



# TCL-104

## Thermal Conductive Heat Curable Epoxy Adhesive

### PRODUCT DESCRIPTION:

- Base chemistry: epoxy only, cationic polymerization
- One component Boron Nitride filled non-electrically conductive adhesive ready for use, solvent-free, heat curing, thixotropic
- Average particle size 7 µm and max size 30 µm

### PRODUCT USE:

- Bonding integrated circuits and components in semiconductor packaging.
- Heat transfer and dissipation
- Bonding of opaque substrates

### FEATURES:

- Thermal conductive and electrical insulating, epoxy only, high adhesion, high T<sub>g</sub>, long shelf and working life, low outgas, excellent reliability performances, robust for solder reflow process

### INSTRUCTIONS FOR USE:

- 1) Clean the substrates to remove contamination, dust, moisture, salt and/or oil
- 2) Dispense adhesive on substrates
- 3) Thermal cure: heat is used for cure of adhesive

### GENERAL USAGE INFORMATION:

**Shipment:** adhesive is shipped in “cold pack with ice bricks”, no Dri ice

**Storage:** After receipt, **cold storage at -20 °C or -40 °C** in the original container is required

**Before use:** The cold adhesive needs to reach RT (23-25°C) before use. The container needs to sit at RT, adding heat is not allowed. Room temperature equilibration time is dependent on container size, but a 10-30 gram syringe equilibration time is approximately 30-60 minutes. Condensed water on the container must be removed prior to use

### SAFETY AND HANDLING

The uncured adhesive can be cleaned from apparatus with isopropyl alcohol (IPA), methyl ethyl ketone (MEK), or commercial alcohol based cleaning solution. Avoid direct skin and eye contact. Use only in well ventilated areas. Use protective clothing, **gloves and safety goggles**. Read [Material Safety Data Sheet](#) before handling.

### CURING CONDITIONS:

- 1) **Heat curing:** the adhesive is cured with heat  
90°C for 60 to 90 minutes  
or 100°C for 60 minutes  
or 110°C for 45 to 60 minutes
- The actual heat cure time is dependent on the heating time of the bonded components. The heat time of the components must be added to the total cure time of the adhesive for the process
  - The effect of humidity is greater for very thin film, if the adhesive layer is <25 µm, then longer cure time might be needed
  - To ensure good curing speed, the humidity should be <60% RH
  - Epoxy adhesives have post cure properties. Adhesion strength testing should be conducted at least 24 hrs after part assembly.

### TYPICAL PROPERTIES

#### Uncured resin

Viscosity at 25 °C, mPa.s or cps (shear rate: 10/s)	30,000 to 34,000
Thixotropic index (shear rate: 1/s over 10/s)	3.5
Appearance of uncured adhesive	white paste
Shelf life (-40 to -20°C):	6 months
Pot life or working life (20 - 25°C):	48 hours
Density (g/mL)	1.3

#### Cured film

Shrinkage (linear, %)	< 0.3
Outgas, weight % (per MIL-STD 883/5011)	0.11
Hardness – Shore D	85-90
Glass transition temperature (DMA, °C)	183
Outgas, weight % (per MIL-STD 883/5011)	0.11
Outgas, weight % (per Telcordia GR-1221)	0.08
Volume Resistivity, ohm-cm	>10 <sup>13</sup>

#### Thermal Properties

<b>Thermal Conductivity:</b>	<b>2.8 W/m °K (75 µm film)</b>
	<b>1.2 W/m °K (500 µm film)</b>

Coefficient of thermal expansion (DMA)	
below T <sub>g</sub> (x10 <sup>-6</sup> ), °C <sup>-1</sup>	21
above T <sub>g</sub> (x10 <sup>-6</sup> ), °C <sup>-1</sup>	60
Physical properties tested at 25°C, 50% RH (ASTM D638)	
Tensile strength, MPa	150
Elongation (%)	3
Young’s Modulus, MPa	16,000
Operating temperature, °C	-60 to 200

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