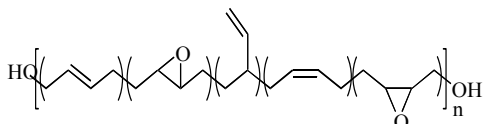


***Poly bd[®] 600E And 605E Resins:
Hydroxyl-Terminated Epoxidized
Polybutadienes***

Poly bd[®] 600E and 605E are multifunctional, hydroxyl terminated, epoxidized polybutadiene resins. The resins bring flexibility and water resistance to urethane formulations. They improve the impact resistance, adhesion and flexibility of epoxy formulations.

Poly bd[®] 600E or 605E resin may be used as the sole resin in an epoxy formulation or as a modifier in bisphenol A-based or cycloaliphatic epoxy resin formulations. They can be used to prepare flexible and impact resistant coatings and potting compounds. They are excellent additives for cationic cured coatings, imparting flexibility and adhesion.

These products are regulated by the United States Department of Commerce and may not be exported without license from that organization.



Typical Resin Properties		
Property	600E	605E
Epoxy value meq/g	2 -2.5	3 - 4
Epoxy Equivalent Weight	500 - 400	260 -330
Oxirane Oxy gen %	3.4	4.8 - 6.2
Viscosity mPa.s @ 30 °C maximum	7000	22000
Water, Wt., %, maximum	0.10	0.10
Specific gravity	1.01	1.01
Hydroxyl value (meq/g)	1.70	1.74
Molecular Weight	1300	1300

Cure Mechanisms for Poly bd[®] 600E and 605E
Unlike bisphenol A-based epoxy resins, internally epoxidized polybutadienes do not react with amines in any practical manner. Reaction with anhydrides and homopolymerization with Lewis acid catalysis follows familiar mechanisms. Anhydride reactions are catalyzed by tertiary-amine, imidazoles and metal salts. Catalysis of homopolymerization by dicyandiamide (DICY) is also possible.

Anhydride Cure for 1 hr. at 125 °C		
Component	Wt. % Formula 1	Wt. % Formula2
Poly bd [®] 600E resin	100	
Poly bd [®] 605E resin		100
Methyl tetrahydrophthalic anhydride	35	46.7
Dimethylaminomethyl phenol (AC 30)	2.9	3.3
Shore Hardness	A45	D35
Comments	Soft and flexible	Stiff and tough

BF ₃ Amine Complex Cure for 1 hr at 150°C		
Component	Wt. % Formula 1	Wt. % Formula 2
Poly bd [®] 600E resin	100	
Poly bd [®] 605E resin		100
BF ₃ Complex	5	5
Shore Hardness	A57	A 80

Cationic UV Cure

Poly bd[®] 605E resin can be used as a reactive polymer for cationically curable compositions. Coatings of high flexibility, showing good adhesion to aluminum and steel, are obtained. A starting point formulation is shown below.

Component	Parts By Weight
Poly bd [®] 605E Resin	100
Cyracure UVRV6110 ⁽¹⁾	90
Cyracure UVR6126 ⁽¹⁾	10
Vikolox 14 ⁽²⁾	6
Cyracure 6974 ⁽¹⁾	2
Silquest A 189 ⁽³⁾	1.5
Byk 341 ⁽⁴⁾	0.1

Property	Result
Solution Viscosity, mPa · sec @ 30°C	34
Coating Flexibility, T-Bend	IT
Impact Resistance, kg cm	30
Cross Hatch Adhesion, %	80

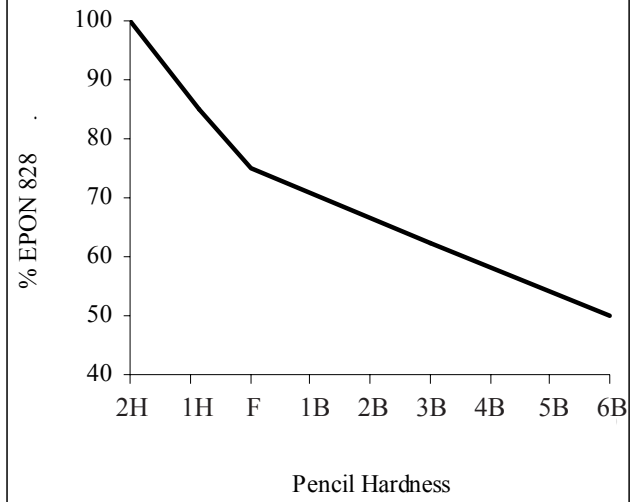
- (1) Union Carbide Corp., a subsidiary of Dow Chemical Co.
 (2) Fallek Chemical Co., a division of ICC Chemical Corporation
 (3) Witco – OSI
 (4) Byk Chimie

Modification of Epoxy Resin Systems with Poly bd[®] 605E

Modification of an epoxy system is desirable when increased flexibility or reduced brittleness in a casting or coating is necessary. The charts below show a simple system in which Poly bd[®] 605E resin was added in increasing amounts to EPON 828. Shore A hardness is reduced significantly at only 10% addition.

Similarly, the pencil hardness of a coating drops below the H range with 25% addition. With only 10% addition, the reverse impact of a coating on steel is improved from 90 in lb to >160 in lb. In all cases, cross-hatch adhesion was 100%.

Effects of Poly bd 605E Content on Pencil Hardness

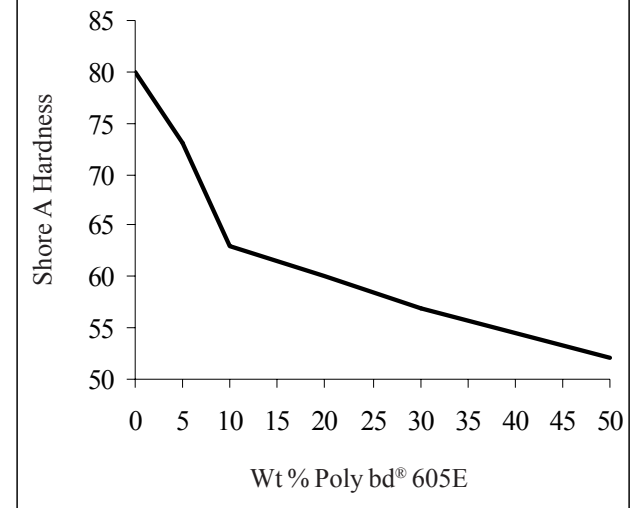


1.0 DFT on Steel

Reverse impact 90 in lb for EPON control

Reverse impact >160 in lb when modified with Poly bd[®] 605

Effects of Poly bd 605E Content on Shore A Hardness



Catalyzed by Rohm and Haas DMP-30