



D.E.R.[™] 593

Brominated Epoxy Resin Solution

Description

D.E.R.[™] 593 Epoxy Resin is a brominated epoxy resin supplied in acetone and DOWANOL[™] PM Glycol Ether. It is designed for the production of improved FR-4 type rigid board and multilayer electrical laminates. This brominated epoxy resin is similar to D.E.R. 592-A80 Epoxy Resin Solution, yet allows for a quicker cure and higher Tg due to the large amount of catalyst that can be added.

Typical Applications

Typical Formulation

For FR-4 laminate production, D.E.R. 593 Epoxy Resin Solution was formulated with dicyandiamide hardener and 2-methylimidazole accelerator. The exact concentration of hardener and accelerator must be optimized to suit the particular equipment and performance needs.

Formulation	Parts Solid
D.E.R. 593 Resin	100
Dicyandiamide	2.9
2-methylimidazole	0.45

Prepreg Production

The formulation described was used to impregnate 7628 type glass cloth then passed through a lab treater to yield prepreg with the following characteristics:

Prepreg Characteristics	
Resin Content (wt%)	40 – 45
Gel Time (sec)	80 – 120
Flow (wt%)	15 – 20

Laminate Production

Laminates were produced using 8 plies of the prepreg between two sheets of 1 oz. copper foil. The constructions were pressed at 200 psi for 30-60 minutes at 350°F. Final properties of the laminate are:

Laminate Properties	
Tg by DSC @ 20°C/min	175 – 180°C
Fire Retardancy UL 94	V – 0
Copper Peel Strength @ 25°C (lb/in)	9 – 10
T260 (min)	5 – 10
Decomposition Temperature (°C)	290 – 300

Typical Properties

Property ⁽¹⁾	Value	Method
Epoxy Equivalent Weight (g/eq) on solids	350 – 370	ASTM D-1652
Color (Gardner)	13 Max.	ASTM D-1544
Viscosity @ 25°C (cSt)	400 – 1100	ASTM D-445
Bromine Content (%)	16.5 – 18.0	Calculated
Volatile Content (wt%)	23 – 25	DowM 101188
Reactivity @ 171°C (sec)	272 – 302	DowM 101235
Shelf Life (Months)	24	

(1) Typical properties, not to be construed as specifications.

Safety and Handling

The Dow Chemical Company provides its customers with a product specific Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) to cover potential health effects, safe handling, storage, use and disposal information. Dow strongly encourages its customers to review the MSDS or SDS on its products and other materials prior to their use.

D.E.R.[™] 593 Epoxy Resin is a solution of epoxy resin in non-reactive solvents. Because of the possible hazards of the solvents used, solutions may be more hazardous to handle than the pure resins alone. Solutions may be much more irritating to the skin and eyes. These solutions are hazardous from inhalation with the potential to cause central nervous system depression (including signs such as dizziness and drowsiness followed by unconsciousness or even death) and other systemic effects. The solvents have exposure guidelines from the American Conference of Governmental Industrial Hygienists (ACGIH). The Threshold Limit Value (TLV) varies according to the specific solvent employed. The resin solutions containing solvent are more flammable than solid resins alone, with fire and explosion hazard again related to the solvent used. Hazard from ingestion is generally low but several of the solvents may cause chemical pneumonia if aspirated into the lung.

This brominated epoxy resin solution is supplied in bulk or in 225 kg tight-head drums. The resin solution should be stored in a dry place in its original closed packaging and should retain its chemical properties for a period of at least 24 months. For further handling information, consult the Dow brochure entitled, *DOW Epoxy Resins Product Stewardship Manual, Safe Handling and Storage*, Form No. 296-00312 and the Dow technical bulletin, *Product Coding, Shelf-life and Storage Stability*, Form No. 296-01657.

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D.E.R. 593 Brominated Epoxy Resin Solution

Form No. 296-01519-0109X-TD

Medical
Application
Policy

Dow will not knowingly sell or sample any product or service ("Product") into any commercial or developmental application that is intended for:

- (a) permanent (long term) contact with internal body fluids or internal body tissues. Long term is a use which exceeds 72 continuous hours;
- (b) use in cardiac prosthetic devices regardless of the length of time involved (cardiac prosthetic devices include, but are not limited to, pacemaker leads and devices, artificial hearts, heart valves, intra-aortic balloons and control systems and ventricular bypass assisted devices);
- (c) use as a critical component in medical devices that support or sustain human life; or
- (d) use specifically by pregnant women or in applications designed specifically to promote or interfere with human reproduction.

Additionally, all Products intended for use in pharmaceutical applications must pass the then current Pharmaceutical Liability Guidelines. For additional information please contact your regular Dow representative.

Food Contact
Applications

This epoxy resin will NOT comply with the U.S. Food, Drugs and Cosmetics Act as amended under Food Additive Regulation 21 CFR 175.300.

If your applications include food contact requirements, please consult your Dow representative.

Regulatory
Status

For more information on the regulatory status of this product, please refer to the MSDS or SDS for this product.

Contact information:

North America: 800-441-4369
+1-989-832-1426
+1-989-832-1465 (fax)
Mexico: +1-800-441-4369
Brazil: +55-11-5188-9222
+55-11-5188-9749 (fax)
Europe: +800-3-694-6367
+32-3-450-2240
+32-3-450-2815 (fax)
Asia Pacific: +800-7776-7776#
+800-7779-7779# (fax)
+60-3-7958-3392
+60-3-7958-5598 (fax)

except Indonesia and Vietnam

<http://www.dowepoxy.com>

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