

Technical Data Sheet

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HELOXY™ Modifier 505

Product Description

HELOXY™ Modifier 505 is a low viscosity polyepoxide resin that imparts flexibility, impact resistance and thermal shock resistance when incorporated in a wide variety of epoxy formulations.

Application Areas/Suggested Uses

- Stress relieved concrete patching and surfacing compounds
- Thermal shock resistant potting and dip coating compounds
- High impact resistant tooling compounds
- High peel strength adhesives

Benefits

- Compatible with conventional epoxy resins
- Non-volatile and low odor
- Excellent water resistance
- Imparts high flexibility and impact resistance to epoxy systems

Sales Specification

Property	Units	Value	Test Method/Standard
Weight per Epoxide	g/eq	500 – 650	ASTM D1652
Viscosity at 25°C	cP	250 – 500	ASTM D445
Color	Gardner	6 max.	ASTM D1544

Typical Properties

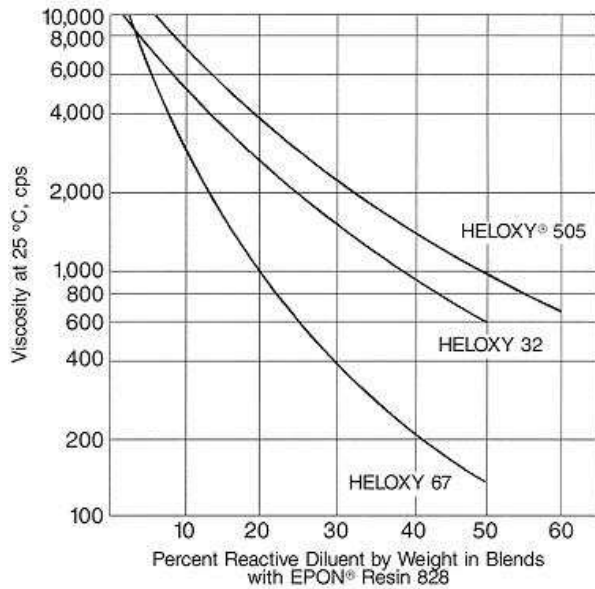
Property	Units	Value	Test Method/Standard
Density at 25°C	lb/gal	8.5	ASTM D1475

Processing/How to use

In blends with unmodified liquid epoxy resins, HELOXY Modifier 505 is generally substituted at concentrations up to 60 percent by weight to provide varying degrees of flexibility. Figure 1 plots the

viscosity of such blends as a function of HELOXY Modifier 505 concentrations. Although the combining ratio of the curing agents must be adjusted to compensate for the lower epoxide content (higher WPE) of HELOXY Modifier 505, the same cure schedules can be maintained as the unmodified epoxy resins. The pot life of formulations modified with HELOXY Modifier 505 is normally slightly longer than that of the corresponding base resin.

Figure 1 / **Viscosity reduction with reactive diluents**



HELOXY Modifier 505 is a useful flexibilizer for systems cured with aliphatic amines, aromatic amines, anhydrides, polybasic acids and Lewis acids. Compared to polyglycol based flexibilizers, HELOXY Modifier 505 imparts superior electrical properties and water resistance at levels providing equivalent flexibility.

Table 1 illustrates the effect of HELOXY Modifier 505 modification on properties of an EPON™ Resin 828/EPIKURE™ 3072 Curing Agent system for ambient temperature use and an EPON 828 anhydride system for elevated temperature cure.

Table 1 / **Properties of Epoxy Systems Containing HELOXY Modifier 505**

	<u>Units</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>
Composition							
EPON Resin 828	pbw	100	75	60	100	60	40
HELOXY Modifier 505	pbw	---	25	40	---	40	60
EPIKURE Curing Agent 3072 ²	pbw	35	30	36	---	---	---
Hexahydrophthalic Anhydride	pbw	---	---	---	80	58	47
EPIKURE Curing Agent 3253	pbw	---	---	---	1.5	1.5	1.5

Handling Properties

Viscosity @ 25°C	cP	4,000	1,600	1,200	1,460	400	320
Gel Time, @ 25°C, 100 g mass	minutes	40	48	67	---	---	---
Peak Exotherm, 100 g mass	°F	315	216	202	---	---	---
	°C	157	102	94	---	---	---

Cure Schedule

2 weeks at 25°C

2 hrs at 93°C
followed by 2 hrs at 204°C**Cured State Properties**¹

Tensile Strength (ultimate)	psi	8,900	5,590	2,390	11,600	7,100	2,750
Tensile Elongation	%	3	9	25	6.4	10	61
Tensile Modulus	ksi	---	---	---	---	---	---
Flexural Strength (ultimate)	psi	16,000	9,530	3,060	21,200	13,520	1,460
Flexural Modulus (initial)	ksi	480	250	70	490	350	---
Flexural Deflection	inches	0.29	>0.6	>0.6	0.41	>0.6	>0.6
Compressive Strength (yield) ²	psi	13,200	8,900	2,100	---	10,400	<800
Izod Impact, notch	ft.·lb./inch	0.40	0.52	0.95	0.40	0.83	2.8
Hardness	Shore D	86	81	71	90	82	63
Water Absorption, 24 hrs	%	0.17	0.33	0.66	0.14	0.10	0.19
Weight Loss, 24 hrs at 150°C	%	---	---	---	0.10	0.83	1.71
Glass Bow Shrinkage ³ (inches divergence from plane surface) ³	inch	>0.400	0.065	0.030	---	---	---
Linear Shrinkage ⁴	inch/inch	0.0038	0.0031	0.0029	---	---	---
Electrical Properties							
Dielectric Constant ⁵		3.97	3.80	4.12	3.52	3.59	3.72
Dissipation Factor		0.021	0.015	0.033	0.012	0.013	0.024
Volume Resistivity							
at 25°C	ohm·cm	1.0(10 ¹⁵)	9.3(10 ¹⁴)	1.5(10 ¹³)	>10 ¹⁶	5.4(10 ¹⁵)	1.1(10 ¹⁵)
at 66°C	ohm·cm	9.9(10 ¹²)	2.1(10 ¹¹)	5.2(10 ⁹)	>10 ¹⁶	2.2(10 ¹⁵)	1.1(10 ¹²)
at 93°C	ohm·cm	2.3(10 ¹¹)	2.4(10 ⁹)	<10 ⁹	9.34	7.8(10 ¹¹)	7.4(10 ¹⁰)
at 130°C	ohm·cm	<10 ⁹	<10 ⁹	---	(10 ¹⁵)	1.3(10 ¹⁰)	4.9(10 ⁹)

at 150°C	ohm•cm	---	---	---	7.12	<10 ⁹	<10 ⁹
at 180°C	ohm•cm	---	---	---	(10 ¹⁴)	---	---
at 200°C	ohm•cm	---	---	---	1.10	---	---
					(10 ¹³)		
					1.52		
					(10 ¹¹)		
					4.42		
					(10 ¹⁰)		

¹ Determined on 1/8" thick test specimens

² Test specimen dimensions –1/2" right cylinder, 1" height.

³ Corps of Engineers test method measuring the curing stress of a 1/8" thick resin layer bonded to a sheet of picture-glass.

⁴ ERF-12-64. Mold Size 1 (195 ml).

⁵ Measured at 1 megacycle and 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.

This product will slowly advance in viscosity and epoxide equivalent weight (EEW) over time, especially when stored above the recommended maximum storage temperature. Refrigerated storage will enhance product stability and thus, extend the product shelf life expectancy.

HELOXY Modifier 505 should be stored in tightly sealed containers, in a dry location at normal room temperatures. Some materials can crystallize during storage. The tendency to do so is affected by storage conditions, composition, and other factors. Should crystallization occur, it may be converted to liquid by opening the drum bung and gently warming to temperatures not to exceed 50 °C (122 °F).

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Packaging

Available in bulk and drum quantities.

Contact Information

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