



D.E.N.[™] 438[™]

Epoxy Novolac Resin

Description

D.E.N.[™] 438[™] Epoxy Novolac Resin is a semi-solid reaction product of epichlorohydrin and phenol-formaldehyde novolac.

Introduction

D.E.N. 438 Epoxy Novolac Resin is a general purpose, widely used epoxy novolac resin. It is recognized as a standard for high temperature applications from which variations have been developed. D.E.N. 438 Resin has multi-epoxy functionality (± 3.6). These additional reactive sites produce tightly cross-linked cured systems. This makes D.E.N. 438 Epoxy Novolac Resin useful in adhesives, structural laminates, coatings and castings for elevated temperature service. The thermal stability of a phenolic backbone with the reactivity and versatility of a bisphenol A epoxy resin are combined in D.E.N. 438 Epoxy Novolac Resin. Laminates can be made using D.E.N. 438 Epoxy Novolac Resin in combination with mica, synthetic glass-fiber or fiberglass reinforcement.

Typical Applications

This product is suitable for use in applications such as:

- Adhesives
- Casting and Tooling
- Composites
- Can and Coil Coatings
- Marine and Protective Coatings
- Photocure Industrial Coatings
- Potting and Encapsulation

Typical Properties

Property ⁽¹⁾	Value	Method
Epoxide Equivalent Weight (g/eq)	176 – 181	ASTM D-1652
Epoxide Percentage (%)	23.8 – 24.4	ASTM D-1652
Epoxide Group Content (mmol/kg)	5525 – 5680	ASTM D-1652
Color (Platinum Cobalt)	250 Max.	ASTM D-1209
Viscosity @ 51.7°C (mPa s)	31000 - 40000	ASTM D-445
Hydrolyzable Chloride Content (ppm)	1200 Max.	ASTM D-1726
Density @ 25°C (g/ml)	1.22	ASTM D-4052
Volatiles (wt%)	0.3 Max.	ASTM E-203
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. This epoxy novolac resin is supplied as semi-solid material in bulk or in 220 kg drums. This resin should be stored in a cool, dry place in its original closed packaging. This epoxy novolac resin 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.

Product Stewardship

The Dow Chemical Company has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis of our Product Stewardship philosophy by which we assess the health and environmental information on our products and then take the appropriate steps to protect employee and public health and the environment. The Dow Chemical Company has enduring commitments to Responsible Care® in the management of chemicals worldwide. Our Product Stewardship program rests with every individual involved with Dow products from the initial concept and research to the manufacture, sale, distribution, and disposal of each product.

Customer Notice

Dow encourages its customers and potential users of Dow products to review their applications for such products from the standpoint of human health and environmental quality. To help ensure that Dow products are not used in ways for which they were not intended or tested, Dow personnel are available to assist customers in dealing with ecological and product safety considerations. Your Dow sales representative can arrange for the proper contacts. Dow literature, including MSDS or SDS, should be consulted prior to the use of Dow products.

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 (except 30 days for PELLETHANE™ Polyurethane Elastomers);
- (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

When properly formulated and cured for food contact applications, this resin will comply with the U.S. Food, Drugs and Cosmetics Act as amended under Food Additive Regulation 21 CFR 175.300(b)(3)(viii)(a); "Epoxy resins, as basic polymer". This use is also subject to good manufacturing practices and any limitations specified in each regulation. Please consult the regulations for complete details.

If your applications include food contact requirements, please contact your Dow representative for further information and forthcoming EC regulations. Also consult the Dow data sheet, *Food Additive Status for Epoxy Resins, Curing Agents and Epoxy Novolac Resins*, Form No. 296-01425.

Regulatory Status

This semi-solid epoxy novolac resin is regarded as a polymer according to the 6th Amendment of Council Directive 67/548/EEC as well as according to Council Directive 92/32/EEC of 30 April 1992; the 7th Amendment of that same directive, and is, therefore, exempt from the European Inventory of Existing Chemical Substances (EINECS). In addition, Dow confirms that the chemicals and intentional additives which form the basis of this product are listed on EINECS.

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

Chemical Inventory Listing

CAS Number ⁽¹⁾		28064-14-4
Europe	EINECS	Polymer
United States	TSCA	28064-14-4
Canada	DSL	28064-14-4
Australia	AICS	28064-14-4
Japan	ENCS	7-2044
Korea	KECI	KE-28226
Philippines	PICCS	28064-14-4
China	SEPA	28064-14-4

(1) Please refer to the MSDS or SDS for this product to ensure this CAS number is consistent with the product(s) you use.

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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