

The copper paste FK3101 can be used on Al₂O₃ and pre-oxidized AlN substrates, as well as a second layer on fired FK3201 films, by a screen printing process. The paste is fired in a nitrogen atmosphere to form thick-film conductors.

Processing

Substrates

The specifications stated are based on samples screen printed onto CoorsTek/ ANCeram AlN ceramic AN180 (lapped), pre-oxidised at 1200 °C for 30 minutes. Alumina (96%, as-fired) is also applicable. Substrates with other surface qualities or from other suppliers may result in variations of performance of the properties.

Screen printing

Use a stainless steel screen with 105 mesh and a wire diameter of 75 µm, as well as 100 µm emulsion thickness to achieve the stated film thickness.

Levelling

The screen printed film should level for 10±2 minutes at room temperature (22 to 25 °C).

Drying

The printed films should be dried for 20 to 30 minutes at 120 °C in a drying oven with an exhaust air system or in a continuous flow dryer.

Firing

The printed films should be fired under a nitrogen atmosphere (residual oxygen content < 10 ppm) at a peak temperature of 955 °C and with a dwell time of 15 minutes. Fraunhofer IKTS recommends a total cycle time of 100 minutes.

Storage

The paste should be stored at 4 to 10 °C. This guarantees a high paste viscosity and prevents the solids from settling. The jar must remain tightly closed during storage. To prevent condensation of air humidity on the paste, the jar must not be opened until the contents have reached room temperature. Before using the paste, it must be sufficiently homogenized, for example by stirring it with a spatula.

Safety notice

For safe handling and storage, also observe the advice of current material safety data sheets.

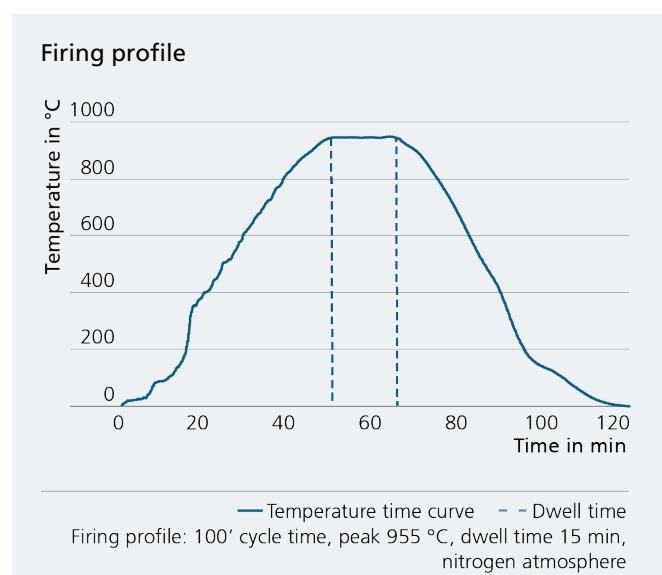
Quality requirements

Each delivery will be supplied with Certificate of Analysis (CoA). The paste meets all requirements of RoHS III (regulation 2015/863/EC) and REACH (regulation (EC) 1907/2006).

Instead of an expiration date, after which an expired paste would have to be disposed of regardless of its condition, it is provided with a retest date. The certified values of the paste are valid for six months from the date of shipment of the unopened jars. Prolonged storage may result in segregation of the solids. Then the paste should be mixed thoroughly before further use. After the retest date the customer can decide whether the product needs to be retested to recheck the parameters for further application. The test conditions are given in point 2 to compare the results with CoA.

Miscellaneous

The current technical specifications are published on our website www.ikts.fraunhofer.de.



Technical specifications

Parameter	Unit	Value
Viscosity ¹	Pa·s	≤ 200
Sheet resistance ^{2, 5}	mOhm/sq	≤ 0.6
Solderability ^{3, 5}	%	≥ 90
Adhesion ⁴ (number of firings)		
- Initial ⁵ (1 x fired)	N/4 mm ²	≥ 25
- Aged ⁵ (1 x fired)		≥ 25
Fired film thickness	µm	60±10
Coverage ⁶	cm ² /g	15±5

¹ Brookfield viscometer HB with spindle/cup combination SC4-14/-6RP(Y) at n=10 rpm and 25±0.2 °C.

² Sheet resistance, calculated for a fired thickness of 60±1 µm.

³ Solder Sn/Ag/Cu 96.5/3.0/0.5; flux: Alpha 611, soldering time: 5 s, soldering temperature: 245±2 °C.

⁴ 90° wire peel test in accordance with DIN 41850-2, 2x2 mm² pad size, solder: Sn/Ag/Cu 96.5/3.5/0.5.

⁵ Firing profile: total cycle time 100 min, 15 min at 955 °C.

⁶ Calculated area that can be printed with one gram paste in the recommended thickness.

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