

## Technical Information

# 4541 Cd-FREE GOLD Substrate Plug Conductor Paste

The thick film gold composition 4541 was designed for plugging through holes in 0.010" to 0.025" thick alumina substrate. It provides a solid, low resistance interconnect for two sided utilization of substrates, resulting in increased circuit density. It may be used with bladder type filling machine or stencil. Its key features include:

- RoHS Compliant
- High Electrical Conductivity
- High Thermal Conductivity
- High Adhesion
- Low Shrinkage, No Separation from Side Walls
- For Use with Stencil or Bladder Machine

### TYPICAL FIRED FILM CHARACTERISTICS<sup>(1)</sup>

<b>Metallurgy</b>	Gold
<b>Resistivity<sup>(2)</sup></b>	10-50 milliohms/square at 25 $\mu$ m fired thickness

(1) Typical properties are based on testing of several batches under various processing conditions. They are not intended as specification limits.

(2) Measured on .020" wide lines.

### COMPOSITION PROPERTIES

<b>Viscosity:</b>	500 -1000 Kcps, when measured with Brookfield HBT viscometer, Spindle #14, utility cup, 10 RPM, 25°C
<b>Specific Gravity:</b>	7.0-8.0 g/cm <sup>3</sup>
<b>Recommended Thinner:</b>	KOARTAN B-1194

## RECOMMENDED PROCESSING PROCEDURE

**Printing:** Hole filling with a bladder machine or 3-5 mil thick stencil is recommended. Pulling vacuum through a porous stone aids in obtaining good plugs if the stencil method is used. Placing an absorbent paper under the substrate also helps in draining the excess liquid and results in a denser mass, regardless of the filling method.

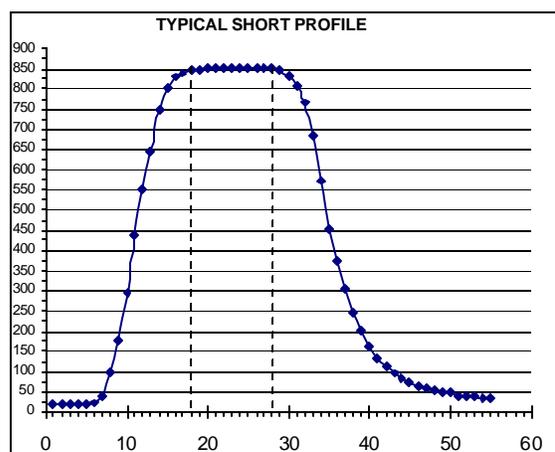
**Drying:** Wet prints should be allowed to stabilize for 5-10 minutes prior to drying. Dry for at least 15 minutes in a convection oven or belt dryer at 100°C-150°C.

**Firing:** Firing in air using a belt furnace and a 36-60 minute profile, with 10 minutes at a peak temperature of 850°C is recommended. Air flow rates must be optimized to ensure that the products of binder burn-off discharge properly and create a fully oxidizing atmosphere in the muffle.

**Application Notes:** Regardless of the filling method used, it is recommended that the filling operation be continued after the holes are apparently filled. This creates a denser mass and assures complete fill when very many holes are to be filled at once. For larger holes, 0.015"-0.025" diameter, it is recommended that the substrate be conditioned by pre-firing it at 850°C -900°C. Better adhesion to side walls is also obtained if the large holes are first coated with KOATAN 4530 thru-hole paste and fired, before filling with 4541.

For thicker substrates it is recommended that the filled parts be dried longer, but at lower drying temperature.

If excess dried paste protrudes on either side of the dried substrate, it can gently be removed with a clean, lint-free rag, sparingly moistened with high purity isopropyl alcohol or other solvent used for cleaning screens and stencils. This may leave a slight depression, which can be filled when printing the remaining circuit layers.



*Temperature (°C) vs. Time (minutes)*

**Storage and Shelf Life:** Store in tightly capped containers at room temperature. Shelf life is 6 months for unopened jars. Under ordinary conditions of storage and use the product should not require thinning. However, solvent loss during extended printing runs may be replaced by incorporating up to 0.5% of Koartan B-1194 thinner.

The information presented herein is based on data believed to be dependable and is accurate and reliable to the best of our knowledge and belief, but not guaranteed to be so. Koartan Company assumes no liability arising from the use of this product or the information provided herein. It is the responsibility of the user to verify the information and to establish the suitability of the product(s) for any particular application. Nothing herein is to be construed as recommending any practice or any product in violation of any patent or in violation of any law or regulation.