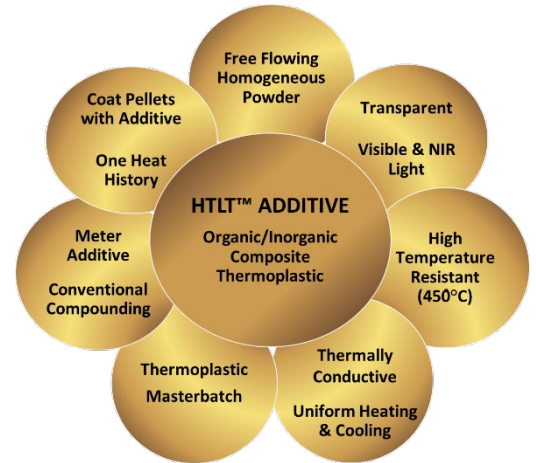


HTLT™ Additives

Leveraging Light and Innovation for a Sustainable Future

- HTLT™ Additives are a mixture of transparent, high temperature resistant, organic/inorganic, sustainable materials.
- HTLT™ Additives deliver a comprehensive menu of totally integrated features & benefits for thermoplastic processing and performance.
- HTLT™ Additives offer design versatility allowing for the transformation of existing thermoplastic resins into a new product line of higher performing transparent composite thermoplastics.
- HTLT™ Additives are employed in conventional processing equipment as a masterbatch, or as either coated pellets or as a free flowing, homogeneous, dry powder for conventional compounding.



HTLT™ Multi-Functional Diagram

Opportunity for Suncolor’s High Temperature Thermoplastic Additives (HTLT™) is driven by robust, growing demand for high heat polymers, with stringent performance requirements for evolving applications in major industries. Current trends, such as miniaturization, weight reduction, improved optics and connectivity, with tight tolerances, mass production capability and ease of processability require new high-performance thermoplastics. HTLT™ Additives transform existing high performance thermoplastic resins into new higher performance products with balanced, totally integrated performance properties.

HTLT™ Masterbatch Additives and HTLT™ Powder Additives are available for polycarbonate, polyetherimide, polyimide, polyphenylsulfone, and certain co-polymer compositions. These HTLT™ Additive modified thermoplastics are characterized by high transparency, broad glass transition temperatures ranging from 220°C to 300°C, CTE’s as low as 18 ppm, very low mold-in stress, and sub-micron replication of detail. Both neat and glass or fiber reinforced thermoplastic performance and processing benefit from the addition of HTLT™ Additives. Glass and fiber reinforcement fillers have a substantially lower CTE than a host polymer in a composite formula. The HTLT™ Additives lower the CTE of the host polymer, making the thermal expansion of the host polymer more compatible with the thermal expansion of the reinforcing filler over a range of temperatures.

Total Integrated Thermoplastic Performance Properties, Features & Benefits Achieved by HTLT™ Additives:

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| ■ High Transparency, Visible & Near Infrared Light | ■ Injection Moldable |
| ■ High Glass Transition Temperature (Tg) (220°C-300°C) | ■ Reduced Cycle Times (Up to 40%) |
| ■ Coefficient of Thermal Expansion (CTE) (18-50 ppm) | ■ Homogeneity/ Compatibilization |
| ■ Low Birefringence, High Index of Refraction (> 1.6) | ■ Impact Resistance & Chemical Resistance |
| ■ Low Mold-In Stress; Uniform Heating & Cooling | ■ High Operating Temperatures (≥150° C) |
| ■ Increased Thermal Conductivity | ■ Surface Treatable / AR and High Temperature Coatings |
| ■ High Heat Processes such as SMT Reflow | ■ High Thermal Stability (400-450°C/ TGA) |
| ■ Geometric Stability during & after Processing | ■ Thermal, Photolytic & Hydrolytic Oxidative Resistance |
| ■ True Replication of Sub-Micron Detail | ■ Inherent, Non-Halogenated Fire Retardancy |

HTLT™ Additive	Base Resin	Neat Additive	Additive MasterBatch
HTLT™ PI/PEI	Polyimide-Polyetherimide	Free-Flowing Dry Powder	Pellets or Powder
HTLT™ PEI	Polyetherimide	Free-Flowing Dry Powder	Pellets or Powder
HTLT™ PPSU	Polyphenylsulfone	Free-Flowing Dry Powder	Pellets or Powder
HTLT™ PI/PPSU	Polyimide-Polyphenylsulfone	Free-Flowing Dry Powder	Pellets or Powder
HTLT™ PC/XT	Polycarbonate	Free-Flowing Dry Powder	Pellets or Powder