Material
Selection Guide

ENGINEERED
PROFILES, LLC

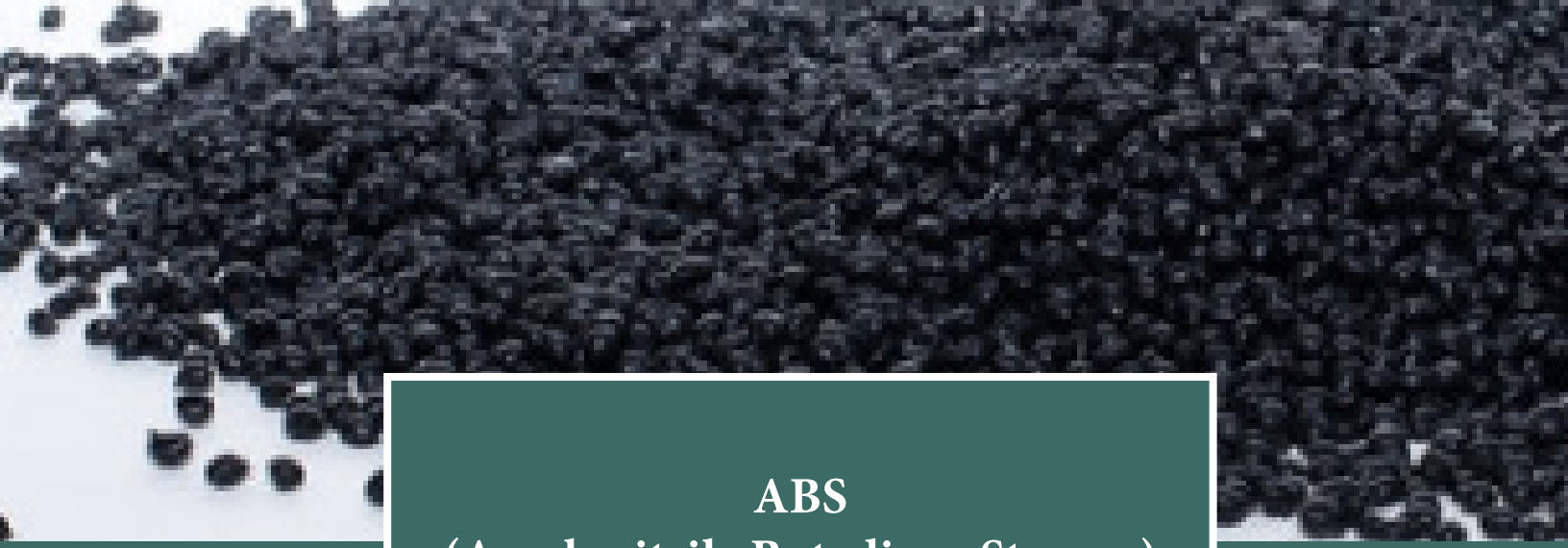
Table of Contents

4	Material Attribute Chart
5	ABS (Acrylonitrile Butadiene Styrene)
6	Acrylic
7	Bioplastics
8	Rigid PVC
9	Flexible PVC
10	CPVC (Chlorinated Polyvinyl Chloride)
11	Mineral Filled Polypropylene
12	Polycarbonate
13	High Density Polyethylene
14	Styrene
15	TPA (Thermoplastic Alloy)
16	TPV (Thermoplastic Vulcanizer)
17	Supplier Partnerships

Material Attribute Chart

Attribute	1 ABS	2 Acrylic	3 Bioplastics	4 Rigid PVC	5 Fleixble PVC	6 CPVC	7 Mineral Filled Polycarbonate	8 Polycarbonate	9 High Density Polyethylene	10 Styrene	11 TPA	12 TPV
High Impact Resistance	■	●	●	●	●	●	●	■	■	●	■	■
UV Resistance (Outdoor)	●	■	●	■	●	■	■	●	●	●	■	■
Chemical Resistance	●	●	●	■	■	■	■	●	■	●	●	■
High Temperature Resistance	●	●	●	●	●	■	■	■	●	●	●	●
Low Temperature Flexibility	●	✕	●	✕	■	●	●	●	■	●	■	■
Transparency / Optical Clarity	●	■	●	✕	●	✕	✕	✕	✕	✕	●	●
Rigidity / Structural Strength	■	●	●	■	✕	■	■	■	✕	●	●	●
Ease of Fabrication / Machinability	■	■	●	■	●	●	●	■	●	●	●	●
Flame Retardant Options	■	●	●	■	■	■	●	●	■	■	●	●
Electrical Insulation Properties	■	■	●	■	■	■	●	■		●	●	●
Weatherability	●	■	●	■	●	■	■	■	■	■	■	■
Sustainability	●	●	■	●	●	●	■	●	●	●	●	●
Cost Efficiency	$	$$	$$$	$	$	$$	$$$	$	$	$	$$	$$

Legend: ■ = Yes (High Suitability) ● = Limited (Conditional) ✕ = No (Not Recommended)



ABS
(Acrylonitrile Butadiene Styrene)

1

ABS is a durable, opaque polymer valued for its impact resistance, versatility, and ease of processing. Available in natural or colorable compounds, it balances performance and aesthetics, making it a go-to material for countless extrusion projects.

What is ABS?

ABS is a terpolymer formed by combining acrylonitrile, butadiene, and styrene, with each component contributing to its unique performance. Acrylonitrile improves chemical resistance and surface hardness, while butadiene enhances toughness and impact strength, even in cold environments. Styrene adds rigidity and a glossy finish. Together, these properties create a lightweight yet resilient material with excellent dimensional stability.

Common Applications

ABS is used across industries where strength, appearance, and cost efficiency matter. Typical applications include:

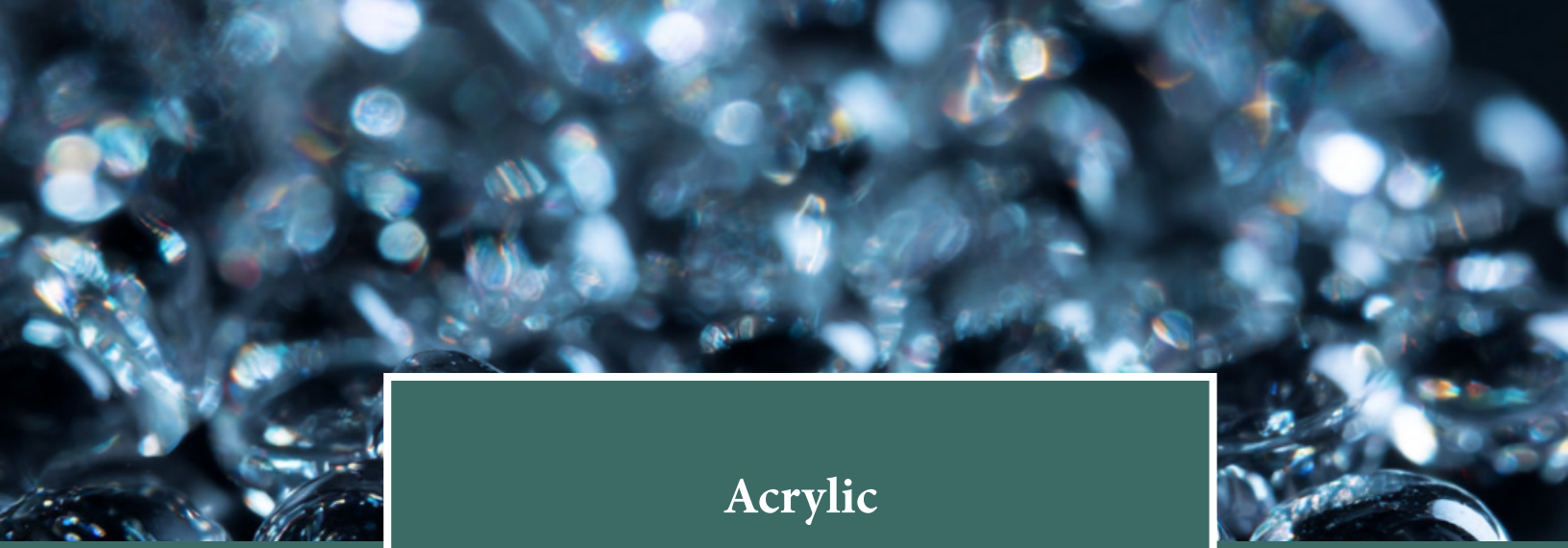
- Appliance housings and components
- Construction and plumbing parts
- Marine and hydroponic systems
- Furniture and consumer products
- Automotive interior trim

Benefits

1. Performs across a wide operating temperature range
2. Strong impact resistance at both high and low temps
3. Higher heat deflection temperature (HDT) than PVC
4. Lightweight and favorable strength-to-weight ratio
5. Cost competitive among engineering thermoplastics

Limitations

1. Poor UV resistance without protective additives or capping layers
2. Higher coefficient of thermal expansion (CTE) compared to some alternatives
3. Not inherently flame retardant
4. Pricing can fluctuate with feedstock costs



Acrylic

2

Acrylic is a transparent thermoplastic known for its excellent optical clarity, weatherability, and versatility. Lightweight yet strong, it is a preferred alternative to glass in many applications where safety, durability, and aesthetics are key.

What is Acrylic?

Acrylic, also known as PMMA, is a synthetic polymer derived from methacrylate monomers. It combines outstanding light transmission with resistance to UV radiation and environmental exposure. Unlike glass, acrylic does not shatter easily, making it safer and easier to fabricate into custom shapes.

Common Applications

- Exceptional optical clarity (transmits up to 92% of visible light)
- Strong resistance to UV exposure and weathering
- Lightweight compared to glass
- Good surface hardness and scratch resistance
- Easy to machine, thermoform, and bond

Benefits

1. Exceptional optical clarity (transmits up to 92% of visible light)
2. Strong resistance to UV exposure and weathering
3. Lightweight compared to glass
4. Good surface hardness and scratch resistance
5. Easy to machine, thermoform, and bond

Limitations

1. More brittle than polycarbonate under high impact
2. Prone to stress cracking with certain solvents
3. Lower heat resistance than some engineering plastics

Bioplastics

3

Bioplastics are innovative class of materials made from renewable resources such as corn, sugarcane, or other plant-based feedstocks, They offer performance similar to conventional plastics while helping reduce reliance on fossil fuels.

What are Bioplastics?

Bioplastics can either be bio-based (sourced from renewable biomass) or biodegradable (designed to break down under specific conditions). Many combine both traits. They are engineered to meet performance requirements while contributing to sustainability goals.

Common Applications

Bioplastics are increasingly used across industries looking to balance performance with environmental responsibility:

- Packaging and consumer goods
- Agricultural products
- Disposable items (cups, utensils, containers)
- Automotive interior components
- Specialty extrusion for eco-focused brands

Benefits

1. Renewable and sustainable resource base
2. Potentially biodegradable or compostable
3. Comparable strength and versatility to many conventional plastics
4. Reduces dependency on petroleum-based feedstocks
5. Growing range of formulations available

Limitations

1. Performance varies widely depending on formulation
2. Some grades require controlled composting to break down
3. Higher cost compared to traditional plastics
4. Limited resistance to extreme heat and moisture in certain applications

Rigid PVC

4

Rigid PVC is a strong, durable thermoplastic widely recognized for its structural integrity and weatherability. It's commonly chosen for applications that require long-term outdoor performance and flame resistance.

What are Rigid PVC?

Rigid PVC is a non-plasticized version of polyvinyl chloride, meaning no plasticizers are added to soften the material. This gives it superior strength, dimensional stability, and resistance to impact, chemicals, and environmental stress.

Common Applications

Rigid PVC is used extensively in construction and industrial products, including:

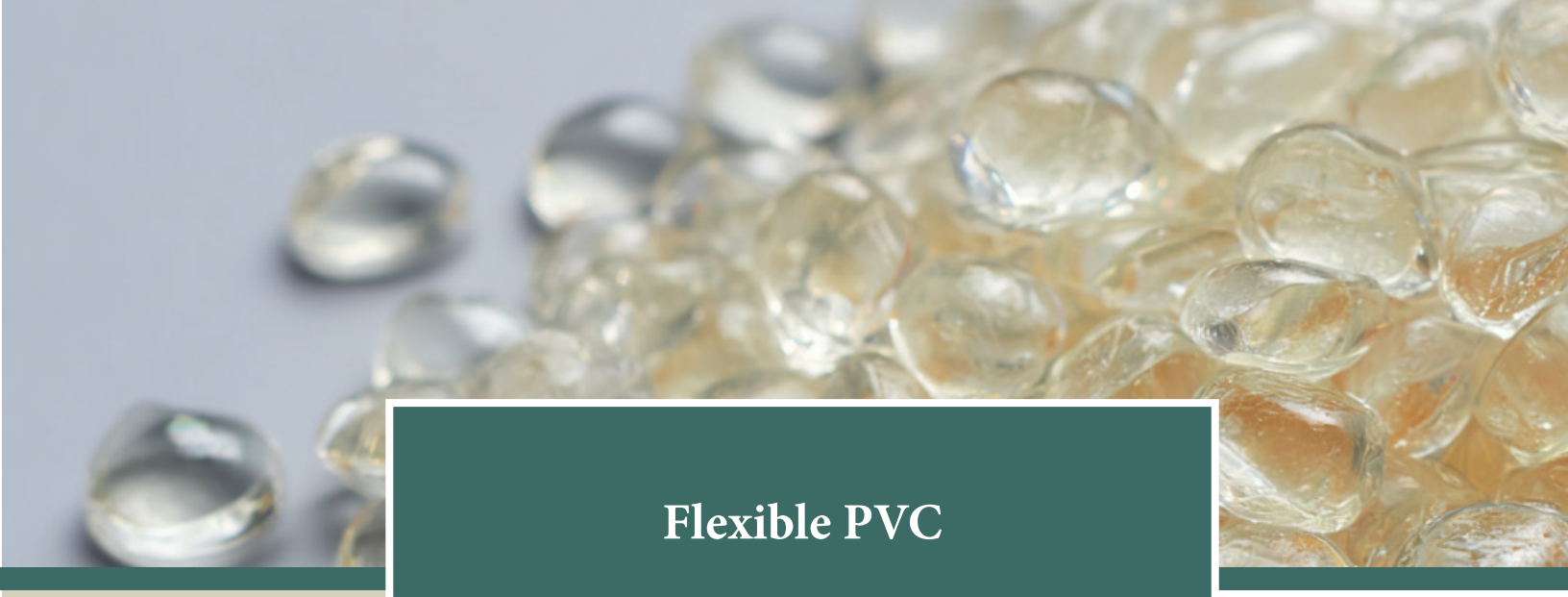
- Window and door profiles
- Pipes and fittings
- Siding and trim
- Outdoor decking and fencing components
- Electrical conduit and housings

Benefits

1. High Strength
2. Excellent flame resistance (self-extinguishing)
3. Strong weatherability and UV stability with proper additives
4. Long service life in outdoor environments
5. Cost-effective compared to many engineering plastics

Limitations

1. Limited flexibility (can be brittle under impact at low temps)
2. Lower heat resistance than CPVC or polycarbonate
3. Requires stabilizers for extended UV protection
4. Heavier than some alternative plastics



Flexible PVC

5

Flexible PVC is a versatile thermoplastic that combines durability with pliability. Known for its resistance to abrasion, moisture, and many chemicals, it is widely used in sealing, cushioning, and protective applications.

What is Flexible PVC?

Flexible PVC is made by adding plasticizers to standard PVC resin, which softens the material and enhances its flexibility. This allows it to bend, compress, and stretch without cracking, making it ideal for parts that need to move or seal.

Common Applications

Flexible PVC is commonly used for:

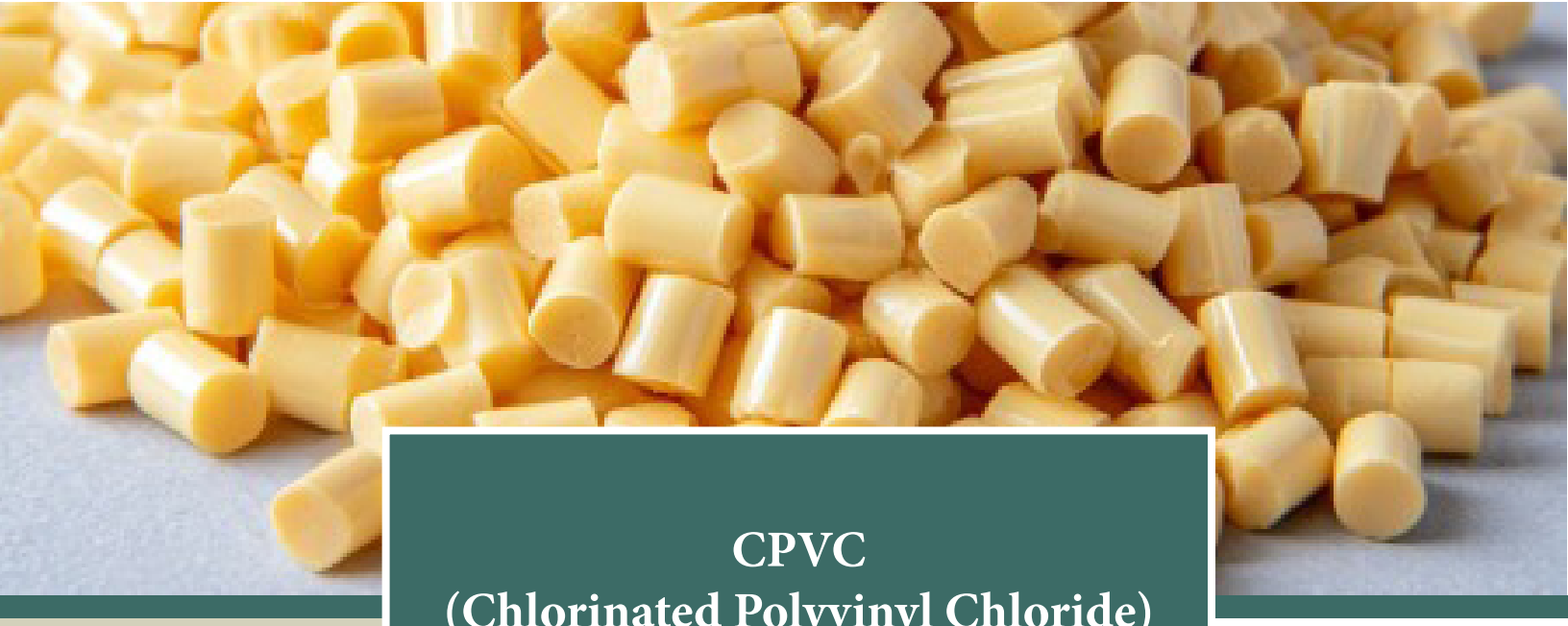
- Seals and gaskets
- Tubing and hoses
- Cable insulation and sheathing
- Protective edging and coverings
- Flexible construction profiles

Benefits

1. Excellent flexibility with strong durability
2. Resistant to abrasion, chemicals, and moisture
3. Good electrical insulation properties
4. Cost-effective compared to many elastomers
5. Available in transparent or colorable grades

Limitations

1. Can harden over time depending on plasticizer choice
2. Limited heat resistance compared to rigid polymers
3. Not ideal for long-term UV exposure without additives
4. Not inherently flame resistant



CPVC (Chlorinated Polyvinyl Chloride)

6

CPVC (Chlorinated Polyvinyl Chloride) is a thermoplastic known for its superior heat and chemical resistance compared to standard PVC. Strong, durable, and versatile, it is widely used in demanding environments where higher performance is required.

What is CPVC?

CPVC is produced by chlorinating PVC resin, which enhances its ability to withstand heat and corrosion. It maintains the versatility of PVC while extending its working temperature and resistance to aggressive chemicals.

Common Applications

CPVC is a reliable choice for:

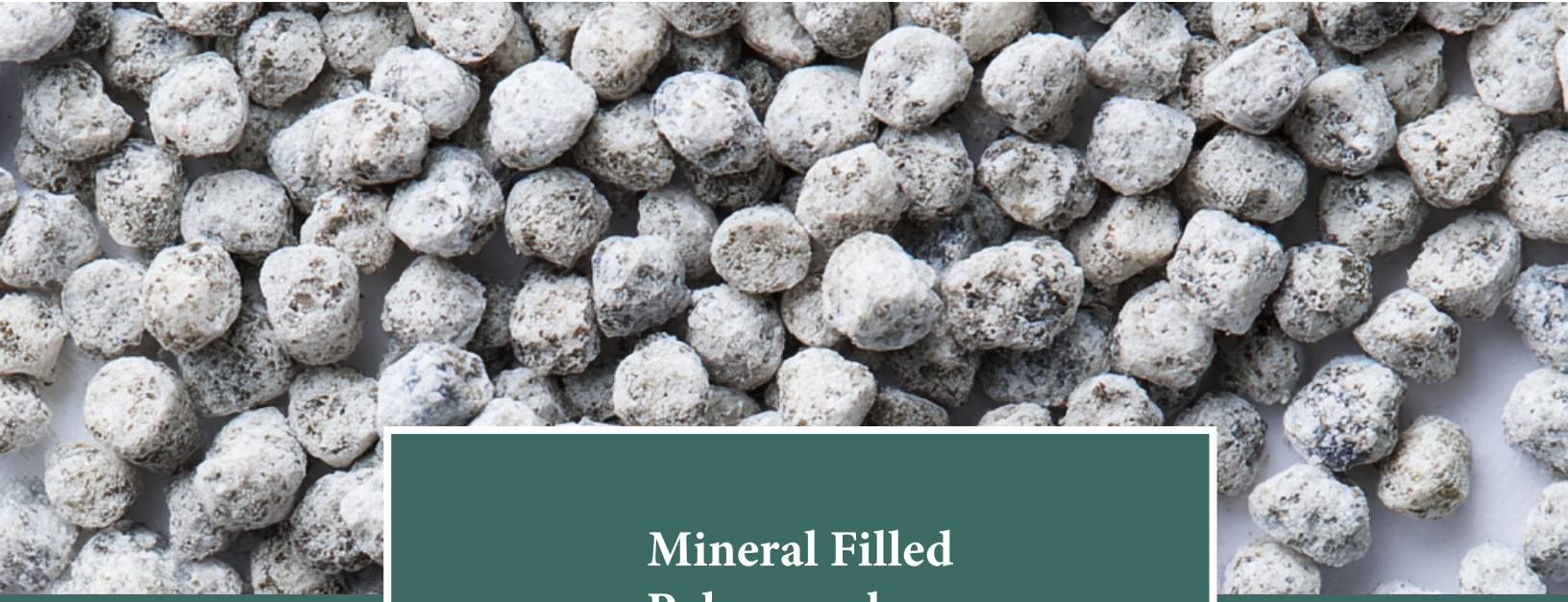
- Hot-and-cold water distribution systems
- Industrial piping and fittings
- Chemical handling equipment
- Fire sprinkler systems
- Durable profiles in high-temperature environments

Benefits

1. High heat resistance (up to ~200°F / 93°C)
2. Excellent chemical and corrosion resistance
3. Strong mechanical integrity in high-temperature environments
4. Maintains rigidity and dimensional stability under stress
5. Compatible with solvent welding and other joining techniques

Limitations

1. Less flexible than other thermoplastics
2. Higher cost compared to unmodified PVC
3. Can become brittle at very low temperatures
4. Requires proper handling and joining techniques to prevent stress cracking



Mineral Filled Polypropylene

7

Mineral-Filled Polypropylene is a reinforced thermoplastic that offers added strength, rigidity, and heat resistance. It's ideal for automotive, industrial, and structural applications requiring lightweight durability.

What is Mineral Filled Polypropylene?

Polypropylene is naturally lightweight and chemically resistant but has limited stiffness and heat tolerance. By incorporating mineral fillers, the material gains added rigidity, reduced shrinkage, and improved thermal performance – all while remaining cost-effective.

Common Applications

Mineral-filled polypropylene is used in:

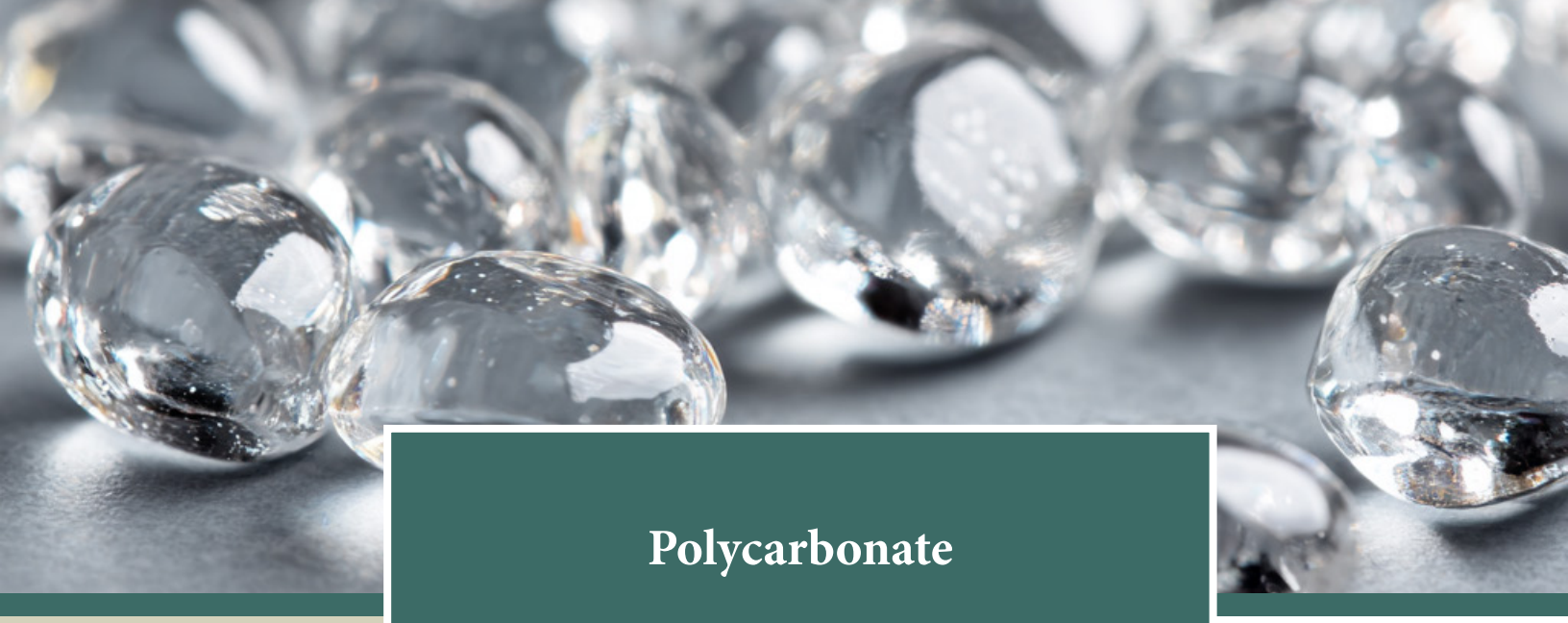
- Automotive interior and under-the-hood parts
- Appliance Mineral-Filled polypropylene housings and components
- Industrial equipment and enclosures
- Rigid packaging and structural parts
- Profiles requiring enhanced stiffness at a low cost

Benefits

1. Increased stiffness and dimensional stability
2. Improved heat resistance compared to unmodified Polypropylene
3. Cost-effective alternative to higher-end engineering plastics
4. Excellent chemical resistance
5. Lower shrinkage and warpage in molded or extruded parts

Limitations

1. Reduced impact strength compared to pure polypropylene
2. Heavier than unfilled grades
3. Surface finish can be less smooth depending on filler type
4. Limited UV resistance without additives



Polycarbonate

8

Polycarbonate is a tough, transparent thermoplastic known for its exceptional impact resistance and optical clarity. It combines strength and design flexibility, making it ideal for demanding applications that require both durability and aesthetics.

What is Polycarbonate?

Polycarbonate is produced through the polymerization of bisphenol A (BPA) and phosgene. The resulting structure creates a material that is virtually unbreakable, with excellent heat resistance and dimensional stability. It can be molded, extruded, or thermoformed into complex shapes while maintaining clarity.

Common Applications

Polycarbonate is widely used in industries where safety and visibility are essential:

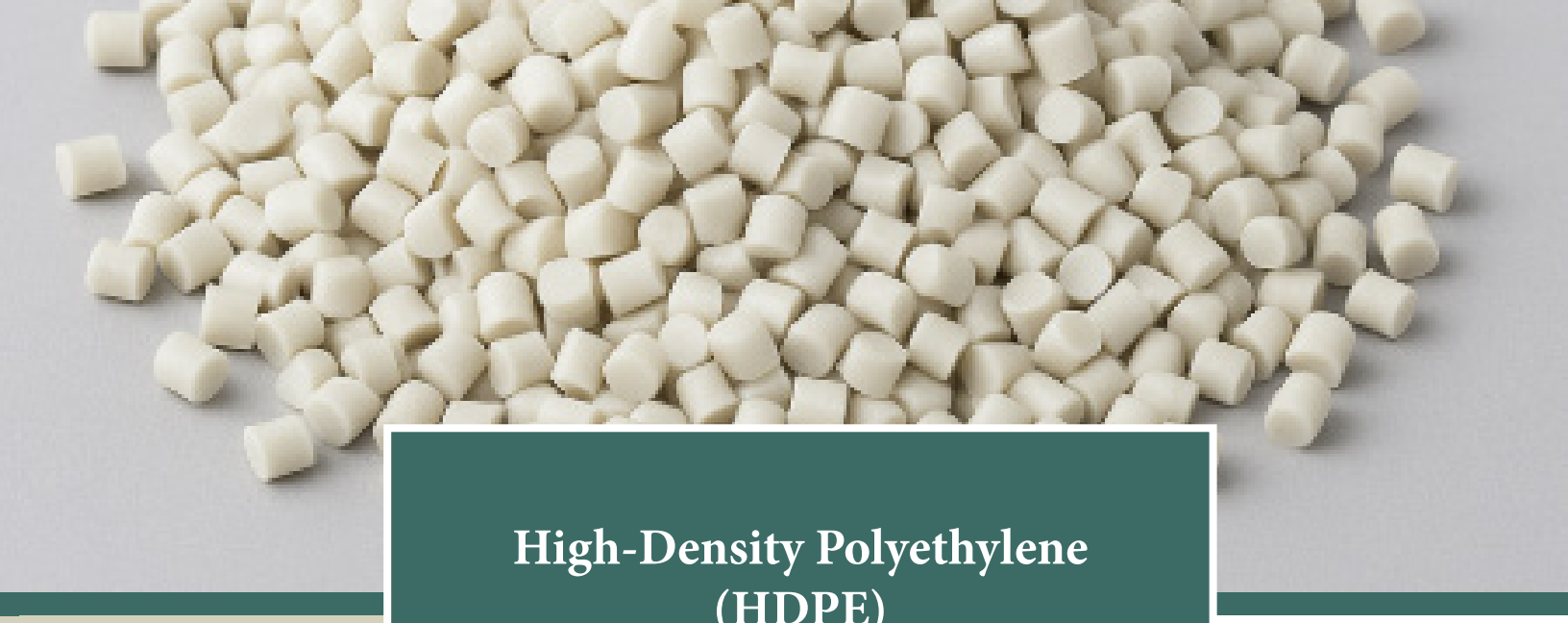
- Safety glasses, shields, and goggles
- Machine guards and protective panels
- Automotive lighting and glazing
- Medical device housings
- Electrical enclosures and connectors

Benefits

1. Outstanding impact resistance (250x stronger than glass)
2. Excellent optical clarity and transparency
3. High heat resistance and dimensional stability
4. Lightweight compared to glass and metals
5. Good electrical insulation properties

Limitations

1. Prone to scratching without protective coatings
2. Susceptible to stress cracking from certain chemicals
3. Lower UV resistance unless stabilized
4. Typically more expensive than acrylic



High-Density Polyethylene (HDPE)

9

High-Density Polyethylene (HDPE) is a tough, lightweight thermoplastic recognized for its strength, rigidity, and exceptional chemical resistance. It offers low moisture absorption and excellent impact durability

What is HDPE?

HDPE is a polymer made from petroleum-derived ethylene monomers that are densely packed to create strong molecular bonds. This high-density structure gives the material its rigidity, tensile strength, and resistance to chemicals and environmental stress cracking. Unlike lower-density polyethylene, HDPE maintains its shape under load and performs reliably across a broad temperature range.

Common Applications

HDPE is used in industries where durability, moisture resistance, and chemical stability are critical. Typical applications include:

- Piping and conduit systems
- Industrial containers and liners
- Extruded profiles and protective covers
- Marine and outdoor components
- Sheets, panels, and construction products

Benefits

1. Excellent chemical and moisture resistance
2. High strength-to-density ratio
3. Superior impact resistance, even at low temperatures
4. Excellent processability for extrusion and molding
5. UV-stabilized grades available for outdoor use

Limitations

1. Can become brittle under prolonged UV exposure without additives
2. Lower temperature resistance compared to some engineering plastics
3. Difficult to bond or paint without surface treatment
4. Not inherently flame retardant

Styrene

10

Styrene is a lightweight, economical thermoplastic often selected for its ease of processing and cost efficiency. While not as durable as engineering plastics, it offers good rigidity for applications where affordability and simplicity are key.

What is Styrene?

Styrene polymers are derived from styrene monomers and can be processed into various forms such as general-purpose polystyrene (GPPS) or high-impact polystyrene (HIPS). These variations allow for different balances of rigidity, impact strength, and surface finish.

Common Applications

Styrene is widely used for:

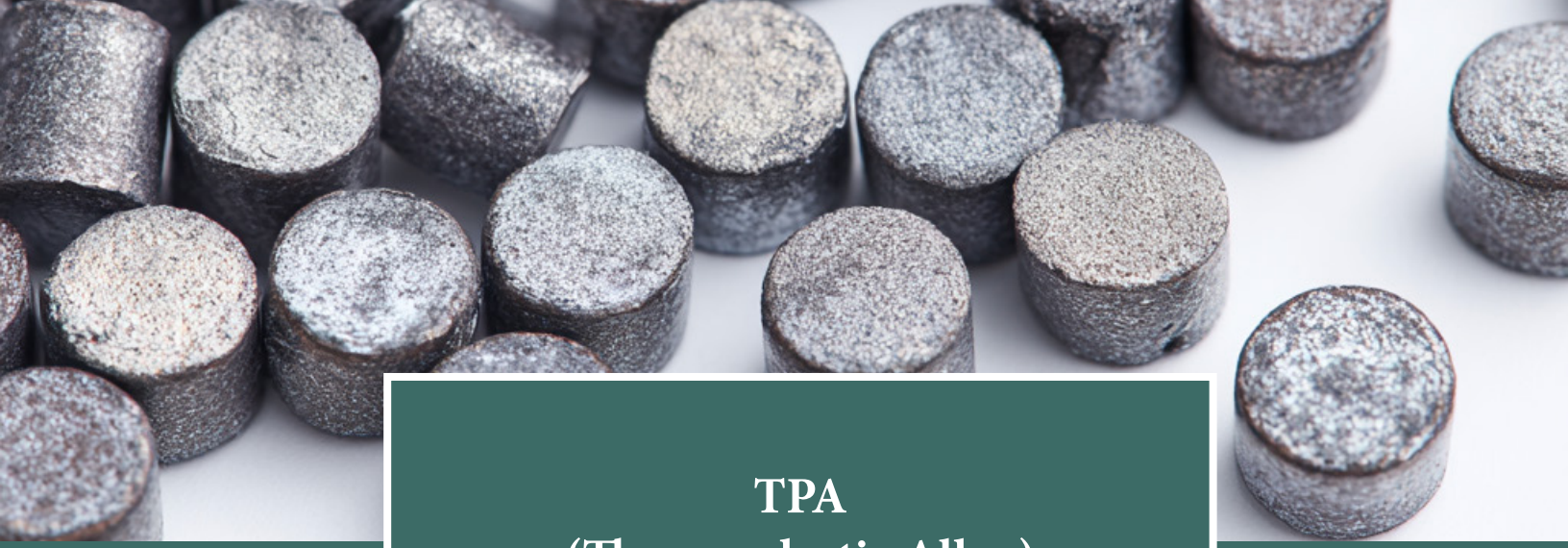
- Point-of-purchase displays and signage
- Packaging and disposable products
- Appliance and electronics housings
- Lightweight construction profiles
- Consumer goods and toys
- Appliance Mineral-Filled polypropylene housings and components
- Industrial equipment and enclosures
- Rigid packaging and structural parts
- Profiles requiring enhanced stiffness at a low cost

Benefits

1. Excellent processability and cost efficiency
2. Good rigidity and dimensional stability
3. Smooth surface finish suitable for printing or coating
4. Lightweight and easy to fabricate
5. Available in both GPPS and HIPS grades for different performance needs

Limitations

1. Lower impact resistance than engineering plastics
2. Limited heat and UV resistance without additives
3. Can become brittle under low-temperature impact
4. Not suitable for heavy structural or load-bearing applications



TPA (Thermoplastic Alloy)

11

Thermoplastic Alloys (TPAs) are engineered blends of different polymers designed to deliver a tailored balance of properties. By combining multiple resins, TPAs provide unique performance characteristics that a single material alone cannot achieve

What is TPA?

TPAs are created by alloying two or more thermoplastics to enhance strength, flexibility, chemical resistance, or other key traits. These alloys are formulated to meet specialized requirements where traditional plastics fall short, offering design flexibility across a wide range of applications.

Common Applications

TPAs are used in industries where materials must meet demanding specifications, such as:

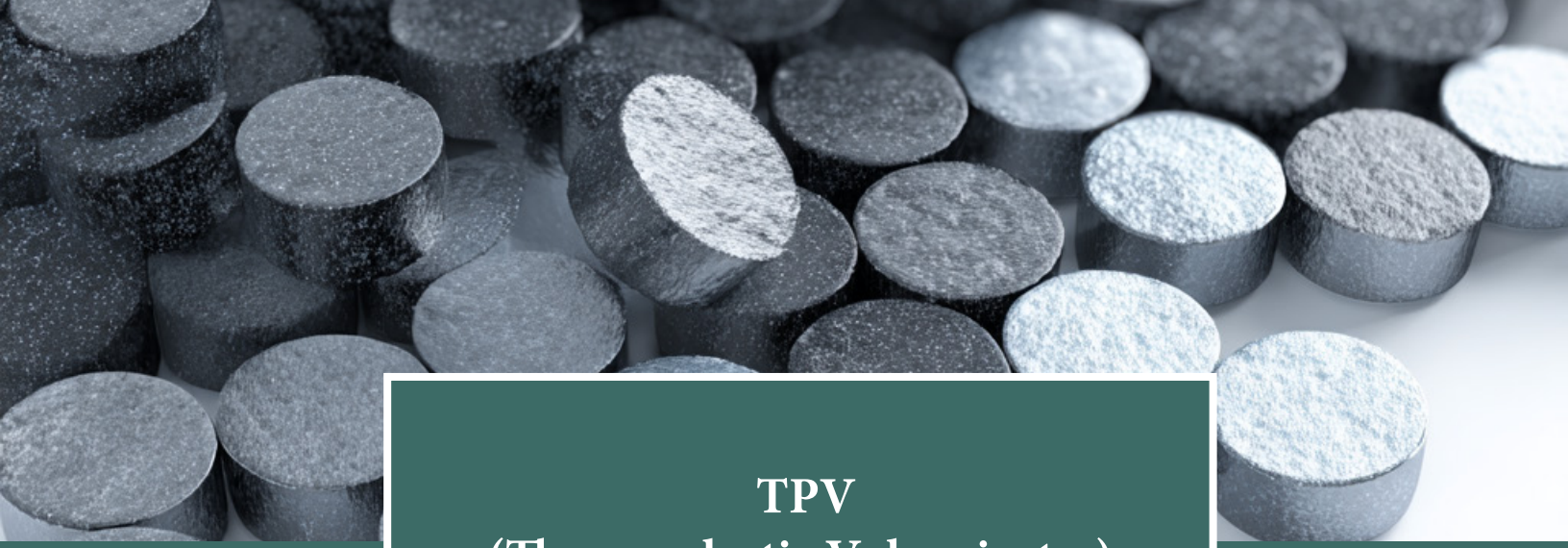
- Automotive interior and exterior components
- Industrial housings and enclosures
- Medical device parts
- Consumer products requiring toughness and aesthetics
- Profiles that need both flexibility and rigidity in one solution

Benefits

1. Combines the strengths of multiple resins in one material
2. Enhanced toughness, flexibility, or chemical resistance
3. Versatile formulations for specific performance needs
4. Good dimensional stability
5. Cost-effective compared to many high-end engineering plastics

Limitations

1. Properties vary widely depending on blend formulation
2. Not all alloys are suited for outdoor/UV exposure
3. Higher material costs than commodity plastics
4. May require specialized processing



TPV (Thermoplastic Vulcanizates)

12

Thermoplastic Vulcanizates (TPVs) are a class of thermoplastic elastomers that combine the flexibility of rubber with the processing ease of plastics. They provide rubber-like performance while being recyclable and easier to manufacture..

What is TPV?

TPVs are created through dynamic vulcanization, where rubber particles are finely dispersed within a thermoplastic matrix. This unique structure gives TPVs elasticity, resilience, and chemical resistance, along with the ability to be processed under conventional thermoplastic methods

Common Applications

TPVs are used in demanding environments that require durability and flexibility:

- Automotive seals, gaskets, and weatherstripping
- Grips and handles for tools and consumer products
- Appliance seals and tubing
- Outdoor and industrial profiles exposed to stress and weather
- Wire and cable jacketing
- Industrial equipment and enclosures
- Rigid packaging and structural parts
- Profiles requiring enhanced stiffness at a low cost

Benefits

1. Combines the strengths of multiple resins in one material
2. Enhanced toughness, flexibility, or chemical resistance
3. Versatile formulations for specific performance needs
4. Good dimensional stability
5. Cost-effective compared to many high-end engineering plastics

Limitations

1. Rubber-like flexibility and resilience
2. Not as soft as some thermoset rubbers
3. Properties depend on formulation and rubber content
4. Limited transparency compared to other elastomers

Supplier Partnerships

Strong partnerships that strengthen supply

Engineered Profiles' commitment to reliability starts with the suppliers we choose. By building long-term, trusted partnerships with raw material providers, we ensure our customers benefit from consistent quality, stable supply, and confidence that every extrusion begins with dependable inputs.

Aligned for innovation and growth

Our supplier partnerships go beyond maintaining a steady supply. We collaborate with our network to explore new resin technologies, specialty additives, and innovative materials that strengthen product performance. With the ability to test and qualify new materials quickly through our quality systems, we help customers access cutting-edge solutions that scale with their growth.

Managing cost and delivering value

Through strategic supply agreements and multiple sourcing strategies, we help stabilize resin costs in volatile markets while ensuring material availability.

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Shaping What Matters.

Better Profiles. Better Products.

At Engineered Profiles, innovation starts with materials - but it's our people, and commitment to quality that shape every solution.

Ready to Explore Options?

Request a quote.

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