

COMMODITY RESINS

Most widely used, less expensive, some limitations in properties

POLYETHYLENE*

Advantages

Low cost except (UMHW)
Excellent dielectric properties, Moisture resistant
Good chemical resistance

Disadvantages

Flammable, Poor weathering resistance,
Difficult to bond and decorate

Applications

Food packaging, housings, toys, moisture barriers

Price Range

\$1.25 – \$1.87 /lb

*LD (low density), LLD (linear low density), HD (high density), UHMW Note: UHMW (ultra high molecular weight) was created for the extrusion process and is very difficult to injection mold.

POLYPROPYLENE

Advantages

Very good chemical resistance, can be sterilized, low coefficient of friction, good abrasion resistance, excellent flexural strength and good impact strength

Disadvantages

Difficult to bond and decorate, breaks down in ultraviolet radiation, flammable (FR grades available)

Applications

Living hinges, automotive uses, hospital equipment, housings

Price Range

\$0.96 – \$3.17 /lb

POLYSTYRENE

Advantages

Good dimensional stability and rigidity, light mass (means lower cost), high gloss, excellent electrical properties

Disadvantages

Brittle and flammable, poor weatherability, poor thermal stability

Applications

Business machines, appliance housings

Price Range

\$2.75 – \$3.31 /lb

HIGH PERFORMANCE RESINS

Specialty resins, most expensive

POLYPHENYLENE SULFIDE RYTON, FORTRON

Advantages

Capable of extended usage of 450°F (232°C), good solvent and chemical resistance, excellent dimensional stability, non-flammable, low water absorption

Disadvantages

Difficult to process, high melt temp, high cost, fillers needed for impact strength

Applications

Computer components, oven parts, pump & relay housings, high temp applications

Price Range

\$5.33 – \$7.75 /lb

POLYSULFONE

Advantages

Tough and rigid, transparent grades, good thermal stability, excellent high temperature creep resistance

Disadvantages

High processing temperature, poor weatherability, subject to stress cracking & attacked by solvents

Applications

Battery cases, distributor caps, face shield for astronauts, electrical circuit breakers

Price Range

\$7.55 – \$11.35 /lb

POLYETHERIMIDE PEI

Advantages

High temperature resistant, reinforced grades improved strength & creep

Disadvantages

High cost, difficult to mold

Applications

Jet engine components, flexible circuits, aircraft parts

Price Range

\$9.00 – \$13.00 /lb

POLYETHERETHERKETONE PEEK

Advantages

High heat resistant
High temperature resistant

Disadvantages

High cost
Difficult to mold

Applications

Aerospace, avionic components and medical

Price Range

\$36.00 – \$52.00 /lb

POLYAMIDE-IMIDE PAI, TORLON

Advantages

High continuous use temperature 500°F (260°C), low coefficient of friction, dimensional stability, very tough

Disadvantages

Very expensive, difficult to mold

Applications

Aerospace, gears, valves, avionics

Price Range

\$48.00 – \$68.00 /lb

ENGINEERING GRADE RESINS

Good physical and mechanical properties designed to meet special needs

ABS

Advantages

High impact resistance with toughness and rigidity, good surface quality, easily colored and assembled, good chemical resistance, very low moisture absorption

Disadvantages

Poor UV resistance, low dielectric strength, limited flexibility, low continuous use temperature

Applications

Telephone housings, camera bodies, water filtration tubes, appliance, other houseware applications

Price Range

\$1.25 – \$4.37 /lb

ACRYLIC

Advantages

Outstanding optical clarity, wide range of colors, high gloss, excellent weatherability and ultraviolet resistance, rigidity with good impact strength, lightweight

Disadvantages

Poor solvent resistance, possibility of stress cracking, brittle, combustibility, limited continuous use at 200°F (93°C)

Applications

Lens, windshields, windows, signs, headlights

Price Range

\$2.58 – \$3.09 /lb

POLYCARBONATE

Advantages

High impact strength, tough, optical clarity, wide variety of colors, excellent creep resistance, good dimensional stability, temperature resistant

Disadvantages

Subject to solvent crazing, sensitive to UV light, requires UV stabilization, poor resistance to alkalis

Applications

Coffee pots, popcorn popper lids, hair dryers, lens, tool & machine housings, instrument panels, airplane windows

Price Range

\$2.56 – \$4.98 /lb

POLYCARBONATE / ABS BLEND

Advantages

Impact resistance, flame resistant, easily molded, can be clear or colored

Disadvantages

Poor chemical resistance to some substances

Applications

Computer housing, appliance components, cameras, lawn & garden equipment

Price Range

\$2.76 – \$5.26 /lb

NYLON

Advantages

Tough, strong – impact and abrasion resistant, low coefficient of friction, good chemical resistance, high temperature resistance

Disadvantages

High moisture absorption (up to 44%), requires UV stabilization, high shrinkage in molding

Applications

Automotive, cams, bearing, casters, fasteners

Price Range

\$2.45 – \$6.89 /lb

POLYESTERS PBT,PET PCT

Advantages

Tough & rigid, some grades come in transparent colors

Disadvantages

Subject to attack by acids and bases, low thermal resistance

Applications

Carbonated beverage bottles, vent grills, electrical switches, pulleys

Price Range

\$3.25 – \$5.45 /lb

ACETAL POM – POLYOXYMETHYLENE

Advantages

High tensile strength with rigidity, toughness, excellent dimensional stability, glossy molded surfaces, low static and friction, wear resistant, retention of electrical and mechanical properties to 248 °F (120°C), good fatigue life and chemical resistivity

Disadvantages

Poor resistance to acids & bases, subject to UV degradation, unsuitable for contact with food, difficult to bond, flammable, toxins released during molding, high shrink, difficult to build mold tight tolerances.

Applications

gears, electrical devices, valves, bearings

Price Range

\$3.11 – \$14.66 /lb

THERMOPLASTIC ELASTOMERS/ POLYURETHANE TPE/TPU

Advantages

Alternative to some rubbers, high abrasion resistance, wide variety of durometers available

Disadvantages

Poor thermal capability, weatherability, subject to attack by solvents

Applications

Rollers, overmolding of handles

Price Range

\$3.91 – \$4.41 /lb

SAN STYRENE-ACRYLONITRILE

Advantages

Rigid, transparent, improved solvent resistant over polystyrene

Disadvantages

Higher water absorption than styrene, low thermal capability, low impact strength

Applications

Vacuum cleaners, kitchen equipment, syringes, decorative panels, lens

Price Range

\$4.41 – \$5.75 /lb

ENGINEERING GRADE RESINS (cont'd)

LIQUID CRYSTAL POLYMERS LCP

Advantages

High strength in thin wall applications, fast cycles, excellent warp resistance, wide temp. range, excellent chemical resistance

Disadvantages

High cost, may have pronounced knit lines

Applications

Electrical connectors, relays, pump housings, automotive

Price Range

\$16.00 – \$18.00 /lb

POLYPHENYLENE OXIDE (PPO) – NORYL

Advantages

Excellent solvent resistance, good fatigue & impact strength, resistant to radiation

Disadvantages

High cost

Applications

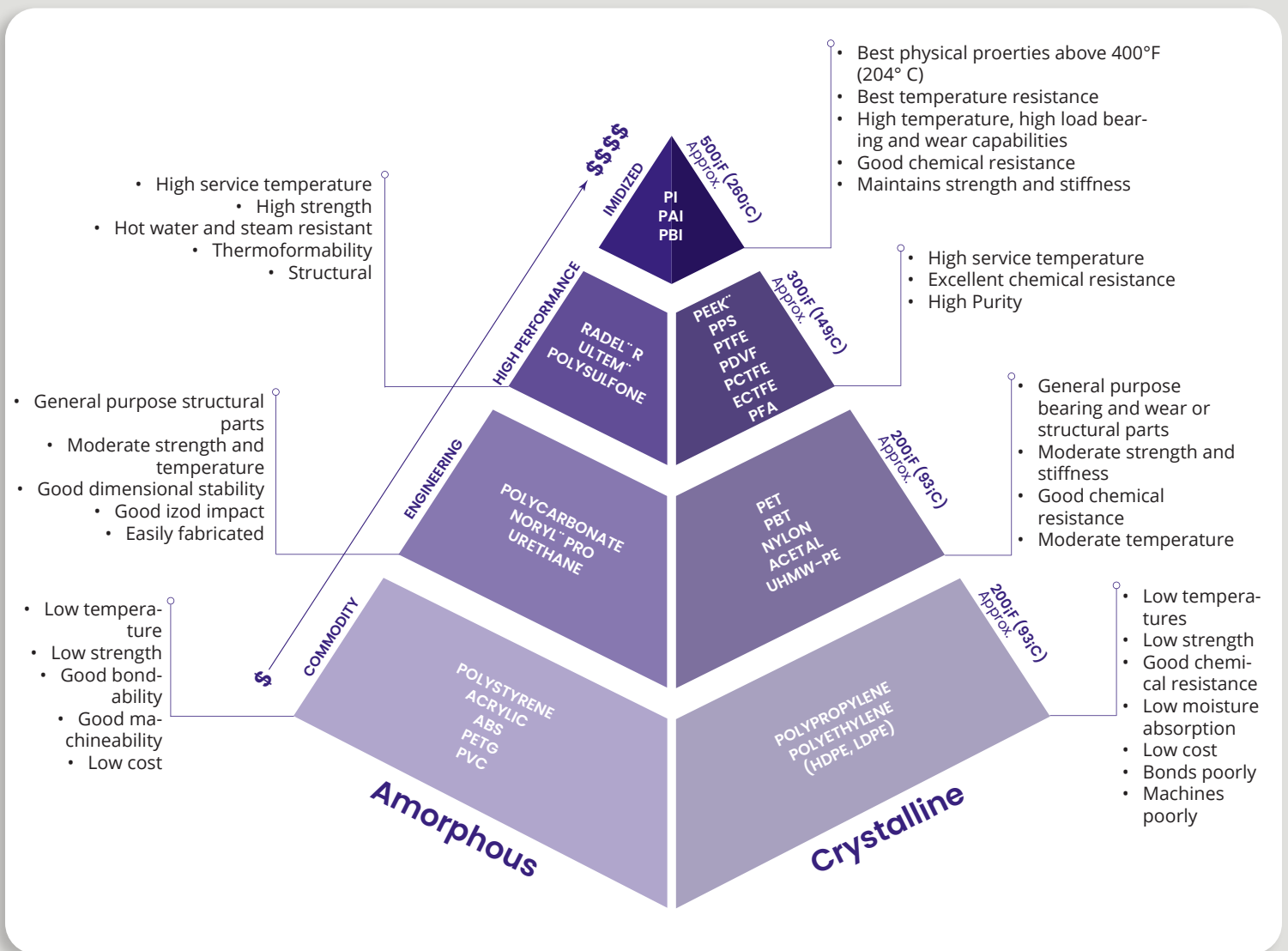
Good alternative to die cast parts, automotive, pump impellers

Price Range

\$4.45 – \$6.20 /lb

Note: This information is to be used for reference only. Aprios Custom Mfg does not guarantee that material selected from this guide will work in all applications.

MATERIAL SELECTION PYRAMID



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