Technical Data Sheet

HYSOL®

Liquid Epoxy Encapsulant

Formerly Dexter

Diluted Epoxy Resin	Undiluted Epoxy Systems
RE2038 & HD3404 – Unfilled	RE2039 & HD3404 – Unfilled
EE4143 & HD3404 – Filled	EE4183 & HD3404 – Filled

1.0 Description

These systems have proven themselves with a 20-year service record on solenoid coils, transformers, resistors, connectors and hundreds of other applications, including general purpose adhesive.

1.1 Diluted Epoxy Resin Systems

HYSOL® resin RE2038 with hardener HD3404 is a very low viscosity, general casting system with excellent electrical and physical properties. It can be used whenever a rigid compound is needed and very low mixed viscosity is critical. HYSOL® casting compound EE4143 with hardener HD3404 is silica filled for improved thermal properties, lower shrinkage and lower expansion characteristics.

1.2 Undiluted Epoxy Resin Systems

HYSOL® resin RE2039 with hardener HD3404 is an undiluted epoxy 100% solids system and should be used where very low mixed viscosity is not a critical requirement. The undiluted resin exhibits a higher heat distortion, lower moisture absorption, lower shrinkage and lower expansion characteristics than obtainable with a diluted resin. HYSOL® casting compound EE4183 with hardener HD3404 is silica filled for improved thermal properties, lower shrinkage and lower expansion characteristics. They are resistant to gasoline, jet fuel and other solvents.

1.3 Colored versions exhibiting identical properties to the systems above are available as follows:

Unfilled: Amber-RE2038 (R8-2038*), Black-EE4175 (C8-4175*)
Amber-RE2039 (R9-2039*), Red-EE4187 (C9-4189*), Black-EE4210 (C9-4210*)

Filled: Tan-EE4143 (C8-4143*), Red-EE4154 (C8-4154*), Black-EE4179 (C8-4179*),
Tan-EE4183 (C9-4183*), Red-EE4190 (C9-4190*), Green-EE4198 (C9-4198*),
Blue-EE4207 (C9-4207*), Black-EE4215 (C9-4215*)

*Formerly

Specification of Product

	RE2038†	EE4143†	RE2039	EE4183	HD3404	Test Method
Color, max.	Gardner 3		Gardener 4		Gardner 2	ASTMD 1544
Color		Tan		Tan		Visual
Filler Content, %		48-52		48-52		
Hydrogen equivalent (meg $HClO_4$/gm)					25.3-29.3	Hysol 14A
Specific Gravity @ 25°C (77°F)	1.12-1.22	1.5-1.62	1.15-1.17	1.5-1.65	0.97-0.99	ASTMD1475
Viscosity @ 25°C (77°F)						ASTMD2393
Brookfield RVF						
Spindle 2, speed 20, cps	500-1300					
Spindle 5, speed 10, cps			10,000-16,000			
Spindle 5, speed 20, cps		15,000 max.				
Spindle 6, speed 4, cps				60,000-1000,000		
Spindle 1, speed 2, cps					20-30	
Shelf Life @ 25°C (77°F), months (minimum from date of shipment)	12	6	12	6	12	

†May crystallize. See paragraph 4.0
NOTE: The resin base of these compounds meets the requirements of ASTM D 1763, specification for epoxy resins.

3.0 Typical Cured Properties – Values are not intended for use in preparation of specifications. All measurements taken at 25°C (77°F) unless otherwise noted.

3.1 Cured Physical Characteristics

	RE2038/HD3404	EE4143/HD3404	RE2039/HD3404	EE4183/HD3404	Test Method
Color	Amber	Gray	Amber	Gray	Visual
Coefficient of Linear thermal Expansion in/in/°C					
25-55°C	77×10^{-6}	78×10^{-6}	68×10^{-6}	47×10^{-6}	
55-120°C	207×10^{-6}	156×10^{-6}	194×10^{-6}	136×10^{-6}	ASTMD3386
Compressive Strength, psi	30,000	17,000	16,000	17,000	ASTMD695
Density, lb/cu in	0.053	0.062	0.06	0.06	ASTMD792
Elongation, %	5.5	1.4	2.6	1.2	ASTMD638
Filler content, %	0	48	0	48	ASTMD2584
Flexural strength, psi	15,700	14,300	19,400	13,100	ASTMD790
Hardness, Shore D	85	80	85	87	ASTMD2240
Heat deflection, temp. @ 264 psi, °C (F°)	57 (135)	57 (135)	100 (212)	100 (212)	ASTMD648
Izod impact strength, Ft-lb/in of notch	0.24	0.26	0.25	0.28	ASTMD256
Linear shrinkage, %	1.10	0.47	0.70	0.38	ASTMD2566
Moisture absorption, % (24 hour immersion)	0.30	0.14	0.14	0.07	ASTMD570
Tensile strength, psi	6,300	8,800	9,200	9,000	ASTMD638

	RE2038/HD3404	EE4143/HD3404	RE2039/HD3404	EE4183/HD3404	Test Method
Thermal conductivity, Cal x cm/ (sec x cm^2 x ºC)	4.7 x 10^{-4}	12.3 x 10^{-4}	4.5 x 10^{-4}	13.1 x 10^{-4}	ASTM D 1674
Guide to operating Class, IEEE ºC (ºF)	105 (221)	105 (221)	105 (221)	105 (221)	ASTM D 1674

3.2 Cured Electrical Properties

Dielectric strength @10 mil thickness, volts/mil	1,800	1,850	1,500	1,520	ASTM D 149
Arc resistance, seconds	95	140	107	183	ASTM D 495

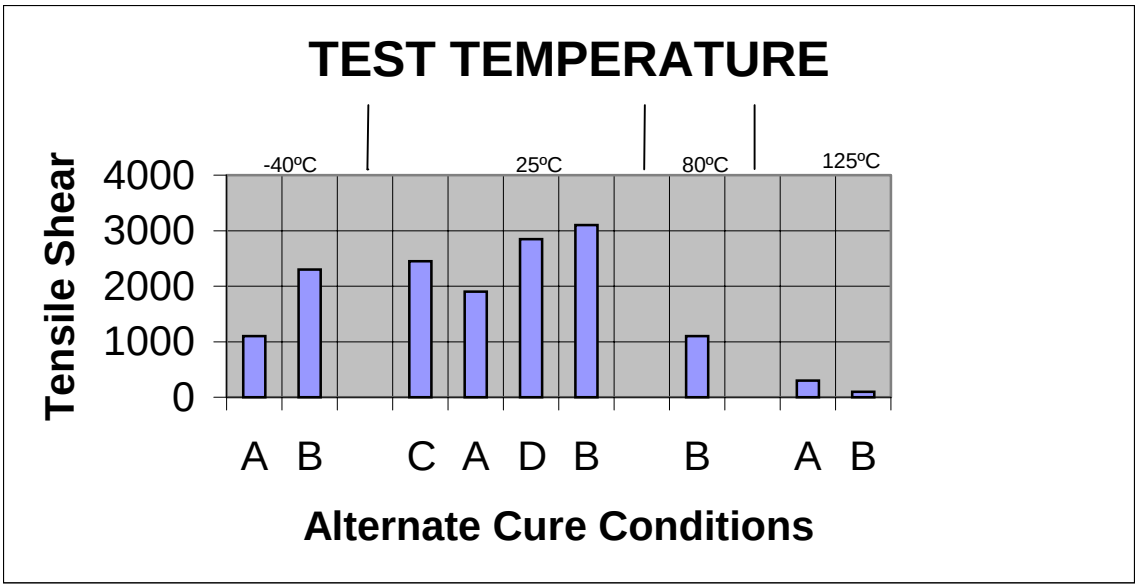
	RE2038/HD3404				EE4143/HD3404				RE2039/HD3404				EE4183/HD3404			
	25º		105º		25º		105º		25º		105º		25º		105º	
	K	**D**	**K**	**D**	**K**	**D**	**K**	**D**	**K**	**D**	**K**	**D**	**K**	**D**	**K**	**D**
100 Hz	3.9	.008	7.1	.446	4.1	.009	6.2	.245	3.9	.007	4.2	.024	4.1	.007	4.6	.016
1 kHz	3.9	.009	6.5	.102	4.0	.008	5.6	.078	3.8	.007	4.1	.012	4.0	.011	4.5	.009
100 kHz	3.7	.020	5.4	.066	3.9	.014	4.8	.040	3.5	.024	4.0	.010	3.8	.020	3.4	.014
Vol res.	$1.9x10^{16}$		$1.2x10^{11}$		$1.2x10^{16}$		$1.6x10^{12}$		$4x10^{16}$		$5x10^{15}$		$8x10^{15}$		$1x10^{14}$	

K = Dielectric constant by ASTM D 150
D = Dissipation factor by ASTN D 150
Vol res. = Volume resistivity in ohm-cm by ASTM D 257

3.3 Typical Cured Properties of RE2038/HD3404

CLIMBING DRUM PEEL STRENGTH – Approximately eighteen pounds per linear inch. Test Method ASTM D 1781. Specimens cured two hours at 60ºC (140ºF) plus four hours at 125ºC (247ºF).

TENSILE SHEER STRENGTH – Test specimens use are 0.063” x 5” 2024-T3 aluminum per MIL-A-5090E. One half inch overlap chromic acid etched. Test method ASTM D 1002.



A – 7 days at 25ºC (77ºF)
B – 2 hours at 60ºC (140ºF)
Plus 4 hours at 125ºC (257ºF)

C – 24 hours at 25ºC (77ºF)
D – 2 hours at 60ºC (140ºF)

The above tensile shear data are based on actual cure conditions. RE2038/HD3404 and other Hysol industrial adhesives should be selected keeping in mind these data versus process and performance requirements.

4.0 HANDLING	**RE2038†/HD3404**	**EE4143†/HD3404**	**RE2039/HD3404**	**EE4183/HD3404**
4.1 Mix ratio, parts by weight*	100/11	100/5.5	100/11	100/5.5
Mix ratio, parts by volume*	100/12.5	100/9	100/13	100/9
Pot life @ 25ºC (77ºF) (200 gram mass), minutes	20	20	20	20
Mixed viscosity @ 25ºC (77ºF), cps	500	3,000	3,000	10,500
@ 40ºC (104ºF), cps				4,000
Peak exothermic temperature (200g mass), ºC (ºF)	150 (302)	100 (212)	150 (302)	100 (212)
Gel time @ 25ºC (77ºF), minutes	25	25	25	25

*Mix ratio of these materials is fixed by their chemistry. Any attempt to increase or decrease the cure rate by adding more or less hardener will result in degraded materials.

†If crystallized during storage, heat to 60ºC (140ºF) for 2 – 16 hours (depending on size of container) with occasional stirring.

Filled resins may tend to settle during storage. Thorough mixing is required each time they are used.

4.2 CURE SCHEDULE

Recommended cure – two hours at 60ºC (140ºF).

Alternate cure – twenty-four hours at room temperature.

Some variation in listed values may occur; customer should determine whether cure other than recommended cure above will give satisfactory results.

06/2000

For additional information in the Americas, please contact one of the following locations:

New York	**Canada**	**Brazil**
TEL: 716.372.6300	TEL: 905.814.6511	TEL: 011.55.11.4143.7000
FAX: 716.372.6864	FAX: 905.814.5391	FAX: 011.55.11.4143.7100

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