

## Tin Whisker Growth

The planned ban of lead by the European Union in July of 2006 directly affects the surface treatment for current carrying metal parts found in electrical and electronic interconnect components (i.e. terminal blocks, connectors, etc.). As such, there is much discussion in the Electronics Industry on a phenomenon known as tin whisker growth on pure tin surfaces.

Whisker are filamentary single crystals growing on tin surfaces caused by residual stresses. The coating process ( integration of brightener, hydrogen in galvanic layer), mechanical stresses ( from bending, rolling, punching process, surface processing), thermal expansion or phase changes within the tin layer may be the reasons.

The single crystals are poor electro-conductive. The electric resistance of a tin whisker of 4 microns length and 2 microns thickness is about 50 Ohm.

A voltage of > 1 volt or a slight shock are sufficient to destroy a whisker.

A suitable measure to prevent whisker growth is the use of pure tin layers > 10 microns. Crystallites forming at the grain boundaries of tin crystals cannot grow through the surface. The method of tin-plating, the electrolyte (matt tin without brightener) as well as tempering of 1 h at 150°C are further counteractive measures.

WAGO has started early activities to replace lead, and has taken the phenomenon of whisker growth on pure tin surfaces into account.

A multitude of laboratory tests, e.g. endurance tests, aging tests, conditioning tests provide evidence that the pure tin surface is of an equivalent quality as the billion fold produced tin-lead surface. In all tests, no whiskers were found.

As a result, the change to pure tin surfaces guarantees, that our products are on the same high quality level and compatible in all functional properties.

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