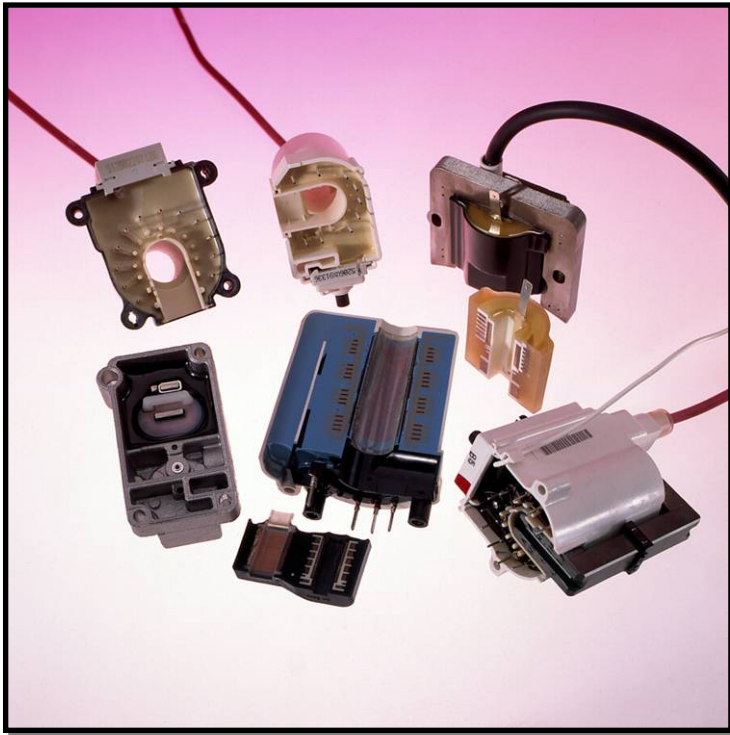


Electrical Encapsulants and Potting Compounds



Electrical Encapsulants and Potting Compounds

- **General Potting Applications**
- **High Voltage**
- **Power Transformers**
- **Telecommunications**
- **Ballasts and Starters**
- **High Temperature**
- **Submersible Pumps**
- **Thermally Conductive**
- **UL/Flame Retardant**
- **UV Potting Compounds**
- **UV Conformal Coatings**
- **Wire and Cable Sealants**

Functions of Encapsulants and Potting Compounds

Function – Protect electrical coils and transformers

● Encapsulants

- Encapsulant makes the container
- Protects components
- Molded to final shape



Encapsulation

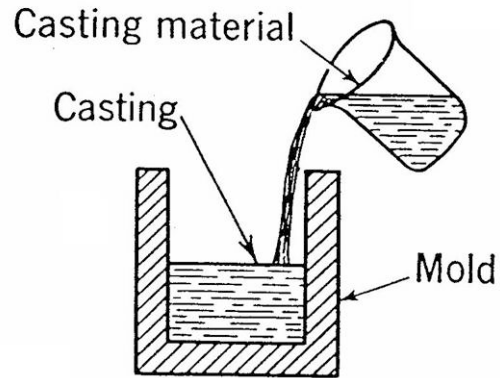
● Potting Compounds

- Fill in around a container
- Protects components
- Adheres to container

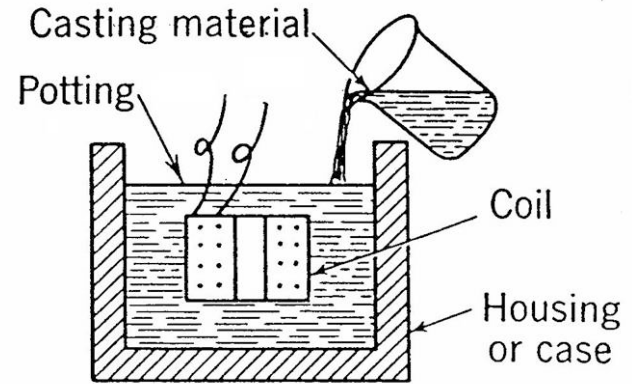


Potting

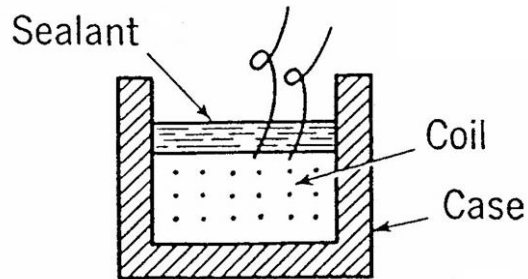
Casting, Potting, Encapsulation and Sealing 101



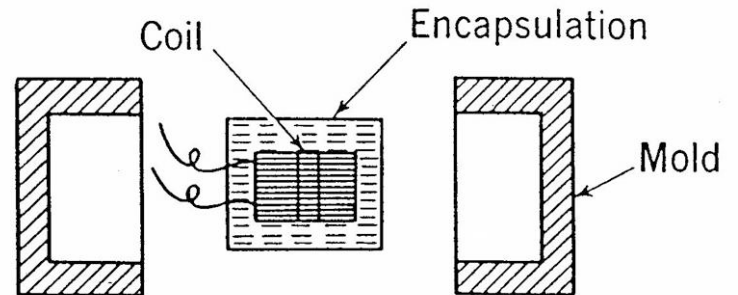
Casting



Potting



Sealing



Encapsulation

Royal Adhesives Products and Services

- **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

- **Technical Expertise**

- **Problem Solving Capabilities**



Target Markets for Distributors

- **General Potting**
- **High-Voltage TV Transformers**
- **High Power Transformers**
- **Telecommunication Strips**



Low to Moderate Voltage Applications

- **Flame Retardant Ambient Curable Systems**

- Capacitors
- Electric motor stators
- Fluorescent ballasts
- Power supplies
- Sensors
- Solid state relays and timers
- Submersible pumps
- Transformers



Power supply

- **Non-Flame Retardant Systems**

- Automotive sensors
- Miscellaneous outdoor applications
- Outboard engine stators and power supplies

High Voltage Applications

- **Flame Retardant Systems**

- **Electronic ballasts**
- **Power supplies**
- **Splitters**
- **TV transformers**

- **Non-Flame Retardant Systems**

- **Appliance igniters**
- **Automotive**
- **High capacity power distribution transformers**
- **Stationary and small engine ignition coils**



Flyback transformer

Urethane Applications

- **Electrical Potting and Encapsulating Systems**

- Low voltage coils and transformers
- Printed circuit blocks
- Re-enterable sealing compounds
- Relays
- Sensors
- Terminal blocks
- Timers
- Transducers



Low voltage coil

- **Casting Compounds**

- Automotive test block holders
- Cable termination bushings
- Miscellaneous parts

General Potting Compounds



General Potting Compounds

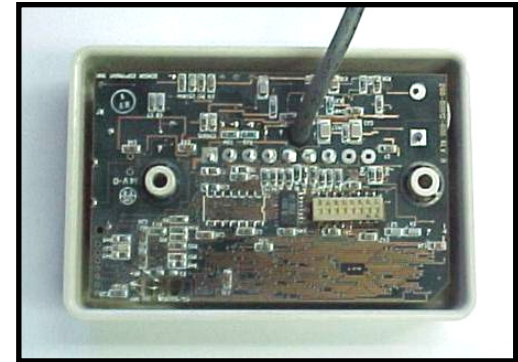
- Value-Added Products

EPOCAP two-component epoxies
MONOPOXY one-component epoxies
KALEX two-component urethane

- Fire retardancy
- High service temperature
- Processing convenience
- Various hardnesses

- Typical Applications: General Purpose Coils and Transformers

- Ballasts
- HID igniters for mercury or sodium vapor lamps
- High-speed switching
- Power supplies
- Starters
- Torroidal transformers



Circuit board to be potted

General Potting Compounds

Product	Application	Key Attribute 1	Key Attribute 2	UL
EPOCAP 3645A/13403B	Low voltage electronics	High impact strength	Low temperature flexibility	
EPOCAP 23648A/25150B	General potting	Fast setting	Convenient 1:1 mix ratio	
EPOCAP 15144	Ballasts, starters, mercury switches	Low exotherm	Low shrinkage, Convenient 1:1 mix ratio	
EPOCAP 16505/69 Blue	Transformers, coils, switches, connectors	Resistance to synthetic lubricants and motor oil	Faster than 114B	
EPOCAP 16505A/114B	Transformers, coils, switches, connectors	Resistance to synthetic lubricants and motor oil	Improved impact resistance v. 69 Blue	
EPOCAP 17550	Ballasts, starters, mercury switches	Extremely low exotherm and shrinkage	Semi-rigid system, excellent thermal shock resistance	UL
EPOCAP 17577	Submersible pump equipment	Non-abrasive inert fillers	Low viscosity	UL
EPOCAP 19174	Coils, transformers, time delay relays	Semi-rigid, low viscosity, excellent impregnation	Excellent thermal shock resistance	UL
EPOCAP 19284	Small coils, transformers	Excellent impregnation of tightly wound coils and transformers	Good thermal conductivity, high heat distortion temperature	
EPOCAP 25119	General purpose low voltage applications	Semi-flexible, 1:1 mix ratio	very good thermal conductivity	UL
MONOPOXY 16678	Coils and other electrical applications	Semi-flexible and unfilled system, good impregnation	Good electrical properties, moisture and vibration resistance	
MONOPOXY 16679	Coils and other electrical applications	Toughened version of MONOPOXY 16678		
KALEX 16552	Time delay relays, connectors	Excellent electrical properties & hydrolytic stability	Flexible. Designed for stress sensitive parts	UL
KALEX 25134A/16813B	Igniters, low voltage circuits.	Very low viscosity	Semi-flexible	



High Voltage

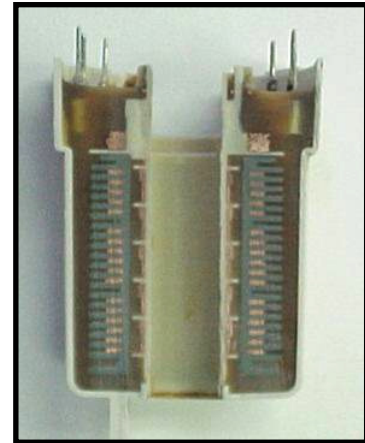


TV Flyback Transformers

● Value-Added Products

EPOCAP two-component epoxies

- Excellent penetration of fine wires
- Flame retardant
- High temperature
- Economical



TV flyback transformer

● Small, High-Voltage Transformers

- Two types of transformer
 - Multi-Layer Transformers (MLT)
 - Bobbin-wound transformers
- High volume production
- Designs change quickly

Igniters for Gas Appliances

- **Electronic and Piezoceramic Igniters**
- **Value-Added Products**

EPOCAP two-component epoxies
EPOWELD two-component epoxies

- **Processing flexibility**
 - **Cure at RT or elevated temperatures**
 - **Range of working times**
 - **Compatible with sand or other economical fillers**
- **Low Viscosity**
- **Performance advantage of epoxies**

Igniters for Coils

● Value-Added Products

EPOCAP two-component epoxies

- Very high performance epoxy
- Good volume resistivity and low dielectrics
- Excellent for difficult-to-pot dielectrics
- Excellent penetration of fine wires
- Unique technology for efficient processing



Small coil

High Voltage

Product	Application	Key Attribute 1	Key Attribute 2	ST	UL
EPOCAP 13111A/13380B	Ignition coil - automotive & outboard motors	Excellent thermal shock resistance.	Excellent impregnation properties. Fast cure	130C	
EPOCAP 16129	Automotive ignition modules & regulators	Unfilled. Excellent thermal shock resistance	resistance to hostile "under the hood" conditions	105C	
EPOCAP 16358	Fly back transformers	Excellent electrical properties, thermal shock properties	Adhesion to thermoplastics-polyester, Noryl®	155C	UL
EPOCAP 16820	Fly back transformers	Good electrical & thermal shock properties.	Adhesion to thermoplastics-polyester, Noryl®	155C	FR
EPOCAP 17580A/17570B	Fly back transformers	Good electrical & thermal shock properties	Adhesion to thermoplastics-polyester, Noryl®	155C	UL
EPOCAP 19360	Automotive ignition coils.	Good electrical & thermal shock properties	High temperature performance	155C	
EPOCAP 19364	Sand potting applications, low voltage	Low viscosity	Unfilled	105C	
EPOCAP 19438	Ignition coils - extreme outdoor environments	Excellent electrical properties	Very good thermal shock resistance	155C	
EPOCAP 19446	Ignition coils - extreme outdoor environments	Neutral color version of 19438		155C	
EPOCAP 25095	Ignition coils - extreme outdoor environments	Excellent electrical properties	Very good thermal shock resistance	155C	
EPOCAP 25136	General low to medium voltage potting	Medium viscosity, 1:1 mix ratio	Long pot-life	105C	
EPOCAP 25190	Splitter potting	Excellent electrical & thermal shock resistance	Excellent moisture resistance, good adhesion to plastics	155C	FR
EPOCAP 25229	Potting of starters, transformers, coils	Excellent electrical properties	Very good low temperature performance	155C	FR
EPOWELD 25289	Igniter coils, low to medium voltage	Unfilled system	Excellent for sand potting.	105C	



Power Transformers



Power Transformer Applications

Function – Transfers electric energy from one circuit to another through a change in voltage, current, phase, etc.

● Value-Added Products

EPOCAP two-component epoxies

- High temperature stability
- Excellent electrical and thermal properties
- Reduced combustion hazard
 - Replaces oil-filled transformers
- No leakage
- Economical

● Typical Power Transformer Applications

- Utilities
- Power sub-stations
- Other major applications

Competitive Products

- Liquid insulators
- Tar
- Polyurethane



Power Transformers

Product	Application	Key Attribute 1	Key Attribute 2	Filled
EPOCAP 13226	Dry type power and distribution transformers	Excellent electrical properties	Service temperature of 180C	unfilled
EPOCAP 16717	Large cast coil transformers	High operating service temperature (>200C)		filled
EPOCAP 16128	Power transformers	Low viscosity system, Excellent electrical properties	Excellent thermal shock resistance	unfilled
EPOCAP 16740	Dry type power and distribution transformers	Unfilled version of Epocap 16741		unfilled
EPOCAP 16741	Dry type power and distribution transformers	Low viscosity	Service temperature of 200C	filled



Telecommunications



Telecommunication Terminal Strips

Terminal Strips – **Connectors for telephone/data wires**

- **Flat rectangular boxes**
 - **Connector acceptors on one side**
 - **Electrical connections in the box**
 - **Filled with potting compound on other side**
- **Made by subcontractors to telecommunication companies**
- **Primary purpose is to protect from moisture**

Telecommunications

Product	Application	Key Attribute 1	Key Attribute 2	UL	H
KALEX 16552	Time delay relays, connectors	Excellent thermal shock resistance	Flexible. Designed for stress sensitive parts	FR	78
KALEX 19256	Time delay relays, connectors	Used in components that must pass Bellcore testing	Low viscosity, fast setting	FR	35* 55*
KALEX 25111	Time delay relays, connectors	Used in components that must pass Bellcore testing	Low viscosity, fast setting with controlled rheology	FR	50
KALEX 25285	Time delay relays, connectors	Used in components that must pass Bellcore testing	Accelerated version of Kalex 25111.	FR	50



Ballasts and Starters

Ballasts and Starters

- Provide starting “kick” and controls electrical current
- Value-Added Products

EPOCAP two-component epoxies
KALEX two-component urethanes

- Fire retardancy
- High service temperatures
- Thermal conductivity
- Environmental protection
- Processing flexibility

Ballasts and Starters

Ballasts and Starters
Product
EPOCAP 15144
EPOCAP 17550A/79B
EPOCAP 25117
EPOCAP 25119
EPOCAP 25190
EPOCAP 25228
EPOCAP 25229
KALEX 19256

High Temperature

High Temperature

High Temperature Applications
Product
EPOCAP 12050
EPOCAP 13113
EPOCAP 13226
EPOCAP 16717
EPOCAP 16742
EPOCAP 16820
EPOWELD 16685



Low-stress Potting Compounds

Low-stress Potting Compounds

Low-stress Potting Compounds
Product
EPOCAP 25106
EPOCAP 25219
EPOCAP 25267
KALEX 12166
KALEX 16552
KALEX 17474
KALEX 18637
KALEX 20272



Submersible Pump Applications

Submersible Pumps

Submersible Pumps	
Product	
EPOCAP 13341A/EP-2420 TC-B	
EPOCAP 17577	
EPOCAP 25306	



Thermally Conductive

Thermally Conductive

Thermally Conductive
Product
EPOCAP 13070
EPOCAP 13341
EPOCAP 16358
EPOCAP 16742
EPOCAP 16820
EPOCAP 19461
EPOCAP 25262A/2420B
MONOPOXY 19351
MONOPOXY 25100
KALEX 16652
KALEX 18515
KALEX 18637



UL/Flame Retardant

UL/Flame Retardant

UL/Flame Retardant
Product
EPOCAP 13341A/EP-2420 TC-B
EPOCAP 15144
EPOCAP 17550
EPOCAP 17550A/79B
EPOCAP 17577
EPOCAP 19174
EPOCAP 19257A/20028B
EPOCAP 19385A/EP-2420 TC-B
EPOCAP 25119
EPOCAP 25184
MONOPOXY 25100
KALEX 16552
KALEX 19256
KALEX 25111



UV Curable Potting Compounds

UV Curable Potting Compounds

UV Curable Potting Compounds
Product
ECLIPSE 401
ECLIPSE 402
ECLIPSE 404
ECLIPSE 802
ECLIPSE 803
ECLIPSE 808



UV Conformal Coatings

UV Conformal Coatings

UV Conformal Coatings
Product
ECLIPSE 101



Wire and Cable Sealants

Wire and Cable Sealants

Wire and Cable Sealants
Product
DPR 576-Q
DPR 4207
DPR 20022
PSR 15021
KALEX 20272

