Technical Data Sheet

HYSOL®
Electronic Formulated Liquid

Formerly Dexter

High Impact, Low Viscosity Room Temperature Cure Casting Systems

RE2039 (Formerly R9-2039) & HD3561 – Unfilled
EE4183 (Formerly C9-4183) & HD3561 – Filled
EE4186 (Formerly C9-4186) & HD3561 – Filled

1.0 Description

RE2039 and HD3561 is an undiluted epoxy, low viscosity casting system that exhibits exceptional resistance to impact and thermal shock. EE4183 and HD3561 is a filled system offering improved thermal conductivity and increased resistance to heat and thermal shock. The filled system is recommended for most applications. EE4186 and HD3561 is a filled system offering lower coefficient of linear thermal expansion (CTE) and shrinkage.

These products are recommended for potting where high impact strength is required…also, where rigid or flexible wire leads protrude directly from the encapsulation. This system eliminates microscopic cracking on flexing of leads. It adheres extremely well to lead materials, such as vinyl or neoprene.

Colored versions exhibiting identical properties to the systems mentioned in above paragraphs are available as follows:
Unfilled: Amber – RE2039 (R9-2039*), Blue – EE4206 (C9-4206*), Black – EE4210 (C9-4210*)
Filled: Tan – EE4183 (C9-4183*), Red – EE4190 (C9-4190*)
Green – EE4198 (C9-4198*), Blue – EE4207 (C9-4207*), Black – EE4215 (C9-4215*)

2.0 TYPICAL UNCURED PROPERTIES

	RE2039	EE4183	EE4186	HD3561	TEST METHOD
Color, maximum	Gardner 4			Gardner 3	ASTM D 1544
Color		Tan	Tan		
Filler content, %		48-52	63-67		ASTM D 2584
Density @ 25ºC (77ºF), gm/cc	1.15-1.17	1.5-1.65	1.75-1.8	1.0-1.02	ASTM D 1475
Viscosity @ 25ºC					ASTM D 2393
Brookfield RVF					
Spindle 5, Speed 10 cps	10,000-16,000				
Spindle 6, Speed 10 cps		60,000-100,000	100,000-200,000		
Spindle 1, Speed 20 cps				14-25	
Shelf Life @ 25ºC (77ºF), months min. from date of shipment	12	6	12	12	

3.0 TYPICAL CURED PROPERTIES – Values are not intended for use in preparation of specifications. All measurements taken at 25ºC (77ºF) unless otherwise noted. Contact your HYSOL® representative for information regarding specification values.

3.1 CURED PHYSICAL CHARACTERISTICS

	RE2039 /HD3561	**EE4183 /HD3561**	**EE4186 /HD3561**	**TEST METHOD**
Color	Amber	Tan	Tan	Visual
Coefficient of linear thermal expansion*				ASTM D 3386
in/in/ºC, (30º to 70ºC)	54×10^{-6}	53×10^{-6}	50×10^{-6}	
(70º to 90ºC)	105×10^{-6}	119×10^{-6}	110×10^{-6}	
Compressive strength, psi	29,000	22,500	21,000	ASTM D 695
Compressive yield strength, psi	13,000	15,200		ASTM D 695
Density, lb/cu in.	0.039	0.054	0.075	ASTM D 792
Elongation, %	4.1	2.2	1.9	ASTM D 638
Filler content, %	0	43.5	59	ASTM D 2584
Flexural strength, psi	13,800	15,500	14,000	ASTM D 790
Hardness, Shore D	75-80	80-85	95	ASTM D 2240
Heat deflection temperature				ASTM D 648
@ 264 psi, ºC (ºF)	84 (185)	85 (185)	85 (185)	
Izod impact strength, ft-lb/in. of notch	1.4	0.44	0.24	ASTM D 256
Linear shrinkage, %	0.60	0.50	0.31	ASTM D 2566
Moisture absorption				ASTM D 570
(24 hr immersion), %	0.43	0.21	0.113	
Specific gravity	1.08	1.50		ASTM D 792
Tensile strength, psi	7,800	8,500	10,000	ASTM D 638
Thermal conductivity				ASTM D 1674
cal x cm/sec cm^2 x ºC	5×10^{-4}	11×10^{-4}	18×10^{-4}	

3.2 CURED ELECTRICAL PROPERTIES

	RE2039 /HD3561	**EE4183 /HD3561**	**EE4186 /HD3561**	**TEST METHOD**
Dielectric strength				ASTM D 149
@ 10 mil thickness, volts/mil	1800	1500	1400	
@ 20 mil thickness, volts/mil			1585	
Arc resistance, seconds	94	138	190	ASTM D 495

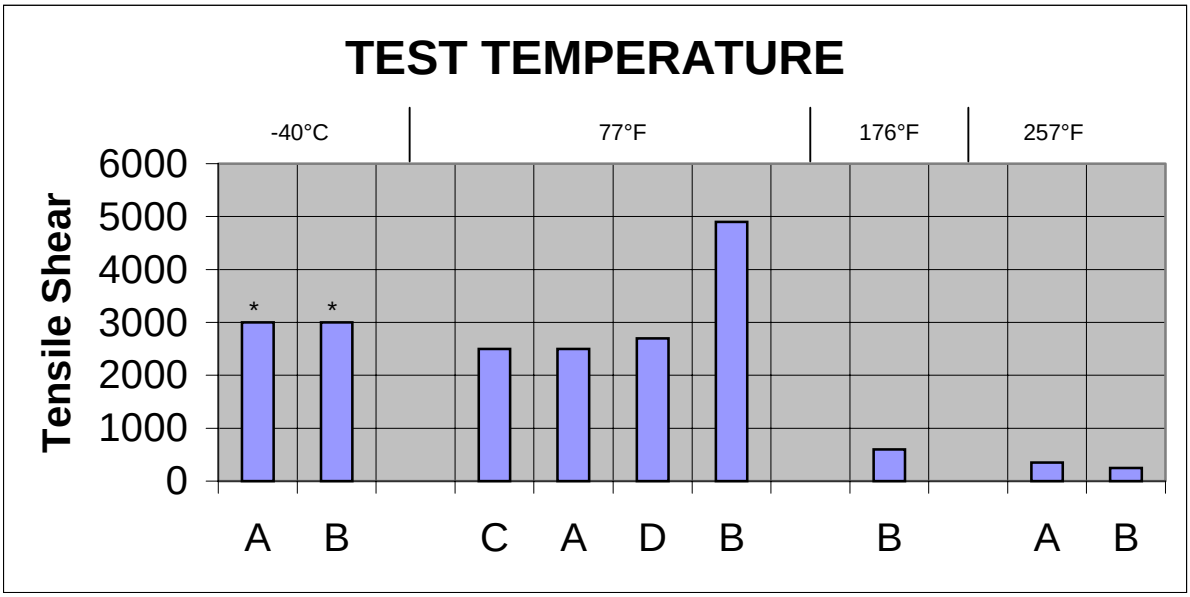
	RE2039/HD3561				EE4183/HD3561				EE4186/HD3561			
	25ºC		80ºC		25ºC		80ºC		25ºC		80ºC	
	K	D	K	D	K	D	K	D	K	D	K	D
100 Hz	4.96	.007	5.60	.029	4.51	.010	6.92	.021	4.80	.011	6.3	.078
1 kHz	5.00	.008	5.60	.012	4.50	.086	6.10	.007	4.80	.008	5.8	.052
10 kHz	4.84	.022	5.17	.014	4.41	.017	5.58	.046	4.52	.013	5.45	.036
100 kHz	4.57	.048	4.92	.027	4.21	.027	5.27	.030	4.60	.022	5.21	.025
Vol. Res.	4×10^{14}		4.0×10^{12}		4.0×10^{14}		2.0×10^{10}		2.0×10^{16}		4.6×10^{12}	

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

3.3 TYPICAL CURED PROPERTIES OF RE2039/HD3561

Climbing Drum Peel Strength – Twenty pounds per linear inch. Test method ASTM D 1781. Specimens cured two hours at 140ºF (60ºC) plus four hours at 257ºF (125ºC).

Tensile Shear Strength – Test specimens used are 0.063" x 5" x 1" 2024-T3 aluminum per Mil-A-5090E. One-half inch overlap chromic acid etched. Test method ASTM D 1002. Values are averages of several determinations and should be used as nominal with tolerances when preparing specifications.



Alternate Cure Conditions

A – 7 days at 77ºF
B – 2 hours at 140ºF plus 4 hours at 257ºF
C – 24 hours at 77ºF
D – 2 hours at 140ºF
*Substrate failed

The above tensile shear data are based on actual cure conditions. RE2039/HD3561 are other HYSOL® industrial adhesives should be selected keeping in mind the above data versus process and performance requirements.

4.0 HANDLING

	RE2039/HD3561	EE4183/HD3561	EE4186/HD3561
Mix ratio, parts by weight*	100/30	100/15	100/10
Mix ratio, parts by volume*	100/33	100/24	100/18
Pot life @ 25ºC (77ºF) (200 gram mass), minutes	35	80	80
Viscosity @ 25ºC (77ºF) cps	600	2,000	4,000
Peak exotherm, 200 gram mass ºC (ºF)	190 (374)	115 (239)	115 (239)

*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.

CURE SCHEDULE

Recommended cure	Three hours at 60ºC (140ºF)
Alternate cure	24 hours at room temperature

Typical cured properties were determined using the recommended cure schedule. Some difference in properties may occur with the alternate or other cure schedules.

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

For a complete listing of worldwide locations and information on related products, please visit our website **www.loctite.com/electronics**