

Advanced Materials**Kerimid[®] 8292 N-75**

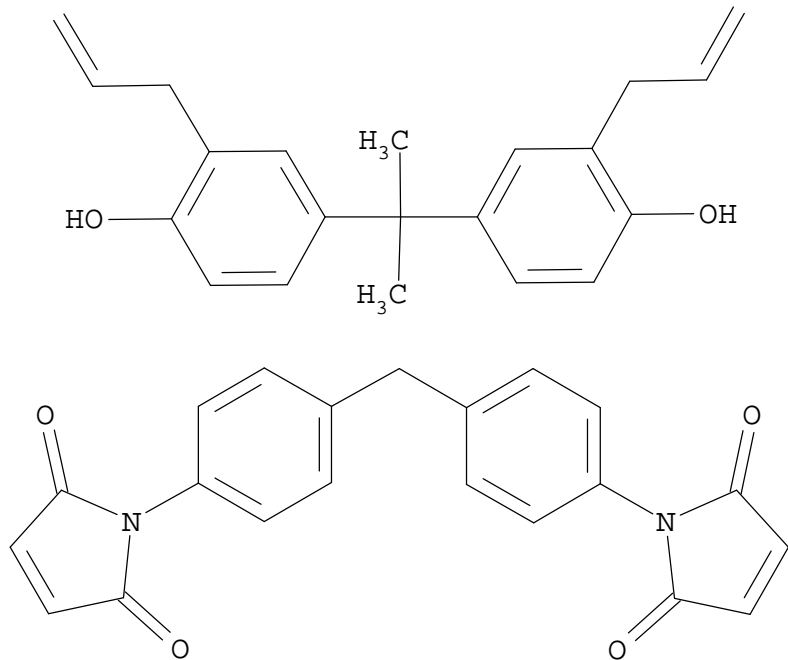
High Performance Bismaleimide Laminating Resin

GENERAL

Kerimid[®] 8292 N-75 is a single component, ready to use, polyimide resin solution for use in the manufacture of high temperature resistant electrical laminates and prepregs.

CHEMICAL DESCRIPTION

Kerimid[®] 8292 N-75 is a 75% by weight solids solution of a polyimide resin in methylethyl ketone. The base polyimide resin is a prepolymer formed by the reaction of the following two components:

**APPLICATIONS**

Laminates and prepregs for printed wiring boards for:
High temperature environment
Surface mount chip carriers
High reliability applications

ADVANTAGES

Excellent toughness
 Good moisture and chemical resistance
 Non-MDA (methylene dianiline) hardener
 Excellent heat performance, Tg 250 - 300°C (480 - 570°F)
 High peel strength at soldering temperature
 Low Z axis expansion and improved reliability

TYPICAL PROPERTIES*

| | |
|--------------------------------------|---------------------|
| Visual Appearance | Amber liquid |
| Color, Gardner, max | 18 |
| Solids, Wt. % | 75 |
| Solvents | methyl ethyl ketone |
| Viscosity @ 25°C (77°F), mPa s (cPs) | 2,000 - 8,000 |
| Stroke cure, 171°C (340°F), sec | 350 - 500 |
| Specific gravity, solution | 1.13 |
| Specific gravity, solid content | 1.23 |

* Typical properties are based on Huntsman's test methods. Copies are available upon request.

VARNISH PREPARATION

Kerimid® 8292 N-75 is a single component, ready to use, polyimide solution. It does not require additional hardeners or catalysts. Viscosity of the varnish can be adjusted with solvents to obtain the desired resin pick up. The following guideline can be used to adjust prepreg resin content. Simply mix solution before using.

| Varnish Solids, % | Glass Style | Resin Pick-up, % |
|-------------------|-------------|------------------|
| 55 - 60 | 7628 | 35 - 45 |
| 55 - 58 | 116 | 50 - 60 |
| 50 - 52 | 108 | 60 - 70 |
| 44 - 48 | 106 | 70 - 80 |

High boiling solvents may be incorporated into the varnish to allow a controlled evaporation rate in the treater.

TREATER OPERATION

As the Kerimid® 8292 N-75 impregnated web travels through the treater ovens, solvent volatilization is achieved in the first zone at 340 - 370°F. Further exposure to this temperature will cause advancement of prepreg resin, resulting in lowering of prepreg gel time and flow. Approximately 3 - 6 minutes residence time in the treater is required to produce prepregs with the following typical properties.

| Glass Style | Resin Content | Dust Gel ₁ | Mil Flow ₂ | Scale Flow ₃ | Volatiles ₃ |
|-------------|---------------|-----------------------|-----------------------|-------------------------|------------------------|
| 7628 | 35 - 40% | 80 sec; ±20 | 15 - 25% | - | 1.5 - 2.0% |
| 2116 | 48 - 52% | 80 sec; ±20 | 20 - 32% | 3.5 - 4.2 | 2.0 - 3.5% |
| 2113 | 50 - 55% | 80 sec; ±20 | 28 - 35% | - | 2.0 - 3.5% |
| 1080 | 59 - 64% | 80 sec; ±20 | 39 - 45% | 2.3 - 3.0 | 2.5 - 4.0% |
| 106 | 62 - 66% | 80 sec; ±20 | 40 - 50% | 1.4 - 1.8 | 2.5 - 4.0% |

1) Test done @ 171°C

2) As per Mil Spec 13949, section 2.3.17

3) Values are mils/ply as per Mil Spec 13949, section 2.4.38

LAMINATION CYCLE

Kerimid[®] 8292 N-75 prepreg resin exhibits a lower melt viscosity than conventional MDA/BMI resins. This is an advantage in multilayer applications where the increased flow allows more complete encapsulation of the internal circuit layers. Care must be exercised, however, in manufacture of core materials to avoid excessive flow and dry laminate surface.

Both hot and cold press cycles can be used to laminate Kerimid[®] 8292 N-75 prepregs.

HOT PRESS CYCLE

Lay-ups are loaded into a preheated press and lamination carried out using a dual pressure cycle.

Parameters

| | |
|------------------------------------|-----------------------------|
| Low pressure, psi | 20 - 30 |
| High pressure, psi | 300 - 400 |
| Platen temperature | 177° - 218°C (350° - 425°F) |
| Heat rise, min | 8° - 10°C (15° - 18°F) |
| Time @ 177° - 218°C (350° - 425°F) | 1 - 3 hrs. |

Procedure:

1. Provide sufficient blotter board to control heat transfer to the desired rate.
2. Preheat press to 177° - 218°C (350° - 425°F) (steam, electric, or oil).
3. Load lay-ups into the press and close immediately to low pressure.
4. Hold at low pressure until load reaches an internal temperature of 138° - 160°C (280° - 320°F). Resin will increase in viscosity and will approach gelation.
5. Increase pressure to 300 - 400 psi and hold for 1 - 3 hours.
6. Cool load under full pressure to 66°C (150°F) or less.
7. Remove from press. Post-cure material per recommended schedule.

COLD PRESS CYCLE

Lay-ups are loaded into a cold press, pressure increased to the desired ultimate value and platen temperature increased to the lamination temperature at controlled rate.

Parameters

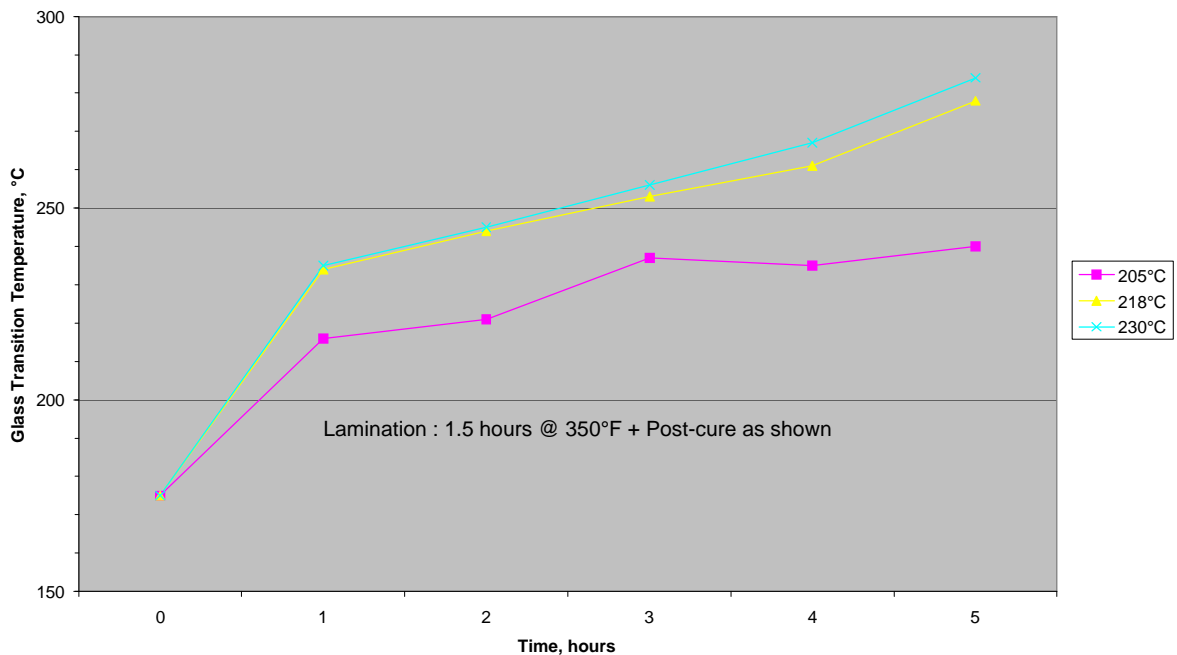
| | |
|------------------------------------|-----------------------------|
| Pressure, psi | 300 - 400 |
| Final platen temperature | 177° - 218°C (350° - 425°F) |
| Heat rise, min | 6° - 8°C (10° - 15°F) |
| Time @ 177° - 218°C (350° - 425°F) | 1 - 3 hrs. |

Procedure

1. Provide sufficient board to control heat transfer to the desired rate.
2. Load lay-ups into the press, close and apply ultimate pressure.
3. Start heat-up at the rate of 6° - 8°C (10° - 15°F) until the lay-ups reach lamination temperature (about 30 minutes).
4. Hold at lamination temperature for three hours.
5. Cool load under full pressure to 67°C (150°F) or less.
6. Remove from press. Post-cure material per recommended schedule.

POST-CURE CYCLE

In order to obtain the ultimate thermal and physical properties, Kerimid[®] 8292 N-75 laminates may require a post-cure. As shown in the figure below, the ultimate Tg will depend on the temperature and length of the cycle. If a higher lamination temperature 218°C (425°F) was used, this will allow a shorter post-cure cycle to achieve the same Tg than if lower lamination temperature 177°C (350°F) was used.

**Kerimid 8292 Cure
TMA Expansion Analysis @ 10°C/m****DRILLING OPERATION FOR
Kerimid[®] 8292 N-75 LAMINATE****Recommendations**

Aluminum back-up and cover materials are recommended for drilling Kerimid[®] 8292 N-75 laminate. Avoid the use of epoxy or phenolic materials.

New carbide drills should be used. Do not sharpen.

Suggested drilling parameters are as follows:

Feed: 70 - 100 in/min

Speed: 35,000 - 100,000 RPM

Stack: 1 - 2 high

Number of hits per bit should be approximately 1,000. It is not recommended that the hits per bit exceeds 2,000.

Plasma etching is recommended for etchback.

Commercial permanganate chemistry can also be used.

**Kerimid® 8292 N-75
LAMINATE PROPERTIES
(8 Ply 7628, .062" Thick)**

| Mechanical Property | Units | Test Method | Kerimid® 8292 Value |
|----------------------------|---------------------|--------------------|----------------------------|
| Ambient peel strength | | MIL-P-13949 | |
| Single and Double Treat | lbs/in | 4.8.3.8 | 9 - 10 |
| Brown Oxide | lbs/in | | 7 - 8 |
| Flex strength | | MIL-P-13949 | |
| Warp | psi | 4.8.3.16 | 74,000 |
| Fill | psi | | 60,000 |
| Flex modulus | | | |
| Warp | psi 10 ⁶ | DMA | 3.13 |
| Fill | psi 10 ⁶ | DMA | 2.88 |
| Modulus retention | | | |
| 150°C | Percent | DMA | 91.3% |
| 250°C | Percent | DMA | 72.0% |

| Chemical Property | Units | Test Method | Kerimid® 8292 Value |
|-------------------------------|--------------|-------------------------|----------------------------|
| Methylene chloride absorption | % wt. gain | IPC 2.3.4.2 | .041 |
| Water absorption | % wt. gain | MIL-P-13949 4.8.3.11 | 0.88 |

| Thermal Property | Units | Test Method | Kerimid® 8292 Value |
|---|-------------------------|--------------------|---------------------------------|
| Glass transition Temperature | °C | IPC 2.4.24 | 260 - 300 |
| Decomposition onset | °C | TGA | 390 - 410 |
| Coefficient of thermal expansion Z-axis | 10 ⁻⁶ /in/°C | IPC 2.4.41 | (below Tg) 39 (above Tg) 144 |
| Solder dip | N/A | MIL-P-13949 | No degradation |
| Pressure cooker | N/A | See below* | No delamination No blisters |

* - 062 unclad laminate 4" x 4" (250°F/1 hr, dessicator storage)
 - 15 psi steam/2,4, and 6 hours exposure
 - 20 seconds solder immersion @ 550°F

| Electrical Property | Units | Test Method | Kerimid® 8292 Value |
|----------------------------|-------------------------|-------------------------|----------------------------|
| Dielectric constant | @ 1Mhz | MIL-P-13949 4.8.3.14 | 4.4 |
| Dissipation factor | @ 1MHz | MIL-P-13949 4.8.3.14 | .01 |
| Volume resistivity | megaohms ^{-cm} | MIL-P-13949 | 15x10 ⁷ |
| Surface resistivity | megaohms ^{-cm} | MIL-P-13949 | 32x10 ⁷ |

PACKAGING & STORAGE

Kerimid® 8292 N-75 is supplied in 450 pound drums. This material should be stored in unopened sealed containers in a dry location at room temperature (actual expiration date appears on the label).

**HANDLING/SAFETY
PRECAUTIONS****Caution : Skin and eye irritant.**

Avoid contact with eyes, skin or clothing.

Avoid breathing vapor, mist or spray.

Use with adequate ventilation.

Wash after handling.

Store in tightly closed containers.

In accordance with good industrial practice, avoid unnecessary personal contact.

**Read Material Safety Data Sheet Before Using.
For Industrial Use Only.****FIRST AID****In case of contact :**

Eyes : Promptly flush with water for at least 15 minutes.

Skin : Wash thoroughly with mild soap and water.

Inhalation : Remove to fresh air. If breathing is difficult, give oxygen.

Ingestion : If conscious, give water and get medical attention.

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