BAKELITE®

PLAINTIFF'S EXHIBIT UC-779

HARDENERS FOR EPOXY RESINS

OUT DATED

UNION CARBIDE

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BAKELITE®

HARDENERS FOR EPOXY RESINS

UNION CARBIDE

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BAKELITE Hardeners for Epoxy Resins

AMINES

The majority of epoxy applications involve room temperature curing, or curing with a moderate degree of heat. Most widely used for these applications are the aliphatic amines such as DEAPA, DETA, TEPA and TETA. Used to a lesser degree are aminoethylpiperazine (AEP), which imparts high impact; ZZL-0822, a polyglycoldiamine that contributes flexibility and impact resistance; and ZZL-0814, a modified amine with a minimum irritation potential and a fast cure.

Any of these amines can be used to cure epoxy resins. The specific selection depends upon the characteristics desired in the system, such as: viscosity, pot life, toxicity potential, color, cost, and cured properties.

ZZL-0806 & ZZL-0809 Diethylenetriamine (DETA)

ZZL-0840
Triethylenetetramine (TETA)

Can be used alternatively to cure epoxy resins and will give equivalent overall cured properties. DETA-cured systems have a higher heat distortion but have a higher degree of toxicity because they are more volatile.

ADVANTAGES

1. Low viscosity (<50 cps).
2. Fast cures.
3. Light color.
4. Good mechanical, electrical and chemical resistance properties in a cured state.

DISADVANTAGES

1. High exotherm during gelation restricts their usage to small volume castings.
2. Short pot life limits the use to continuous mixing equipment for production situations (<25 min.).
3. Low use ratio requires very careful weighing operation (<15 phr).
4. High skin sensitizing potential.

USAGE

General purpose curing agents with following general applications:

1. Hand lay-up glass cloth laminates for structural purposes, or for tooling applications.
2. Small electrical castings. Size limited by exotherm. Larger castings possible with high filler loading.
3. Moderate strength adhesives.
4. Solution coatings.

TYPICAL STARTING FORMULATIONS

CASTINGS (Limited to small volume unless highly filled)

Electrical Compounds

ERL-2774[1]	100 pbw
Clay[2]	75 pbw
CALIDRIA RG-144 Asbestos Thixotrope[1]	2 pbw
DETA[1] or	10.5 pbw
TETA[1]	12.5 pbw
Pot Life	30 minutes
Dielectric Constant, 60 ~ at 25°C.	3.5
Dissipation Factor, 60 ~ at 25°C.	.009
Dielectric Strength, S/T	480 v/mil
Volume Resistivity,	>1 x 10^{16} ohms

Flexible Compounds

ERL-2774[1]	100 pbw
Polysulfide LP-3[3]	100 pbw
TETA[1]	10 pbw
Pot Life	40 minutes
Tensile Strength at 25°C.	1800 psi
Tensile Elongation	30%
Shore D Hardness	40

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TYPICAL STARTING FORMULATIONS

(Limited to small volume unless highly filled)

ERL-2774[1]	100 pbw
ZZL-0814[1]	25 pbw
Pot Life	11.5 minutes
Gel 24 hrs. at 25°C. + 2 hrs. at 100°C.	
Tensile Strength	10,700 psi
Tensile Elongation	7%
Compressive Strength, yield	15,000 psi
Heat Deflection Temperature	100°C.

FLOORING APPLICATIONS

Red Troweling Compound

(High Impact, Good Chemical Resistance)

Part A

ERL-2774[1]	100 pbw
CELLOSOLVE Solvent[1]	10 pbw
Titanium Dioxide[3]	10 pbw
Red Iron Oxide[3]	5 pbw
Silica, 100 mesh[3]	500 pbw
Pot Life	one hour

Apply with trowel

Part B

ZZL-0822	15 pbw
EH-30 or[4] DMP-30	5 pbw

PRIMER COATINGS

(Blush Resistant)

Part A

ERL-2774[1]	90 pbw
Triphenyl Phosphite[2]	10 pbw
Toluene	2.5 pbw
Methyl Ethyl Ketone[1]	2.5 pbw

Part B

ZZL-0822[1]	13 pbw
ZZL-0814[1]	11 pbw

15 to 25 mil films tack free in 3 to 4 hours at 100% humidity. Excellent gloss finish.

ADHESIVES

	I	II
ERL-2774[1]	100 pbw	100 pbw
ZZL-0822[1]	29 pbw	29 pbw
A-1100 Silane[1]	—	1.3 pbw
Asbestos Floats[3]	30 pbw	30 pbw
CALIDRIA RG-144 Asbestos Thixotrope[1]	5 pbw	5 pbw
Cured 7 days at 25°C. (77°F.)		
Lap Shear Strength, Al-Al	2000 psi	3590 psi
After seven days immersion in 100°F. water	2434 psi	3520 psi

[1]Union Carbide [2]Monsanto/Hooker
[3]Local supply [4]Thiokol Chemical/Rohm & Haas

WET LAY-UP LAMINATES

(Tooling or Structural Applications, Low Toxicity)

ERL-2795	100 pbw
ZZL-0814	25 pbw
12-ply 181/A-1100 glass-cloth laminate. Cure for seven days at 25°C. (77°F.)	
Tensile Strength at 25°C.	43,500 psi
Flexural Strength at 25°C.	65,200 psi

ADHESIVES

(Fast curing)

	I	II
ERL-2774[1]	100 pbw	100 pbw
Talc ("Fibrene" C-400)[2]	—	75 pbw
CALIDRIA RG-144 Asbestos Thixotrope[1]	—	6 pbw
ZZL-0814[1]	25 pbw	25 pbw
Pot Life	11.5 minutes	15 minutes
Cure seven days at 25°C.		
Shear Strength, Steel-Steel	1480 psi	2630 psi

[1]Union Carbide [2]Sierra Talc [3]Local Supply

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