FK4027:
Encapsulation paste for AlN

Fraunhofer IKTS

The encapsulation paste FK4027 is applied as a protective film onto thick-film resistors of the FK9600 and FK9900M resistor paste series, and onto its contacts. This prevents resistance drifts which could result from environmental factors, such as high air humidity or slight mechanical abrasion.

Where high film thicknesses are required, the paste should be processed in multiple separate screen printing and firing steps.

Processing

Substrates
The paste is designed for use on AlN substrates (with lapped surfaces) from CoorsTek/ANCeram. Substrates with other surface qualities or from other manufacturers may lead to variations in the results.

Screen printing
Use a stainless steel screen with 200 mesh and a wire diameter of 40 µm, as well as 25 µm emulsion thickness (10 to 12 µm EOM) 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
After leveling, the films are dried at 150 °C for 15 minutes in a well ventilated drying furnace. A conveyor dryer can also be used.

Firing
The films should be fired in air at a peak temperature of 650 °C, a dwell time of two minutes and a total cycle time of 26 minutes in a belt furnace.

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.

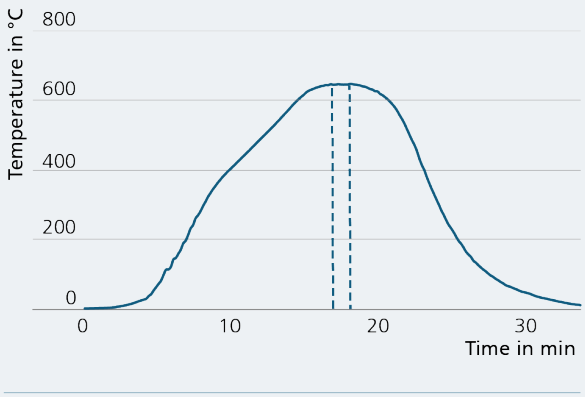
Safety notice
For safe handling and storage, also observe the advice of current material safety data sheets.

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.

Firing profile



Firing profile: 26'cycle time, peak 650 °C, dwell time 2 min

For more information please turn the page.

Technical specifications

Parameter	Unit	Value
Viscosity[1]	Pa·s	20…50
Color	—	Green
Film surface[2]	—	Smooth, glazed
Resistance change[2, 3]	%	< 5
Fired film thickness	µm	12±2
Coverage[4]	cm²/g	120±5

[1] Brookfield viscometer HB with spindle/cup combination SC4-14/-6RP(Y) at n=10 rpm and 25±0.2 °C.
[2] Firing profile: total cycle time 26 min, 2 min at 650 °C.
[3] Resistance drift, calculated from resistance values with the geometry 2x2 mm2 and a sheet resistance of approx. 50-100 Ohm/Sq before and after firing of layers of FK4027 printed on top.
[4] Calculated area that can be printed with one gram paste in the recommended thickness.

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