

## ELECTRIC CONTACTS

The invention relates to contacts in particular for pins of electronic assemblies. The demands on pins for electronic assemblies are very high since they must have, on the one hand, a good electric conductivity and thus a good heat conductivity and, on the other hand, a high strength so that they, on the one hand, are not bent during insertion and, on the other hand, experience little wear. Furthermore, these contacts must also be very flexible and must be suited for coating. A high strength is furthermore necessary if one wants to reduce the dimensions, in particular the cross sections, of the contacts.

Standard alloys, as for example brass or bronze, are presently used for such contacts, which, however, have a comparatively low electric conductivity. Materials with a higher electric conductivity with a simultaneously higher strength are, for example, CuFe<sub>2</sub>P-alloys. These alloys, however, have the disadvantage that they, because of their high iron content, have the tendency to precipitate iron with the corresponding corrosion problems. In particular when these pins are used for safety-relevant parts, it cannot be guaranteed that a sufficiently secure contact transfer exists at all times.

The basic purpose of the invention is to provide contacts of the above-mentioned type in such a manner that they, aside of a high electric conductivity and a comparatively high strength, can be easily manufactured, can be easily worked, and are very flexible, and experience no disadvantageous precipitations.

This purpose is attained according to the invention in such a manner that the contact element consists of a core alloy with 0.2 to 1.5 wt.% Ag and the remainder copper, and that at least the contact surface of the core material has one or more highly conductive and/or easily solderable coatings.

A contact of the invention is distinguished by a high conductivity, which, compared with pure copper, is only slightly less. A conductivity of over 40 Siemens can be achieved with this contact of CuAg-alloys. The tensile strength as such can be compared with the CuFe2P-alloy, whereby here strength values of over 600 N/mm<sup>2</sup> are obtained. Furthermore, the contacts of the invention are distinguished by a slight temperature increase during an electric load. The corrosion resistance is, in comparison to copper, further increased by the addition of silver.

The contacts can be provided in accordance with the invention comparatively easily with a coating, for example, with a rhodium, palladium, silver, indium, iridium, platinum, gold, tin, nickel, copper or lead coating. A coating with the aforementioned metals or their alloys results, on the one hand, in a good soldering ability and, on the other hand, in a low transfer resistance, namely a good contact ability. Thus, the one end of the contact can advantageously be provided with an easily solderable coating and the other end with a highly conductive coating. Due to the higher strength and conductivity it is possible to design the contacts with smaller cross sections so that the density of the number of plugs can be increased. A blocking layer of nickel or copper is advantageously provided between the core alloy and the outer coating, which blocking layer prevents phase-limit reactions between the core material and the outer coating.

The content of the core alloy of iron and manganese should each not exceed 0.8 wt.% and the content of silicon and aluminum should not exceed 0.3 wt.%. Boron, calcium, phosphorus and magnesium should in turn not exceed 0.1 wt.%. Zinc can advantageously be added up to 2 wt.%. Furthermore, it is possible to add zircon, titanium and chromium to the core alloy, whereby these are added in amounts of each no more than 0.2 wt.%. The

alloy elements iron and manganese are strength-increasing, whereas the other alloy elements act both as a deoxidation means and act also, due to precipitations, strength-increasingly. Chromium and zircon have proven to be particularly advantageous.

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Claims:

1. A contact, in particular for pins of electronic assemblies, characterized in that the contact consists of a core alloy with 0.2 to 1.5 wt.% Ag, and the remainder copper, and that at least the contact surface of the core element is provided with one or more highly conductive and/or easily solderable coatings.

2. The contact according to Claim 1, characterized in that the coating consists of one or more of the following elements: Rh, Pd, Ag, In, Ir, Pt, Au, Sn, Cu, Ni and Pb.

3. The contact according to Claim 1 or 2, characterized in that Zn up to 2 wt.% is added to the core alloy.

4. The contact element according to one of the Claims 1 to 3, characterized in that the content of

Fe 0.8 wt.%  
Mn 0.8 wt.%  
Si 0.3 wt.%  
Al 0.3 wt.%

is not exceeded in the core element.

5. The contact according to one of the Claims 1 to 4, characterized in that B, Ca, Mg, P is added by alloying to the core element, whereby these alloy elements each do not exceed 0.1 wt.%.

6. The contact according to one of the Claims 1 to 5, characterized in that Zr, Ti, Cr is added by alloying to the core element, whereby these alloy elements each do not exceed 0.2 wt.%.

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7. The contact according to one of the Claims 1 or 2, characterized in that the contact has the following composition in wt.%:

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Ag 0.9

P 0.02

Mn 0.1

Remainder Copper.

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8. The contact according to one of the Claims 1 to 7, characterized in that the one end of the contact is provided with an easily solderable coating and the other end with a highly conductive coating.

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### ABSTRACT

A contact intended especially for pins of electronic assemblies, consists of a core alloy of 0.2 to 1.5 wt.% Ag and the remainder copper, in which at least the contacting surface of the core component has one or more highly conductive and/or easily solderable coatings. This provides not only better conductivity in the contact but also comparatively high strength with simple production and good workability, making it possible to miniaturize the contacts.



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**CLAIMS:**

1. Pin contact for electronic assemblies, characterized in that the contact consists of a core alloy with 0.2 to 1.5 wt.% Ag and selectively of one or more elements of the group

0 to 2 wt.% Zn,

0 to 0.8 wt.% Fe,

0 to 0.8 wt.% Mn,

0 to 0.3 wt.% Si,

0 to 0.3 wt.% Al,

0 to 0.1 wt.% P,

0 to 0.2 wt.% Ti,

0 to 0.2 wt.% Cr,

and the remainder copper and common impurities, and that the contact surface of the core element is provided with one or more highly conductive and/or easily solderable coatings, which consist of one or more elements of the group Rh, Pd, Ag, In, Ir, Pt, Au, Sn, Cu, Ni and Pb.

2. The contact according to Claim 1, characterized in that the contact has the following composition in wt.%:

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Ag 0.9

P 0.02

Mn 0.1

Remainder Copper.

3. The contact according to Claim 1 or Claim 2, characterized in that the one end of the contact is provided with an easily solderable coating and the other end with a highly conductive coating, which consists of one or more elements of the group Rh, Pd, Ag, In, Ir, Pt, Au, Sn, Cu, Ni and Pb.

