

Technical Data Sheet Kryptos - 17™

DESCRIPTION

The KRYPTOS™ product line is highly adaptable, of which KRYPTOS-17™ is a filled, RoHS compliant, medium viscosity, self-extinguishing flame retardant, low stress, thermally conductive epoxy casting resin system. This material is UL 94V0 rated. This system was designed to meet the physical security requirements of FIPS 140-2, and FIPS140-3 for an encapsulating material. The materials inherent nature offers good Tin-whisker mitigation properties. It provides very good resistance to water, salt spray, inorganic acids, bases and most organic solvents. The material is intended for use in both indoor and outdoor environments. The material cures at room temperature to a tough, semi-rigid polymer; it exhibits good wetting and adhesion to most surfaces and is free flowing to penetrate voids and provide good air release. KRYPTOS-17™ contains a flame retardant package and thermally conductive fillers, that provide good resistance to hard settling. It will generally reach a state of “cure-to-handle” at room temperature within 24 hours depending upon mass and ambient temperature. Cure is usually achieved within 36 to 72 hours. Cure time can be accelerated by the application of heat. Times and temperatures from 3 hours at 60°C to 60 minutes at 100°C are typical for most castings (less than 100 grams).

TYPICAL PROPERTIES

All properties given are at 25°C unless otherwise noted.

UNCURED PROPERTIES

Specific Gravity	Part A	2.14
	Part B	0.97
	Mixed	1.97
Viscosity, cP (mixed measured at 24°C)	3,500 to 4,500	
Color (standard mixed color)	Black	
Shelf Life (From date of shipment in original sealed containers)	18 Months	

PHYSICAL PROPERTIES

Hardness, Shore D (ASTM D2240-05)	86-92
Relative Temperature Index (RTI) Impact	130
Relative Temperature Index (RTI) Strength	130
Service Temperature, °C	
Continuous	-55 to 200 Intermittent
Intermittent	-65 to 260
Tensile Strength, psi @ 25°C (ASTM D 638-10)	
Ambient cure, 7 days @ 20°C	6000 *(nominal)
Heat cure, 2 hours @ 60°C	6750 *(nominal)
Elongation % @ break (ASTM D 638-10)	
Ambient cure, 7 days @ 20°C	0.70 to 2.00
Heat cure, 2 hours @ 60°C	0.70 to 2.00

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PHYSICAL PROPERTIES (continued)

Tensile Modulus, psi @ 25°C (ASTM D 638-10)		
Ambient cure, 7 days @ 20°C		1098000(nominal)
Heat cure, 2 hours @ 60°C		1167000(nominal)
Compressive Strength, psi @ 25°C		
Ambient cure, 7 days @ 20°C		23,500(nominal)
Heat cure, 2 hours @ 60°C		24,000(nominal)
Shear Strength, psi @ 25°C (ASTM D 732-10)		
Ambient cure, 7 days @ 20°C		4500(nominal)
Heat cure, 2 hours @ 60°C		5160(nominal)
Izod Impact, ft lbs./in of notch		1.2
Heat Distortion, °C		160 to 170
Water Absorption, % (ASTM D 570-98)		0.3 to 0.4
Linear Shrinkage, in/in		≤0.002

THERMAL PROPERTIES

Thermal Conductivity, W/m-K (ASTM E 1530-11)		0.70 @ 60°C
Coefficient of Thermal Expansion, in/in/°C x10-6		40*

OUTGASSING PROPERTIES

Total Mass Loss, % (ASTM E595-15)		
Heat cure, 4 hours @ 65°C		0.16
Collected Volatile Condensable Material, % (ASTM E595-15)		
Heat cure, 4 hours @ 65°C		0.00
Water Vapor Recovered, % (ASTM E595-15)		
Heat cure, 4 hours @ 65°C		0.03

ELECTRICAL PROPERTIES

Volume Resistivity, ohm-cm (ASTM D 257-07)		
		3.95 x10 ¹⁵
Relative Temperature Index (RTI) Electrical		
		130
Comparative Tracking Index (CTI)		
		0
Dielectric Constant		
	@ 100 kHz	4.69
	@ 1 MHz	4.80
Dissipation Factor		
	@ 100 kHz	0.017
	@ 1 MHz	0.018
Dielectric Strength, V/mil		
		525-575 (nominal)
0.003" thickness, V/mil		1,000-1,500
0.125" thickness, V/mil		535-670

MIX RATIO (Part A to B)

by weight		10.00 to 1 (variable up to 12:1)
by volume		5.00 to 1 (variable up to 6:1)

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INSTRUCTIONS

1) Bring both components to room temperature (25°C +/- 3°C) stirring Part A in its shipping container to assure a homogenous consistency, and proper dispersion of the fill before use. Power mixing equipment is recommended with a suggested operating speed of between 500rpm to 1000rpm with a mixing paddle (metal or plastic) sufficient to turn material and disperse any filler. Product should be stored at a cool temperature (5°C +/- 3°C) for maximum shelf life. Bulk containers should be inverted every two to three weeks to reduce the accumulation of the flame retardant fillers on the bottom of the containers. Inventory should be rotated on a FIFO (first in, first out) basis.

Part B should be stored at 25°C +/- 3°C.

2) If used in bulk, weigh desired amount of compound in a clean container, mixing parts A and B accurately and thoroughly in the proportion specified. During mixing scrape the sides of container often in an effort to prevent unmixed material. Do not pour from mixing container, transfer to a new container as residual unmixed material may cause a tacky spot or cosmetic blemish on surface of casting. If product is used in a side-by-side cartridge, attach a new static mixer with each cartridge, pre-bleed the first 3 inches of dispensed material or until a uniform color is obtained. Maintain adequate velocity during dispensing to ensure complete mixing.

3) When it is necessary to remove entrapped air, evacuate prior to pouring. A vacuum of 2 Torr or less is typically recommended to ensure air removal.

4) Allow to cure undisturbed. In order to accelerate full cure, heat may be applied after the product has gelled. See Cure Schedule for detailed information on temperatures and times.

USE IN A WELL VENTILATED AREA WITH APPROPRIATE PPE, AND AVOID CONTACT WITH EYES AND SKIN.

CURE SCHEDULE

Pot Life, 200 grams @ 25°C (77°F)	1 to 2 hours
Gel Time @ 25°C (77°F)	8 to 10 hours
Handle Time @ 25°C (77°F)	24 hours
Cure Time @ 25°C (77°F)	36 to 72 hours (≥95% of full properties)
Heat Cure Time @ 60°C (140°F)	2 to 4 hours
Heat Cure Time @ 100°C (212°F)	60 - 90 minutes

* Asterisk denotes values considered typical to associated resin systems or extrapolated from other test results.

** General use guideline, based on weight loss and material performance at elevated temperature.

Notes:

Values presented above are considered to be typical properties, not to be used for specification purposes. Please contact our Technical Department for further information.

SHELF LIFE

18 Months from date of shipment when stored between 5°C to 20°C in the original sealed container.