

General Information About Common Materials

ABS (Acrylonitrile Butadiene Styrene)

Trade Names	ABEL, ASTALAC, AVP, CEVIAN, CYCOLAC, ESPREE, EXCELLOY, KRALASTIC, LUSTRAN, Nyloy, Toyolac, TRILAC, Veroplas
General Characteristics	ABS is an amorphous terpolymer that consists of Acrylonitrile, Butadiene, and Styrene. This polymer has good flame retardant properties, a glossy finish, and high impact resistance depending on the blend. ABS has limited weathering resistance and certain grades have a relatively high cost.
Applications	General purpose, automotive, housings, electrical, and thin walled parts
Processing Temp. Range	425-500 °F (220-260 °C)
Mold Temp. Range	120-190 °F (50-90 °C)

Acetal or POM (Polyoxymethylene)

Trade Names	Celcon, Delrin, Hostaform, Kepital, Lucel, Lucet, RTP, Tarnoform, Tenac, Ultraform
General Characteristics	A highly crystalline polymer with good creep, fatigue, solvent, and water resistance. POM is a high strength and stiff polymer with good electrical properties.
Applications	Gears, bearings, automotive, and industrial
Processing Temp. Range	375-420 °F (190-215 °C)
Mold Temp. Range	120-200 °F (50-95 °C)

Acrylic or PMMA (Polymethyl Methacrylate)

Trade Names	Acrylite, Acryrex, Cyrex, Cyrolite, Kamax, Lustran, Optix, Plexiglas
General Characteristics	PMMA is a transparent amorphous thermoplastic low cost alternative to Polycarbonate when physical strength is not needed. This material also has better environmental stability than PS or PE, making it popular for many outdoor and automotive applications.
Applications	Automotive, TV Screens, Furniture, Windows, Medical
Processing Temp. Range	350-500°F (175-260°C)
Mold Temp. Range	100-200°F (40-95°C)

CPVC (Chlorinated Polyvinylchloride)

Trade Names	Harvel, Corzan, CTS, BlazeMaster, TempRite, Geon, Kaneka
General Characteristics	CPVC is an amorphous thermoplastic that is difficult to process due to very high shear sensitivity. Many grades of CPVC exist with different chlorine concentrations that effect the properties of the material. C PVC has strong chemical resistance with better temperature resistance than PVC.
Applications	Wire coating, tubing, automotive, electronics, profiles, drainage, and general purpose
Processing Temp. Range	375-435°F (190-225°C)
Mold Temp. Range	50-175°F (10-80°C)

HDPE (High Density Polyethylene)

Trade Names	Alathon, Bapolene, Braskem, Formolene, Ineos, SCLAIR
General Characteristics	HDPE is a highly crystalline opaque polymer with low moisture absorption as well as high tensile strength, chemical resistance and impact resistance. HDPE can also be machined and processed easily.
Applications	Automotive, coatings, containers, film, general purpose, industrial, packaging, tanks, and wire jacking
Processing Temp. Range	380-550 °F (195-290 °C)
Mold Temp. Range	80-100 °F (25-40 °C)

HIPS (High Impact Polystyrene)

Trade Names	ASTALAC, Avantara, CERTENE, Edistir, ESPREE, POLYREX, STYRON
General Characteristics	HIPS is an amorphous copolymer of Polystyrene and Polybutadiene rubber which has better impact resistance and dimensional stability than GPPS but lacks the superb clarity. HIPS has good machinability and dimensional stability with a low cost. As with GPPS, HIPS has poor solvent and electrical resistance.
Applications	Prototypes, housings, covers, toys, and appliances
Processing Temp. Range	410-500 °F (210-260 °C)
Mold Temp. Range	70-140 °F (20-60 °C)

Ionomer

Trade Names	Bexloy, Surlyn
General Characteristics	Ionomers are comprised of neutral and ionized polymer segments. Ionomers typically have ethylene based performance characteristics but with the added benefits of low temperature impact, chemical, and abrasion resistance. Some grades are designed to have high gloss and barrier properties.
Applications	Packaging, coatings, industrial, film, liners, sheet, and automotive exteriors
Processing Temp. Range	420-530 °F (215-275 °C)
Mold Temp. Range	40-120 °F (5-50 °C)

LDPE (Low Density Polyethylene)

Trade Names	Braskem, Kemcor, Lutene, Marlex, Riblene
General Characteristics	LDPE is a low cost, semi-crystalline polymer with good moisture resistance and flexibility. LDPE is generally used in high volume extrusion processes.
Applications	Agricultural, bags, coatings, containers, film, general purpose, packaging, and electrical insulation
Processing Temp. Range	325-550 °F (165-290 °C)
Mold Temp. Range	70-90 °F (20-30 °C)

LLDPE (Linear Low Density Polyethylene)

Trade Names	Braskem, CERTENE, DOW, Flexirene, NEO-ZEX, Petrothene, ULTZEX
General Characteristics	LLDPE is a semi-crystalline polymer with good moisture and chemical resistance. LLDPE typically has a rather high melt flow rate and exhibits good low temperature toughness and gloss.
Applications	Caps, containers, medical, toys
Processing Temp. Range	325-550 °F (165-290 °C)
Mold Temp. Range	70-90 °F (20-30 °C)

PA-11 (Nylon-11)

Trade Names	ASHLENE, Rilsan
General Characteristics	PA-11 is a semi-crystalline polyamide with outstanding thermal, chemical, and mechanical properties. PA-11 is a versatile polymer used in demanding situations due to its good impact properties and a high working temperature.
Applications	Hoses, electrical/electronics, automotive, sports, and medical
Processing Temp. Range	440-550 °F (225-285 °C)
Mold Temp. Range	100-150 °F (40-65 °C)

PA-12 (Nylon-12)

Trade Names	ASHLENE, Ecomass, Fostalon, Grilamid, PLUS-TEK, Rilsan, Vestamid
General Characteristics	PA-12 is a semi-crystalline polyamide with great dimensional stability, impact strength, and chemical resistance. PA-12 is an excellent material for many applications because of its dimensional stability and properties at low temperatures.
Applications	Appliance components, automotive, bushings, cell phones, gears, general purpose, household goods, housings, medical, outdoor, engineering parts, sporting goods, tools, and wheels
Processing Temp. Range	450-570 °F (230-300 °C)
Mold Temp. Range	100-180 °F (40-80 °C)

PA-4/6 (Nylon-4/6)

Trade Names	Stanyl
General Characteristics	PA-4/6 is a semi-crystalline polyamide with outstanding structural performance properties and dimensional stability at elevated temperatures. PA-4/6 has excellent resistance to friction and wear with good flow properties. Many grades have some sort of fiber reinforcement to enhance the mechanical properties of the material.
Applications	Gears, automotive, electronics, and industrial
Processing Temp. Range	580-600 °F (305-315 °C)
Mold Temp. Range	180-300 °F (80-150°C)

PA-6 (Nylon-6)

Trade Names	ALTECH, CAPRON, Durethan, Grilon, HiFill, Maxamid, Nypel, Radilon, Ultramid
General Characteristics	PA-6 is a semi-crystalline polyamide with great toughness and elasticity which makes it suitable for textile and oriented fibers. PA-6 also has high tensile strength and chemical resistance.
Applications	Textiles, fibers, zip fasteners, gears, gun frames, instrument strings, and surgical sutures
Processing Temp. Range	460-520 °F (240-270 °C)
Mold Temp. Range	120-200 °F (50-95 °C)

PA-6/10 (Nylon-6/10)

Trade Names	ALAMID, Nylene
General Characteristics	PA-6/10 is a semi-crystalline polyamide with a lower brittleness temperature, strength, and water absorption than other PA-6's. PA-6/10 has good resistance to most solvents and diluted mineral acids. PA-6/10 tends to have large amount of shrinkage.
Applications	Electrical, filaments, and precision parts
Processing Temp. Range	480-550 °F (250-290 °C)
Mold Temp. Range	120-220 °F (50-105 °C)

PA-6/12 (Nylon-6/12)

Trade Names	ASHLENE, Nycal, Radici, Vestamid, Zytel
General Characteristics	PA-6/12 is a semi-crystalline polyamide with low water absorption compared to other nylons. PA-6/12 has more consistent properties than PA-6 when exposed to humidity and has good heat resistance and dimensional stability.
Applications	Electrical components, gears, general purpose, knife handles, gun frames
Processing Temp. Range	450-550 °F (230-290 °C)
Mold Temp. Range	100-200 °F (40-95 °C)

PA-6/6 (Nylon-6/6)

Trade Names	Celstran, Clariant Nylon 6/6, Elastoblend, HiFill, Nylene, Nymax, Polifil, Vydyne
General Characteristics	PA-6/6 is a semi-crystalline polyamide with good toughness and abrasion resistance. Typically used for commercial applications that will encounter extended use and abrasion.
Applications	Commercial grade fabrics, airbags, tires, textiles, carpets
Processing Temp. Range	500-580 °F (260-305 °C)
Mold Temp. Range	100-200 °F (40-95 °C)

PAEK (Polyaryletherketone)

Trade Names	Avaspire
General Characteristics	PAEK is a high performance semi-crystalline engineering thermoplastic that has extremely high temperature stability, mechanical strength, and chemical resistance. PAEK has slightly better dimensional stability and fatigue resistance than PEEK.
Applications	Chemical processing, electronics, medical, automotive, seals, valves, gears, and bearings
Processing Temp. Range	700-800 °F (370-425 °C)
Mold Temp. Range	300-425 °F (150-220 °C)

PBT (Polybutylene Terephthalate)

Trade Names	ABEL, ALCOM, ALTECH, ASHLENE, CELANEX, Crastin, Lutrel, PLANAC, POCAN, RAMSTER, Ultradur, VALOX, Vestodur
General Characteristics	PBT is a semi-crystalline polyester with good stiffness and toughness. PBT has similar properties to some nylons but with much less water absorption. PBT has a continuous service temperature of around 120°C and is often used as an electrical insulator.
Applications	Automotive, industrial, electronics, housings, medical
Processing Temp. Range	450-500 °F (230-260 °C)
Mold Temp. Range	100-200 °F (40-95 °C)

PC (Polycarbonate)

Trade Names	ALCOM, Apec, ASHLENE, CALIBRE, Carbotex, Durolon, Enviroplas, Hylex, LEXAN, Lupoy, Makrolon, Panlite, RAMTOUGH, TRIREX
General Characteristics	PC is an amorphous polymer with great impact resistance and optical clarity along with good heat resistance, toughness, and dimensional stability. Many polycarbonate products have surface coatings since PC does not have good chemical or scratch resistance.
Applications	Exterior automotive components, engineering components, housings, lenses, structural parts, medical components, and bullet proof sheeting
Processing Temp. Range	500-620 °F (260-325 °C)
Mold Temp. Range	160-220 °F (70-105 °C)

PC/ABS (PC/ABS Alloy)

Trade Names	Abel PC/ABS, ASTALOY, Bayblend, CYCLOY, Duroloy, EMERGE, EXCELLOY, Hybrid, Lupoy, Multilon, Novalloy-S, TECHNIACE, TRILOY, Verolloy, WONDERLOY
General Characteristics	PC/ABS is an amorphous thermoplastic copolymer of Polycarbonate and Acrylonitrile Butadiene Styrene. PC/ABS offers the properties of both PC and ABS including: the strength and heat resistance of PC and the flexibility of ABS. PC/ABS exhibits high toughness even at cold temperatures.
Applications	Automotive, electronics, medical, and aeronautical
Processing Temp. Range	480-540 °F (250-280 °C)
Mold Temp. Range	120-200 °F (50-95 °C)

PC/PET (PC/PET Alloy)

Trade Names	Makroblend, XENYO
General Characteristics	PC/PET is an amorphous thermoplastic blend that combines the properties of both PC and PET. It can be opaque or transparent and has high rigidity, dimensional stability, and impact resistance.
Applications	Sporting goods, electrical/electronic, automotive, industrial/mechanical, and household
Processing Temp. Range	490-550 °F (255-290 °C)
Mold Temp. Range	130-190 °F (55-90 °C)

PEEK (Polyetheretherketone)

Trade Names	Arlon, Ketaspire, MOTIS, PEEK-OPTIMA, VESTAKEEP, VICTREX
General Characteristics	PEEK is a high performance semi-crystalline engineering thermoplastic that has extremely high temperature stability and mechanical strength. PEEK has great dimensional stability, fatigue resistance, and chemical resistance with low smoke and toxic gas emission when exposed to flame.
Applications	Piston parts, gears, aerospace, automotive, chemical processing, and insulation
Processing Temp. Range	660-750 °F (350-400 °C)
Mold Temp. Range	325-425 °F (165-220 °C)

PEI (Polyetherimide)

Trade Names	ULTEM
General Characteristics	PEI is an amorphous polymer with excellent dimensional stability, chemical resistance, mechanical strength, and high temperature performance. PEI is electrically conductive which makes it suitable for some electronics applications.
Applications	Medical devices, microwave cookware, insulators, automotive, electrical/electronics, and metal replacement
Processing Temp. Range	640-800 °F (340-425 °C)
Mold Temp. Range	175-350 °F (80-175 °C)

PES (Polyethersulfone)

Trade Names	HiFill PES, Ratron, SUMIKAEXCEL, TRIBOCOMP, Ultrason
General Characteristics	PES is an amorphous transparent polymer with good stiffness and heat resistance. PES is suitable for high continuous use temperatures over extended periods of time. PES has high rigidity and dimensional stability over a broad temperature range. PES is susceptible to UV degradation and weathering.
Applications	Medical, automotive, industrial, pistons, filters/membranes, and electrical/electronics
Processing Temp. Range	640-730 °F (340-385 °C)
Mold Temp. Range	250-360 °F (120-180 °C)

PET (Polyethylene Terephthalate)

Trade Names	Ultrason, Valox, Hiloy, Impet, Petra, Shulandur, Ektar, Rynite, Selar, Dacron, Terylene
General Characteristics	PET is a semi-crystalline thermoplastic that is commonly used for synthetic polyester fibers and plastic bottle production. Most bottle manufacturers control the clarity of PET by limiting the degree of semi-crystallinity since higher levels of semi-crystallinity cause the product to turn opaque. PET has excellent has strong chemical resistance and can withstand temperatures in excess of 212°F (100°C).
Applications	Bottles, fibers, synthetic fabrics, films, and packaging
Processing Temp. Range	480-580°F (250-305°C)
Mold Temp. Range	50-200°F (10-90°C)

PETG (Polyethylene Terephthalate Glycol)

Trade Names	Spectar, Vivak, Eastar
General Characteristics	PETG is an amomrphous thermoplastic which has similar properties to PET but with better mechanical and dimensional stability. PETG also has greater clarity and impact resistance than PET which makes it very popular for packaging applications such as thermoforming.
Applications	Fibers, films, and packaging
Processing Temp. Range	300-500°F (150-260°C)
Mold Temp. Range	50-150°F (10-65°C)

PP (Polypropylene)

Trade Names	Braskem, CERTENE, COPYLENE, Exelene, FERREX, Formolene, GAPEX, Hostacom, INEOS, Maxxam, Polifil, POLYFLAM, Pro-fax, RAMOFIN, TIPPLEN, YUPLENE
General Characteristics	PP is a versatile semi-crystalline polymer with high impact resistance and melt flow rates. PP is a resilient polymer that acts as a living hinge when cyclically loaded or fatigued. PP is difficult to bond with adhesives and has poor low temperature impact strength.
Applications	Automotive, films, containers, industrial applications, general purpose, and living hinge applications
Processing Temp. Range	390-510 °F (200-265 °C)
Mold Temp. Range	70-140 °F (20-60 °C)

PPO (Polyphenylene Oxide)

Trade Names	Fiberfil, Noryl
General Characteristics	PPO is an amorphous engineering plastic with high temperature resistance, dimensional stability, and electrical resistance along with low thermal expansion. PPO is sensitive to organic solvents and is susceptible to environmental stress cracking.
Applications	Pumps, valves, fittings, electrical components, manifolds, covers, housings, and coatings
Processing Temp. Range	490-590 °F (255-310 °C)
Mold Temp. Range	140-200 °F (60-95 °C)

PS (Polystyrene)

Trade Names	Amoco, Bapolan, Eporex, Styron, Valtra
General Characteristics	PS is an inexpensive amorphous polymer with great optical clarity. Unfilled polystyrene is typically called GPPS (general purpose polystyrene) and is rigid but brittle. PS can be used in virtually all processes, making it extremely versatile in the marketplace. PS has poor thermal stability and solvent resistance.
Applications	Toys, packaging, sheet, housings, appliances, household goods, and expanded beads
Processing Temp. Range	350-525 °F (175-275 °C)
Mold Temp. Range	50-150 °F (10-65 °C)

PVC (Polyvinylchloride)

Trade Names	APEX, Geon, Georgia Gulf, Manner, Reinier, Roscom, Sylvin, Unichem
General Characteristics	PVC is an amorphous thermoplastic that is difficult to process as a homopolymer. Many grades of PVC exist with different plasticizer concentrations that effect the processing of the material. Rigid PVC has strong chemical resistance and moderate temperature resistance. PVC has poor UV resistance.
Applications	Wire coating, tubing, automotive, electronics, profiles, general purpose, and medical
Processing Temp. Range	330-400 °F (165-205 °C)
Mold Temp. Range	70-125 °F (20-50 °C)

SAN (Styrene Acrylonitrile)

Trade Names	FORMPOLY, KIBISAN, Kumho, LG SAN, Lustran, Porene, SANREX, Veroplas
General Characteristics	SAN is an amorphous copolymer of styrene and acrylonitrile. SAN has higher strength, rigidity, and chemical resistance than polystyrene but lacks the same optical clarity. SAN has poor impact strength and low thermal capabilities.
Applications	Electrical, appliances, cosmetics, medical, containers, and automotive
Processing Temp. Range	420-500 °F (215-260 °C)
Mold Temp. Range	110-180 °F (45-80 °C)

TPC-ET (Thermoplastic Copolyester Elastomers)

Trade Names	Arnitel, Elitel, Hytel, Keyflex, Riteflex
General Characteristics	TPC-ET polymers are amorphous thermoplastic copolymers that exhibit the flexibility of rubbers and the strength and processability of thermoplastics. TPC-ET blends have excellent flex fatigue resistance and a broad use temperature. They have good toughness and resist hydrocarbons.
Applications	Adhesives, cast film, coatings, filaments, hose, sheet, and tubing
Processing Temp. Range	490-550 °F (255-290 °C)
Mold Temp. Range	130-190 °F (55-90 °C)

TPE (Thermoplastic Elastomer)

Trade Names	Ecdel, Estamid, Estane, Hytel, Kraton, Ontex
General Characteristics	A TPE is an amorphous copolymer of thermoplastic and elastomeric monomers and properties. TPEs can come in many classes including block-copolymers, polyolefin blends, and thermoplastic polyurethanes to name a few. Generally, these polymers have high heat resistance and ozone resistance.
Applications	Gaskets, automotive, sporting goods, tubing, and medical
Processing Temp. Range	350-450 °F (175-230 °C)
Mold Temp. Range	50-150 °F (10-65 °C)

TPO (Thermoplastic Polyolefin)

Trade Names	Exxtral, Lupol
General Characteristics	A TPO is a polymer/filler blend consisting of some fraction of polyolefin(s) and reinforcements. They have good dimensional stability and usually have a balance between stiffness and impact resistance in semi-structural and non-structural applications.
Applications	Appliances, automotive, electrical, consumer, packaging, and nonwovens
Processing Temp. Range	375-500 °F (190-260 °C)
Mold Temp. Range	50-150 °F (10-65 °C)

PPS (Polyphenylene Sulfide)

Trade Names	Fortron, Ryton, Sultron, TEDUR, Thermec, Xtel
General Characteristics	PPS is a semi-crystalline polymer which usually contains fillers or reinforcements. PPS has excellent ionizing radiation and chemical resistance. PPS is self-extinguishing and has low toxicity smoke when exposed to flame.
Applications	Chemical pumps, electrical components, coatings, piping, rods, and seals
Processing Temp. Range	580-640 °F (305-340 °C)
Mold Temp. Range	280-320 °F (140-160 °C)

PSU (Polysulfone)

Trade Names	Udel, Ultrason
General Characteristics	PSU is an amorphous polymer with good stiffness and heat resistance. PSU is transparent and maintains good mechanical properties over a wide temperature range. PSU has one of the highest service temperatures of melt-processable thermoplastics which can be autoclaved and steam sterilized without any loss in physical integrity.
Applications	Medical, electrical/electronics, filters, industrial, and aerospace
Processing Temp. Range	625-725 °F (330-385°C)
Mold Temp. Range	200-325 °F (95-165 °C)

PUR (Polyurethane)

Trade Names	Chronothane, Hydrothane, Polyblend
General Characteristics	PURs are a large family of polymers that may be thermoset or thermoplastic polymers with a broad array of properties. PUR has high abrasion resistance and is typically used as a coating, foam, or elastomer copolymer. These polymers tend to be weak to UV rays and most organic solvents.
Applications	Adhesives, bushings, coatings, insulation, piping, sealants, sheet, washers, and wheels
Processing Temp. Range	425-525 °F (220-275 °C)
Mold Temp. Range	50-150 °F (10-65 °C)