

TRANSPARENT THERMOPLASTICS

Transparent thermoplastics offer glass-like clarity with added advantages such as impact resistance, lightweight design, and versatile processing options. They enable complex part geometries, can be customized for UV stability, chemical resistance, or high heat performance, and are available in medical- and optical-grade formulations. Widely used in medical devices, automotive lighting, eyewear, and consumer products, these materials deliver both aesthetic appeal and functional visibility in applications where clarity is critical.

POLYMER	TRANSPARENCY QUALITY	NOTABLE PROPERTIES	TRADE NAMES	KEY ADVANTAGES
PC (Polycarbonate)	High clarity	Impact resistant, heat resistant, UV-stable grades available	LEXAN® Resin, DURATOUGH™, LUPOY®	Virtually unbreakable clarity
PMMA (Acrylic)	Exceptional clarity	Rigid, scratch resistant, lower impact than PC	CRISTALUX®, DURAMMA™	Best optical quality and weatherability
mABS (Transparent ABS)	High clarity	Impact resistant, chemical resistance, processing flexibility	TOYOLAC®, LG Chem mABS	Balanced mechanical properties, design flexibility
PSU / PES / PPSU (Sulfones)	Amber-clear	High heat and chemical resistance	PARYLS®	Transparent, high-performance polymers
Transparent Polyamides (Nylon)	High clarity	Chemical resistance, flexible	Grilamid® TR Series	Used in eyewear and tubing
PEI (Polyetherimide)	Amber-clear	Heat resistance, dimensional stability, inherent flame retardance	ULTEM™ Resin, DURATEMP™	Transparent, high-performance polymers
SAN (Styrene Acrylonitrile)	High clarity	Good rigidity and chemical resistance, higher clarity than ABS	LG Chem SAN	Economical transparent option with good stiffness and gloss

CLARITY LEVEL	LIGHT TRANSMISSION	HAZE	APPLICATIONS
Optical Grade	>90%	<1%	Lenses, medical devices, precision optics
High Clarity	85–90%	1–5%	Consumer goods, automotive light covers
Moderate Clarity	50–85%	5–15%	Diffusers, privacy panels
Opaque	<50%	>15%	Structural or decorative parts

HOW IS PLASTIC CLARITY MEASURED?

METRIC	WHAT IT TELLS YOU	WHY IT MATTERS	HOW IT'S MEASURED
Light Transmission (%)	How much light passes through	Higher transmission equals clearer material	ASTM D1003
Haze (%)	How much light scatters inside	Lower haze equals sharper view, less cloudiness	ASTM D1003
Refractive Index	How light bends	Higher index means better optical focus	ASTM D542
Yellowness Index (YI)	Color stability over time	Low YI means material stays clear longer	ASTM E313 / D1925
Gloss	Surface shininess	High gloss equals better perceived clarity	ASTM D523

Clarity isn't just transparency—it's how cleanly and sharply light passes through your material. Measuring haze, light transmission, and color stability ensures your transparent polymer performs beautifully in every application.

FACTORS THAT AFFECT POLYMER CLARITY

Several factors can interfere with how light travels through a polymer, making it appear cloudy, hazy, or opaque:

- **Crystallinity:** When parts of the polymer form ordered crystals, they scatter light instead of letting it pass through smoothly.
- **Impurities or fillers:** Additives, pigments, or contaminants can absorb or block light, reducing transparency.
- **Internal stress or uneven cooling:** Variations during processing can create density changes or micro-voids that distort light.
- **Surface imperfections:** Scratches, roughness, or poor mold finish can reflect and scatter light.
- **Chemical degradation or UV exposure:** Over time, the polymer can break down at the molecular level, causing yellowing or haziness.



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