STEIGER
Galvanotechnique SA

ARGOGLIDE®

for better electrical connections

ARGOGLIDE®–self-lubricating coating for better electrical connections

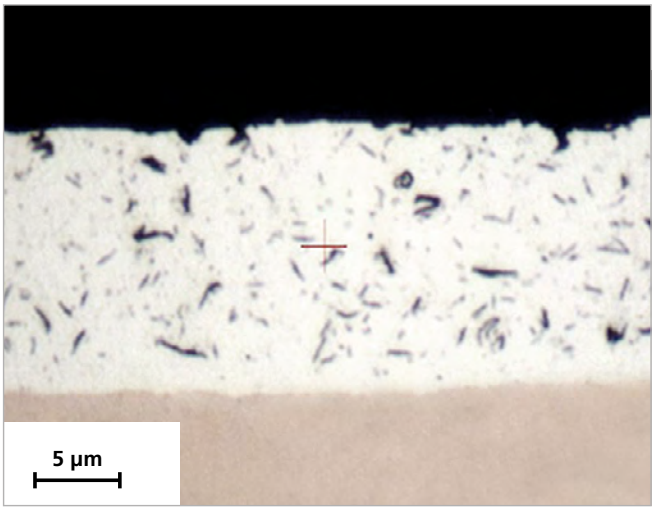
ARGOGLIDE® is a new development of dispersion coating for low and high voltage applications. It is characterized by low electrical contact resistance in the milliohm range and low friction coefficient with high wear resistance.

Description

The coating consists in a highly conductive silver matrix containing 1 to 2 wt-% graphite particles (1 to 10 µm particle size). The conductive graphite particles are responsible for efficient lubrication and enhanced wear resistance in sliding configurations. The graphite particles are homogenously distributed in the silver matrix. During the switching process the top layer wears off, thus new particles appear to the surface maintaining good sliding properties by creating self-lubrication.

Microsection of ARGOGLIDE® coating produced by means of galvanic processes on copper substrate with a 3 µm thick silver underlayer. The silver-graphite layer contains 1.3 wt-% (6.5 Vol-%) graphite particles. Typical thicknesses of ARGOGLIDE®, for low voltage contacts, are between 15 and 25 µm, over an underlayer of 2 to 3 µm of silver.

ARGOGLIDE® can be applied on different substrates or underlayers as for instance copper and copper alloys, aluminium alloys, silver and others. The treatment is applied on the entire part or selectively to functional areas. The process is suitable for single and bulk parts.



Finely dispersed graphite particles are embedded in the silver layer as shown in the microsection.

Properties of ARGOGLIDE® versus silver coating

o unappropriated; * acceptable; ** good; *** excellent

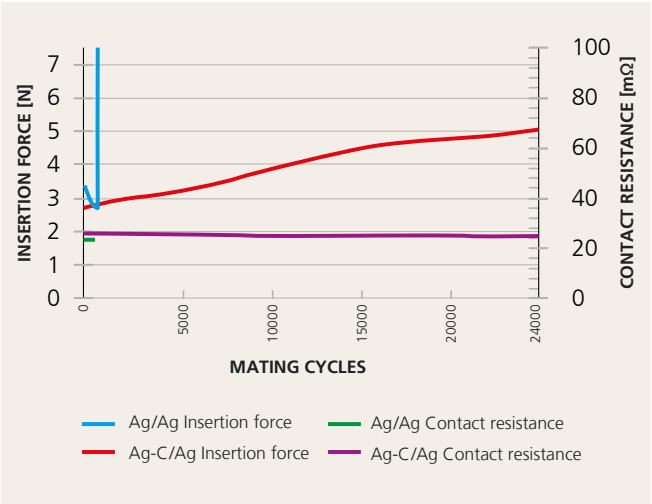
	ARGOGLIDE®	Silver	Remark
corrosion resistance	***	***	
tarnish resistance	**	* [1]	[1] after passivation
wear resistance	***	*	in sliding function
sliding ability	***	* [2]	[2] for thickness < 1 µm
electrical contact resistance	***	***	
solderability	o [3]	**	[3] lower weldability than Ag
microhardness HV (ISO 4516)	90–130	90–130	
ductility %-elongation	> 10	> 10	
electrical resistivity [µΩcm]	1.61	1.61	
maximum operating temperature [°C]	850 [4]	850 [4]	[4] above 350°C an inert atmosphere is needed
usual thicknesses [µm]	10–100	2–50	
particular property	excellent for switch contacts	excellent in HF	

Friction and electrical contact properties

When two silver-coated surfaces are moved over one another, a high level of force is required. This shows the disadvantage of contacts with silver surfaces, since these have a relatively high coefficient of friction, which leads to high insertion and removal forces, particularly for plug contacts. The high coefficient of friction causes wear on silver surfaces, which severely limits the number of possible mating cycles. In addition, there is the problem that silver surfaces tend to cold weld.

ARGOGLIDE®, thanks to the incorporation of graphite in the silver layer, significantly reduces the friction as compared to pure silver, which results in lower insertion forces, improved corrosion protection and a longer service life due to the increased wear protection of the contacts. At the same time, good electrical contact, equivalent to pure silver is guaranteed.

Insertion force and electrical contact resistance were measured simultaneously on a pin and socket contact pair during a long run plug & unplug test. The sliding distance was 1 cm and the sliding speed 1 cm/s. A current intensity of 10A was applied to the contact pair throughout the test duration. The contact resistance has been measured every 200 ms. The results are presented in the diagramm hereunder.



The ARGOGLIDE®, – Silver couple shows life duration more than 25'000 mating cycles with insertion force under 5N and contact resistance lower than 25 mΩ. The Silver – Silver couple shows immediately a strong increase of the insertion force above 7N thus ending the test.

Applications

Silver-graphite (AgC) composites are used in electrical switchgears as sliding contacts. The conductivity, contact resistance and coefficient of friction are relevant for applications in the electrical and electronics sector, particularly for plug contacts.
In view of the growth of electric vehicles, an increased demand for silver contacts, in particular electrodeposited silver-graphite, can be expected.

High power contact systems

ARGOGLIDE® enables switching contacts that switch reliably and without excessive mechanical force. There is no cold welding at 200 KA load/10 KA switching current. And at the same time, good electrical properties especially conductivity, are retained with silver-graphite contact systems.

Low voltage applications

ARGOGLIDE®, coating allows more than 25'000 mating cycles of contacts Pin & sockets for battery charging. Contact systems are significantly improved in terms of plug cycles and reliability in comparison to commonly applied connecting technology.

Low voltage, high current, low friction plug for car battery charging.

STEIGER
Galvanotechnique SA

High-tech from Switzerland.
Welcome to Steiger Galvanotechnique SA.

Steiger Galvanotechnique SA in Châtel-St-Denis (CH) is a member of the Estoppey-Reber group which was founded in 1885. Today, the group employees 150 people. The other members of the group are located in Aegerten, including Estoppey-Reber SA, Akrom SA and Galvametal SA. The four companies are active in electrochemical and chemical surface treatments as international leaders in the electroplating industry.

Pin and socket contact system: pin silver coated; socket ARGOGLIDE®

The Estoppey-Reber Group offers a wide range of services in the fields of electrical engineering, precision engineering, jewlery and watches, aerospace, medical technology and biotechnology. These are fields of innovation and development.

Steiger Galvanotechnique SA skills mainly focus on:

- Energy transmission with high and low power switches protected with ARGOGLIDE® and Silver coating systems.
- Coating on Aluminium: ARGOGLIDE®, silver, electroless nickel, Ni-PTFE and different types of anodizing.
- Medical implants and instruments: Titanium and stainless steel surface treatment for medical applications: implants for traumatology, spine, dental as well as medical instruments. Clean & pack in a clean room is part of the complete service package.
- UV-LIGA Microelectroforming for watches, precision mechanics, optics, HF connectors, biomedical devices, hard magnetic microdevices.
- Coating Systems, combining PVD layers and Electroplating.

Steiger Galvanotechnique SA is certified ISO 9001 and ISO 13485.

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