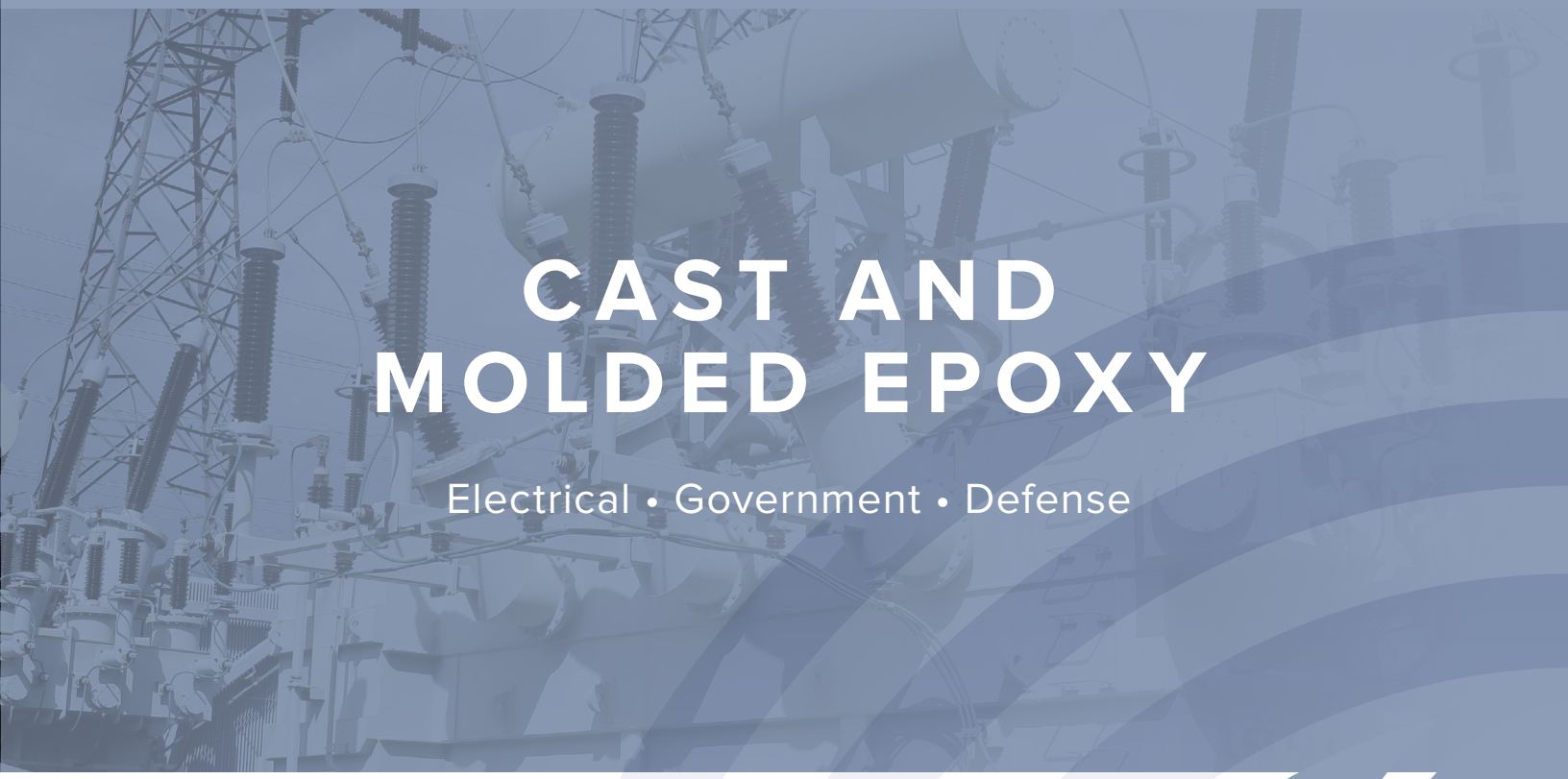
InsulVolt®



CAST AND MOLDED EPOXY

Electrical • Government • Defense

COMPOSITES
Cast. Wind. Press.

CK Composites, Co. LLC. 361 Bridgeport Street Mount Pleasant, PA 15666 USA
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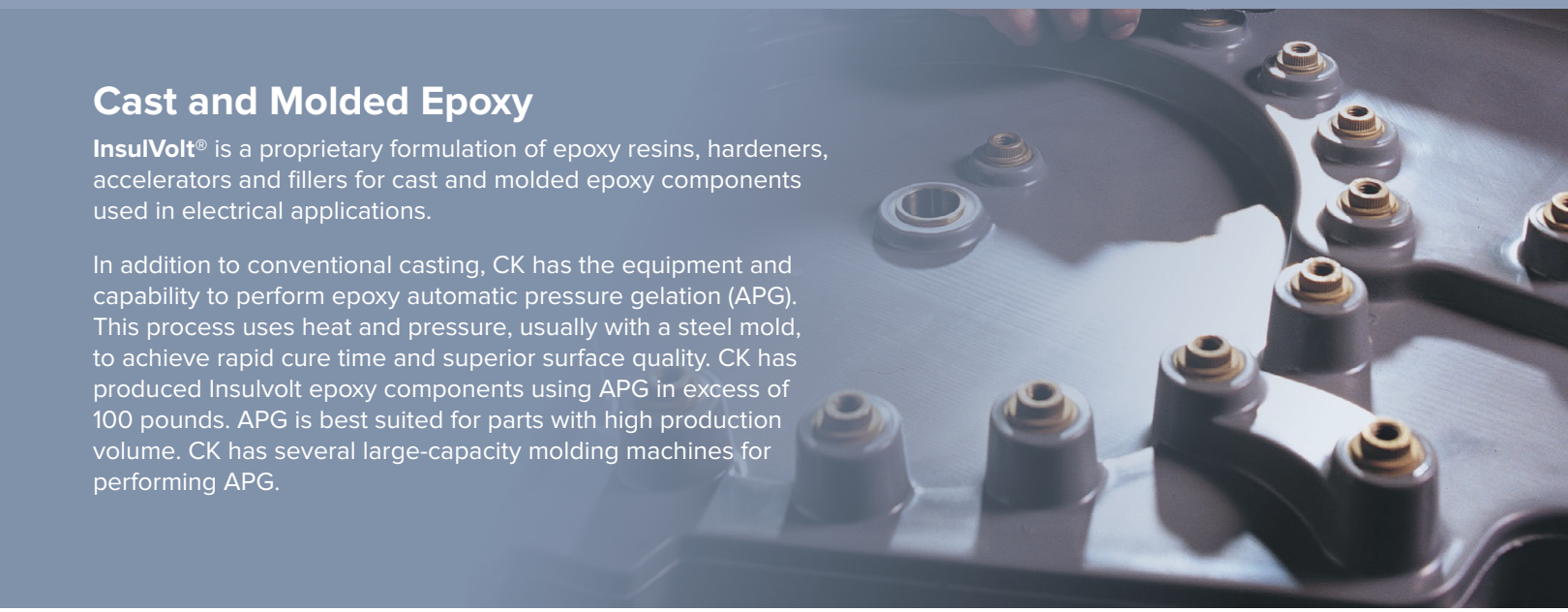
EFFECTIVE PERFORMANCE – EFFICIENTLY



Cast and Molded Epoxy

InsulVolt® is a proprietary formulation of epoxy resins, hardeners, accelerators and fillers for cast and molded epoxy components used in electrical applications.

In addition to conventional casting, CK has the equipment and capability to perform epoxy automatic pressure gelation (APG). This process uses heat and pressure, usually with a steel mold, to achieve rapid cure time and superior surface quality. CK has produced Insulvolt epoxy components using APG in excess of 100 pounds. APG is best suited for parts with high production volume. CK has several large-capacity molding machines for performing APG.

We can assist in your effort to replace damaged or worn bushings. CK has the ability to reverse engineer, replicate and replace your original insulators, design and tested thru 69kV.

Bis-a and Cycloaliphatic Systems. CK's cycloaliphatic resin systems produce insulators which are non-tracking, self-scouring and non-weathering for outdoor applications. CK's Bisphenol resin systems produce extremely high strength insulators.

Vacuum Casting. Many cast and molded epoxy parts are poured and processed in a vacuum to minimize voids and assure a strong bond between epoxy and metal. CK has extensive equipment for performing vacuum casting, including large capacity vacuum pumps and vacuum chambers. Finished parts are oven cured to achieve specified mechanical properties. Final operations include careful cleaning, inspection, and testing.

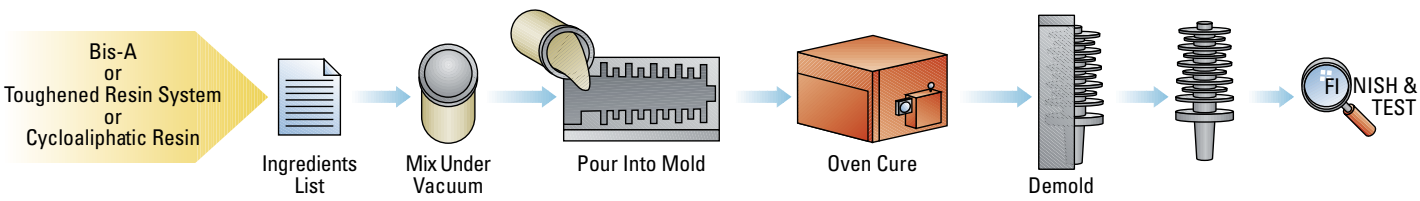
APG-Liquid Injection Molding. In addition to conventional and vacuum casting, CK has the equipment and capability to perform epoxy automatic pressure gelation (APG). This process uses heat and pressure, to achieve rapid cure time and productivity. CK has produced tens of thousands of bushings, spouts, and insulators using APG which is best suited for parts with a high production volume. CK has several large-capacity molding machines for perfuming APG.

Common Areas of Application

Molded Insulators for high, medium, and low voltage applications

- Circuit Breakers
- Switch Gear
- Furnace, Power & Distribution Transformers
- Standoff Insulators
- Tap Changers
- Custom Bushings
- Power Supply Equipment
- HV DC Equipment
- Corrosion-Resistant Applications
- Primary and Secondary Bushings
- Roof Entrance Bushing

Cast & Molded Epoxy Process

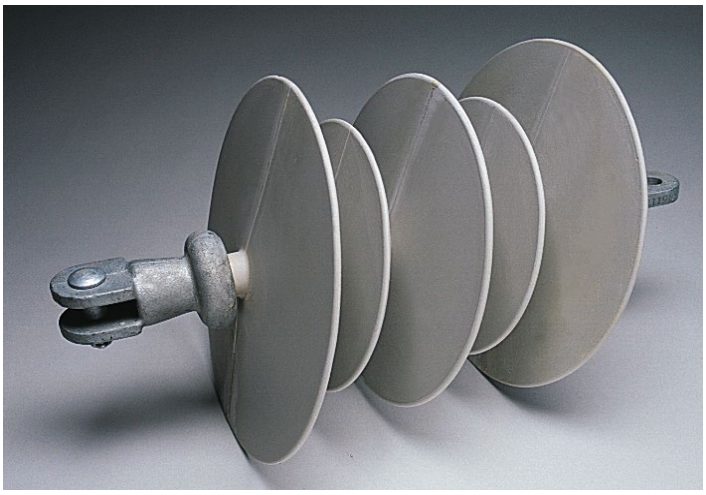


CAST AND MOLDED EPOXY INSULATORS

Customized Quality

At CK, the process of custom-engineering electrical components begins with the proprietary formulation of epoxy resin, hardeners, accelerators and fillers, including new toughened resin systems.

Our polymer chemists can match your product need with the strength, durability and chemical resistance of the right resin system. Electrical insulators from 5-69 kV in Bis-A or Cycloaliphatic epoxy resins are tested to ensure outstanding performance characteristics. Using computerized electrical field plot analysis, our engineers work with you to design your component, the mold, conductors or other inserts to meet your quality requirements.



Pressure Gelation/ Vacuum Casting

We can select from a range of manufacturing methods, to provide you the optimum balance of volume and manufacturing cost. The Open Pour, Vacuum Casting, and Automatic Pressure Gelation operations each have advantages which allow us to produce finished parts of the highest possible quality while minimizing mold investment.

Prototyping and Reverse Engineering

The combination of our technical capability, in-house testing, custom resin formulations and low-cost manufacturing options make CK the ideal choice for partnerships in prototyping new designs. Or we can reverse engineer, replicate and replace original worn or damaged insulators.

Encapsulation

Using CK's expertise in electrical insulation component manufacture, we can take your sensitive sensor or instrument and protectively encapsulate it in the correctly chosen resin system.

Acclaimed Customer Service

Our customer service professionals work hand-in-hand with our technical staff to offer award-winning customer service and delivery times to fit your J.I.T or Kanban schedules.

The majority of cast and molded epoxy components are for electrical applications. CK has several proprietary formulations of epoxy resins, hardeners, accelerators and fillers.

Metal conductors and other metal inserts can be included as integral part of casting. Flanges, holes and "other-than-round" cross sections can be molded. Therefore, a properly designed single epoxy casting or molding can often replace an assembly of parts of other materials such as porcelain, high-pressure laminates, tapes and metals.

CK offers design assistance to customers covering not only part design but mold design as well. Many technical issues in part and mold design are interrelated. The most common approach for CK to design and purchase the mold on the customer's behalf, with CK being responsible for the mold producing the specified part.

CK's cycloaliphatic resin systems produce insulators which are non tracking, self-scouring and non-weathering. CK's Bisphenol resin systems produce extremely high strength insulators.

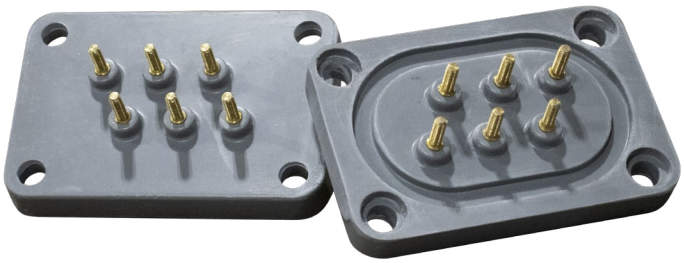
Many cast and molded epoxy parts are poured and processed in a vacuum to minimize voids and assure a strong bond between epoxy and metal. CK has extensive equipment for performing vacuum chambers. Finished parts are oven cured to achieve specified mechanical properties. Final operations include careful cleaning, inspection and testing.

PROCESS CONTROLLED VARIABLES

In addition to conventional casting, CK has the equipment and capability to perform epoxy automatic pressure gelation (APG). This process used heat and pressure, usually with a steel mold, to achieve rapid cure time and superior surface quality. CK has produced weather cases of epoxy using APG, with individual part weights of up to more than 100 pounds. APG is best suited for parts with high production volume. CK has several large-capacity molding machines for performing APG. Another name used for APG is expose liquid injection molding (LIM).

Maintenance Projects

CK can assist in your effort to replace damaged or worn bushings. CK has the ability to reverse engineer, replicate and replace your original insulators, design and tested thru 69kV.



Cast Resin Systems

Particular in the case of epoxy castings and moldings, properties can vary with part design. Therefore it is nearly always appropriate to build prototypes and tests. If the part has cast in metal parts, the issue of stresses must be considered caused by temperature changes and differences in coefficient of expansion between the metal and the resin. CK can perform a complete test program including temperature cycling.

The technical data in the table on the reverse are representative for the more important properties of the most popular resin formulations. Please call for additional data. For many customers CK has developed custom formulations to meet a special need.

CK can assist in a customer's effort to replace damaged or worn parts. CK can reverse engineer to replicate an old part for which no drawings are available.

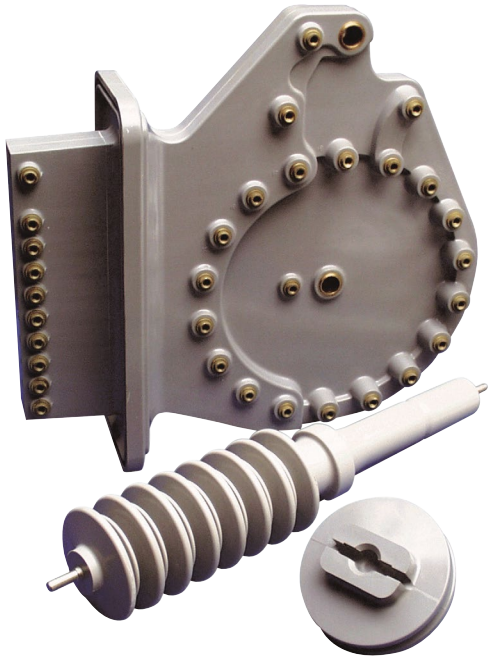
Testing Equipment Includes:

Heat Deflection Tester: determines the temperature at which a 41/2" x 1/2" x 1/2" cast epoxy sample distorts .010" with a load of 264 psi.

Denison Tensile Tester: (range 0-32,000#) used for flexural strength, bonding strength, and compressive strength tests.

Dillon LW Universal Tester: (10,000 lb. capacity) for flexural strength and tensile testing.

IZOD Impact Tester: ranges: 0–2 ft. lb. and 0–30 ft. lb.



High Voltage Test Set: (0–100 kV @ 5 kVA) performs one minute or more static tests on finished bushings at prescribed voltages. Routine tests use step-by-step method until breakdown occurs.

High Voltage Test Transformer: range: 0–200 kV at 30 kVA.

Corona Detection Equipment: used in conjunction with high voltage test transformer to determine corona discharge level. Measurements can be made up to 175 kV.

400 kV Surge Generator: for surge withstand testing on both material samples and finished components.

60 Hz Capacitance Bridge: G. R. Model 1611-B, which directly reads dissipation factor to 60%.

Megohm Bridge: G. R. Model 1644-A, which has a range of 1 k ohm to 1,000 T ohm at fixed voltages from 10 to 1,000 volts.

Inclined Plane Track Tester: Self-contained liquid-contaminant inclined plane type conforming to ASTM D2303.

Outdoor Test Stands: for weathering tests with a continuously applied voltage.

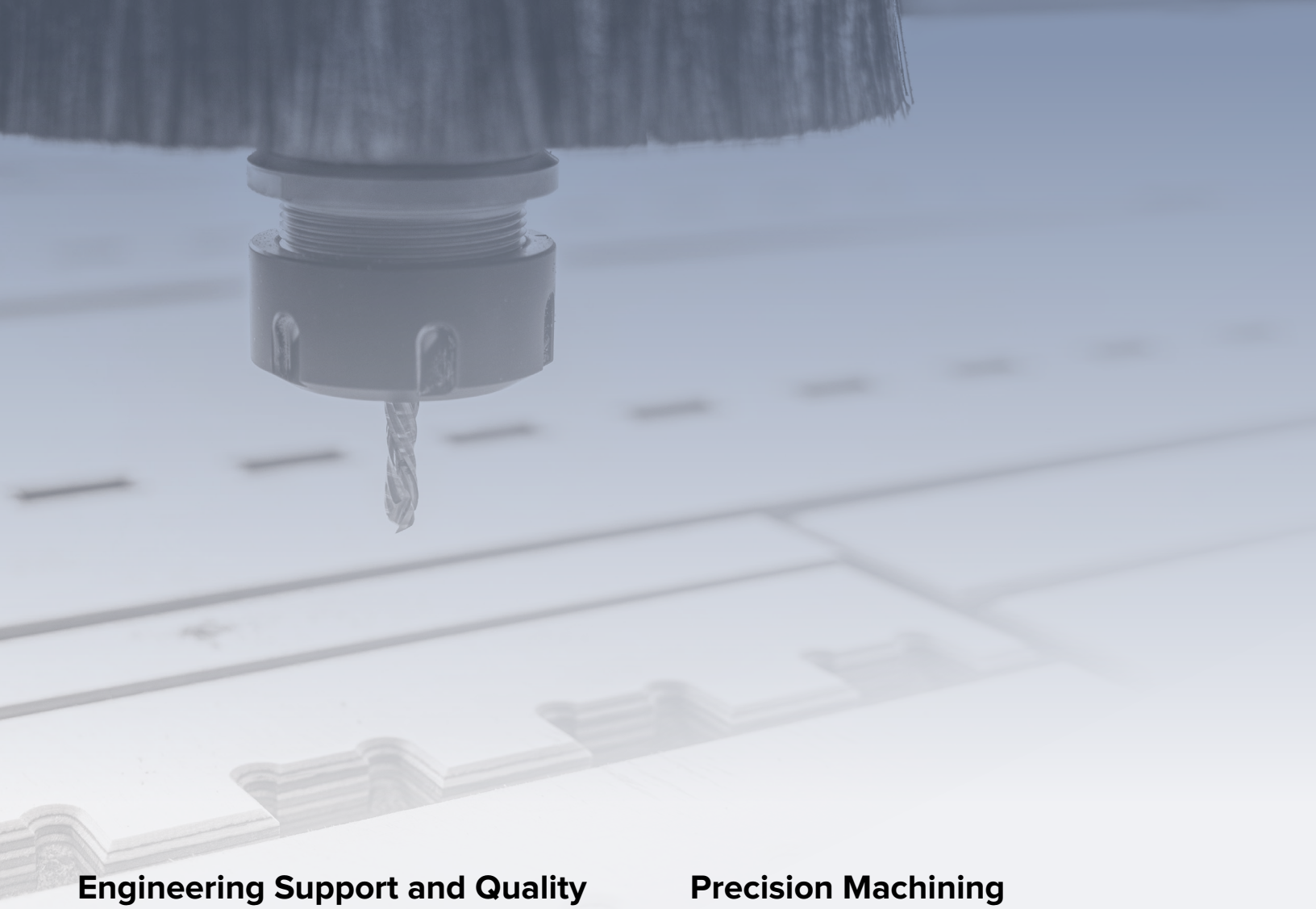
TECHNICAL DATA

The following technical data represents **minimum** values for some of the more significant properties of the most commonly used epoxy formulations. Additional data is available upon request.

Epoxy Formulation	CRS-48	CRS-48A	CRS-48B	CRS-58	CRS-48B	CRS-22	CRAS-98	CRD-48B	CRHS-48A	CRS-WD1
Specific Gravity (ASTM D-792)	1.8	1.8	1.8	1.8	2.3	2.0	2/2	1.9	1.7	1.7
Heat Deflection Temperature (ASTM D-648)	120 °C	88 °C	105 °C	62 °C	90 °C	115 °C	165 °C	85 °C	85 °C	125 °C
Flexural Strength (ASTM D-790)	10,000 psi	10,000 psi	10,000 psi	9000 psi	10,000 psi	10,500 psi	10,000 psi	6,200 psi	7,000 psi	9,000 psi
Compressive Strength (ASTM D-695)	24,000 psi	22,000 psi	22,000 psi	20,000 psi	20,000 psi	20,000 psi	30,000 psi	25,000 psi	18,000 psi	18,000 psi
Impact Strength* (ASTM D-256)	1.2 ft.-lb./in.	1.4 ft.-lb./in.	1.3 ft.-lb./in.	1.4 ft.-lb./in.	0.9 ft.-lb./in.	0.4 ft -lb./in.	1.0 ft.-lb./in.	0.8 ft.-lb./in.	0.8 ft.-lb./in.	1.4 ft.-lb./in.
Dielectric Strength (AST D-149)	360 v/mil	350 v/mil	350 v/mil	350 v/mil	310 v/mil	400 v/mil	350 v/mil	320 v/mil	330 v/mil	350 v/mil

*Izod, unnotched

Note: The above values are minimum routine test values and may be subject to change without notice.



Engineering Support and Quality

Because components and products we manufacture usually perform a critical function, CK Composites has strong technical capabilities and quality assurance procedures. Our staff includes several individuals with a background and work experience in electrical, mechanical and chemical engineering as well as skilled production technicians, programmers and machinists. With these resources, we are able to offer assistance to customers in the areas of material development, product design and manufacturing, quality test development, and technical problem solving.

Customer satisfaction is CK Composites' number one priority and we have a stringent Quality Assurance program in place to ensure the performance requirements of our materials and services used in the industry are exceeded on a routine basis. Quality assurance procedures include testing and inspection of incoming raw materials, in-process inspection and both destructive and non-destructive material testing. Specific electrical, mechanical, and hydrostatic testing is performed on the completed products to customer specifications. We pride ourselves on the quality of our products.

Precision Machining

Not only can CK Composites develop and engineer materials with the desired properties in the customer's applications, we can provide finished parts or assemblies as well. We have a complete machine shop with precision milling, routing, turning and assembly capabilities. We employ both manual and CNC equipment to ensure we efficiently produce parts with the proper fit and finish required. To complete our offering to the industry, we can paint or varnish the parts if desired. We can help design the parts or manufacture them to specific designs our customers provide.

The information provided is based on average test results and is accurate to the best of our knowledge, information and belief at the date of its publication. No warranty is to be construed. The customer should test for suitability in the specific application.

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