

1 DESCRIPTION

Sk70N is a very high thermally conductive silver-loaded polymeric adhesive designed for high-temperature wire-bonding applications. The adhesive component of Sk70N is an interpenetrating network (IPN) of thermoplastic and thermoset resins. Pure thermoplastic resins do not provide high-temperature adhesion necessary for high wire-bonding temperatures. Pure thermoset resins are generally too stressful for larger die attach on metal heat spreaders. An IPN of the two types of polymers provides the higher temperature adhesion for wire bonding, without creating excessive stress on the die. When cured, a highly conductive polymer matrix yields excellent thermal transfer properties, matching or exceeding typical soft solder die attach performance.

2 APPLICATIONS

- Exposed heat-slug molded packages
- High-k thermal interfaces
- High-power die attach
- High-temperature wire bonding
- Large or small area component attach

3 KEY FEATURES

- Very high thermal conductivity - **50 W/m²K**
- **Low interfacial thermal resistance**
- **Fast throughput**
- **Extremely low moisture uptake** - ideal for non-hermetic packages
- Void-free bondlines - **maximum thermal transfer**
- **Extended work time**
- **Superior adhesion**

4 TYPICAL PROPERTIES

Parameter	Sk70N	Unit	Note / Condition	
PASTE PROPERTIES (before curing)				
Viscosity	30,000	cP	25 °C, 10 rpm, Brookfield RVT viscometer, Helipath C spindle	
Thixotropic index	3.3	--	25 °C, 10 rpm / 50 rpm	
Shelf life	12	month	Syringes, - 40 °C	
	6	month	Jars, 25 °C	
Density	4.5	g/cc	Calculated	
CURED PROPERTIES (after 6 °C/minute ramp and 200°C, 15 minute cure)				
Bulk thermal conductivity	50	W/m ² K	Laser Flash, ASTM E1461-07	
Volume electrical resistivity	16	μΩ-cm	LCR Meter	
Rth	0.05	Kcm ² /W	300 - mil Si to 400 - mil Si (Laser Flash, ASTM E1461-07)	
Shear adhesion (25°C)	2,100	psi	200-mil Si die to Ag-Cu	
	15	N/mm ²	5-mm Si die to Ag-Cu	
Coefficient of Thermal Expansion (CTE)	28	ppm/°C	TMA	
Storage modulus	25°C	1,276,300	psi	DMA
		8,800	MPa	
	150°C	578,700	psi	
		3,990	MPa	
Glass Transition Temperature (Tg)	40, 91	°C	DMA	
Ionic impurities	Cl ⁻	4	ppm	NATS
	Na	2	ppm	
	K	1	ppm	
pH	4.1		pH meter	
Silver content	93	%	By weight	
Density	7.3	g/cc	Calculated	
SYRINGE PROPERTIES				
Syringe thaw time	30-60	minutes		

Note: Sk70N includes a small amount of organo-tin compound (DBT < 300ppm)

5 STORAGE AND HANDLING

Sk70N is available packaged in frozen syringes and shipped at -40°C or below. For more information please refer to the document *SYRINGE-PACKAGED ADHESIVE PASTES*.

Sk70N is also available packaged in jars without dry ice. Storing jars on a jar roller, such as Diemat's model 8010, at 1 to 5 rpm is recommended. Failure to roll the jars adequately could result in non-homogeneity and inconsistent dispensing. If not jar-rolled, gentle stirring is recommended before use. If the paste is homogeneous (no solvent on top or thick solid felt in bottom of the jar), it can be poured into a syringe and used immediately.

Deposition weights will vary according to component size. Typical dispense quantities are 75 µL or 240 mg per square inch of die area. Components should be pressed all the way into the Sk70N material wet deposit such that a **2.0 - 2.5 mil** wet bondline exists with fillet formation around the perimeter. Final cured bondline thickness should be approximately **1.5 to 2.0 mil**.

Curing Profile

There is no drying stage for Sk70N. All solvent evolution and bonding occur within one quick curing profile. Simply place attached materials into a preheated circulating oven at the desired dwell temperature. If using a belt furnace or other type of oven, ramp rates should be controlled for optimal results. The following ramp rate, time and temperature guidelines are recommended for components smaller than 15 mm square attach area. Die greater than 15 mm require a prebake step. Proper processing will result in a cohesive failure mode with silver showing at both interfaces.

6 PROCESSING GUIDELINES

Application

The Sk70N rheology has been designed to be utilized in automated high speed dispensing equipment without tailing or dripping. Sk70N should be uniform and essentially free of air bubbles prior to use. Please note that the time between material application and component placement can be important in the attachment of small components. If open time in excess of 20 minutes is required before component placement for attach areas of less than 4 mm², please contact Namics for specific deposition options.

A 21 gage needle (16 mil ID) is typically recommended for dispensing of Sk70N. Needles smaller than 25 gage (10 mil ID) may not produce uniform dispense weights. The material should be dispensed as an "X" pattern with sufficient quantity to produce fillets wicking up the side of the attached component.

Recommended Curing Profiles

Pre-bake Temperature: 100 °C		Pre-bake Time: 30 minutes	
Ramp Rate	Cure Temperature	Dwell Time	Typical Profile
5-20°C / minute	200°C	15-30 minutes	Ramp 5-20 °C/minute; dwell 15 minutes @ 200 °C
5-20°C / minute	175°C	60 minutes	Ramp 5-20 °C/minute; dwell 60 minutes @ 175 °C
5-20°C / minute	150°C	120 minutes	Ramp 5-20 °C/minute; dwell 120 minutes @ 150 °C

Note: Use only one cure temperature/time combination

7 ORDERING INFORMATION

Ordering Number	Key Product Characteristics
Sk70N	Very high thermal conductivity; 6-month shelf life in jars at room temperature; 12-month shelf life in frozen syringes.
<ul style="list-style-type: none">Specify container type and size when ordering. Available in syringes and jars.Standard syringe sizes and fill amounts are: 5cc filled with either 5 or 10 grams, and 10 cc filled with 15 grams.Standard jar sizes are 50, 100, and 200 grams.	

8 MORE INFORMATION

For more information on Sk70N and other Namics products, contact:

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