



D.E.R.™ 353

Liquid Epoxy Resin

Description

D.E.R.™ 353 Liquid Epoxy Resin is a mono-functional reactive diluent modified liquid epoxy resin.

Introduction

D.E.R. 353 Epoxy Resin is a C₁₂-C₁₄ aliphatic glycidyl ether modified bisphenol A/F based epoxy resin of low viscosity. The performance of D.E.R. 353 Liquid Epoxy Resin in ambient curing coating/flooring formulations is similar to that obtained with D.E.R. 324 Epoxy Resin. The tendency for D.E.R. 353 Epoxy Resin to crystallize, however, is much lower than for D.E.R. 324 Epoxy Resin. The enhanced crystallization resistance caused by the bisphenol A/F epoxy resin blend greatly improves the formulation stability, reduces the handling costs, and makes emptying drums easier. See the Dow technical bulletin, *Crystallization of Liquid Epoxy Resins*, Form No. 296-01652.

The reactive diluent contained in D.E.R. 353 Epoxy Resin lowers both the viscosity and the surface tension of the resin compound which results in excellent surface wetting and adhesion. Moreover, the reactive diluent used in this resin formulation increases pot life as well as flexibility (impact resistance). Although the diluent reduces the solvent resistance somewhat versus regular unmodified bisphenol A epoxy resins, such as D.E.R.™ 331™ Epoxy Resin, it improves the acid resistance. Compared to other C₁₂-C₁₄ aliphatic glycidyl ether modified epoxy resins such as D.E.R. 324 Epoxy Resin, an improved resistance against solvent has been demonstrated.

A wide variety of curing agents is available to cure this liquid epoxy resin at ambient conditions. Most frequently used are cycloaliphatic polyamines, polyamides, amidoamines, and modified versions of these. These systems are sometimes cured at elevated temperatures to improve selected properties such as chemical resistance and glass transition temperature. If anhydride or catalytic curing agents are employed, elevated temperature and long-post cures are required to develop full end properties.

Typical Applications

This product is suitable for use in applications such as:

- Adhesives
- Casting and Tooling
- Civil Engineering
- Composites
- Marine and Protective Coatings
- Potting and Encapsulation

Typical Properties

Property ⁽¹⁾	Value	Method
Epoxide Equivalent Weight (g/eq)	190 – 200	ASTM D-1652
Epoxide Percentage (%)	21.5 – 22.6	ASTM D-1652
Epoxide Group Content (mmol/kg)	5000 – 5260	ASTM D-1652
Color (Gardner)	2 Max.	ASTM D-1544
Viscosity @ 25°C (mPa s)	800 – 1000	ASTM D-445
Density @ 25°C (g/ml)	1.12	ASTM D-4052
Clarity	Pass	DowM 101303
Shelf Life (Months)	24	

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

Cured Physical Properties

The low viscosity of D.E.R.™ 353 Epoxy Resin and the excellent wetting properties allow for high filler loadings and the formulation of self-leveling flooring compounds. Depending on the curing agent choice, a formulation can be prepared showing excellent mechanical properties as can be seen from below:

Typical Starting Point Formulation	Parts By Weight
D.E.R. 353 Liquid Epoxy Resin	195
Polyamide (i.e. Ancamide 350A ex. Air Products)	95
Tensile Strength (MPa)	44.8
Tensile Modulus (GPa)	2.03
Elongation @ Break (%)	6.1
Flexural Strength (MPa)	65
Flexural Modulus (GPa)	1.98

Primer

Prior to the application of an epoxy flooring/coating it is necessary to ensure that the substrate is sound and optimum adhesion can be achieved. To ensure appropriate adhesion on porous substrates such as concrete, the use of a primer / sealer is required. The primary purpose of a primer is to provide a strong bond to the concrete and a surface for adhesion of a subsequent coating layer. Primers generally have much lower viscosity than the subsequent coating and as a result, can provide deeper penetration into the substrate. An example of a primer formulation is shown in the table below:

Typical Primer Formulation	Parts By Weight
D.E.R. 353 Liquid Epoxy Resin	195
Cycloaliphatic Epoxy-Amine Adduct Hardener (e.g. Polypox H 354 ex. UPPC or similar)	93
Pot Life, 100 grams @ 25°C (min)	20
Consumption (gr/m ²)	200 – 300
Application	by Roller

Self-leveling Flooring

The functional layer of the coating system is applied over the primer layer and offers the required characteristics. Besides the appropriate choice of the binder system (resin and curing agent) a well-balanced use of pigments, fillers and additives also contributes to the overall performance of a coating system.

Following is an example of a starting formulation for a self-leveling flooring compound.

Self-leveling Flooring (*continued*)

Typical Starting Point Formulation	Parts By Weight
D.E.R.™ 353 Liquid Epoxy Resin	125
Titanium Dioxide	5
Colored Pigment (e.g. Iron-oxide)	2
Barium Sulphate	150
Quartz Sand (0.1-0.3 mm)	300
Air Release	1
Cycloaliphatic Epoxy-Amine Adduct (e.g. Polyox H 354 ex. UPPC or similar)	60
Filler : Binder	2.5 : 1
Pot Life, 100 grams @ 25°C (min)	35
Consumption (kg/m ²)	1.5 – 2

Self-leveling flooring formulations, typically up to 3 mm, contain a low filler / binder ratio and are therefore relatively free-flowing. These formulations are characterized by their excellent chemical resistance and, in the majority of cases, high gloss. Typical applications include those of decorative floorings or flooring systems designed for light traffic.

When using any epoxy product it is important that the components are thoroughly mixed in the correct proportions. It is recommended that no more flooring material than can reasonably be applied within the pot life of the material be prepared. The mixed composition shall be placed immediately after mixing has been completed. Application should be done by skilled and experienced workers with a plastic comb or broom. Since the formulation is self-leveling the composition has sufficient flow to ensure a smooth glossy surface without extensive effort. It can be advantageous to roll the floor covering with a spiked (“porcupine”) roller in order to assist with any air release.

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. 353 Liquid Epoxy Resin is supplied in bulk, in 1000 kg intermediate bulk containers or in 225 kg tight-head drums. The resin should be stored in a dry place in its original closed packaging. D.E.R. 353 Epoxy 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

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D.E.R. 353 Liquid Epoxy Resin

Form No. 296-01450-1207X-TD

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 Food, Drug and Cosmetic Act as amended under Food Additive Regulation 21 CFR 175.300 (Resinous and Polymeric Coatings), BUT ONLY FOR BULK DRY FOODS AT ROOM TEMPERATURE OR BELOW. This use is also subject to good manufacturing practice 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

The base epoxy resin components of this epoxy resin blend are regarded as polymers according to the 6th Amendment of Council Directive 67/548/EEC and as substances according to Council Directive 92/32/EEC of 30 April 1992, the 7th Amendment of that same directive. These substances have been reported to the EC Commission as No-Longer Polymers (NLP), are registered under NLP # 500-033-5 and NLP # 500-108-2, and are, therefore, exempt from the European Inventory of Existing Chemical Substances (EINECS). In addition, Dow confirms that the chemicals and intentional additives which form the basic of this product are listed on EINECS.

The bisphenol A diglycidyl ether component is registered under CAS registration number 25085-99-8 on the U.S. Toxic Substances Control Act (TSCA). In Europe, CAS # 25068-38-6 is frequently used (bisphenol A polymer with epichlorohydrin). Both CAS numbers describe epoxy resins produced by the condensation of bisphenol A with epichlorohydrin.

**Regulatory
Status
(continued)**

The bisphenol F diglycidyl ether component is registered under CAS registration number 28064-14-4 on TSCA. The C₁₂-C₁₄ alkyl glycidyl ether is listed on EINECS under the number 271-846-8 and under CAS registration number 68609-97-2.

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⁾		25085-99-8 (25068-38-6) / 28064-14-4 / 68609-97-2
Europe	EINECS	NLP # 500-033-5 & 500-108-2 / 271-846-8
United States	TSCA	25085-99-8 / 28064-14-4 / 68609-97-2
Canada	DSL	25085-99-8 / 28064-14-4 / 68609-97-2
Australia	AICS	25085-99-8 / 28064-14-4 / 68609-97-2
Japan	ENCS	7-1279 / 7-2044 / 2-2426
Korea	KECI	KE-24083 / KE-28226 / KE-27545
Philippines	PICCS	25085-99-8 / 28064-14-4 / 68609-97-2
China	SEPA	25085-99-8 / 28064-14-4 / 68609-97-2

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

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