

BAMBERGER POLYMERS TECH TIPS

APRIL 2023

Chemical Exposure & Resistance

One of the most common causes of plastic part failure is exposure to chemicals. It's important to evaluate the chemical compatibility of your material, part, and environment as early in your part design process as possible. The chemical compatibility of plastics is driven by many factors; this guide is meant to serve as a starting point for your evaluation.

Factors that can Influence Chemical Compatibility:

- Exposure Time
- Temperature
- UV Exposure
- External Loads and Stress
- Processing and Molded Stress
- Material Crystallinity
(Amorphous vs. Crystalline)
- Material Additives and Loading Level
- Concentration of Chemical or Solvent

Effects of a Chemical Attack

- **Softening of Polymer:** Tensile strength and other physical property decreases.
- **Cracking and/or Crazing:** Surface appearance may seem foggy or white with possible visible cracks, and elongation of the material decreases making it more brittle.

Importance of Testing

Since the amount of damage chemical exposure can cause will vary with the many factors listed above, it's important to always test your individual parts and materials with as close to the exact end-use conditions as possible to determine material suitability for your application.

Types of Common Chemicals

Acids

Citrus, Lab Chemicals,
Soft Drinks, Liquid Drain
Cleaners, Vinegar,
Battery Acid

Alcohols

Methanol, Ethanol, Rubbing
Alcohols, Fragrances, Dyes
and Inks, Windshield Wiper
Fluid, Bug Spray, Antifreeze

Alkalis

Soaps, Bleach,
Baking Soda, Toothpaste,
Window Cleaners,
Ammonia-Based Cleaners

Aromatic Hydrocarbons

Vaseline, Motor Oil,
Baby Oil, Heating Oil,
Mineral Oil, Pesticides,
Lacquers

Fuel

Gasoline,
Diesel fuel,
Kerosene

Halogens

Salt (Chloride),
Pools (Chlorine),
Toothpaste (Fluoride),
Disinfectants (Iodine),
Refrigerant/Freon
(Chlorine/Fluorine)

Ketones

Gasoline, Diesel fuel,
Kerosene

Organic Solvents

Rubbing Alcohol,
Degreasers, Turpentine,
Lubricating Oils, Some
Paint Thinner, Glues
AND Adhesives, Paints

BAMBERGER POLYMERS TECH TIPS

APRIL 2023

Chemical Compatibility Guide

Material	Diluted Acids	Concentrated Acids	Alcohols	Alkalis	Organic Solvents	Aromatic Hydrocarbons	Fuels	Halogens	Ketones
Acrylonitrile-Butadiene-Styrene (ABS)	Excellent	Good	Poor	Excellent	Poor	Poor	Poor	Poor	Poor
Alloys - PC + ABS	Excellent	Good	Poor	Good	Poor	Poor	Poor	Poor	Poor
Alloys - PC + PBT	Fair	Poor	Good	Poor	Fair	Poor	Fair	Poor	Fair
Acrylonitrile Styrene Acrylate (ASA)	Excellent	Good	Poor	Excellent	Poor	Poor	Poor	Poor	Poor
Ethylene-Vinyl Acetate (EVA)	Excellent	Good	Excellent	Good	Good	Fair	Good	Fair	Good
High Density Polyethylene (HDPE)	Excellent	Good	Excellent	Excellent	Good	Good	Good	Fair	Good
Low Density Polyethylene (LDPE)	Excellent	Good	Excellent	Good	Good	Fair	Good	Fair	Good
Linear Low Density Polyethylene (LLDPE)	Excellent	Good	Excellent	Good	Good	Fair	Good	Fair	Good
Medium Density Polyethylene (MDPE)	Excellent	Good	Excellent	Good	Good	Fair	Good	Fair	Good
Nylon 6 (PA 6)	Good	Poor	Good	Good	Excellent	Good	Good	Poor	Good
Nylon 66 (PA 66)	Good	Poor	Good	Good	Excellent	Good	Good	Poor	Good
Polybutylene Terephthalate (PBT)	Fair	Poor	Good	Poor	Excellent	Poor	Good	Poor	Fair
Polycarbonate (PC)	Excellent	Fair	Good	Poor	Poor	Poor	Poor	Poor	Poor
Polyethylene Terephthalate (PET)	Fair	Poor	Good	Poor	Excellent	Poor	Good	Fair	Good
Poly(methyl methacrylate) (PMMA)	Good	Good	Poor	Fair	Poor	Poor	Fair	Poor	Poor
Polyoxymethylene (POM)	Poor	Poor	Fair	Poor	Excellent	Good	Good	Poor	Good
Polypropylene (PP)	Excellent	Good	Good	Excellent	Poor	Fair	Fair	Poor	Excellent
Polyphthalamide (PPA)	Excellent	Good	Good	Excellent	Excellent	Excellent	Good	Good	Excellent
Polyphenylene Sulfide (PPS)	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Good	Fair	Excellent
Polystyrene (PS)	Excellent	Fair	Good	Good	Poor	Poor	Poor	Poor	Poor
Polyvinyl chloride (PVC)	Excellent	Good	Excellent	Excellent	Good	Poor	Good	Fair	Poor
Thermoplastic Elastomer (TPE) - SEBS, SBC	Excellent	Good	Good	Good	Poor	Poor	Poor	Good	Poor
Thermoplastic Polyolefins (TPO)	Excellent	Good	Good	Excellent	Poor	Excellent	Good	Poor	Excellent
Thermoplastic Polyurethane - Ester (TPU)	Fair	Fair	Fair	Fair	Poor	Good	Fair	Good	Fair
Thermoplastic Polyurethane - Ether (TPU)	Fair	Poor	Fair	Poor	Poor	Good	Fair	Good	Fair
Thermoplastic Vulcanisate (TPV)	Excellent	Good	Good	Good	Poor	Fair	Fair	Good	Fair
Styrene Acrylonitrile (SAN)	Good	Good	Poor	Good	Poor	Poor	Poor	Poor	Poor