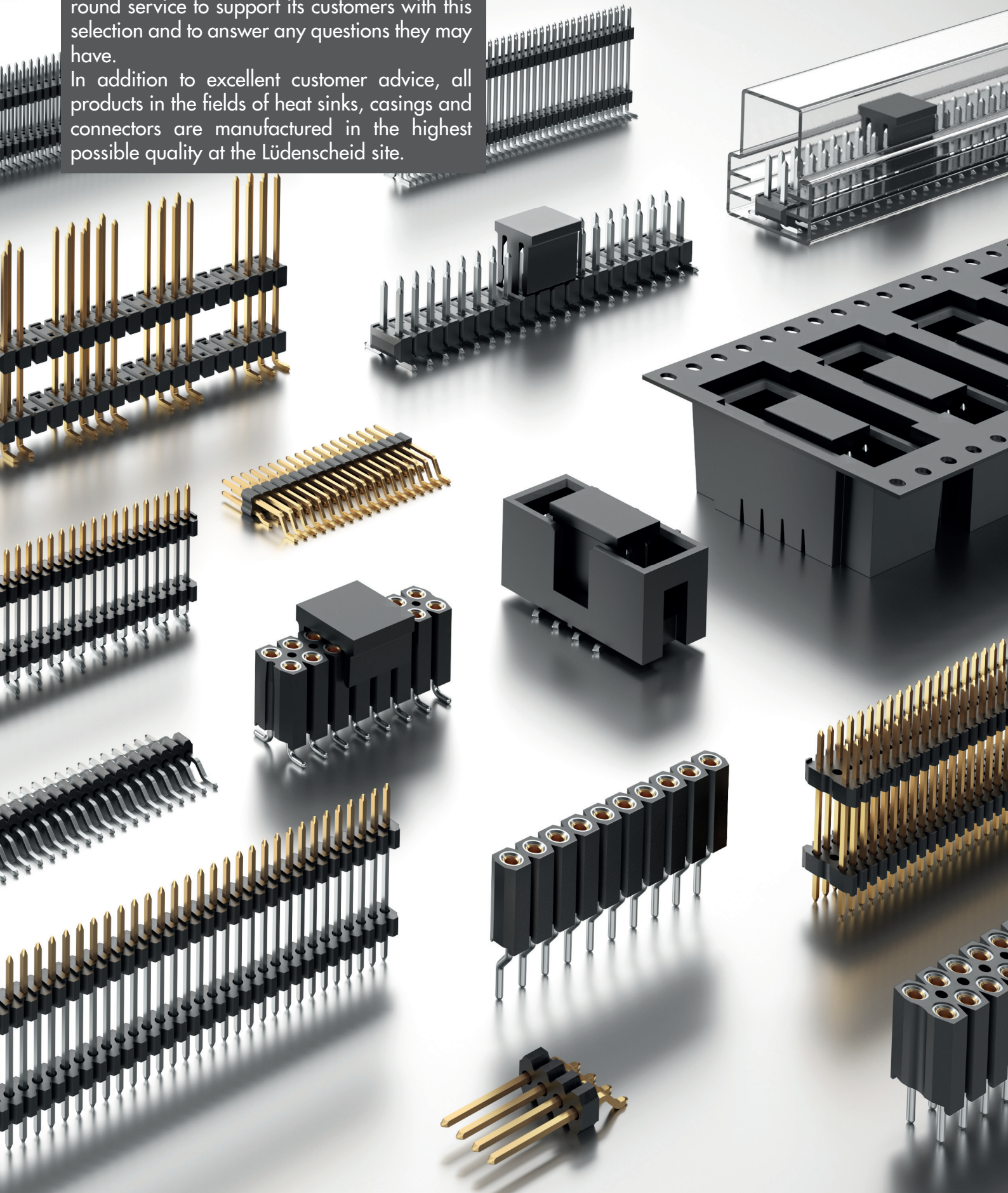


Selecting Contact Coatings Correctly



When selecting the contact coating for circuit board connectors there are a number of things to consider. Fischer Elektronik offers an all-round service to support its customers with this selection and to answer any questions they may have.

In addition to excellent customer advice, all products in the fields of heat sinks, casings and connectors are manufactured in the highest possible quality at the Lüdenscheid site.



#selectingcontactcoatingscorrectly

When it comes to selecting the contact interface coating, the customer must be aware of the individual layer thicknesses and alloys of the other contact coatings. Depending on the application, a nickel barrier layer may influence the system. This can be avoided by modifying the nickel alloy or using a different material for the barrier layer. Furthermore, the layer thicknesses of the individual coating materials can also have a significant influence on the performance of the connector and its longevity.

tal ions of the electrolysis bath. Thus, the ion conduction closes the circuit to the cathode. Due to the closed circuit, the electrons of the anode, in this case tin or nickel, are transported to the cathode (material) and are deposited on the cathode. The layer thickness is determined by the applied current strength and the time in which the current flows. In addition to strip electroplating, drum electroplating is often used for loose contacts. In this process, the contacts are poured into a drum and flooded

Mating Cycles of Connectors

Depending on the manufacturer, the information on the corresponding mating cycles of the pin and socket contacts varies.

Fischer Elektronik guarantees at least 10 mating cycles for tin and at least 50 mating cycles for gold. The fewest mating cycles can be achieved with all manufacturers with a standard tin coating of 4 to 6 μm . Here, it is recommended to stay below 10 mating cycles as tin is a very soft material and already after approx. 10 mating cycles the tin layer is worn down to such an extent that the nickel barrier layer is visible.

With flash gold, the recommended number of mating cycles is also approx. 10, as the gold layer of 0.1 μm is very thin. As soon as a gold layer of 0.2 μm is applied to the nickel barrier layer, up to 50 mating cycles can be achieved without the user having to reckon with an increase in contact transition resistance. A classification or subdivision of the individual mating cycles into quality classes is only carried out for d-sub connectors. The classification is divided into 3 quality classes. In quality class 3 at least 50 mating cycles can be achieved. In quality class 2, at least 200 mating cycles are already achieved and in quality class 1, at least 500 mating cycles are specified by the manufacturers. In order to achieve the individual quality classes, however, a not inconsiderably thick gold coating is required. 50 mating cycles are achieved with a minimum of 0.2 μm gold. In order to achieve 200 or 500 mating cycles, a 0.8 μm respectively 1.27 μm thick gold coating is required on the pin and socket contacts of the d-sub connectors. Fischer Elektronik orientates its work in accordance with DIN 41652.

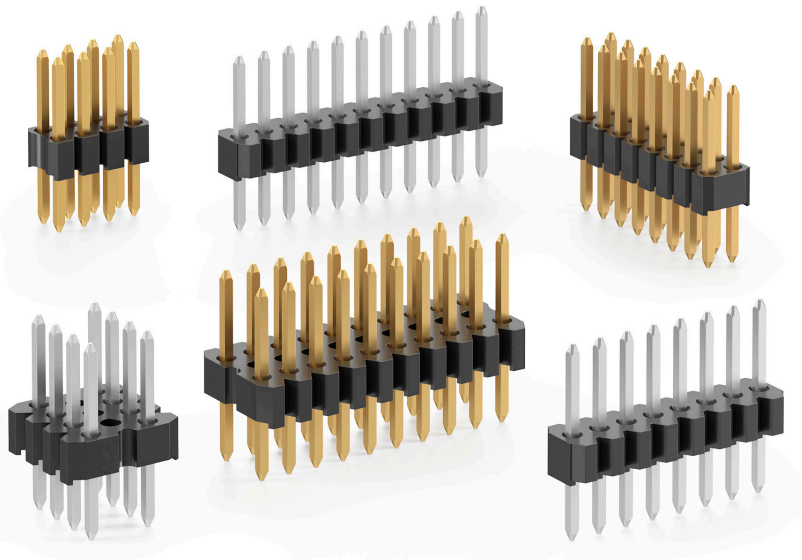


Illustration 1: Male headers - gold-plated and tin-plated

Galvanic Tin Plating and Gold Plating

In addition to the chemical application of the contact coatings, an electroplating process is used in most cases for coating the contacts. In the electroplating process, a distinction is made between barrel electroplating and strip electroplating.

The set-up of an electroplating system consists of an anode, a cathode, a direct current source, an electrolyte liquid and a tank. Both the electrodes (anode, cathode) and the electrolyte liquid are located in the electroplating tank. The positive terminal of the direct current source is connected to the anodes which consist of soluble tin plates in the case of tinplating and of durable titanium plates in the case of gold-plating. The negative pole of the direct current source is connected to the cathode which is connected to the workpiece. When the direct current is switched on, electrons are pumped into the anode. The electrons are released via the anode to the electrolyte liquid. In this liquid the electrons combine with the positively charged me-

with electrolyte liquid. The principle of the electroplating is identical, but the anode is an insulated copper cable with a brass tip that makes a permanent connection with the pin or socket contacts. In addition to the complete coating with tin or gold, there is also a mixture of the two. This type of coating is called selective gold plating. In selective gold plating, the connection area is gold plated by strip electroplating and then the soldering area is tin plated.

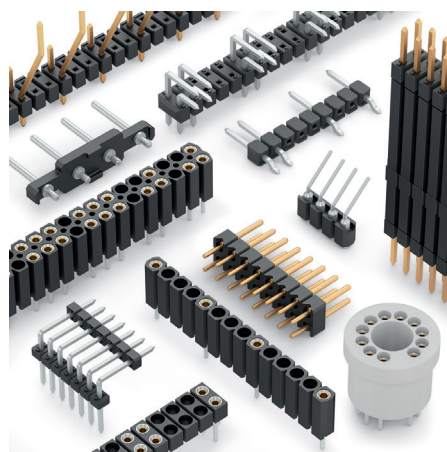


Illustration 2 Customer-specific connectors

Advantages and Disadvantages of the Individual Contact Coatings

The advantages of tin-plated contacts are the good solderability and the favourable tin price.

The disadvantages of tin coating are the mating cycles, as tin is a relatively soft material. The maximum number of mating cycles for tin is about 10, depending on the contact geometry and layer thickness.

With gold-plated contacts, the situation

is reversed. The number of mating cycles is relatively high compared to tin and can be influenced by the thickness of the gold layer. The disadvantage of gold is its high price. This makes gold-plated contacts much more expensive than tin-plated contacts.

Selective gold-plated contacts offer a compromise between price and performance. With selectively gold-plated contacts, the soldering area is tin-plated and only the mating area is gold-plated. By restricting the gold plating to the mating area, the costs can be kept in check.

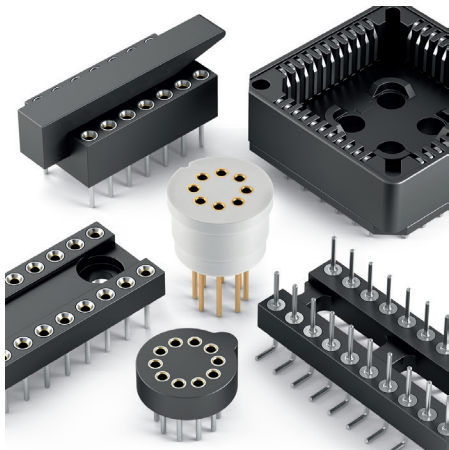


Illustration 3: Sockets

Conclusion

In principle, it can be said that there are a number of things to consider when choosing the right contact coating.

In addition to the influence of the nickel barrier layer on metrological applications, the respective layer thicknesses of gold, tin or nickel can also have a considerable influence on the performance and durability of the connector.

Depending on the area of application, some coatings are more suitable than others.

So that the end customer does not experience problems or failures of components, for more than 50 years the company Fischer Elektronik has been supporting its customers with a high level of expertise in every application, not only in the field of circuit board connectors, but also in all other product areas.



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