

# PRODUCT INFORMATION

<b>PRODUCT</b>	<i>(TYPICAL PROPERTIES)</i>			
	These should not be considered as specifications.			
<b>KEY TOUGH-SEAL 41</b> (PC2041A/B) <b>UL 94V-0 FLAME RETARDANT TOUGH-SEAL</b>				
<b>DESCRIPTION</b>	<p><b>KEY Tough-Seal 41A/B</b> is a flame retardant version of <b>Tough-Seal 21</b>. Self-extinguishing flame retardant performance has been validated by UL and <b>KEY Tough-Seal 41A/B</b> has achieved a UL94V-0 rating. <b>KEY Tough-Seal 41A/B</b> achieves flame retardant properties without antimony and brominated compounds. Like Tough-Seal, it is a tough and durable two component, hybrid epoxy elastomer that features a fast gel time, excellent thermal cycling and exceptional flexibility. Since <b>KEY Tough-Seal 41A/B</b> is an epoxy and not a urethane, it does not incorporate isocyanates and, accordingly, <b>KEY Tough-Seal 41A/B</b> has a mild health and safety profile. <b>KEY Tough-Seal 41A/B</b> is ideal for electrical potting applications requiring thermal cycling and thermal shock resistance, low embedment stress and flame retardant properties.</p>			
<b>ADVANTAGES &amp; APPLICATIONS</b>	<ul style="list-style-type: none"> <li>✓ Excellent thermal cycling performance &amp; thermal shock resistance</li> <li>✓ Resilient, Tough, Durable</li> <li>✓ Low embedment stress on electronics, Low shrinkage</li> <li>✓ Flame Retardant, Self-Extinguishing in Vertical Testing, Bromine-Free, Antimony-Free</li> </ul>			
<b>PHYSICAL PROPERTIES</b> <i>(Typical)</i>		<b>Tough-Seal 41A</b>	<b>Tough-Seal 41B</b>	<b>MIX</b>
	Color	Tan	Black	Black
	Viscosity @ 77°F (25°C)	10,000 cP	20,000 cP	18,000 cP
	Brookfield RVT	#6 @ 20 rpm	#6 @ 20 rpm	#6 @ 20 rpm
	Specific Gravity	1.47	1.43	1.44
	Density (lbs/gal)	12.3	11.9	12.0
<b>CURED PROPERTIES</b> <i>(Typical)</i>	<b>Mechanical Properties</b>	<b>ASTM</b>	<b>Temperature</b>	<b>Value</b>
	Elongation at Break	D638	25°C (77°F)	~ 200%
	Linear Shrinkage	D2566	25°C (77°F)	<0.001 in/in
	Hardness, Shore A	D2240	25°C (77°F)	55-65A
	<b>Flame Retardant</b>	Performance consistent with UL 94V0, (not UL rated to date)		
<b>CURE SCHEDULE</b> <i>(Typical)</i>	<p>Operating Temperature Range: -40°C to 100°C (-40°F to 212°F)            Gel Time (200g): 20 minutes at 25°C (77°F)            Full Cure: Within 24-72 hours. Mild 66°C (150°F) heat cures can accelerate cure.</p>			
<b>INSTRUCTIONS FOR USE</b>	<b>MIX RATIO By</b>	<b>WEIGHT</b>	<b>VOLUME</b>	
	KEY Tough-Seal 41 Part A	55 A	1 A	
	KEY Tough-Seal 41 Part B	100 B	2 B	
	<p>Combine Part A and B and mix thoroughly, being careful to limit entrapped air during mixing. Scrape sides, walls and bottom of container. Pour material into part and cure. Bulk meter-mix dispensing machines and convenient cartridges provide air free mixing.</p>			
<b>SAFETY &amp; HANDLING</b>	<p><b>PLEASE READ MATERIAL SAFETY DATA SHEET BEFORE USING.</b>            Avoid all contact with skin, eyes, clothing and food. Wash thoroughly after handling.</p>			
<b>SHELF LIFE &amp; STORAGE</b> <i>For Unopened, Factory Sealed Containers.</i>	KEY Tough-Seal 41A (PC2041A)	3 Months from Date of Manufacture (15°C to 35°C)		
	KEY Tough-Seal 41A (PC2041A)	12 Months from Date of Manufacture (-18°C to 3°C)		
	KEY Tough-Seal 41B (PC2041B)	12 Months from Date of Manufacture (-18°C to 35°C)		
	KEY Tough-Seal 41 Cartridges	3 Months from Date of Shipment (15°C to 35°C)		
	KEY Tough-Seal 41 Cartridges	12 Months from Date of Shipment (-18°C to 3°C)		

DCO# 3665 Revision AG

## KEY POLYMER

CORPORATION

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SPECIALTY CHEMICAL COMPOUNDS

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<b>CURED PROPERTIES</b> <i>(Typical) Page 2</i>	<b>Electrical Properties</b>				
		<b>ASTM</b>	<b>Temperature</b>	<b>Value</b>	
	Dielectric Strength	D149	25°C (77°F)	312 Volts/mil	
	Volume Resistivity	D257	25°C (77°F)	1.2 x 10 <sup>12</sup> Ω-cm	
	Dielectric Constant	1 MHz	D150	25°C (77°F)	5.40
		1 kHz	D150	25°C (77°F)	6.00
		60 Hz	D150	25°C (77°F)	8.00
	Dissipation Factor	1 MHz	D150	25°C (77°F)	0.022
		1 kHz	D150	25°C (77°F)	0.101
		60 Hz	D150	25°C (77°F)	0.683
	<b>Thermal Properties</b>				
		<b>ASTM</b>	<b>Condition</b>	<b>Value</b>	
	Heat Capacity, Cp	E1461	25°C (77°F)	1.74 J/g°K	
	Thermal Conductivity	E1461	25°C (77°F)	0.441 W/m°K	
	Coefficient of Thermal Expansion	E831 E1545	-60°C to 150°C	146 ppm/°C	
	<b>Mechanical Properties</b>				
		<b>ASTM</b>	<b>Condition</b>	<b>Value</b>	
	Tensile Strength	D638	25°C (77°F)	194 psi	
	Elongation at Break	D638	25°C (77°F)	300%	
	Linear Shrinkage (Upon Cure)	D2256	25°C (77°F)	<0.001 in/in	
	Hardness vs Temperature Shore A	D2240	-25°C (-13°F)	75 A	
		D2240	5°C (41°F)	66 A	
		D2240	25°C (77°F)	64 A	
D2240		50°C (122°F)	58 A		
D2240		66°C (150°F)	54 A		
D2240		80°C (176°F)	52 A		
D2240		100°C (212°F)	50 A		
Hardness vs RT Cure	1 Hour	D2240	25°C (77°F)	10 A	
	2 Hours	D2240	25°C (77°F)	22 A	
	4 Hours	D2240	25°C (77°F)	30 A	
	8 Hours	D2240	25°C (77°F)	33 A	
	12 Hours	D2240	25°C (77°F)	35 A	
	1 Day	D2240	25°C (77°F)	38 A	
	2 Days	D2240	25°C (77°F)	42 A	
	3 Days	D2240	25°C (77°F)	50 A	
	4 Days	D2240	25°C (77°F)	55 A	
	1 Week	D2240	25°C (77°F)	60 A	
	1 Month	D2240	25°C (77°F)	65 A	

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<b>CURED PROPERTIES</b> <i>(Typical) Page 3</i>	<b>METALLIC ADHESION</b>	<b>ASTM</b>	<b>Temperature</b>	<b>Value</b>
	Tensile Lap Shear Strength, 1" x 4" Adherands, 20 mil bondline gap, 1 inch overlap Co = Cohesive Bond Mode    Ad = Adhesive Bond Mode			
	Aluminum Bare	D1002	25°C (77°F)	90 psi [Co]
	Steel Bare	D1002	25°C (77°F)	85 psi [Ad]
	Steel Ground	D1002	25°C (77°F)	70 psi [Co]
	Primed Steel	D1002	25°C (77°F)	90 psi [Co]
	Galvanized Steel	D1002	25°C (77°F)	80 psi [Co]
	Tin Plated Steel	D1002	25°C (77°F)	90 psi [Co]
	Chrome Plated Steel	D1002	25°C (77°F)	70 psi [Ad]
	<b>FRP ADHESION</b>	<b>ASTM</b>	<b>Temperature</b>	<b>Value</b>
	Tensile Lap Shear Strength, 1" x 4" Adherands, 20 mil bondline gap, 1 inch overlap Co = Cohesive Bond Mode    Ad = Adhesive Bond Mode			
	FRP – Polyester Fiberglass	D3163	25°C (77°F)	50 psi [Ad]
	Garolite G-9 Melamine/Glass	D3163	25°C (77°F)	50 psi [Ad]
	Garolite G-10 Epoxy/Glass	D3163	25°C (77°F)	50 psi [Ad]
	Garolite XX Phenolic/Paper	D3163	25°C (77°F)	45 psi [Ad]
	<b>THERMOPLASTIC ADHESION</b>	<b>ASTM</b>	<b>Temperature</b>	<b>Value</b>
	Tensile Lap Shear Strength, 1" x 4" Adherands, 20 mil bondline gap, 1 inch overlap Co = Cohesive Bond Mode    Ad = Adhesive Bond Mode			
	Acrylic	D3163	25°C (77°F)	30 psi [Ad]
	Acrylic / PVC	D3163	25°C (77°F)	60 psi [Ad]
	PVC - Polyvinyl Chloride	D3163	25°C (77°F)	50 psi [Ad]
	CPVC - Chlorinated PVC	D3163	25°C (77°F)	50 psi [Ad]
	ABS	D3163	25°C (77°F)	45 psi [Ad]
	Acrylonitrile Butadiene Styrene	D3163	25°C (77°F)	45 psi [Ad]
	PETG Polyethylene Terephthalate	D3163	25°C (77°F)	35 psi [Ad]
	Polycarbonate	D3163	25°C (77°F)	45 psi [Ad]
	Nylon 6/6 - Polyamide	D3163	25°C (77°F)	50 psi [Ad]
	Polypropylene	D3163	25°C (77°F)	45 psi [Ad]
Polyethylene LDPE	D3163	25°C (77°F)	65 psi [Ad]	
Polyethylene HDPE	D3163	25°C (77°F)	65 psi [Ad]	
Teflon PTFE	D3163	25°C (77°F)	50 psi [Ad]	
Polytetrafluoroethylene	D3163	25°C (77°F)	50 psi [Ad]	
Noryl	D3163	25°C (77°F)	60 psi [Ad]	
Polyphenylene Oxide/Polystyrene	D3163	25°C (77°F)	60 psi [Ad]	
Ultem - Polyetherimide	D3163	25°C (77°F)	50 psi [Ad]	

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## **DISCLAIMER OF LIABILITY:**

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**KEY POLYMER CORP.  
LAWRENCE, MA 01843**

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