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How Epoxy Resins and Polycarbonate Plastics Help Power Your Everyday Electronics

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From smartphones to smart homes, modern electronics are built on more than just innovation — they rely on high-performance materials that make devices safer, stronger, and more reliable. Two essential materials working behind the scenes are epoxy resins and polycarbonate plastics which are made using the building-block chemistry Bisphenol A (BPA).

These materials may not be visible, but they're vital to the performance, durability, and safety of the devices we use every day.

[View Fact Sheet: Epoxy Resins: The Hidden Backbone of Electronics \(PDF\)](#)

Epoxy resins are essential for the inner workings of electronics. They provide structural integrity, insulation, and protection for sensitive components:

- Epoxy resins help provide electrical insulation that shields motors, switches, and transformers from moisture and dust, helping prevent short circuits.
- They form the base of printed circuit boards (PCBs), which are the heart of devices like smartphones, tablets, and TVs.
- These resins can be engineered to resist heat and even self-extinguish, enhancing the safety of electronic devices.
- Epoxy resins are used in advanced electronic components such as sealants for batteries and magnets, embedding compounds, and conductive adhesives.
- They are found in power systems including switchboards, switchgear, electrical windings, coils, and insulator bushings.
- Epoxy resins are integral to passive components like resistors, capacitors, inductors, and semiconductors.
- They are also used in specialized applications, including

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crankcase heaters and other advanced electronic systems.

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[View Fact Sheet: Polycarbonate Plastics: Durable, Clear, and Smart \(PDF\)](#)

Polycarbonate plastics play a key role in the design and protection of electronics. Their unique properties make them ideal for both external and internal components:

- Polycarbonate plastics offer impact resistance that helps protect devices from drops and bumps, making them ideal for phone cases, laptop shells, and gaming consoles.
- They withstand high temperatures, which is crucial for heat-generating devices such as computers and chargers.
- These plastics combine toughness with lightness, enabling sleeker and more portable electronic designs.
- Polycarbonate materials are used in a wide range of electronics, including smartphones, tablets, e-book readers, laptops, desktops, and protective cases.
- Their optical clarity makes them suitable for use in optical media like CDs and DVDs, as well as LED light pipes and diffusers.
- They are essential in electrical applications such as connectors, housings, insulation, and membrane switches, enabling safe and efficient performance.

Electronic Industry's Economic Contribution

Epoxy resins and polycarbonate plastics both contribute to the electronics and electrical industry, which accounted for \$27 billion in shipments, supported 170,100 jobs and generated \$39 billion in payroll towards the overall U.S. economy, according to September 2024 data from the American Chemistry Council's Economics & Data Analytics Department, the Bureau of Labor Statistics, and the U.S. Census Bureau.

Epoxy resins and polycarbonate plastics may not be the first things that come to mind when you think about your favorite devices, but they're essential to how those devices work — and how long they

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last. These materials help electronics perform better under stress, resist heat and impact, and maintain safety standards. Whether you're streaming a movie, working remotely, or gaming online, these high-performance materials are quietly working behind the scenes to make it all possible.

Learn More

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