

EPI-CURE™ Curing Agent 3277

Introduction EPI-CURE™ Curing Agent 3277 is a moderately reactive curing agent for epoxy resins. It is low in viscosity, water insensitive, and resists “blushing” and “sweat-out” even under high humidity conditions.

- Suggested Uses**
- Systems designed for underwater application and/or cure
 - Waterborne epoxy resin formulations
 - Solventless high-build coatings
 - Wet lay-up laminating compounds
 - Glaze coat and binder for sand-filled, trowel-applied floor toppings
 - High solids coatings

Typical Properties	Viscosity at 25 °C, cP	275
	Pounds/Gallon	8.01
	Color, Gardner	<5
	Amine value	280-313
	Equivalent Weight	92

General Information Even under high humidity conditions, systems containing EPI-CURE Curing Agent 3277 have good resistance to sweat-out, no overnight tack, and have good adhesion to a variety of substrates, including damp and submerged substrates.

EPI-CURE Curing Agent 3277 is compatible in all proportions with liquid epoxy resins and does not require an induction period to produce glossy surfaces which are free from amine carbonate salts. The curing agent, when combined with an epoxy resin, gives fast cure development with good solvent resistance. Due to the difference in viscosities between this curing agent and most liquid epoxy resins, it may take longer than usual to achieve thorough blending. A mixing period of 3 minutes is usually adequate to ensure a homogeneous solution of resin and curing agent.

General Information (cont.)

The handling characteristics and cured state properties of the compositions presented in Tables 1 and 2 illustrate the versatility of EPI-CURE 3277 systems. While monoepoxide diluent modification of resins used in conjunction with EPI-CURE Curing Agent 3277 is an effective means of formulating low viscosity, flexible thermosetting systems, care should be taken in selecting the concentration of modifier to be employed.

As seen in Table 1 data, excessive amounts of monoepoxide diluent result in significant reductions in crosslink density, causing reduced heat distortion temperature and solvent resistance.

Polyepoxide diluents, such as HELOXY™ Modifier 505 and HELOXY Modifier 48, are effective viscosity reducers which impart some flexibility and which have a minimal effect on other cured state properties (Table 1).

Flow control agents such as urea-formaldehyde resin, colloidal silica, SR-82 silicone resin¹, Modaflow² or various thixotropes should be incorporated into high-build coatings to ensure good film continuity.

EPI-CURE Curing Agent 3277 can be blended with EPI-REZ™ Resin WD-510 to produce a water dispersible mixture for applications where the use of conventional diluents is not feasible (Table 2).

Cure rate is proportional to application thickness and temperature. For 7 mil films, EPON™ Resin 828/EPI-CURE Curing Agent 3277 systems cure tack-free in approximately 9 hours at 23 °C. Monoepoxide diluent modifications generally extend the working life and prolong the necessary cure period. Polyepoxide diluents, such as HELOXY Modifier 48, maintain or decrease cure time. Flexibilizers, such as HELOXY Modifier 505, will extend cure time (Table 1).

If increased reactivity is desired, EPI-CURE Curing Agent 3270 or EPI-CURE Curing Agent 3271 can be blended with EPI-CURE Curing Agent 3277 (Tables 1 and 2).

Storage

EPI-CURE Curing Agent 3277 should be stored in tightly sealed containers of metal, glass, or polyolefin plastic at normal room temperature. The curing agent may darken during long-term storage, the extent of color formation depending on storage temperature and exposure to air.

¹Supplied by General Electric Company.

²Supplied by Monsanto Company.

Table 1/Properties of Diluent-Containing Resin Systems Cured¹ with EPI-CURE™ Curing Agent 3277

Composition (parts by weight):	A	B	C	D	E	F
EPON™ Resin 828	100	88	90	85	85	88
HELOXY™ Modifier 62	–	12	–	–	–	12
HELOXY Modifier 8	–	–	10	–	–	–
HELOXY Modifier 48	–	–	–	15	–	–
HELOXY Modifier 505	–	–	–	–	15	–
EPI-CURE™ Curing Agent 3277	49	49	47	50	43.9	36.8
EPI-CURE Curing Agent 3271	–	–	–	–	–	4.1
Blend Viscosity, cP at 23 °C	2,300	1,150	1,000	1,600	1,790	875
Gel Time, 100 g mass at 23 °C, min.	47	60	65	42	58	41
Peak Exotherm, 100 g mass at 23 °C,						
°F	301	293	246	303	224	355
°C	149	145	119	151	107	179
Heat Deflection Temperature, °C	59	48	49	55	46	58
Tensile Strength, 10³ psi	8.70	6.40	5.50	6.90	5.40	8.30
Tensile Modulus, 10⁶ psi	0.47	0.47	0.26	0.34	0.29	0.40
Tensile Elongation, percent	2.4	25	40	45	22	2.3
Flexural Strength, 10⁴ psi	1.55	1.10	0.94	1.21	0.83	1.37
Flexural Modulus, 10⁶ psi	0.49	0.40	0.32	0.39	0.25	0.46
Flexural Deflection, inches	0.24	>0.6	>0.6	>0.6	>0.6	0.18
Ultimate Compressive Strength, 10⁴ psi	1.42	1.65	1.80	1.58	2.12	1.54
Compressive Yield Strength, 10⁴ psi	1.38	1.18	0.97	1.22	0.72	1.54
Izod Impact, ft.·lb./in. notch	0.34	0.42	0.44	0.42	0.44	0.41
Hardness, Shore D	87	85	83	87	83	88
Chemical Resistance²						
Water	0.13	0.08	0.10	0.17	0.18	0.10
5% Acetic Acid	0.44	0.29	0.38	0.83	0.48	0.27
Xylene	1.43	6.06	4.68	2.51	4.25	1.04

¹Determined on 1/8" thick test specimens cured two weeks at 23 °C.²Reported as percent weight gain after immersion for 24 hours at 23 °C.

Table 2/Properties of Epoxy Resin Systems Cured¹ with EPI-CURE™ Curing Agent 3277

	A	B	C	D
EPON Resin 828	100	–	100	100
EPI-REZ Resin WD-510	–	100	–	–
EPI-CURE Curing Agent 3277	49	46	28.1	29.7
EPI-CURE Curing Agent 3271	–	–	7.0	–
EPI-CURE Curing Agent 3270	–	–	–	29.7
Blend Viscosity, 10³ cP at 23 °C	2.30	2.80	2.30	3.40
Gel Time, 100 g mass at 23 °C, min.	47	47	23	18
Peak Exotherm, 100 g mass at 23 °C,				
°F	301	305	369	336
°C	149	152	187	169
Heat Deflection Temperature, °C	59	60	62	67
Tensile Strength, 10³ psi	8.70	7.20	9.40	9.40
Tensile Modulus, 10⁶ psi	0.47	0.35	0.55	0.47
Tensile Elongation, percent	2.4	4.3	1.7	2.8
Flexural Strength, 10⁴ psi	1.55	1.05	1.59	1.57
Flexural Modulus, 10⁶ psi	0.49	0.31	0.56	0.43
Flexural Deflection, inches	0.24	>0.6	0.15	0.23
Ultimate Compressive Strength, 10⁴ psi	1.42	–	1.46	1.16
Compressive Yield Strength, 10⁴ psi	1.38	–	1.46	1.16
Izod Impact, ft.·lb./in. notch	0.34	0.46	0.38	0.39
Hardness, Shore D	87	85	88	87
Chemical Resistance²				
Water	0.13	0.23	0.11	0.12
5% Acetic Acid	0.44	0.62	0.40	0.54
Xylene	1.43	2.86	0.32	0.49

¹Determined on 1/8" thick test specimens cured two weeks at 23 °C.²Reported as percent weight gain after immersion for 24 hours at 23 °C.

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