized

In the development of **bercoweld**® S2, Berkenhoff was able to make full use of their expertise in material engineering and manufacturing technology. The company which

was founded 120 years ago and which has currently more than 400 employees, can look back on a long tradition in wire production, specializing early in precision wires of copper and copper alloys. Under the umbrella brand “bedra”, more than 30 million kilometres of wire leave our production facilities every year. Besides the brazing and welding industry, bedra precision wires are mainly used for spark erosion applications in tool and mold making, in the electronics industry as well as in medical technology.

### Target market automotive industry

The major market for **bercoweld**® S2 is the international automotive industry. A two-tier distribution concept consisting of authorized dealers ensures the delivery of **bercoweld**® brazing wires to customers throughout the world. The creative technology behind many private label welding and brazing wires originates from Berkenhoff. In North America, Berkenhoff is represented with their own sales company. In addition, the highly qualified Berkenhoff staff at the German locations are available, at any time, to assist the automotive manufacturers and to provide detailed answers to specific applications, development projects or special solutions.

### The entire process chain in-house

As a producer of non-ferrous metal fine wires, Berkenhoff covers the complete process chain – from melting of raw materials to final packaging. Having their own foundry ensures that only virgin metals of highest purity are molten, alloyed, continuously cast and subsequently processed; in this way, contaminations in continuous wire electrodes can be reliably excluded.

# Quality makes the difference

All succeeding production steps of **bercoweld**<sup>®</sup> electrodes are also performed in special plants. All machine parameters for the production of the **bercoweld**<sup>®</sup> wire electrodes are configured to meet the high requirements of brazing and welding applications. High-quality diamond dies are used to draw wires to their final diameter while providing maximum roundness. Permanent monitoring will exclude damage of the product, eg from scoring.

## The best prerequisite for consistent joining processes

Each production step is integrated into a continuous quality management system. Central and online monitoring in an in-house laboratory ensures that deviations in the process are immediately revealed and corrected. This is the base for consistent product quality and an important prerequisite for reliable processing in the automotive industry. Moreover, this 100 % in-house concept guarantees complete traceability for all Berkenhoff products. Upon request, Berkenhoff offers a free inspection certificate 3.1. The company is certified according to DIN EN ISO 9001 and 14001.

## Research and Development

Berkenhoff, with its extensive research and development activities, is not just a supplier, but a market and customer-oriented partner for high-quality and future-proof precision wire solutions. Our numerous innovations have decisively shaped the market. For example, when brazing zinc-coated sheets in the vehicle roof and side area, perfect gap bridging and the best possible design freedom is realized utilizing innovative **bercoweld**<sup>®</sup> electrodes such as S2.

Berkenhoff's own foundry allows, at any time, to produce new alloys in small quantities. Our engineers can carry out individual test series under real conditions on all succeeding manufacturing plants.



In the bedra-owned foundry, **bercoweld**<sup>®</sup> wires are produced while adhering to tightest tolerances.

## Joint research projects and innovative developments with high benefit to customers

Berkenhoff regularly participates in joint research projects with universities, research institutions and the industry. Our extensive involvement in the joint project "Proremix" (Producing, Repairing and Recycling of products in material-mix-construction), funded by the Federal Ministry of Education and Research and supported by the research center Karlsruhe, is one example of Berkenhoff's commitment. The best example of innovation is the development of new products which stand out for their optimized functionality and establish the basis for the user to achieve improved, cost and time saving processes as well as final products of higher quality. That is what the new development **bercoweld**<sup>®</sup> S2 offers.

# bercoweld®

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