HEXION

# Technical Data Sheet

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**EPON™ Resin 8111**

**Product Description**

EPON™ Resin 8111 is a low viscosity resin displaying exceptionally rapid reaction rates with aliphatic amine curing agents over a broad temperature range while providing performance levels roughly equivalent to basic liquid epoxy resins. This unique feature suggests the use of EPON Resin 8111 in rapid set adhesives and patching compounds capable of satisfactory use at application temperatures to 0 °C.

Aliphatic amine cured EPON Resin 8111 systems are characterized by hard, tough cures exhibiting mechanical, electrical, and water resistance properties similar to those normally expected from conventional liquid epoxy resins.

Good wetting characteristics, strong bonding to various substrates, and a reduced tendency to form amine carbonate in thin film applications suggest the use of EPON Resin 8111 in various high build coating applications such as two-component spray applied traffic striping, wear resistant surfacing and clear sealers.

**Sales Specification**

| Property | Units | Value | Test Method/Standard |
|---|---|---|---|
| Weight per Epoxide | g/eq | 300 - 320 | ASTM D1652 |
| Viscosity at 25°C | cP | 800 – 1,100 | ASTM D445 |
| Color | Gardner | 1 max. | ASTM D1544 |
| | | | |

**Typical Properties**

| Property | Units | Value | Test Method/Standard |
|---|---|---|---|
| Density at 25°C | lb/gal | 9.52 | ASTM D1475 |
| Equivalent weight [1] | | 140 | |
| | | | |

[1] Based on reaction with active amine hydrogen.

**Processing/How to use**

**General Information**

EPON Resin 8111 is a highly reactive multifunctional resin containing both epoxide groups and reactive unsaturation. Unlike conventional epoxy resins, polymerization can occur under certain conditions. The temperature of EPON Resin 8111 should not exceed 50 °C during storage, mixing or grinding operations.

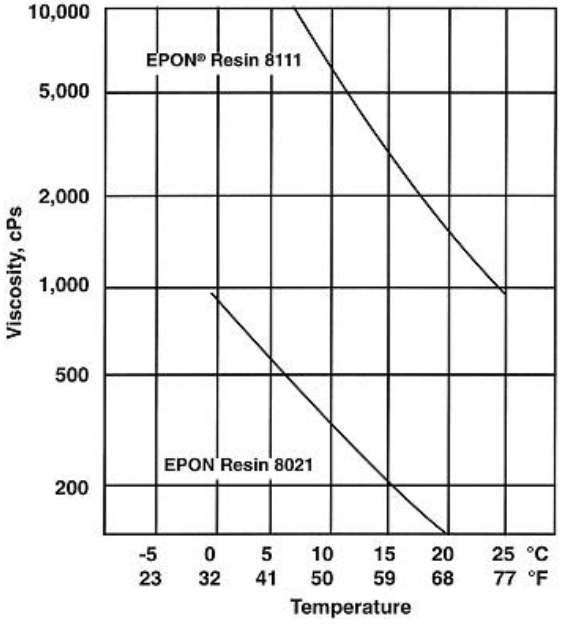
The use of typical epoxy diluents or alkaline fillers with EPON Resin 8111 may also result in polymerization. Therefore, it is important that any modifier be carefully screened prior to commercial use with EPON Resin 8111.

For applications requiring further viscosity reductions and/or flexibility, the addition of EPON Resin 8021 is suggested. EPON Resin 828 is also compatible with EPON Resin 8111.

The viscosity of EPON Resin 8111 is lower than that of unmodified bisphenol A liquid resins. (Because of its low viscosity, reactive diluents are not necessary for most applications.)

This low viscosity combined with high reactivity makes EPON Resin 8111 suitable for use in many low temperature applications. Figure 1 plots the viscosity of this resin at various temperatures.

Figure 1/ **Resin viscosity at various temperatures**




EPON Resin 8111 was designed to be cured with aliphatic amines. Within this curing agent class, EPI-CURE* Curing Agent 3295, EPI-CURE Curing Agent 3271, and unmodified polyethylene amines such as triethylene tetramine are particularly useful converters for this resin due to their low viscosity and moderate to high reactivity. EPI-CURE Curing Agent 3282, while higher in viscosity, is also recommended for this use. When using these curing agents, the preferred combining ratio is calculated on the basis of one active hydrogen equivalent weight per one hundred forty parts by weight EPON Resin 8111.

When cast in thin films, systems based on EPON Resin 8111/aliphatic amine curing combinations form smooth, continuous coatings free of cratering, crawling or residual surface tackiness. Such systems are less

prone to “sweat-out” when applied in thin films than are similar systems based on conventional bisphenol A based epoxy resins.

Epoxy compounds based on EPON Resin 8111 possess unusually low exotherm temperatures in comparison to conventional epoxy systems of similar reactivity. This combination of high reactivity and moderate exotherm suggests the use of this resin in splicing and sealing compounds.

**Performance Properties**

The cured state properties resulting from triethylene tetramine cures of EPON Resin 8111 alone, and in combination with various levels of EPON Resin 828, are listed in Table I.

Table 1 / **Properties of Epoxy Systems Containing EPON™ Resin 8111**

| | Method | Units | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|
| EPON Resin 8111 | | pbw | 100 | 75 | 50 | 25 | --- | 100 | --- |
| EPON Resin 8021 | | pbw | --- | --- | --- | --- | 25 | --- | --- |
| EPON Resin 828 | | pbw | --- | 25 | 50 | 75 | 75 | --- | 100 |
| EPIKURE Curing Agent 3234 [1] | | pbw | 17 | 16 | 15 | 14 | 13.5 | 17 | 12 |
| Handling Properties @ 25°C | | | | | | | | | |
| Resin Viscosity | | cP | 900 | 1,490 | 2,640 | 5,270 | 2,000 | 900 | 12,000 |
| Gel Time, 100 gram mass | | minutes | 2.5 | 3 | 4.5 | 13 | 23 | 2.5 | 31 |
| Peak Exotherm at 25°C, 100 grams | | °C | 188 | --- | 196 | --- | --- | 188 | 229 |
| Cure Schedule | | wk/°C | 2/25 | 2/25 | 2/25 | 2/25 | 2/25 | 16hrs/25 + 2hrs/100 | 16hrs/25 + 2hrs/100 |
| Cured State Properties [2] | | | | | | | | | |
| Heat Deflection Temperature | ASTM D648 | °C | 56 | 57 | 59 | 59 | 58 | 79 | 101 |
| Tensile Strength | ASTM D638 | psi | 10,000 | 10,400 | 10,600 | 11,000 | 11,100 | 8,900 | 12,500 |
| Tensile Elongation at break | | % | 3.4 | 3.1 | 2.5 | 2.5 | 4.2 | 4.2 | 5.3 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Flexural Strength | ASTM D790 | psi | 15,600 | 16,700 | 17,400 | 17,900 | 17,000 | 15,000 | 20,000 |
| Flexural Modulus, Initial | | ksi | 500 | 530 | 560 | 560 | 540 | 410 | 510 |
| Compressive Strength, Ultimate | | psi | 18,000 | 14,000 | 14,900 | 15,100 | 18,000 | 29,000 | 35,000 |
| Compressive Strength, Yield | | psi | 13,000 | 14,000 | 14,900 | 15,100 | 14,500 | 11,000 | 16,000 |
| Izod impact, notched | ASTM D256 | ft.•lb./in. | 0.46 | 0.40 | 0.37 | 0.38 | 1.03 | 0.69 | 0.51 |
| Hardness | | Shore D | 85 | 85 | 85 | 85 | 84 | 86 | 87 |
| Linear Shrinkage | | inch/inch | --- | --- | 0.021 | --- | --- | --- | --- |
| Weight loss [3] | | % | 0.38 | 0.34 | 0.33 | 0.30 | 0.58 | 0.21 | 0.16 |
| | | | | | | | | | |
| Chemical Resistance [4] | | | | | | | | | |
| Distalled Water | | % | 0.15 | 0.14 | 0.14 | 0.14 | 0.15 | 0.17 | 0.15 |
| 5% acetic acid | | % | 1.31 | 1.26 | 1.31 | 1.38 | 0.92 | 0.57 | 0.19 |
| 5% NaOH | | % | 0.15 | 0.14 | 0.14 | 0.14 | 0.15 | 0.16 | 0.15 |
| 50% xylene/50% isopropanol | | % | 0.04 | 0.02 | 0.07 | --- | 0.17 | 0.01 | 0.02 |
| | | | | | | | | | |
| Weight loss [4] | | % | 0.38 | 0.34 | 0.33 | 0.30 | 0.58 | 0.21 | 0.16 |
| | | | | | | | | | |
| Electrical Properties | | | | | | | | | |
| Dielectric constant, 100 Hz [5] | ASTM D150 | | 3.97 | 4.01 | 4.06 | 4.13 | 4.12 | 3.80 | 4.08 |
| Dissipation factor, 100 Hz [5] | | | 0.025 | 0.023 | 0.022 | 0.022 | 0.023 | 0.029 | 0.026 |
| Volume resistivity at 25 °C | | ohm•cm | $2.4x10^{16}$ | $2.5x10^{16}$ | $2.7x10^{16}$ | $3.0x10^{16}$ | $1.6x10^{16}$ | $1.8x10^{16}$ | $1.8x10^{16}$ |

[1] Use of EPON Resin 8111 with aliphatic polyamines, which include such products as amidoamine, amine adducts and polyamides.

[2] Determined on 1/8-inch thick test specimens tested at 25 °C. Systems A through E were cured for 2 weeks at 25 °C. Systems F and G were cured for 16 hours at 25 °C followed by 2 hours at 100 °C.

[3] Percent weight loss after 24 hours at 150 °C.

[4] Percent weight gain after 24 hour immersion at 25 °C.

[5] Determined at 100 Hertz at 25 °C.

**Safety, Storage & Handling**
Please refer to the MSDS for the most current Safety and Handling information.

Please refer to the Hexion web site for Shelf Life and recommended Storage information.

EPON Resin 8111 should be stored in tightly sealed glass, stainless steel or phenolic line containers at normal room temperatures. Storage in unlined steel containers should be avoided. Care should be taken to avoid storage of this resin above 50 °C.

Prolonged storage of EPON Resin 8111 at temperatures below -10 °C can result in resin crystallization. Should this occur, gentle warming to normal ambient temperatures will restore this resin to its original homogeneous state.

Exposure to these materials should be minimized and avoided, if feasible, through the observance of proper precautions, use of appropriate engineering controls and proper personal protective clothing and equipment, and adherence to proper handling procedures. **None of these materials should be used, stored, or transported until the handling precautions and recommendations as stated in the Material Safety Data Sheet (MSDS) for these and all other products being used are understood by all persons who will work with them.** Questions and requests for information on Hexion Inc. ("Hexion") products should be directed to your Hexion sales representative, or the nearest Hexion sales office. Information and MSDSs on non-Hexion products should be obtained from the respective manufacturer.

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**Contact Information**
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