



EPOXY

## EPOXY INDUSTRIAL COATING MATERIALS





## Coatings Innovation Derived from Experience and Expertise

Epoxy technology is the fundamental building block for durable, high-performance coating technology used in diverse industries around the world.

Olin is an experienced innovator in epoxy technology, helping formulators develop robust solutions to meet society's energy, transportation and infrastructure needs.

It has been that way for more than 60 years, and our longevity and dedication have yielded an impressive and broad portfolio of epoxy solutions. Looking ahead to the next 60 years, we're closely following industry trends and are constantly reevaluating our product line to meet changing emissions and sustainability targets.

We're proud of our past and excited about our future as we continue to provide a reliable global supply of innovative epoxy products and solutions for a changing world.

## Intense Focus on Industrial Coatings

From oil platforms to pipelines, from chemical processing plants to marine vessels and containers, each approach to protective coatings is unique. But no matter the asset, no matter the location, Olin Epoxy is at your side to help protect your investment.

Supported by a broad portfolio comprising the traditional as well as the innovative, Olin Epoxy enables formulators to provide a complete package: better performance with value-added features such as improved sustainability, broader application parameters and economical lifetime costs.

Olin Epoxy experts understand end-use applications and global markets. Our in-region experts appreciate the nuances of each situation and environment.

## Dedicated to Continued Innovation

New challenges in the energy, infrastructure, petrochemical, manufacturing, industrial architecture, transportation and marine markets are driving the need for innovation. And Olin Epoxy

is delivering higher-performing technologies that respect the environment, perform in increasingly demanding conditions and provide value.

Olin Epoxy continues to boost our portfolio to meet these needs. Our research and development efforts are founded on three guiding principles:

- Reduce environmental impact
- Enhance durability
- Lower system costs

Of course, we also understand that innovation sometimes means taking a new approach. Fortunately, innovation is not confined to the laboratory. We view collaboration as the key to optimizing technology and processes. It's the best way we know to help formulators focus on creating the right solution for their customers – the first time and every time.

## Industry Leading Innovations

Olin Epoxy is rethinking the traditional approach to industrial epoxy coating with game-changing systems enabled by our low viscosity epoxies and novolacs, waterborne technologies, and high-performance powder coatings and hardeners.

In addition, Olin Epoxy possesses the global resources to develop specialty products to address specific local challenges.





## Low Viscosity Epoxy and Novolacs

Heavy-duty coating performance requirements call for high-performance epoxy solutions. Solvent-free, low-viscosity resins from Olin Epoxy can be used to achieve both high volume solids and high pigment concentration (PVC), while maintaining good application and metal protection properties.

Olin Epoxy's low viscosity epoxies and novolacs are suited for applications in challenging environmental conditions such as low temperatures and high humidity. They can be used to formulate coatings for marine use, as well as for linings in chemical tanks. All of these are low viscosity liquid epoxy resins modified with a cycloaliphatic polyglycidyl ether (free of any organic solvent) that facilitate high solids coating formulations with low volatile organic compound (VOC) emissions, while minimizing compromises in performance. They can be cured with multiple types of curing agents (hardeners).

Olin Epoxy low-viscosity technologies can overcome many of the disadvantages inherent in current high-solids systems. In particular, Olin Epoxy technologies can combine ease of application using conventional spray equipment and demonstrate similar performance compared to traditional epoxy systems.

### Low Viscosity Epoxy and Novolacs Benefits

- Solvent-free formulation capability
- Enables primers with excellent balance of:
  - Application properties
  - Corrosion resistance
  - Chemical resistance
- High achievable volume solids and PVC
- High sprayability
- Long pot life
- Exceptional cured coating properties
- DLVNE™ products have higher chemical and thermal resistance

## Typical Properties<sup>1</sup>

Grade	EEW (gr/eq)	Viscosity @25 °C (mPa·s)	Description	Availability by Region
DLVE™ 18	160-175	400-1,000	Low viscosity liquid epoxy resin modified with a cycloaliphatic polyglycidyl ether for high solids coating formulations with ultra low volatile organic compound (VOC) emissions and ease of application. Excellent corrosion protection and chemical resistance. Can be cured with multiple types of curing agents (hardeners).	EMEA, NAA, LAA
DLVE 19	185-200	2,600-4,200	Low viscosity epoxy resin modified with a cycloaliphatic polyglycidyl ether for high solids coating formulations with low volatile organic compound (VOC) emissions, excellent application, corrosion and chemical resistance. Can be cured with multiple types of curing agents (hardeners).	EMEA, NAA, LAA
DLVE 52	165-180	350-550	Ultra low viscosity epoxy resin modified with a cycloaliphatic polyglycidyl ether (free of any organic solvent) for high solids coating formulations with low volatile organic compound (VOC) emissions, excellent application, corrosion and chemical resistance. This resin is more hydrophobic and can provide better surface wetting. Can be cured with multiple types of curing agents (hardeners).	EMEA, NAA, LAA
DLVNE 59	160-175	2,000-4,000	Low viscosity novolac resin modified with a cycloaliphatic polyglycidyl ether (free of any organic solvent) for high solids coating formulations with low volatile organic compound (VOC) emissions. Balance of properties similar to solvent-borne novolac.	EMEA, NAA, LAA
DLVNE 60	166-176	1,100-1,900 <sup>2</sup>	Low viscosity novolac resin modified with a cycloaliphatic polyglycidyl ether (free of any organic solvent) that facilitates high solids coating formulations with low volatile organic compound (VOC) emissions, improved application, and strong chemical and thermal resistance.	EMEA, NAA, LAA
DLVNE 61	155-170	4,500-6,500	Medium low viscosity novolac resin modified with a cycloaliphatic polyglycidyl ether (free of any organic solvent) that facilitates high solids coating formulations with low volatile organic compound (VOC) emissions, improved application, and strong chemical and thermal resistance.	EMEA, NAA, LAA

<sup>1</sup>All grades are 100% solids    <sup>2</sup>cSt @ 51.7 °C

## Waterborne Epoxies

Olin Epoxy is pushing waterborne technology to new levels. The solvent-free nature of these products can help formulators meet stringent VOC regulations, including ultra-low VOC formulations, in the development of high-performance coatings.

Our waterborne epoxies have been shown to perform as well as solvent-borne technologies, giving formulators the opportunity to gain solvent-level performance while also meeting environmental and performance goals.

### Waterborne Epoxy Benefits

- Solvent-free formulation capability
- Easy mixing with other waterborne components
- Manufactured without the use of APEO<sup>1</sup> surfactants
- Low odor
- Shear stable
- Easy water clean-up
- High gloss
- Early hardness
- Good abrasion
- Chemical resistance
- Freeze stable (curing agents)

<sup>1</sup>Alkyl phenol ethoxylates



### Typical Properties – Waterborne Epoxy Resins

Grade	EEW (gr/eq) on Solids	Viscosity @25 °C (mPa·s)	Solids (wt%)	Description	Availability by Region
D.E.R.™ 900	193-204	NA	64	Liquid epoxy emulsion designed for use in waterborne 2-pack coating systems. Also used as cross-linking agent for other aqueous (acrylic) systems.	APAC
D.E.R. 913	167-193	100-400	67	Liquid epoxy resin emulsion with improved reactivity. Designed for 2-component coating systems.	EMEA
D.E.R. 915	475-500	3,000-9,000	47	Waterborne dispersion of “1-type” solid epoxy resins for 2-component coating systems. Offers good corrosion protection on steel as well as fast-drying on mineral substrates.	EMEA, NAA, LAA
D.E.R. 916	184-204	5,000-10,000	58	Semi-solid epoxy novolac resin dispersion designed for 2-component coating systems. Can produce highly cross-linked matrices, providing excellent heat and chemical resistance similar to solvent-borne novolac systems.	EMEA, APAC, LAA
D.E.R. 917	193-204	3,000-9,000	64	Liquid epoxy emulsion designed for use in waterborne 2-pack coating systems. Also used as cross-linking agent for other aqueous (acrylic) systems.	EMEA, NAA, LAA

### Typical Properties – Waterborne Curing Agents

Grade	AHEW on Solids (gr/eq)	Viscosity @25 °C (mPa·s)	Solids (wt%)	Description	Availability by Region
D.E.H.™ 805	143	10,000-18,500	65	Aqueous polyamine adduct solution with emulsification capability. Offers visible end of pot life, low odor, fast drying and through hardening.	EMEA, NAA
D.E.H. 806	160	9,500-15,500	80	Aqueous polyamine adduct solution with emulsification capability. Designed for anti-corrosion applications in combination with epoxy dispersions. Compatible with zinc-phosphate anti-corrosion pigments.	EMEA, APAC
D.E.H. 810	150	2,000-4,000	50	Aqueous polyamine adduct solution with emulsification capability. Offers low viscosity, long pot life and excellent coatings properties.	EMEA, NAA
D.E.H. 813	140	5,000-10,000	70	Aqueous polyamine adduct solution with emulsification capability. Designed for fast drying anti-corrosion applications in combination with epoxy dispersions. Compatible with zinc-phosphate anti-corrosion pigments.	EMEA, APAC

## High-Performance Powder Coatings

Olin's high-performance coating products are strong enough to address the toughest coating challenges while also meeting stringent environmental requirements. Ideal for high-temperature and high-stress applications, these inherently VOC-free products offer increased adhesion and increased durability to help resist corrosion.

### High-Performance Powder Coatings Benefits

- Inherently VOC-free
- Enable increased adhesion
- Increased durability
- High corrosion resistance

### Typical Properties – High-Performance Powder Coatings Resins

Grade	EEW (gr/eq)	Softening Point (°C)	Description	Availability by Region
FORTEGRA™ 104	960-1,060	–	Specialty “4-type solid” epoxy resin with improved toughness and impact resistance designed for fusion bonded epoxy abrasion resistant overcoats.	APAC, LAA, NAA
FORTEGRA 304	920-1,090	105-115	Specialty solid resin designed to improve flexibility and impact resistance of fusion bonded epoxy coatings.	APAC, LAA, NAA
FORTEGRA 310	400-450	105-117	Specialty resin designed to improve flexibility and impact resistance of fusion bonded epoxy coatings with high glass transition temperature (up to 170 °C).	APAC, LAA, NAA
D.E.R.™ 664HA	750-850	105-115	Chemically modified medium molecular weight solid epoxy resin offering significantly improved hot/wet adhesion and cathodic disbondment.	EMEA, NAA
D.E.R. 6615	500-550	78-86	Low application temperature cure, down to approximately 110 °C, solid epoxy resin. Based on Olin patented process technology that allows combination of low melt viscosity while retaining sufficiently high softening point.	Globally
D.E.R. 6508	380-420	95-105	Specialty resin designed for high glass transition temperature fusion bonded epoxy coatings (up to 150 °C).	Globally
D.E.R. 6510 HT	410-440	105-114	Specialty resin designed for high glass transition temperature fusion bonded epoxy coatings (up to 170 °C).	Globally

### Typical Properties – High-Performance Powder Curing Agents

Grade	OHEW (gr/eq)	Softening Point (°C)	Description	Availability by Region
D.E.H.™ 90	240-270	76-84	Phenolic curing agent for fast cure combined with superior adhesion under humid conditions. Suitable also for low application temperature applications in combination with D.E.R. 6615 solid epoxy resin.	Globally





## Other Regional Solutions

Whatever the challenge, wherever you are located, Olin Epoxy can help develop solutions that meet specific temperature and flexibility requirements and faster return to service, among other demands.

## Typical Properties – Regionally Specific Resins

Grade	EEW (gr/eq)	Viscosity @25 °C (mPa·s)	Description	Availability by Region
D.E.R.™ 301	245-265	10,000-14,000	Modified liquid epoxy resin; compared with standard bisphenol A based liquid epoxy resin, similar viscosity, improved flexibility, longer pot life and anti-corrosion performance; suitable for high solids (80% volume solid above) formulation.	APAC
D.E.R. 3401	175-215	1,500-3,500	Low viscosity rapidly reacting bisphenol A/F epoxy resin designed for fast-curing coatings, adhesives and mortars. It can be used as the sole epoxy or in combination with other epoxy resins. Benefits include rapid cure, return to service, low emissions or substance of concern content, low viscosity and good chemical resistance.	NAA

## Typical Properties – Regionally Specific Curing Agents

Grade	AHEW (gr/eq)	Viscosity @25 °C (mPa·s)	Pot Life, min (with Reference Resin)	Reference Resin	Description	Availability by Region
D.E.H.™ 125	120	8,000-12,000 <sup>1</sup>	NA	NA	Standard polyamide. Excellent adhesion to various substrates. Recommended for anti-corrosion coatings, concrete primer and adhesives.	APAC
D.E.H.140	95	10,000-20,000	NA	NA	Standard polyamide. Lower viscosity, higher chemical resistance, excellent adhesion to various substrates, good balance in performances. Recommended for adhesives and anti-corrosion coatings.	APAC
D.E.H. 590 <sup>2</sup>	83	1,600-1,800	38	D.E.R. 354	Excellent resistance to sulfuric acid (50% to 98%). Epoxy novolacs resins (D.E.R. 354, D.E.N. 425 or D.E.N. 431) need to be used for 98% sulfuric acid resistance application. Good chemical resistance to concentrated hydrochloric acid.	NAA, APAC
D.E.H. 591 <sup>2</sup>	65	60-80	33	D.E.R. 354	Excellent acid resistance properties similar to D.E.H. 590 but with improved blush resistance and coating appearance.	NAA

<sup>1</sup>40 °C    <sup>2</sup>Includes NAA exempt solvents



# Our Complete Portfolio

Olin is committed to the successful development of protective coatings that stand up to the harshest conditions. We're here to assist you during each stage of the formulation process. The following overview of our complete portfolio of resin products and hardeners can be used to compare options and determine which combination provides the required performance for your application.

These are the same products that have been trusted by formulators for decades, and can be reliably supplied nearly anywhere in the world.

For more information about any of these products, or to learn more about how Olin Epoxy can provide the products and support you need to strengthen your system differentiation and competitive position, contact your Olin Epoxy representative.

## Liquid Epoxy Resins

Grade	EEW (gr/eq)	Viscosity @25 °C (mPa·s)	Description	Availability by Region
<b>Bisphenol A Epoxy Resins</b>				
D.E.R.™ 330	176-185	7,000-10,000	Lower viscosity bisphenol-A epoxy resin allowing the use of less diluents or more fillers in the formulation. Offers longer pot life versus the standard resin and slightly improved resistance properties when used in heat curing (composite) applications.	EMEA, NAA
D.E.R. 331	182-192	11,000-14,000	Industry standard bisphenol-A based liquid epoxy resin. Offers excellent mechanical, thermal and chemical resistance properties in multiple applications. Shows improved reactivity and wetting properties versus competitive alternatives.	Globally
D.E.R. 336	181-185	9,400-11,000	Standard liquid bisphenol-A epoxy resin of intermediate viscosity and equivalent weight with narrow specification limits.	EMEA
D.E.R. 337	230-250	400-800 <sup>1</sup>	Intermediate epoxy equivalent weight semi-solid epoxy resin, mainly used in adhesives and protective coatings, or as a modifier for other epoxy resins to improve impact strength, extensibility and adhesion.	EMEA
D.E.R. 383	176-183	9,000-10,500	Lower viscosity bisphenol-A epoxy resin allowing the use of fewer diluents or more fillers in the formulation. Offers longer pot life versus the standard resin and slightly improved resistance properties when used in heat curing (composite) applications.	NAA, APAC, LAA
<b>Modified Bisphenol A Epoxy Resins</b>				
D.E.R. 317	192-203	16,000-25,000	High viscosity, fast reacting (20% faster than D.E.R. 331) liquid epoxy resin designed for adhesive applications requiring quick gelling with amine curing agents.	NAA
D.E.R. 321	180-188	500-700	Very low viscosity resin allowing large amounts of fillers. Cure rate similar to undiluted resins. Improved acid resistance can be observed. For floorings, grouting, concrete reinforcement, structural adhesives, crack injection and castings.	EMEA, NAA, LAA
D.E.R. 3212	179-193	750-1,400	Similar to D.E.R. 321 epoxy resin but of higher viscosity, maintaining more mechanical strength.	NAA, LAA
D.E.R. 322	183-193	5,500-8,500	Low diluent content resin combining significant viscosity reduction while maintaining mechanical strength properties.	NAA
D.E.R. 323	190-204	1,000-1,200	Low viscosity liquid epoxy resin with reduced surface tension. Offers excellent wetting and flow. The low diluent content is the cause of the improved mechanical properties over D.E.R. 324 epoxy resin.	NAA

<sup>1</sup>70 wt% in diethylene glycol monobutyl ether





Grade	EEW (gr/eq)	Viscosity @25 °C (mPa·s)	Description	Availability by Region
<b>Modified Bisphenol A Epoxy Resins , cont.</b>				
D.E.R.™ 324	195-204	600-800	Offers low viscosity and low surface tension to wet the surface better, giving better adhesion and slightly lower viscosity at any given filler loading. The diluent increases pot life, flexibility (impact resistance) and acid resistance, but limits the solvent resistance. Prone to crystallization.	Globally
D.E.R. 325	185-206	850-2,800	Low viscosity liquid epoxy resin with reduced surface tension. Offers excellent wetting and flow. The low diluent content is the cause of the improved mechanical properties over D.E.R. 323 and D.E.R. 324 epoxy resin.	NAA
D.E.R. 3274	160-180	1,300-1,500	Bi-functional reactive diluent containing resin offering reduced viscosity while only affecting the mechanical and thermal properties moderately.	EMEA, NAA, LAA
D.E.R. 362	185-205	4,500-6,500	Chemically modified liquid epoxy resin without diluent. Offers excellent flow and high gloss coatings/floorings. This resin is used in building applications above and below ground, on road and bridge construction, as well as in underwater applications.	NAA
<b>Bisphenol A/F Epoxy Resins</b>				
D.E.R. 351	169-181	4,500-6,500	Bisphenol A/F resin with very low tendency to crystallize. Applications include solvent-free coating, tank- and pipe-linings, concrete reinforcements and also floorings, adhesives, electrical insulation and filament winding.	EMEA, APAC
D.E.R. 352	172-181	5,700-7,700	Higher viscosity and more economical bisphenol A/F liquid epoxy resin. Recommended base for many modified bisphenol A/F epoxy resins.	EMEA
D.E.R. 356	176-183	6,500-8,000	Economical bisphenol A/F epoxy resin with enhanced reactivity.	EMEA
<b>Modified Bisphenol A/F Epoxy Resins</b>				
D.E.R. 353	190-200	800-1,000	Low viscosity epoxy resin with very low crystallization tendency. Offers low surface tension to wet the surface better, giving better adhesion. The diluent increases pot life, flexibility (impact resistance) and acid resistance.	NAA, APAC, LAA
D.E.R. 3531	183-199	750-1,150	Low crystallization resin with low vapor pressure and hydrophobic in nature. Offers low viscosity and good wetting properties and is suitable for casting resin, coatings and adhesives.	EMEA
D.E.R. 3581	169-180	900-1,400	Liquid epoxy resin, modified with a lower vapor pressure di-functional reactive diluent. Offers improved reactivity, better mechanical properties as well as solvent resistance versus mono functional aliphatic diluents.	EMEA
<b>Bisphenol F Epoxy Resins</b>				
D.E.R. 354	167-174	3,400-4,200	Unmodified bisphenol F-based epoxy resin of low viscosity. Improves crystallization resistance of other epoxy resins and gives improvement in solvent resistance. Frequently used in solvent-free coatings, floor coverings, adhesives or composite applications.	NAA, LAA, APAC
<b>Flexible Epoxy Resins</b>				
D.E.R. 3912	550-650	21,000-29,000	Aliphatic liquid epoxy resin flexibilizer for high solids or solvent-free coatings.	EMEA, APAC
D.E.R. 732 (P)	310-330	60-70	Longer chain length polyglycol diepoxide liquid resin. Applications include coatings and adhesives for improved flexibility, elongation and impact resistance.	Globally
D.E.R. 736 (P)	175-205	30-60	Shorter chain polyglycol diepoxide liquid resin for improved flexibility, elongation and impact resistance in coatings and adhesives.	Globally
D.E.R. 750	176-186	2,500-4,500	Flexibilized epoxy resin suitable for civil engineering compounds (crack bridging), adhesives or for improvement of the toughness of fiber reinforced composites.	NAA
D.E.R. 791	255-275	28,000-34,000	Toughened epoxy resin with good cold elasticity and good curing rate.	APAC

## Epoxy Toughening Agents and Toughened Epoxy Resins

Grade	EEW (gr/eq)	Viscosity @25 °C (mPa·s)	Description	Availability by Region
FORTEGRA™ 100	NA	3,000-4,000	Low-viscosity toughening agent designed for use in amine-cured epoxy systems.	NAA, APAC, LAA
FORTEGRA 102	345-374	4,000-8,000	Toughened bisphenol A liquid epoxy resin master-batch (50 wt%). Allows easy formulation into other liquid epoxy binder systems for composite as well as coating applications.	NAA, LAA
FORTEGRA 201	325-360	26,000-46,000	Elastomer-modified epoxy functional adduct designed to improve toughness of epoxy systems with minimal impact on thermo-mechanical properties. Offers improved fatigue resistance, thermal shock resistance, impact resistance, and peel and shear strength.	NAA, LAA
FORTEGRA 202	NA	4,500-8,000	Low-viscosity toughener based on innovative technology. Imparts adhesion, impact resistance and anti-corrosion resistance via nanometer size phase separation in curing matrix.	APAC
FORTEGRA 301	200-225	2,700-3,500 <sup>1</sup>	Toughened liquid epoxy resin with core shell rubber particles. Offers improved toughness in coating and composite applications.	NAA, LAA

<sup>1</sup>at 50°

## Epoxy Novolac Resins

Grade	EEW (greq) on Solids	Viscosity @25 °C (mPa·s)	Description	Availability by Region
D.E.N.™ 425	169-175	9,500-12,500	Approximately 2.5 functional liquid epoxy novolac resin bridging between standard liquid epoxy resin and semi-solid epoxy novolac resins. When used in combination with a fast curing agent no post-cure is required and binder systems are obtained with excellent mechanical and especially solvent resistance properties.	Globally
D.E.N. 431	172-179	1,100-1,700 <sup>1</sup>	Multi-functional (±2.8) epoxy novolac resin of lower molecular weight for application where solvents cannot be tolerated and application viscosity (temperature) needs to remain relatively low. Used in adhesives, electrical and structural laminates and castings for elevated temperature service and excellent chemical resistance.	Globally
D.E.N. 438™	176-181	31,000-40,000 <sup>1</sup>	Highly functional (±3.6) epoxy novolac resin offering best mechanical, temperature and chemical resistance performance with acceptable viscosity. Recognized as a standard for high-temperature applications.	Globally
D.E.N. 438L	176-181	27,500-32,500 <sup>1</sup>	Low(er) viscosity version of D.E.N. 438 epoxy novolac resin to allow higher solids and/or lower viscosity formulations.	NAA
D.E.N. 438-A85	176-181	500-1,200	Solution of D.E.N. 438 in acetone mainly for laminating or prepreg applications.	NAA, APAC
D.E.N. 438-EK85	176-181	600-1,600	Solution of D.E.N. 438 in methyl-ethyl ketone mainly for laminating or prepreg applications.	EMEA, NAA, APAC
D.E.N. 438-MAK80	176-181	600-1,200	Solution of D.E.N. 438 in methyl n-amyl ketone mainly for laminating or prepreg applications.	NAA
D.E.N. 438-MK75	176-181	200-600	Solution of D.E.N. 438 in methyl iso-butyl ketone mainly for laminating or prepreg applications.	NAA
D.E.N. 438-X80	176-181	1,200-2,000	Solution of D.E.N. 438 in xylene. Main use in wet-paint systems with high temperature or chemical resistance requirements.	EMEA, NAA, APAC
D.E.N. 439	191-210	15,000-35,000 <sup>2</sup>	Highly functional (±3.8) epoxy novolac resin with improved reactivity. The higher viscosity offers a means of obtaining good drape and limited tack in prepreg formulations.	EMEA, NAA, APAC
D.E.N. 439-EK85	191-210	4,000-10,000	Solution of D.E.N. 439 in methyl-ethyl ketone mainly for laminating or prepreg applications.	EMEA, NAA, APAC
D.E.N. 440	187-192	50,000-90,000 <sup>2</sup>	Extremely high functional (± 4.4) epoxy novolac resin. Offers highest performance in this product group with regards to mechanical, temperature and chemical resistance properties.	NAA

<sup>1</sup>at 51.7 °C

<sup>2</sup> at 71 °C

## Brominated Resins

Grade	EEW (gr/eq) on Solids	Viscosity @25 °C (mPa·s)	Description	Availability by Region
D.E.R.™ 530-A80	425-440	1,500-2,500	Standard brominated epoxy resin in acetone with about 20.5% bromine on solids.	EMEA, NAA
D.E.R. 538-A80	465-495	800-1,800	Brominated epoxy resin in acetone with about 20% bromine on solids. Offers less flow during lamination versus D.E.R. 530-A80 epoxy resin.	EMEA, NAA
D.E.R. 539-EK80	430-470	NA	Brominated epoxy resin in methyl ethyl ketone with about 20% bromine on solids. Offers enhanced UV-blocking and fluorescence.	EMEA
D.E.R. 592-A80	350-370	1,000-2,400	Brominated epoxy resin in acetone with about 17% bromine on solids. Offers best dimensional stability and better chemical resistance than standard resins.	EMEA, NAA
D.E.R. 593	350-370	400-1,100	Brominated epoxy resin in DOWANOL™ PM glycol ether with about 17 wt% bromine on solids. Allows quicker cure and higher Tg due to the large amount of catalyst that can be added.	EMEA, NAA

## Solid Epoxy Resins

Grade	EEW (gr/eq)	Softening Point (°C)	Description	Availability by Region
<b>Low Molecular Weight Solids</b>				
D.E.R.™ 6116	520-560	80-90	Low molecular weight “1.5-type” epoxy resin offers excellent flow in standard and low temperature cure powder coating systems. Suggested in cases where D.E.R. 662E resin does not provide adequate flow.	NAA, APAC, LAA
D.E.R. 6224	675-725	88-98	Low molecular weight “2.5-type” epoxy resin specifically designed for decorative powders coatings requiring excellent gloss and flow.	NAA, APAC
D.E.R. 661	500-560	75-85	Unmodified standard “1-type” solid epoxy resin. Excellent base for many high quality chemical-resistant coatings withstanding exposure to corrosive atmospheres.	NAA, APAC, LAA
D.E.R. 662E	590-630	87-93	Standard “2-type” epoxy resin for excellent flow in standard as well as in low application temperature cure applications.	Globally
D.E.R. 662UH	675-750	90-98	Low molecular weight “2.5-type” epoxy resin for decorative powders coatings requiring excellent gloss and flow.	NAA, LAA
D.E.R. 671	475-550	75-85	Low molecular weight “1-type” solid epoxy resin designed for room temperature curing wet paints. Industry standard for heavy duty anti-corrosion paints for which many solutions exists.	Globally
D.E.R. 692	660-720	87-97	Low molecular weight “2.5-type” epoxy resin for decorative powders coatings requiring excellent gloss and flow.	Globally
D.E.R. 692H	660-720	89-97	Low molecular weight “2.5-type” epoxy resin containing 2 wt% of a polyacrylate flow modifier. The flow modifier is different than in D.E.R. 692HB epoxy resin.	EMEA, APAC
D.E.R. 692HB	660-720	89-97	Low molecular weight “2.5-type” epoxy resin containing 2 wt% of a polyacrylate flow modifier. The flow modifier is different than in D.E.R. 692HB epoxy resin.	EMEA
<b>Medium Molecular Weight Solids</b>				
D.E.R. 6155	1,250-1,400	105-125	Medium molecular weight “5 type” solid epoxy resin designed for powder coatings that require greater flexibility.	NAA, APAC, LAA
D.E.R. 663U	730-820	92-102	Medium molecular weight “3-type” epoxy resin for both pure epoxy and epoxy/polyester hybrid powder coatings requiring good gloss, smoothness and excellent flexibility.	NAA, APAC, LAA
D.E.R. 663UE	740-800	98-104	Medium molecular weight “3-type” epoxy resin for both pure epoxy and epoxy/polyester hybrid powder coatings requiring good gloss, smoothness and excellent flexibility.	Globally
D.E.R. 664	875-955	100-110	Medium molecular weight “4-type” epoxy resin containing an esterification catalyst. Esters prepared by reacting this resin with fatty acids have very consistent viscosities and acid values.	NAA, LAA
D.E.R. 664U	875-955	100-110	Medium molecular weight “4-type” epoxy resin for both decorative and functional coatings to provide improved viscosity characteristics and greater flexibility.	NAA, APAC, LAA
D.E.R. 664U-20	875-955	103-111	Medium molecular weight “4-type” epoxy resin for both decorative and functional coatings to provide improved viscosity characteristics and greater flexibility.	EMEA
D.E.R. 664UE	860-930	104-110	Medium molecular weight “4-type” epoxy resin for both decorative and functional coatings to provide improved viscosity characteristics and greater flexibility.	Globally



## Solid Epoxy Resins, cont.

Grade	EEW (gr/eq)	Softening Point (°C)	Description	Availability by Region
<b>Specialty Solids</b>				
D.E.R.™ 6225	650-725	87-95	Chemically modified bisphenol A solid epoxy resin for very high flow and gloss powder coating applications. Specifically suitable for thin film applications.	NAA, LAA
D.E.R. 6330-A10	780-900	98-106	Solid epoxy resin master-batch resin containing 10% wt of a silicone-free flow agent.	EMEA, NAA, LAA
D.E.R. 640	840-940	93-103	Chemically modified epoxy resin with low surface tension offering excellent flow and pigment / substrate wetting.	EMEA
D.E.R. 642U	520-560	92-98	Novolac modified solid resin for functional powder coatings. In combination with other resins provides excellent corrosion and chemical resistance combined with good mechanical properties. Typical applications include pipe coatings and internal drum linings.	NAA, APAC, LAA
D.E.R. 642U-20	500-560	89-97	Novolac modified solid resin for functional powder coatings. In combination with other resins provides excellent corrosion and chemical resistance combined with good mechanical properties. Typical applications include pipe coatings and internal drum linings.	EMEA, APAC
D.E.R. 6670	1,600-1,900	115-125	Internally flexibilized solid epoxy resin designed for powder coatings for low diameter pipes.	EMEA
D.E.R. 672U	750-850	110-120	Novolac modified, higher molecular weight solid epoxy resin for more flexible, corrosion resistant epoxy powder coating. Extra edge-coverage can be obtained by the addition of 10-50% of this resin grade to the pipe or internal drum lining formulation.	NAA, APAC, LAA
D.E.R. 672U-20	740-830	110-120	Novolac modified, higher molecular weight solid epoxy resin for more flexible, corrosion resistant epoxy powder coating. Extra edge-coverage can be obtained by the addition of 10-50% of this resin grade to the pipe or internal drum lining formulation.	EMEA, APAC
D.E.R. 8230WS	770-860	82-92	Master batch resin for powder coatings. The siloxane flow modifier provides maximum transparency in clear powder coatings. Also the flow modifier provides good slip and mar resistance.	APAC
Grade	EEW (gr/eq)	Viscosity @25 °C in cSt <sup>1</sup>	Description	Availability by Region
<b>High Molecular Weight Solids</b>				
D.E.R.™ 666E	1,350-1,650	1,500-2,200	Solid epoxy resin of the “6-type” particularly suited for higher solids can coatings.	EMEA
D.E.R. 667-20	1,600-1,950	1,300-4,000	Higher reactivity, high molecular weight “7-type” solid epoxy resin. Suitable for metal decoration, interior and exterior can coatings, tube and drum linings, coil primers and many other industrial applications.	EMEA, APAC
D.E.R. 667E	1,600-1,950	2,000-2,900	High molecular weight “7-type” solid epoxy resin with improved solution stability. Suitable for metal decoration, interior and exterior can coatings, tube and drum linings, coil primers and many other industrial applications.	Globally
D.E.R. 668-20	2,000-3,500	2,700-5,000	High molecular weight “8-type” epoxy resin designed for can and coil coatings. Offers improved flexibility versus equivalent 7-type epoxy resins.	Globally
D.E.R. 669-20	3,500-5,500	4,400-10,000	Highest molecular weight solid epoxy resin, of the “9-type,” for can and coil coatings. Offers enhanced reactivity versus the E-version.	Globally
D.E.R. 669E	2,500-4,000	4,500-10,000	Highest molecular weight solid epoxy resin, of the “9-type,” for can and coil coatings. Shows improved solution storage stability.	Globally

<sup>1</sup>40 wt% in diethylene glycol monobutyl ether

## Epoxy Resin Solutions

Grade	EEW on Solids (gr/eq)	Viscosity @25 °C (mPa·s)	Description	Availability by Region
D.E.R.™ 337-DA97	230-278	NA	Solution of D.E.R. 337 with diacetone alcohol.	NAA
D.E.R. 337-X80	230-260	500-1,200	Solution of D.E.R. 337 in xylene. The excellent resistance and physical properties for epoxy coal tar combinations and higher solids content marine coatings.	EMEA, NAA
D.E.R. 337-X90	230-250	5,000-15,000	Solution of D.E.R. 337 in xylene. Higher solids content than D.E.R. 337-X80 epoxy resin solution.	NAA
D.E.R. 338-X90	230-280	5,000-50,000	Solution of a semi-solid epoxy resin in xylene.	NAA
D.E.R. 3680-X90(K)	230-270	1,200-3,200	Chemically modified low molecular weight epoxy resin in xylene. Offers lower viscosity allowing higher solids contents at similar corrosion protection properties. Improves lower temperature curing.	Globally
D.E.R. 660-B80	300-350	2,300-7,500	Semi-solid epoxy resin solution of D.E.R. 660 in butanol.	NAA
D.E.R. 660-MAK80	300-350	1,000-1,500	Semi-solid epoxy resin solution of D.E.R. 660 in methyl n-amyl ketone.	NAA
D.E.R. 660-PA80	300-350	1,500-4,500	Solution of D.E.R. 660 epoxy resin in propyl acetate. The solvent choice makes it possible to formulate coatings without solvents listed as Hazardous Air Pollutants.	NAA
D.E.R. 660-X80	300-335	3,500-7,000	Intermediate molecular weight epoxy resin in a xylene solution for high solids / build coatings. Combines the high solids and chemical resistance of liquid epoxy resins with the outstanding adhesion, flexibility and fast cure of higher molecular weight solid epoxy resin.	EMEA, NAA, APAC
D.E.R. 661-A75	500-550	800-2,500	Low viscosity solution of D.E.R. 661 solid epoxy resin in acetone.	NAA
D.E.R. 661-A80	475-575	3,500-8,500	Intermediate viscosity solution of D.E.R. 661 solid epoxy resin in acetone.	NAA
D.E.R. 671-MAK75	425-550	3,000-15,000	Solution of D.E.R. 671 in methyl n-amyl ketone, for industrial protective coatings.	NAA
D.E.R. 671-PM75	425-500	9,500-15,000	Solution of D.E.R. 671 in DOWANOL™ PM glycol ether, for industrial protective coatings.	NAA
D.E.R. 671-T75	425-550	2,200-10,000	Solution of D.E.R. 671 in toluene, for industrial protective coatings.	NAA
D.E.R. 671-X70	445-500	2,000-4,000	Solution of D.E.R. 671 in xylene. Industry standard for heavy duty anti-corrosion paint.	NAA, APAC
D.E.R. 671-X75	430-480	7,500-11,500	Solution of D.E.R. 671 in xylene. Industry standard for heavy duty anti-corrosion paint.	EMEA, NAA, APAC
D.E.R. 671-XM75	425-550	2,500-9,000	Solution of D.E.R. 671 in xylene/methyl isobutyl ketone, for industrial protective coatings.	NAA
D.E.R. 684-EK40	2,800 min.	600-2,500 <sup>1</sup>	Solution of an ultra-high molecular weight epoxy resin. It has essentially no epoxy functionality and provides coatings with outstanding physical and chemical resistance properties by solvent evaporation alone. Main applications include maintenance- and flash-primers, shop coats, wire enamels, road markers and clear coatings for brass, chrome and aluminum.	EMEA, NAA, APAC

<sup>1</sup>cSt

## Solid Epoxy Curing Agents

Grade	OHEW (gr/eq)	Softening Point (°C)	Description	Availability by Region
D.E.H.™ 80	245-275	83-90	Phenolic hardener containing curing catalyst and polyacrylate flow modifier of moderate reactivity. Phenolic curing agents offer excellent chemical and moisture/water resistance and improved flexibility compared to e.g., dicyandiamide curing agents.	Globally
D.E.H. 81	240-270	83-90	Phenolic curing agent of intermediate reactivity containing curing catalyst as well as a polyacrylate flow modifier. The intermediate reactivity makes D.E.H. 81 particularly suitable as starting base for product development.	Globally
D.E.H. 82	235-265	83-90	High reactivity phenolic curing agent containing curing catalyst as well as a polyacrylate flow modifier. Can be formulated in low temperature applications in combination with D.E.R.™ 6615 solid epoxy resin.	Globally
D.E.H. 84	240-270	83-90	Phenolic curing agent of intermediate reactivity containing only curing catalyst. The lack of flow modifier allows formulation with alternative additives that could potentially cause compatibility problems.	Globally
D.E.H. 85	250-280	83-90	Unmodified phenolic curing agent particularly suitable for optimizing the reactivity of hardeners such as D.E.H. 81, D.E.H. 82 or D.E.H. 84 phenolic curing agent.	Globally
D.E.H. 87	370-400	96-102	Unmodified, high molecular weight phenolic hardener for increased flexibility and good storage stability.	Globally

## Epoxy Curing Agents

### Typical Properties – Epoxy Curing Agents

Grade	AHEW (gr/ eq)	Viscosity @25 °C (mPa•s)	Pot Life min. (with Reference Resin)	Reference Resin	Description	Availability by Region
<b>Modified Amine Curing Agents</b>						
D.E.H.™ 20	21	4-8	25	D.E.R.™ 331™	Short pot life curing agent on basis of diethylenetriamine (DETA).	NAA, APAC, LAA
D.E.H. 24	24	19.5-22.5	25	D.E.R. 331	Short pot life curing agent on basis of triethylenetetramine (TETA).	NAA, APAC, LAA
D.E.H. 26	27	50-60	27	D.E.R. 331	Similar to D.E.H. 24 Epoxy Curing Agent in application, it provides lower vapor hazard to workers due to its higher boiling point.	NAA, LAA
D.E.H. 29	29	200-300	24	D.E.R. 331	Economical mixture of linear, branched and cyclic ethylene amines that offers higher flexibility and peel strength in applications where color is not a limitation.	NAA, APAC, LAA
D.E.H. 39	43	10-15	27	D.E.R. 331	Fast curing amine hardener based on amino-ethyl piperazine. Mostly used as accelerator for other curing agents.	NAA, LAA
D.E.H. 508	34	100-300	12	D.E.R. 331	Reactive low viscous curing agent with good chemical resistance and high strength.	LAA
D.E.H. 512	86	150-350	9	D.E.R. 331	Fast, low viscosity curing agent with good flexibility and blush resistance.	LAA
D.E.H. 55	40-42	1,000-1,700	11	D.E.R. 331	Medium viscosity, room-temperature, accelerated curing agent that is good for systems requiring low color.	NAA, LAA
D.E.H. 58	28-32	85-130	15	D.E.R. 331	Room-temperature, low viscosity curing agent that is extremely reactive with liquid epoxy resins.	NAA, LAA
<b>Modified Epoxy Amine Adducts</b>						
D.E.H. 4060	122	5,000-7,000	30	D.E.R. 331	Offers best-in-class chemical resistance in combination with food contact compliance.	Globally
D.E.H. 4129	108	700-1,000	20	D.E.R. 331	For high quality coatings and flooring with good UV stability, mechanical properties and increased impact resistance.	NAA, APAC, LAA
D.E.H. 444	93	160-220	105	D.E.R. 331	Longer pot life curing agent with good UV stability.	EMEA, NAA, LAA
D.E.H. 445	105	370-570	45	D.E.R. 331	Low viscosity curing agent with good UV stability and overall mechanical & chemical resistance properties.	EMEA, NAA, LAA
D.E.H. 4702	115	370-470	40	D.E.R. 331	Excellent early water-spot resistance combined with high acid and solvent resistance.	Globally
D.E.H. 4712	87	1,600-2,400	20	D.E.R. 3581	Offers systems with good UV stability and is therefore suitable for paints and coatings as well as floorings.	Globally
D.E.H. 487	93	170-270	41	D.E.R. 331	Longer pot life version of D.E.H. 488 curing agent.	EMEA, NAA, LAA
D.E.H. 488	93	280-380	25	D.E.R. 331	Low viscosity curing agent for liquid epoxy resins. Good blush resistance and general chemical resistance.	EMEA, NAA, LAA
D.E.H. 489	93	210-290	20	D.E.R. 331	Accelerated version of D.E.H. 488 curing agent.	EMEA, NAA, LAA
D.E.H. 52	42-47	5,000-7,500	18	D.E.R. 331	Viscous, room temperature curing agent that has a short pot life and convenient handling and mixing rates with liquid epoxy resins.	NAA, LAA
D.E.H. 530	112	300-400	43	D.E.R. 331	Rapid set, low temperature curing agent for high gloss, blush-free products with good mechanical, chemical and water spot resistance.	NAA, LAA



Product	AHEW (gr/eq)	Viscosity @25 °C (mPa·s)	Pot Life min. (with Reference Resin)	Reference Resin	Description	Availability by Region
<b>Modified Epoxy Amine Adducts, cont.</b>						
D.E.H.™ 534	120	500-1,000	18	D.E.R.™ 331™	Rapid set, low temperature curing agent offering good corrosion protection and water spot resistance.	NAA, LAA
D.E.H. 536	116	750-1,250	14	D.E.R. 331	Low viscosity, low temperature curing agent for applications requiring high gloss and good color stability.	NAA, LAA
D.E.H. 554	86	60-80	38	D.E.R. 331	Low viscosity curing agent for applications requiring self-leveling with chemical, blushing and water spot resistance.	NAA, LAA
D.E.H. 581	95	250-600	9	D.E.R. 331	Low viscosity, low temperature curing agent for products with good color and light stability.	NAA, LAA
D.E.H. 595	75	1,000-1,500	16	D.E.R. 331	Very fast ambient and low temperature curing agent for non-blushing products with good water spot resistance, excellent chemical resistance, high gloss and high strength.	NAA, LAA
<b>Modified Polyamide Curing Agents</b>						
D.E.H. 1450	115	600-1,400	60	D.E.R. 331	Excellent adhesion on critical (badly prepared or wet/humid) substrates. Contains alkyl phenol.	EMEA, APAC, LAA
D.E.H. 545	115	400-650	39	D.E.R. 331	Polyamide curing agent offering excellent adhesion onto highly humid or wet substrates. Good corrosion protection and low viscosity.	NAA, LAA
<b>Low Temperature Curing Agents</b>						
D.E.H. 613	90	900-1,300	10	D.E.R. 331	Shorter pot life version of D.E.H. 614 curing agent.	NAA, APAC
D.E.H. 614	85	450-750	15	D.E.R. 331	Solvent-free, Mannich base curing agent curing down to about 0 °C. High water and chemical resistance.	EMEA, NAA
D.E.H. 615	75	400-500	15	D.E.R. 331	Low viscosity version of D.E.H. 614 curing agent. Over-coatable after 4 hours (industrial coatings).	EMEA, NAA, APAC
D.E.H. 616	75	400-600	15	D.E.R. 331	Good cure rate above 0 °C and high water resistance.	NAA
D.E.H. 619	92	820-1,200	52	D.E.R. 3261	VOC-free, modified Mannich base curing agent for improved chemical resistance	EMEA
D.E.H. 622	60	490-690	6	D.E.R. 331	Modified amine curing agent with extreme high reactivity. Cures down to -5 °C.	Globally
D.E.H. 630	73	700-900	14	D.E.R. 3531	Highly reactive (non-Mannich base) curing agent with an improved EH&S profile, better chemical resistance and UV stability over traditional Mannich base curing agents.	EMEA
<b>Low Emission Curing Agents</b>						
D.E.H. 1911	115	1,100-1,700	70	D.E.R. 3531	Low emission curing agent particularly suited for the development of primers whenever the substrate is wet or adhesion is difficult.	EMEA, LAA
D.E.H. 2955	82	1,400-1,700	6	D.E.R. 3581	Offers very rapid curing and is highly suitable for anchoring systems or as accelerator. Suitable for primers if curing is required at temperatures down to -5 °C.	EMEA
D.E.H. 4909	83	180-280	60	D.E.R. 3531	Free of benzyl alcohol, nonyl phenol, bisphenol A and any inert volatile compounds for low-emission flooring systems. Excellent wetting, long pot life and quick tack-free time.	NAA
D.E.H. 4911	82	360-460	50	D.E.R. 3531	Fully reactive curing agent containing no VOC and no alkyl phenol. Good mechanical properties.	EMEA
D.E.H. 4912	84	280-480	40	D.E.R. 3531	Fully reactive curing agent containing no VOC and no alkyl phenol. Shows low exothermic reaction.	EMEA, NAA
D.E.H. 4914	108	8,000-10,000	45	D.E.R. 331	Excellent corrosion resistance and impact resistance for wet paints on metallic substrates.	EMEA

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