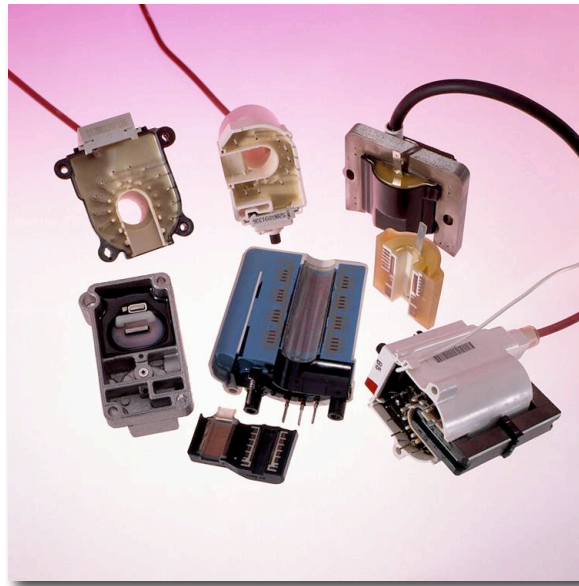


Royal Adhesives and Sealants

Hardman® Electrical/Electronics Adhesives and Encapsulants





Hardman

- **Hardman Rubber Co. Founded in 1879**
 - Rubber cements, molded rubber sundries, DPR
 - Developed epoxy brush adhesives in 1950's
 - Developed electrical encapsulants in 1960's
- **60,000 Square Feet Manufacturing Center in Belleville, NJ**
- **4,000+ Square Feet R&D Center in Belleville, NJ**
- **80 Years Combined Experience Formulating Epoxy and Urethane Adhesives**



ROYAL
ADHESIVES & SEALANTS



Applications

- **Low to Moderate Voltage**
 - Capacitors, electric motor stators, fluorescent ballasts, power supplies, sensors, solid state relays and timers, submersible pumps, transformers, outboard engine stators and power supplies.
- **High Voltage**
 - Electronic ballasts, power supplies, splitters, TV transformers, Appliance igniters, automotive, high capacity power distribution transformers, stationary and small engine ignition coils
- **Telecommunications**
- **Thermally Conductive**
- **UL/Flame Retardant**





Electrical/Electronics Systems

- **Value-Added Products**

- EPOCAP[®] and EPOWELD[®] two-component epoxies
- MONOPOXY[®] one-component epoxies
- KALEX[®] Two-component polyurethanes
- ECLIPSE[®] Light-cure systems
- DPR[®] and PSR[®] elastomer compounds

- **Custom Formulations**

- R&D has ability to develop customized formulations in a timely manner through TSR system

- **Variety of Packaging and Applications Solutions**



Competitor Comparisons

Two-Component Epoxy	Product Range	Base Material	Mix Ratio	Viscosity (cPs)	Cure Method	Fire Resistance	Service Temperature (C)	Hardness (Shore D)
	Loctite Hysol Brand	Epoxy	100:5.5 to 100:100	500-70,000	Room Temp. & Elevated Temp.	Available	105-180	45-95
	National Starch Brands (including Bondmaster, Emerson & Cuming)	Epoxy	100:5 to 100:100	1,000-70,000	Room Temp. & Elevated Temp.	Available	-75-175	50-90
	Lord Brand (including Thermoset)	Epoxy	100:7 to 100:100	1,000-40,000	Room Temp. & Elevated Temp.	Available	-50-155	60-95
	Hardman Brand	Epoxy	100:7 to 100:100	500-100,000	Room Temp. & Elevated Temp.	Available	-50-180	30-95

Two-Component Urethane	Product Range	Base Material	Mix Ratio	Viscosity (cPs)	Cure Method	Fire Resistance	Service Temperature (C)	Hardness (Shore)
	Loctite Hysol Brand	Urethane	100:16 to 100:100	450-5,000	Room Temp. & Elevated Temp.	Available	-70-105	gel-65D
	National Starch Brands (including Bondmaster, Emerson & Cuming)	Urethane	100:4 to 100:100	1,000-5,000	Room Temp. & Elevated Temp.	Available	-70-105	gel-75A
	Lord Brand (including Thermoset)	Urethane	100:13 to 100:100	500-5,000	Room Temp. & Elevated Temp.	Available	-70-130	0050-A85
	Hardman Brand	Urethane	100:7 to 100:100	500-25,000	Room Temp. & Elevated Temp.	Available	-70-105	0050-A85



Hardman Electrical/Electronics Systems

- **Full Range of Epoxy, Urethane and UV Systems**
 - Adhesives
 - Sealants
 - Encapsulants
 - Potting compounds
- **Full Range of Packaging and Applications Options**
- **Custom Formulation Capability**
 - Application specific
- **Private Label Programs**



Additional Markets Served

- **Assembly, Maintenance and Repair Adhesives**
- **Automotive Systems**
 - Adhesives, sealants, encapsulants, potting compounds
- **Filter Adhesives and Casting Compounds**
- **Brush Adhesives**
- **Aerospace and Defense Adhesives**