USP Polymers - Technical Product Overview

1. Thermoplastic Elastomers (TPE)

Thermoplastic Elastomers (TPEs) are copolymers combining thermoplastic and elastomeric properties. They provide

rubber-like flexibility with easy thermoplastic processing.

Key Technical Properties:

- Hardness Range: 30 Shore A to 85 Shore D

Tensile Strength: 5-15 MPa
Elongation at Break: 200-600%
Processing Temp: 160-220 °C
Density: 0.9-1.2 g/cm³

Applications:

- Soft-touch grips, medical tubing, gaskets, toys, overmolded handles

2. Thermoplastic Vulcanizates (TPV)

TPVs are dynamically vulcanized blends of thermoplastics (PP) and elastomers (EPDM), offering rubber resilience and recyclability.

Key Technical Properties:

Hardness Range: 40-90 Shore A
Tensile Strength: 7-18 MPa
Elongation: Up to 300%
Heat Resistance: Up to 135 °C
Compression Set: Excellent

Applications:

- Automotive seals, appliance gaskets, electrical connectors, consumer grips

3. Thermoplastic Rubber (TPR)

TPR is based on styrenic block copolymers (SBS/SEBS) with processability and elasticity.

Key Technical Properties:

- Hardness Range: 20 Shore A to 70 Shore D

Processing Temp: 170-210 °C
 Density: 0.90-1.20 g/cm³

Applications:

- Shoe soles, toys, mats, tool handles, electrical insulation

4. Impact Modifiers

Impact modifiers enhance toughness and ductility of rigid polymers.

Key Technical Features:

- Types: MBS, ABS, EVA, acrylic core-shell
- Dosage: 5-20% by weight
- Effect: Improved impact, low-temp resistance, dimensional stability

Applications:

- PVC profiles, automotive parts, packaging, appliance casings

5. Silicone Masterbatch

Silicone masterbatches are UHMW polysiloxane in thermoplastic carriers to improve surface and processing properties.

Key Technical Properties:

- Silicone Loading: 20-50%

- Carrier Resin: PE, PP, EVA, TPE

- Dosage: 0.5-5%

- Function: Slip, mold release, anti-scratch

- Thermal Stability: Up to 280 °C

Applications:

Injection molded parts, films, cables, packaging, compound enhancements

Thermoplastic Elastomer (TPE) – A Comprehensive Technical Overview

Key Properties

Property	Typical Range / Value
Shore Hardness	30 Shore A – 85 Shore D
Tensile Strength	5 – 25 MPa
Elongation at Break	200% – 700%
Specific Gravity	$0.89 - 1.3 \text{ g/cm}^3$
Processing Temp	160 – 230 °C
Service Temperature	-50 °C to +130 °C (depending on type)
Recyclability	100% (can be remelted and reused)

Processing Techniques

TPEs are processed like traditional thermoplastics using:

- **Injection Molding** for precision parts (e.g., gaskets, grips)
- Extrusion for profiles, tubing, and seals
- **Blow Molding** for bellows, flexible bottles
- **2K Overmolding** for bonding with PP, ABS, PC

Advantages

- No curing or post-processing needed
- Shorter cycle times than rubber
- Excellent fatigue resistance and rebound
- Flexibility across a wide temperature range
- Good UV, chemical, and abrasion resistance (especially SEBS-based)

Limitations

- Lower thermal resistance compared to thermosets
- Can show creep under long-term stress
- Cost may be higher than commodity rubbers

• Limited oil resistance in some grades (e.g., SBS)

Typical Applications

- **Automotive**: air ducts, seals, mats, cable grommets
- Consumer Goods: grips, soft-touch handles, kitchenware
- **Medical**: tubing, syringe plungers, wearable straps
- Electrical: cable insulation, plugs, strain reliefs
- Toys: safe, soft-touch parts compliant with EN71 & REACH

Grades & Compliance

USP Polymers supplies TPE grades tailored to:

- Food contact (FDA, EU 10/2011)
- **Toy safety** (EN71)
- RoHS / REACH
- Halogen-free and recyclable applications

Thermoplastic Vulcanizate (TPV) - A Detailed Technical Overview

Definition

Thermoplastic Vulcanizates (TPVs) are **dynamically vulcanized blends** of thermoplastic materials (typically **polypropylene**) and **crosslinked rubber** (usually **EPDM**). They offer the elastomeric performance of vulcanized rubber combined with the processing ease and recyclability of thermoplastics.

TPVs are a subclass of Thermoplastic Elastomers (TPEs), but with superior heat resistance, mechanical strength, and long-term aging properties—making them ideal for demanding industrial and automotive applications.

Material Composition

- **Matrix Phase**: Polypropylene (PP)
- **Dispersed Phase**: Fine EPDM rubber particles that are chemically crosslinked during dynamic vulcanization
- Additives: Stabilizers, UV inhibitors, processing aids

This co-continuous phase morphology provides **rubber-like elasticity** with **thermoplastic processability**.

Key Technical Properties

Property	Typical Range
Shore Hardness	40 – 90 Shore A (up to 45 Shore D)
Tensile Strength	7 – 18 MPa
Elongation at Break	150% – 300%
Compression Set	<30% (at 70°C / 22 hrs)
Specific Gravity	$0.90 - 1.00 \text{ g/cm}^3$
Thermal Resistance	–40 °C to +135 °C
Weatherability	Excellent UV, ozone, and moisture resistance
Recyclability	Fully recyclable through melt reprocessing

Processing Methods

TPVs are compatible with conventional thermoplastic equipment:

- **Injection Molding**: Complex parts with tight tolerances (e.g., automotive seals)
- Extrusion: Profiles, tubing, weatherstrips
- **Blow Molding**: Flexible bellows, ducts
- **Overmolding**: Adheres well to PP in multi-shot molding

Typical Processing Conditions:

• Barrel Temp: 190–240 °C

• Mold Temp: 30–60 °C

• Screw Speed: Medium to high

• Drying: Not required in most cases

Advantages

- Rubber-like elasticity with thermoplastic processability
- Outstanding heat, oil, and chemical resistance
- Excellent **compression set performance** at elevated temperatures

- **No need for post-curing** like traditional rubbers
- Lightweight and **low VOC** (ideal for automotive interiors)
- Recyclable and environmentally sustainable

Limitations

- Lower temperature range than some thermoset rubbers
- May require surface treatment for painting or printing
- Bonding with polar substrates (e.g., PC, PA) may be limited

Typical Applications

Automotive

- Door seals, window trims, air ducts
- Under-the-hood parts (seals, bellows)
- Weatherstrips, gaskets, mats

Industrial

- HVAC seals, cable grommets, vibration dampers
- Appliance gaskets, connectors

Consumer

- Grips, tool handles, enclosure seals
- Wearables and straps

Compliance & Customization

Grades can be tailored for:

- Automotive OEM standards (OEM-Tier1 validated)
- REACH & RoHS compliance
- Halogen-free flame-retardant grades
- FDA / EU 10/2011 for food contact

Comparison: TPV vs TPE vs TPR

Feature	TPV	TPE (SEBS)	TPR (SBS)
Heat Resistance	Up to 135 °C	Up to 120 °C	Up to 80–100 °C
Compression Set	Excellent	Good	Moderate
Weather Resistance	Excellent	Good	Fair
Processability	Injection, extrusion	Injection, extrusion	Injection, extrusion
Recyclability	Yes	Yes	Yes
Softness Range	40–90 Shore A	20 Shore A – 85 Shore D	20 Shore A – 70 Shore D

Thermoplastic Rubber (TPR) - In-Depth Technical Overview

Definition

Thermoplastic Rubber (TPR), also known as **Styrenic Block Copolymer Elastomer**, is a type of Thermoplastic Elastomer (TPE) primarily based on **SBS** (**styrene-butadiene-styrene**) or **SEBS** (**styrene-butylene-styrene**) block copolymers. It combines the elasticity and soft feel of rubber with the melt-processability of thermoplastics.

TPR is widely used in applications that require a **soft, flexible, and grippy material** that can be easily molded, extruded, or overmolded.

Molecular Structure

- **Block copolymer** with hard styrenic end-blocks and soft butadiene or ethylene-butylene mid-blocks.
- No chemical crosslinking TPR softens on heating and solidifies on cooling (reversible).

Key Technical Properties

Property	Typical Range
Shore Hardness	20 – 70 Shore D (or 30A – 95A)
Tensile Strength	5 – 15 MPa
Elongation at Break	200 – 600%
Density	$0.90 - 1.2 \text{ g/cm}^3$
Processing Temp	160 – 220 °C
Operating Temp	-30 °C to $+80$ °C (SBS); SEBS up to 120 °C
Compression Set	Moderate (~30–40% at 70 °C)
Recyclability	Fully recyclable, thermally reprocessable

Processing Techniques

TPR can be processed using standard thermoplastic equipment:

- **Injection Molding** soft-touch parts, soles, handles
- Extrusion tubes, profiles, gaskets
- **Blow Molding** squeeze bottles, flexible reservoirs
- Overmolding (2K) adheres well to PP, PE, ABS

Processing Notes:

- Drying not usually required
- Compatible with color and filler masterbatches
- Shear thinning behavior ensures easy flow in molds

Advantages

- Soft-touch, rubber-like feel
- Good **flexural fatigue resistance**
- No vulcanization required → short cycle times
- Bonds well in overmolding (especially to PP, ABS, PC)
- Available in transparent, translucent, and colored grades
- Fully recyclable and cost-effective

Limitations

- Lower thermal and chemical resistance vs. TPV/TPU
- Poor oil and hydrocarbon resistance (especially SBS-based)
- Susceptible to UV degradation without additives (SEBS is better)
- Creep under long-term loading

Typical Applications

Footwear & Lifestyle

- Shoe soles, sandals, sportswear components
- Gel pads, watch straps

Toys & Consumer Goods

- Non-toxic toy parts, grips, squeeze toys
- Flexible enclosures and casings

Household & Industrial

- Grips, knobs, seals, cable grommets
- Anti-slip mats, rubber-like tools

Electronics

• Cable jackets, connectors, strain reliefs

Grades & Compliance

TPR grades can be tailored to meet:

- EN71 (Toy Safety)
- FDA / EU food contact
- REACH, RoHS
- Anti-static, UV-resistant, or flame-retardant requirements

TPR vs TPV vs TPE

Feature	TPR (SBS)	TPV	TPE (SEBS)
Heat Resistance	Moderate (~80–100 °C)	Excellent (up to 135 °C)	Good (up to 120 °C)
Elasticity	High	Moderate to High	High
Chemical Resistance	Fair	Excellent	Good
UV Resistance	Poor (SBS), Fair (SEBS)	Excellent	Good (SEBS-based)
Processing Ease	Excellent	Excellent	Excellent
Cost	Lower	Medium-High	Medium

Silicone Masterbatch - Detailed Technical Overview

Definition

Silicone masterbatch is a high-performance additive concentrate containing **ultra-high molecular weight (UHMW) polysiloxane** dispersed in a thermoplastic carrier resin such as **PE, PP, EVA, or TPE**. It is primarily used to enhance surface properties, improve processability, and reduce defects in thermoplastic processing.

It is added during compounding or processing in small quantities (typically 0.5% to 5%) to impart slip, anti-blocking, mold release, abrasion resistance, and improved flow characteristics.

Composition

Component	Typical Content
Polysiloxane	20% – 50% (UHMW)
Carrier Resin	PE, PP, EVA, TPU, TPE, PA, or custom polymer
Additives (optional)	Stabilizers, dispersing agents

Key Technical Properties

Parameter	Typical Values
Silicone Content	20–50% (by weight)
Melt Flow Index (MFI)	Matches base polymer or customized for process
Processing Temperature	180–280 °C (depending on carrier resin)

Thermal Stability	Excellent; silicone stable up to ~300 °C
Compatibility	PE, PP, PS, ABS, PA, TPU, TPE, PC blends
Appearance	Pellets – white, translucent, or off-white

Functional Benefits

- Slip & Lubrication: Reduces coefficient of friction (CoF) on plastic surfaces
- Mold Release: Acts as a natural release agent in injection molding
- Anti-scratch: Improves mar/scratch resistance for cosmetic and durable goods
- **Anti-blocking**: Prevents film surfaces from sticking together
- **Processing Aid**: Improves flow, reduces torque and energy consumption in extrusion/injection
- Surface Finish: Enhances smoothness, shine, and haptic (touch) feel

Processing Guidelines

- **Dosage**: Typically 0.5–5% depending on desired effect and base polymer
- **Drying**: Not usually required unless specified
- Mixing: Blend directly with virgin resin, compatible with most fillers and colorants
- **Form**: Supplied in pellet or granular form; easy to feed with standard gravimetric or volumetric feeders

Typical Applications

1. Film & Packaging

- BOPP, LDPE, HDPE films improved slip, anti-blocking
- Lamination films better surface finish and runnability
- Stretch & shrink wraps reduced friction for high-speed lines

2. Injection Molded Parts

- Automotive interiors, gaskets, seals
- Consumer electronics casings
- Appliance housings (improved surface feel)

3. Wire & Cable

- TPE/TPU cable sheathing lower drag, smoother finish
- Reduces wear on processing dies

4. Extrusion

- Pipe, profile, and tube extrusion lower die build-up, smoother flow
- TPE, TPV, and PE profiles for seals, weatherstrips

5. Compounding

• Masterbatch and compound producers use it as a process modifier or surface enhancer

Grades & Customization

- Carrier resin can be matched to the base material for full compatibility
- Available in:
 - **Universal** (PE-based for wide use)
 - **Polyolefin-specific** (PP/PE)
 - Engineering grade (PA, TPU, PC/ABS)
 - **Halogen-free** (for electrical applications)
- Can be combined with anti-static, flame-retardant, or anti-fog additives

Advantages over Liquid Silicone Additives

Feature	Silicone Masterbatch	Liquid Silicone Oil (LSR/ LSO)
Handling	Pellet form, non-messy	Difficult to dose accurately
Consistency	High dispersion uniformity	May cause uneven film effects
Thermal Stability	Excellent	May volatilize or bleed
Compatibility	Tailored to polymer	Often incompatible directly

Compliance & Safety

- REACH & RoHS compliant
- FDA & EU 10/2011 food-contact grades available
- Non-migratory, non-blooming behavior (if UHMW grade used)

Impact Modifier for Polypropylene (PP) – Technical Overview

Definition

Impact modifiers for **polypropylene** (**PP**) are specialty polymer additives or elastomeric compounds designed to **significantly enhance the toughness, impact resistance, and low-temperature performance** of rigid PP materials. These modifiers are particularly useful in applications where standard PP is too brittle or fails under stress, especially at sub-ambient conditions.

USP Polymers supplies high-efficiency **impact modifiers specifically tailored for PP**, optimized for injection molding, extrusion, and compounding applications. These are not intended for use with TPE or TPR systems.

Material Chemistry

Our PP impact modifiers are typically **olefin-based elastomers**, formulated as:

- Polyolefin elastomers (POE)
- Ethylene-propylene rubber (EPR or EPDM)
- Core-shell elastomer blends (EPDM-grafted)
- Thermoplastic blends with reactive or compatibilized interfaces

These modifiers are designed to **disperse uniformly within the PP matrix**, forming micro-domains that absorb stress and prevent crack propagation.

Key Technical Properties

Property	Typical Values
Base Polymer Compatibility	Homo & co-polymer PP (injection and extrusion grades)
Appearance	Free-flowing pellets
Processing Temp	180 − 240 °C
Dosage Range	5 – 25% (application-specific)
Impact Improvement	Up to 10× increase in notched Izod impact strength
Effect on MFI	Slight reduction (depends on loading)
Thermal Aging	Excellent retention (UV-stabilized grades available)

Performance Highlights

• **Room Temperature Toughness:** Improves impact strength up to $8-10\times$

- **Cold Weather Performance**: Excellent ductility retention down to -30 °C
- Dimensional Stability: Maintains stiffness and shrinkage control
- Flow Characteristics: Designed to minimally affect melt flow index (MFI)
- **Surface Finish**: Compatible with pigment masterbatches and fillers

Applications in Polypropylene Systems

Application Sector	Typical Use Cases
Automotive	Bumpers, interior trims, pillar covers, ducting
Industrial Goods	Storage bins, impact housings, rigid containers
Consumer Products	Luggage shells, chairs, appliance parts
Electrical & Electronics	Plug casings, tool housings, impact-resistant covers
Packaging	Rigid packaging, crates, toolboxes

Processing Guidelines

- **Mixing**: Can be dry blended or compound mixed with PP
- **Drying**: Usually not required unless specified by supplier
- **Injection Molding**: Compatible with standard PP mold parameters
- Extrusion: Stable at high shear; improves toughness of profiles and sheets

Advantages

- Tailored for **polypropylene only** ensures high interfacial adhesion
- Non-reactive and stable no gassing, blooming, or odor
- Cost-effective toughness less modifier needed per impact gain
- Fully recyclable with PP matrix
- Compatible with filler-loaded systems (e.g., talc, glass-filled PP)

Limitations

- Not suitable for use in **TPE**, **TPR**, **TPU**, **or PVC** systems
- Slight reduction in stiffness (can be compensated with fillers)
- Higher loadings may impact transparency or surface gloss

Compliance & Customization

- RoHS / REACH compliant
- UV-stabilized or non-UV grades available
- Custom grades available for:
 - Injection molding vs. extrusion
 - High impact at room vs. low temperatures
 - Glass-filled PP compatibility

APPLICATIONS

Application: Pen Grip

Recommended Material

- Thermoplastic Elastomer (TPE) especially SEBS-based grades
- Alternate: Thermoplastic Rubber (TPR), depending on desired cost-performance balance

Why TPE for Pen Grips?

- **Soft-Touch Comfort**: Provides ergonomic cushioning and anti-fatigue feel for long writing sessions
- Excellent Elasticity: Enables stretch-fit or molded-on fit over pen barrels
- Non-Toxic & Skin-Safe: Complies with EN71, REACH, RoHS, and FDA (for safe skin contact)
- Anti-Slip Surface: High friction coefficient ensures secure hold even with sweaty hands
- Color Customization: Easily colorable for brand/product differentiation
- Odorless: Unlike rubber-based grips, TPEs are free from unpleasant smell
- **Recyclable**: Environmentally safer compared to vulcanized rubber

Technical Specifications

Property	Typical Value
Shore Hardness	40–70 Shore A
Tensile Strength	5 – 10 MPa
Elongation at Break	300 – 600%
Specific Gravity	0.90 – 1.15 g/cm ³
Processing Temperature	160 – 220 °C
Surface Finish	Matte / soft-touch, can be textured
Friction Coefficient	High (good for non-slip performance)

Processing Methods

- Injection Molding: Most common; enables high-volume, precision grip production
- **2K Overmolding**: Direct molding of TPE onto the pen barrel (usually PP or ABS)
- **Compression Molding** (less common): For simple sleeve-type grips

Common Pen Grip Types

- 1. Slip-On Grips (after-market) made via injection or extrusion
- 2. Overmolded Grips part of pen body, created in multi-shot molds
- 3. Triangular / Ergonomic Grips contoured for finger placement

Compliance and Safety

- REACH and RoHS Compliant
- EN71-3 (Toy Safety) suitable for school stationery
- FDA 21 CFR (optional) for food-grade skin-contact applications
- No phthalates, latex, or heavy metals

Industries Served

- Stationery & Office Supplies
- Promotional Gifting

- School & Educational Products
- Premium Writing Instruments

Typical Customer Queries Answered by Chatbot

Q: What material is best for soft-touch pen grips?

A: TPE is ideal due to its soft, flexible, non-toxic nature and excellent grip properties.

Q: Can TPE pen grips be recycled?

A: Yes, TPE is a thermoplastic material and is fully recyclable.

Q: Is the material safe for school use?

A: Yes. Our TPE grades are certified to comply with EN71 (Toy Safety), REACH, and are free of phthalates or latex.

Q: Can I get a translucent or colored grip?

A: Yes. TPE can be customized in various colors, including clear/translucent formulations.

Q: Does the grip bond directly with the pen?

A: In 2K overmolding processes, TPE bonds well with substrates like PP and ABS.

Application: Toothbrush (Handle Grip & Head Pads)

Recommended Material

- Thermoplastic Elastomer (TPE) especially SEBS-based grades for skin/mouth contact
- **Alternate**: Soft-grade **TPR** (if cost-sensitive), but TPE is preferred for hygiene and medical compliance

Why TPE for Toothbrushes?

- **Soft & Flexible Touch Zones**: Ensures user comfort and gum safety when applied to grip and brush head
- Non-Toxic & Biocompatible: Safe for repeated oral and skin contact
- Slip Resistance: Wet-grip performance in moist environments like bathrooms
- **Durable Under Repeated Stress**: Retains flexibility through daily brushing cycles
- **Compatible with Overmolding**: Bonds well to PP, ABS handles in multi-shot injection molding
- Fully Recyclable: More eco-conscious than thermoset rubber or PVC

Functional Applications within Toothbrush

- 1. Handle Grips ergonomic, non-slip surface zones
- 2. Thumb Rest Pads textured, soft patches for control
- **3. Brush Head Cushions** soft head base for gum protection (especially in children's brushes)
- **4. Tongue Cleaners** molded on back of head

Technical Specifications

Property	Typical Value
Shore Hardness	30 – 70 Shore A (handle grip), 20–40A (head pad)
Tensile Strength	5 – 12 MPa
Elongation at Break	300 – 600%
Density	$0.90 - 1.10 \text{ g/cm}^3$
Processing Temp	170 – 230 °C
Slip Coefficient	High friction for wet grip
Bonding Substrates	PP, ABS, SAN (via 2K injection molding)

Processing Methods

- 2K Injection Molding (Two-shot)
 - Primary hard plastic (PP/ABS) + overmolded TPE grip
 - Ensures permanent adhesion, design flexibility
- **Insert Molding**: Alternative where 2K molding is unavailable
- Mono-shot Molding: For single-material soft brushes (e.g., toddler toothbrushes)

Compliance & Regulatory

- FDA 21 CFR 177.2600 safe for oral care and food contact
- **REACH, RoHS Compliant** free from SVHCs, heavy metals
- EN71-3 (Toy Safety) safe for children's use
- **Halogen-Free** hygienic and eco-safe disposal

Advantages of Using TPE in Toothbrushes

- Gentle feel on hands and gums
- Improves brushing control and ergonomics
- Supports aesthetic flexibility (color, texture)
- Medical and oral-grade safety certified
- Process-efficient in large-scale molding operations

Industries Served

- Oral Care & Hygiene
- Personal Care & Grooming
- Pediatric Healthcare Products
- Promotional Gifting (toothbrush + hygiene kits)

Common User Queries Answered by Chatbot

Q: What material is used in the soft grip of toothbrushes?

A: The soft grips and head pads are typically made from TPE (Thermoplastic Elastomer), chosen for its soft, rubber-like feel and skin safety.

Q: Is the toothbrush grip material safe for children?

A: Yes. TPE grades used in toothbrushes are EN71 and FDA compliant, ensuring safe use even for toddlers.

Q: Will the TPE grip detach over time?

A: No. In 2K injection molding, the TPE is chemically bonded to the PP or ABS handle, ensuring long-term durability.

Q: Can we use TPE for the tongue cleaner part of the brush?

A: Absolutely. TPE provides ideal softness, flexibility, and hygiene for tongue scrubbing areas.

Q: Is this material recyclable?

A: Yes. TPE is a recyclable thermoplastic and can be reprocessed in the manufacturing line.

Application: Blinker Stay (Automotive Indicator Mounting Bracket)

Recommended Material

- Thermoplastic Elastomer (TPE) for flexible yet durable stays
- Thermoplastic Vulcanizate (TPV) preferred for high-heat, vibration-prone areas
- Alternate: Glass-filled Polypropylene (if rigidity is more critical than flexibility)

What is a Blinker Stay?

A **blinker stay** is the structural or semi-flexible **mounting component** that holds the **turn indicator** (**blinker**) in position on a two-wheeler or automotive body. It is expected to absorb minor impacts, resist vibrations, and retain form over time despite continuous thermal and mechanical loading.

Why TPV/TPE for Blinker Stays?

- **High Flex-Fatigue Resistance**: Allows repeated flexing without cracking
- Shock Absorption: Withstands minor impacts and road vibration
- Excellent Weatherability: UV, ozone, and temperature resistant
- Chemical Resistance: Withstands automotive oils, greases, and road chemicals
- **Design Flexibility**: Can be injection molded into custom shapes
- **Durability**: Outperforms PVC or traditional rubbers in long-term aging

Technical Specifications

Property	Typical Range
Shore Hardness	60–85 Shore A (for flexible-mount designs)
Tensile Strength	8 – 15 MPa (TPV grade)
Elongation at Break	250 – 400%
Flexural Modulus	20 – 150 MPa (depending on rigidity)
Operating Temperature	–40 °C to +125 °C (TPV)
UV & Ozone Resistance	Excellent (ideal for outdoor vehicle parts)

Processing Methods

- Injection Molding: Most common method for precise, repeatable production
- Extrusion: Used in continuous-profile blinker stay covers or boot-type stays
- Overmolding (optional): For integrated mounting systems on headlight or body panels

Material Selection Guide Based on Design

Stay Design	Recommended Material
Rigid with some flexibility	TPV (with moderate Shore A)
Fully flexible boot-type	TPE (soft SEBS-based)
High-load rigid types	Glass-filled PP or PA6

Compliance

- **Automotive OEM Grade** (UL94 HB, ISO 3795 for flammability)
- **REACH / RoHS Compliant** free of SVHCs
- Weather & UV Stability meets long-term exterior durability tests
- Color Stability black masterbatch compatible for fade-resistance

Advantages of TPE/TPV in Blinker Stays

- Maintains elasticity and integrity in outdoor conditions
- Doesn't crack or harden in low or high temperatures
- Resistant to oil drips, brake fluid, and road salts
- Lightweight and cost-effective versus metal alternatives
- Simplifies production with recyclable thermoplastic processing

Industries Served

- Two-Wheeler Manufacturers (motorcycles, scooters)
- Passenger and Commercial Vehicle OEMs
- Automotive Aftermarket Part Suppliers
- Injection Molding Component Suppliers

Common User Queries Answered by Chatbot

Q: What material is best for making blinker stays?

A: TPV is preferred due to its flexibility, heat resistance, and long-term durability in automotive conditions.

Q: Will TPE or TPV survive outdoor exposure?

A: Yes. Both materials have excellent UV, ozone, and weather resistance, making them ideal for external automotive parts.

Q: Can the blinker stay be injection molded?

A: Absolutely. TPV and TPE are fully compatible with standard injection molding for automotive-grade precision.

Q: Are these materials compliant with automotive safety standards?

A: Yes. Our grades meet REACH, RoHS, and flammability standards (ISO 3795/UL94 HB).

Q: Can this be used in flexible or boot-type stays?

A: For boot-type flexible designs, soft TPE (40–60 Shore A) is ideal. For semi-rigid, TPV in 70–85 Shore A range is recommended.

Application: Weather Strip (Sealing Profiles for Automotive & Industrial Use)

Recommended Material

- Thermoplastic Vulcanizate (TPV) industry standard for automotive and durable weather seals
- Thermoplastic Elastomer (TPE) used for soft-touch and flexible industrial sealing strips
- Optional Co-Extrusion: TPV + rigid PP or metal insert for dual-hardness profiles

What is a Weather Strip?

A weather strip (or weatherseal) is a flexible sealing component used to close gaps between moving or fixed parts in a vehicle or industrial enclosure, protecting against:

- Water ingress
- Dust and particulate intrusion
- Noise and vibration

• Air drafts and heat loss

Weather strips are critical for **NVH** (**Noise**, **Vibration**, **Harshness**) performance in vehicles and **IP-rated sealing** in industrial systems.

Why TPV/TPE for Weather Strips?

- Superior Elastic Recovery: Seals tightly without permanent deformation
- Thermal Stability: Functions across wide automotive temperature cycles
- Weather & UV Resistance: Long-term durability in outdoor exposure
- **Lightweight**: Lower weight than EPDM rubber or PVC
- **Process Efficiency**: Easier extrusion and corner welding than rubber
- **Eco-Friendly**: Fully recyclable (vs. thermoset rubbers)

Technical Specifications

Property	Typical Range (TPV Grade)
Shore Hardness	40 – 90 Shore A
Tensile Strength	8 – 15 MPa
Elongation at Break	200 – 400%
Compression Set	<30% (at 70°C for 22 hrs)
Operating Temperature	–40 °C to +135 °C
UV/Ozone Resistance	Excellent
Co-Extrudability	With PP, metal inserts

Processing Methods

- Extrusion (primary): For long-profile sealing strips, edge protectors
- **Co-Extrusion**: Combines soft TPV with rigid PP base or carrier bead
- Corner Welding / Splicing: Enables frame-like full perimeter seals
- **Profile Notching / Adhesive Backing:** For customized fit and installation

Design Options

• Hollow Bulb Seals – compressible and ideal for door closure

- Flap Seals used in trunk, hood, window trim
- **D-Seals / P-Seals** industrial enclosures, cabinet doors
- Glass Run Channels guides and seals side-window glass

Compliance & Certifications

- Automotive OEM Approved Grades
- REACH & RoHS Compliant
- Weathering ISO 4892 and UV ISO 877 compliant
- **Flammability**: UL94 HB or FMVSS 302 (for interior seals)
- Noise Sealing: Meets SAE J1400 NVH requirements

Industries Served

- Automotive OEM & Tier-1 (doors, hoods, trunks, sunroofs)
- Rail & Mass Transit (compartment doors, emergency exits)
- HVAC & Appliance Sealing (refrigerators, air handling units)
- Industrial Enclosures (IP-rated cabinets, telecom shelters)

Advantages of TPV/TPE in Weather Strips

- Replaces EPDM with better processability and recyclability
- Maintains seal elasticity under repeated compression
- Bonds well in co-extruded multi-material profiles
- Available in matte or gloss finishes
- Can integrate flocked, adhesive, or metal-insert features

Common User Queries Answered by Chatbot

Q: What material is best for long-lasting weather strips?

A: TPV is the industry-standard material due to its high UV stability, elasticity, and thermal resistance.

Q: Can weather strips be made via extrusion?

A: Yes, TPV and TPE are ideal for profile extrusion and can be co-extruded with rigid supports.

Q: Will these materials perform in extreme outdoor conditions?

A: TPV can handle –40°C to +135°C and is resistant to ozone, UV, and moisture—ideal for exterior seals.

Q: Do you offer dual-hardness profiles?

A: Yes, we supply grades that support co-extrusion with PP or metal inserts for structural flexibility.

Q: Are TPV seals recyclable?

A: Yes. TPV is a thermoplastic elastomer and is fully recyclable, unlike thermoset rubbers.

Application: Gear Knob (Automotive Transmission Handle)

Recommended Material

- Thermoplastic Elastomer (TPE) ideal for soft-touch surface layers
- Thermoplastic Vulcanizate (TPV) for more durable, UV-resistant performance
- Inner Core: Often made from ABS, PP, or POM (with overmolded TPE/TPV)

What is a Gear Knob?

A **gear knob** is the **manual interface** for operating the vehicle's transmission. It must offer a comfortable grip, resist surface wear, and withstand environmental stress like UV exposure, temperature fluctuations, and contact abrasion from hands.

Most modern gear knobs are **dual-shot molded** components, featuring a hard plastic or metal core with a soft, durable outer shell made from **TPE** or **TPV**.

Why TPE/TPV for Gear Knobs?

- Ergonomic Soft Touch: Ensures driving comfort with a rubber-like surface
- Excellent Abrasion Resistance: Withstands daily wear from hand contact
- UV and Heat Stability: Suitable for hot automotive interiors
- Sweat and Oil Resistance: Resists hand oils, cleaning chemicals
- **Overmolding Compatibility**: Bonds with PP, ABS, PC, or metal inserts
- Color & Texture Versatility: Can be finished in leather-feel, matte, or gloss

Technical Specifications

Property	Typical Range (TPE/TPV)
Shore Hardness	60 – 85 Shore A
Tensile Strength	10 – 20 MPa
Elongation at Break	300 – 500%
Heat Resistance	Up to 130 °C (TPV)
UV & Ozone Resistance	High (for long-term cabin use)
Chemical Resistance	Good – resists skin oils, cleaners, sweat

Processing Methods

- **2K Injection Molding**: TPE/TPV is overmolded onto a hard core (ABS, PP, or metal)
- **Insert Molding**: For integration with pre-manufactured inner cores
- **Texture Finishing:** Grain-textured molds used to simulate leather or rubber grip

Design Considerations

- Custom Hardness Zones: Soft-touch zone for fingers, firm base for structure
- Aesthetic Options: Colored or painted inlays, logos, texture gradients
- Variants: Manual gear knobs, automatic shift knobs, rotary knobs (for EVs)

Compliance & Automotive Standards

- REACH & RoHS Compliant
- Interior Flammability: Meets FMVSS 302 / ISO 3795
- Low VOC Grades: Available for OEM automotive interior compliance
- Fogging & Odor Test: Passes DIN 75201 / VDA 270 (interior safety and smell standards)

Industries Served

- Passenger Vehicle OEMs (manual & automatic gear knobs)
- Commercial Vehicles (trucks, buses)
- Luxury & Electric Vehicle Interior Suppliers

• Aftermarket Automotive Accessory Manufacturers

Common User Queries Answered by Chatbot

Q: What material is used for the soft surface of gear knobs?

A: TPE or TPV is used for the outer soft-touch layer due to its comfort, abrasion resistance, and UV stability.

Q: Will the material fade or crack in sunlight?

A: No. TPV and UV-stabilized TPE grades are engineered to resist sunlight, ozone, and interior heat over many years.

Q: Can the gear knob be overmolded directly onto metal?

A: Yes. TPE/TPV grades can be overmolded onto compatible substrates like PP, ABS, and metal cores using 2K molding.

Q: Are the materials compliant with automotive interior safety standards?

A: Yes. We supply REACH, RoHS, and FMVSS 302-compliant grades with low VOC and odor for cabin applications.

Q: Can we achieve a leather-like texture with TPE?

A: Absolutely. Mold textures can replicate leather, matte, or high-gloss finishes directly onto the TPE surface.

Application: HVAC Part (Seals, Grommets, Dampers, and Flexible Connectors)

Recommended Materials

- Thermoplastic Vulcanizate (TPV) for long-term heat aging and flexibility
- Thermoplastic Elastomer (TPE) for soft sealing, gaskets, or vibration dampening components
- Silicone Masterbatch Additive for surface slip, anti-squeak, and mold release
- **Impact Modifiers** for rigid PP-based HVAC housings requiring improved toughness (optional)

What Are HVAC Parts in Polymer Applications?

HVAC parts encompass **thermoplastic-based components** used in the ducting, sealing, and mounting systems within automotive and industrial HVAC assemblies. These include:

Air outlet seals

- Flap/damper gaskets
- Flexible connectors
- Vibration isolators
- Tube holders
- Housing seals and grommets

Why Use TPV/TPE in HVAC Systems?

- **Temperature Resistance**: Operates reliably from -40 °C to +125 °C
- Fatigue Durability: Withstands long-term flexing and actuation cycles
- Sealing Efficiency: Prevents air leakage and maintains duct pressure integrity
- **Vibration & Noise Damping**: Improves HVAC NVH (noise, vibration, harshness) performance
- Weather & Ozone Resistance: Ideal for under-hood and cabin-facing applications
- Recyclability: Easier to process and recycle than EPDM or PVC

Key Technical Specifications

Property	Typical Range (TPV/TPE)
Shore Hardness	40 – 80 Shore A (seals & gaskets)
Tensile Strength	8 – 15 MPa
Compression Set	<30% at 70 °C / 22 hrs
Elongation at Break	200 – 400%
Thermal Stability	-40 °C to +125 °C (TPV)
Resistance to HVAC Fluids	High – tolerates condensation, dust, oils
UV & Ozone Resistance	Excellent

Common HVAC Polymer Components

- Air Mixer Flap Seals TPE gaskets reduce air bleed
- **Duct Grommets** vibration dampening, air-tight sealing
- **Tube & Hose Clamps** flexible TPV straps or clip inserts
- **Air Filter Seal Rings** TPE seals for tight fitting and low VOC

- **Damper Hinge Pads** soft TPE for noise reduction at pivot points
- Flexible Joint Couplings extruded TPV/TPE sleeves for duct flexibility

Processing Methods

- Injection Molding: Complex grommets, seals, and connectors
- Extrusion: Long profile ducts, bellows, flexible sleeves
- **2K Overmolding**: Soft seal over rigid PP duct frame or housing
- **Co-Extrusion**: Rigid/soft dual-material profiles

Compliance & Certifications

- REACH, RoHS Compliant
- Low VOC Emission Grades for interior air quality standards
- Thermal Aging Resistance tested per ASTM D573
- Noise & Acoustic Standards SAE J1400, ISO 3382 (where applicable)

Industries Served

- Automotive HVAC (OEM and Tier-1 suppliers)
- Commercial HVAC (duct seals, silencers, filter systems)
- White Goods (refrigerator and air conditioner gasket seals)
- Appliance and Electrical Enclosures (airflow regulation components)

Advantages of Using TPV/TPE for HVAC Parts

- No post-curing like rubber
- Consistent sealing force across temperature ranges
- Good bonding with PP, ABS, and PA materials
- Moldable into complex geometries
- Lightweight and recyclable alternative to EPDM or PVC

Common User Queries Answered by Chatbot

Q: What polymer is best for flexible air duct seals in HVAC?

A: TPV is ideal due to its thermal aging resistance, elasticity, and excellent sealing behavior across a wide temperature range.

Q: Can these materials be used in under-hood HVAC parts?

A: Yes. TPV performs well under the thermal and chemical exposure found in engine compartments.

Q: Do you offer low-VOC grades for cabin air systems?

A: Absolutely. We supply low-emission TPV/TPE grades that meet automotive interior air quality norms.

Q: Are these HVAC parts recyclable?

A: Yes. TPE and TPV are both thermoplastics and can be reprocessed unlike vulcanized rubber.

Q: What processing method is used for air flap seals?

A: These are typically produced using injection molding with TPV or soft TPE grades in 60–70 Shore A.

Application: Seat Belt Grommet / Cover

(Also known as seat belt pass-through, escutcheon, or trim collar)

Recommended Materials

- Thermoplastic Elastomer (TPE) for soft-touch grommet lips and flexible collars
- Thermoplastic Vulcanizate (TPV) for durable, UV-stable, and heat-resistant covers
- **Base Support (Optional)**: Polypropylene (PP) or ABS for rigid frames with overmolded elastomer seal

What is a Seat Belt Grommet / Cover?

A **seat belt grommet or cover** is the trim part through which the seatbelt emerges from the pillar or seat frame. It protects the belt webbing, improves aesthetics, **reduces abrasion**, and often includes a **flexible sealing lip or dust cover**.

These are typically mounted:

- At the B-pillar of passenger vehicles
- On seats in integrated seat belt systems
- Along SUV 3rd-row seatbelt exits

Why TPE / TPV for Grommets and Covers?

- Soft Contact Surface: Protects seat belt webbing from fraying or wear
- Elastic Flexibility: Allows belt angle movement without hard-edge contact
- Abrasion Resistance: Long-life under repeated belt sliding cycles
- UV and Heat Resistance: Withstands long-term exposure inside vehicle cabins
- Low VOC & Odor: Suitable for automotive interiors
- **Bonding Compatibility**: Supports overmolding onto PP, ABS, or POM frames

Technical Specifications

Property	TPE/TPV Range
Shore Hardness	50 – 80 Shore A (TPE lips); 80–95A (TPV frame)
Tensile Strength	10 – 18 MPa
Elongation at Break	200 – 500%
Compression Set	<25% (at 70 °C)
Thermal Range	–40 °C to +125 °C (TPV)
UV/Ozone Resistance	Excellent (for interior/exposed trims)
Coefficient of Friction	Low to medium (reduces belt wear and drag)

Processing Methods

- **2K Injection Molding**: Soft TPE or TPV lip overmolded onto rigid PP/ABS frame
- Mono-shot Molding: For one-piece flexible designs (used in budget models)
- Insert Molding: Overmolding onto pre-formed decorative bezels or frames

Design Options

- Flush-Mount Grommets with minimal projection
- Tilt-Assist Grommets accommodate belt retraction movement
- **Sealed Collars** dust-proof designs for SUV / commercial seating
- **Decorative Finishes** textured, matte, or high-gloss

Compliance & Standards

- REACH & RoHS Compliant
- FMVSS 302 / ISO 3795 interior flammability
- VDA 270 odor testing for interior plastic trims
- Low VOC Grades for automotive cabin air quality compliance
- Scratch & Mar Testing per ASTM D1044 for surface retention

Industries Served

- Passenger Vehicle OEMs (SUVs, sedans, hatchbacks)
- Commercial Vehicles (bus, van, pickup)
- Automotive Seating System Suppliers
- Aftermarket Seatbelt Kits & Accessories

Advantages of Using TPE/TPV in Seat Belt Grommets

- Prevents webbing damage and enhances belt retraction smoothness
- Improves in-cabin aesthetics with premium finish
- Resists cracking, hardening, or discoloration over years of use
- Compatible with soft-touch and textured mold finishes
- Recyclable and more sustainable than rubber or PVC

Common User Queries Answered by Chatbot

Q: What material is used for soft seatbelt grommets?

A: TPE or TPV is used for their soft, flexible, and abrasion-resistant properties.

Q: Will the material scratch or damage the seatbelt?

A: No. These materials are specifically chosen for their low-friction and soft-touch surface, preventing wear on the webbing.

Q: Are these materials UV-stable and heat resistant?

A: Yes. TPV grades used for seatbelt grommets are engineered for long-term cabin exposure and meet automotive interior standards.

Q: Can this part be molded in two materials?

A: Absolutely. 2K injection molding allows a rigid carrier with a soft elastomer seal around the belt opening.

Q: Is the material REACH and RoHS compliant?

A: Yes. All seatbelt grommet grades offered are fully compliant with automotive environmental and safety directives.

Application: Sticky Toy (Stretchable, Tacky Play Object) / Chipkoo Toy/ Chipku Toy/ Chip Chip Toy

Also referred to as: sticky hands, wall crawlers, splat toys, or squishy slingers

Recommended Material

- Ultra-Soft Thermoplastic Elastomer (TPE) specially formulated SEBS-based grades
- Plasticizer-Modified TPE for ultra-low Shore hardness and enhanced tackiness
- No PVC or Silicone due to safety, recyclability, and regulation preferences

What is a Sticky Toy?

A sticky toy is a soft, flexible, and stretchable toy that adheres temporarily to smooth surfaces such as walls, tiles, glass, or hands. Designed for tactile fun, slinging, or sticking play, these toys must be non-toxic, soft, washable, and safe for children.

These toys require extremely low Shore hardness (as low as 0–10A) and customized tack-modifiers for stickiness without permanent adhesion or residue.

Why TPE for Sticky Toys?

- Ultra-Low Hardness: Mimics gel-like feel without liquid content
- Tacky Surface: Adheres to smooth surfaces for play (non-permanent)
- Non-Toxic & Safe: Free of phthalates, PVC, silicone, or heavy metals
- Washable & Reusable: Regains stickiness after rinsing with water
- Stretchable & Tear Resistant: Survives pulling, slinging, twisting
- Colorable & Moldable: Can be formed into animals, hands, characters

Key Technical Specifications

Property	Typical Value / Range
Shore Hardness	0 – 10 Shore A (extremely soft)
Tensile Strength	1 – 3 MPa
Elongation at Break	500 – 800%
Tackiness Index	High (custom-modified for playful adhesion)
Density	$0.90 - 1.05 \text{ g/cm}^3$
Recovery Speed	Fast rebound without memory effect
Washability	Excellent – recovers after dust removal
Additives	Safe mineral oils, slip control agents (optional)

Processing Methods

- Injection Molding: Small sticky shapes and characters
- **Open Pour Molding**: For complex toys with cavities
- **Hand Molding**: For custom toy kits and batch production
- **Coloring**: Compatible with non-migratory colorants and glitter inclusions

Compliance & Safety Standards

- EN71 Part 3 (Toy Safety Europe)
- ASTM F963 (Toy Safety USA)
- REACH & RoHS Compliant
- Phthalate-Free, PVC-Free, BPA-Free
- **Heavy Metal Testing**: Passed (Pb, Cd, Hg, Cr VI)
- Migration Testing: Meets limits for saliva and skin contact

Packaging & Handling Tips

- Store in **dust-free**, **dry packaging** to maintain tack
- Toys can be washed with **mild soap and water** to restore stickiness
- Avoid exposure to oily or painted surfaces (may stain)

• Shelf-life: up to **2 years** if sealed and stored below 40 °C

Industries Served

- Toy Manufacturers (OEM and Private Label)
- Party Supplies and Return Gift Makers
- Promotional Gifting (licensed cartoon themes)
- Educational Play Material Suppliers
- Sensory & Occupational Therapy Toys (in gel grades)

Common User Queries Answered by Chatbot

Q: What material is used for sticky wall-crawling toys?

A: These toys are made using ultra-soft SEBS-based TPE compounds specially modified to be stretchy, safe, and sticky.

Q: Is the stickiness permanent? Will it leave marks?

A: No. The tackiness is temporary and designed for clean, residue-free sticking on smooth surfaces like glass or tile.

Q: Are these toys safe for children?

A: Yes. Our materials comply with EN71 and ASTM F963 standards and are free from phthalates, PVC, and heavy metals.

Q: Can these toys be recycled or reprocessed?

A: Yes. TPE is a recyclable thermoplastic and can be re-melted in controlled environments, although sticky toy compounds are often customized.

Q: What happens if the toy gets dirty or dusty?

A: Simply rinse it with mild soap and water to restore its stickiness and clarity.

Application: Crazy Ball (High-Bounce Elastic Toy Ball)

Recommended Material

- **High-Rebound Thermoplastic Elastomer (TPE)** SEBS or SIS-based
- Alternate: TPR (for more economical, slightly firmer versions)
- **Silicone-Free**: For ease of processing and recyclability

What is a Crazy Ball?

A **crazy ball** is a small, elastic toy ball designed to **bounce extremely high and unpredictably** when thrown or dropped. It is intended for recreational use and sensory stimulation, commonly sold in toy sets, vending machines, or promotional kits.

The material must combine **high elasticity**, **energy return**, and **durability** while complying with global **toy safety standards**.

Why TPE for Crazy Balls?

- **High Rebound Efficiency**: Returns up to 70–90% of drop energy
- Excellent Elasticity: For lively bounce and shape retention
- Tear & Abrasion Resistance: Withstands frequent impacts
- Safe for Children: Non-toxic, odor-free, soft yet firm feel
- Color Customization: Allows for neon, glitter, glow-in-dark variants
- **Recyclable**: Sustainable alternative to thermoset rubber

Key Technical Specifications

Property	Typical Range
Shore Hardness	50 – 80 Shore A (optimum balance of bounce and toughness)
Rebound Ratio	70% – 90% (from 100 cm height)
Tensile Strength	6 – 12 MPa
Elongation at Break	300 – 600%
Specific Gravity	$0.95 - 1.15 \text{ g/cm}^3$
Tear Strength	High – resistant to cracks and splits
Transparency	Transparent to opaque
Optional Additives	Glitter, phosphors (glow), fragrance, glitter inclusions

Processing Methods

- Injection Molding: Most common for smooth round or multi-textured crazy balls
- **Compression Molding:** For glow-in-the-dark and high-volume batches
- Overmolding (Optional): For dual-color, multi-texture designs

Performance Highlights

- Long bounce life with minimal degradation
- Consistent performance over temperature range –10 °C to +60 °C
- Ideal for indoor/outdoor play
- Can be customized in multiple sizes (20 mm to 70 mm+)

Compliance & Safety

- EN71 Parts 1, 2 & 3 European toy safety standards
- **ASTM F963** US toy safety compliance
- **REACH / RoHS Compliant** Free of SVHCs, phthalates, and heavy metals
- Non-PVC, Non-silicone Safer processing and handling
- **No choking hazards** (requires minimum diameter of 32 mm for <3 yrs age)

Industries Served

- Toy Manufacturers
- Party Supply Distributors
- Promotional Gift Industry
- Sensory & Therapy Product Lines
- Vending Machine Product Suppliers

Common User Queries Answered by Chatbot

Q: What material is used to make bouncy crazy balls?

A: Crazy balls are made using high-rebound Thermoplastic Elastomers (TPE) that offer elasticity, toughness, and safety.

Q: Is this material safe for kids?

A: Yes. Our TPE grades are EN71 and ASTM F963 certified, making them completely safe for children's use.

Q: Can I make glow-in-the-dark or glitter balls with this material?

A: Absolutely. TPE supports special effects like glow, glitter, and neon colors without compromising performance.

O: How durable are these balls?

A: They are designed for long-term bounce performance with excellent tear and impact resistance.

Q: Can this material be recycled?

A: Yes. Unlike thermoset rubber, TPE is recyclable and reprocessable, making it eco-friendly.

Application: Wipers – Floor Wipers / Squeegees

Recommended Material

- Thermoplastic Elastomer (TPE) SEBS or SBS-based flexible blade compounds
- **Thermoplastic Vulcanizate (TPV)** for heavy-duty, heat- and solvent-resistant wiper blades
- **Polypropylene** (**PP**) for rigid frame/handle components (often overmolded with TPE)

What is a Floor Wiper?

A **floor wiper** or **floor squeegee** is a cleaning tool used to remove water, soap, or liquid residue from surfaces such as tiles, marble, concrete, or epoxy flooring. It typically consists of:

- A **flexible wiping blade** (rubber-like polymer)
- A rigid plastic frame
- A handle connector

The wiper blade material must combine flexibility, durability, chemical resistance, and recovery after bending.

Why TPE/TPV for Wiper Blades?

- Soft yet Resilient Edge: Removes water efficiently without scratching the floor
- Elastic Recovery: Maintains shape after multiple uses or bending
- Chemical Resistance: Tolerates floor cleaners, detergents, and disinfectants
- **Temperature Resistance**: Withstands hot water cleaning (~90 °C with TPV)
- Non-Tacky, Matte Finish: Avoids residue build-up or dust attraction
- **100% Recyclable**: Sustainable alternative to synthetic rubber

Key Technical Specifications

Property	Typical Range
Shore Hardness	55 – 75 Shore A (optimum for firm yet flexible blade)
Tensile Strength	6 – 12 MPa
Elongation at Break	300 – 500%
Compression Set	<30% (after 24 hrs at 70 °C)
Water & Detergent Resistance	Excellent
Surface Compatibility	Safe for ceramic, granite, marble, concrete

Processing Methods

- Extrusion: Common for long continuous blade profiles
- Injection Molding: For fixed blade heads or multi-part assemblies
- **Co-Extrusion / Overmolding:** For bonding soft TPE blade onto hard PP frame

Design Options

- Single Edge Wipers general home and light commercial use
- **Double Blade Wipers** industrial or automotive garages
- **360° Swivel Head** molded using soft hinge-grade TPE
- Wall-Mount Storage Hooks molded as part of frame

Compliance & Safety

- **REACH and RoHS Compliant** no SVHCs, phthalates, or heavy metals
- **ISO 22196 Compatible** supports antimicrobial grades for hygiene zones
- Low VOC Grades suitable for indoor use in sensitive environments
- Slip and Surface Scratch Testing conforms to household safety norms

Industries Served

• Household & Cleaning Product Manufacturers

- Janitorial Equipment OEMs
- Facility Management Tools
- Hospitals and Commercial Kitchens
- Automotive Workshops & Industrial Floors

Advantages of TPE/TPV in Floor Wipers

- Long service life without cracking or hardening
- Does not leave streaks or scuff marks
- Safe for all flooring types including polished and porous surfaces
- Easy to color-code for industry/hygiene segregation
- Compatible with recycled content and green labeling

Common User Queries Answered by Chatbot

Q: What material is used in floor wiper blades?

A: TPE or TPV is used for its flexibility, durability, and chemical resistance—ideal for cleaning applications.

Q: Will the wiper scratch polished floors?

A: No. TPE blades are soft enough to prevent scratching and stiff enough to push water effectively.

Q: Is the blade resistant to hot water or acidic cleaners?

A: Yes. TPV grades can tolerate high temperatures and various cleaning chemicals without degrading.

Q: Can the blade be molded in color?

A: Absolutely. TPE can be pigmented in any shade, including translucent, neon, or color-coded variants.

Q: Is the material recyclable?

A: Yes. TPE and TPV are both recyclable thermoplastics and can be reprocessed during manufacturing.

Application: Squeezy Toy

(Also known as: stress ball, squishy toy, fidget toy, sensory toy)

Recommended Material

- Ultra-Soft Thermoplastic Elastomer (TPE) SEBS-based, gel-like grades
- **Plasticized TPE Compounds** for ultra-low Shore A hardness
- Foamed TPE (Optional) for slow-recovery "memory foam" effect
- Filling (if applicable): Air, water-gel beads, starch paste (for enclosed designs)

What is a Squeezy Toy?

A **squeezy toy** is a soft, flexible, and deformable toy that compresses under pressure and returns to its original shape once released. These toys are used for **stress relief**, **hand therapy**, **fidgeting**, or **sensory stimulation**, especially for children and adults with attention or anxiety disorders.

Why TPE for Squeezy Toys?

- **Ultra-Low Hardness**: Feels gel-like and deformable for comfort
- Excellent Elastic Recovery: Returns to shape after repeated squeezing
- Non-Toxic and Skin-Safe: Suitable for extended hand contact
- Washable and Durable: Easy to clean and reusable
- Stretchable Without Tearing: Resists punctures and splits
- Customizable Look and Feel: Can be made glossy, matte, scented, or foamed

Key Technical Specifications

Property	Typical Value
Shore Hardness	0 – 20 Shore A (gel grade TPE)
Elongation at Break	500 – 1000%
Rebound Speed	Fast (for fidget-type) or Slow (for anti-stress slow rise)
Density	$0.90 - 1.15 \text{ g/cm}^3$
Tear Strength	High (especially for closed-cell toys)
Fragrance Compatibility	Compatible with essential oils or safe perfumes
Transparency	Clear to opaque, pigmentable

Processing Methods

- **Injection Molding**: For hollow or filled shapes
- Compression Molding: For larger or semi-rigid formats
- Overmolding (Optional): Soft layer on rigid core
- **Rotomolding / Blow Fill**: For toys with liquid, gel, or bead fillers

Common Squeezy Toy Types

- Stress Balls classic hand exercisers
- Animal-Shape Squishies character-based slow-rise toys
- **Textured Fidget Toys** with bumps, grooves, or spikes
- **Splat Balls** soft shells filled with water/gel
- Glow-in-Dark or Scented Toys enhanced sensory experience

Compliance & Safety

- EN71 Parts 1–3 Mechanical, flammability, and migration safety for toys
- **ASTM F963** US toy safety regulations
- REACH & RoHS Compliant
- Free from PVC, latex, silicone, phthalates, and BPA
- Passed heavy metal migration and saliva-contact tests

Industries Served

- Toy Manufacturers (OEM & Private Label)
- Sensory Toy Suppliers
- Corporate Gift and Wellness Product Makers
- Educational & Therapeutic Toy Brands
- Retail/Online Toy & Fidget Product Resellers

Advantages of Using TPE for Squeezy Toys

- Fully customizable softness and rebound speed
- Odor-free and safe for prolonged skin contact

- Can be foamed, colored, or scented
- Environmentally safer than silicone or PVC-based toys
- Recyclable and thermally reprocessable

Common User Queries Answered by Chatbot

Q: What material is used in soft, squishy stress toys?

A: Most high-quality squeezy toys are made from ultra-soft TPE compounds that are safe, stretchable, and reusable.

Q: Is the material safe for children?

A: Yes. Our TPE compounds meet EN71 and ASTM F963 standards and are free from phthalates, BPA, PVC, and heavy metals.

Q: Will the toy return to its original shape after squeezing?

A: Yes. TPE offers excellent elastic recovery and can be tuned for fast or slow rebound depending on the toy design.

Q: Can these toys be scented or glow-in-the-dark?

A: Absolutely. TPE is compatible with fragrances, glow pigments, and even glitter or glitter-free sparkle effects.

Q: Is the material recyclable?

A: Yes. TPE is a recyclable thermoplastic, making it a more sustainable option than rubber or silicone-based toys.

Application: Castor Wheel (Trolley/Equipment Wheel Components)

Recommended Material

- Thermoplastic Elastomer (TPE) for non-marking, noise-dampening outer tread
- Thermoplastic Vulcanizate (TPV) for outdoor, high-load, or solvent-resistant wheels
- Polypropylene (PP) or Nylon (PA6) for hard center hub/core

What is a Castor Wheel?

A castor wheel is a swiveling or fixed wheel mounted on furniture, equipment, trolleys, or industrial carts. The elastomeric outer material must offer a balance of load-bearing strength, shock absorption, surface protection, and smooth rolling.

Castor wheels typically comprise two material components:

- A hard plastic or metal core (hub)
- A **soft yet durable tread (rim)** made from TPE, TPV, or TPU

Why TPE/TPV for Castor Wheel Treads?

- Excellent Abrasion Resistance: Withstands rolling wear and repeated movement
- Low Noise: Soft tread absorbs sound and vibration
- Non-Marking: Leaves no streaks on floors like polished tile or vinyl
- Oil, Grease & Chemical Resistance: Especially in TPV-based grades
- UV & Weather Resistance: For outdoor carts or industrial use
- **Customizable Hardness**: From soft for smooth indoor floors to hard for rough industrial terrain

Key Technical Specifications

Property	TPE / TPV Range
Shore Hardness	70 – 90 Shore A (depending on load class)
Tensile Strength	10 – 18 MPa
Elongation at Break	250 – 400%
Compression Set	<25% (maintains shape under static loads)
Rebound / Resilience	High (for smooth roll and shock damping)
Load-Bearing Capacity	Up to 150 kg per wheel (with reinforced core)
Temperature Resistance	−30 °C to +120 °C (TPV), +80 °C (TPE)
Floor Compatibility	Marble, PVC, wood, epoxy, tile, concrete

Processing Methods

• **Injection Molding**: For mono-material and two-component caster wheels

- **2K Overmolding**: Soft TPE/TPV tread molded over rigid PP/PA core
- **Insert Molding**: Hub insert bonded with elastomeric rim during molding

Design Types

- Single-Material TPE Wheels for lightweight domestic furniture
- Overmolded Industrial Castors high-load transport systems
- Brake-integrated Castors soft tread enables better grip and hold
- Swivel vs Fixed Mount standard caster head designs

Compliance & Durability Standards

- **REACH & RoHS Compliant** free of heavy metals, phthalates
- Non-Marking Certification confirmed via floor residue testing
- **Noise Level Reduction** up to 30–40% lower than hard rubber
- Friction & Slip Testing conforms to ISO 4649 for wear
- **ISO 22877** Castor fatigue and load bearing tests (for industrial use)

Industries Served

- Furniture & Modular Office Systems
- Hospital Beds and Medical Trolleys
- Supermarket and Warehouse Equipment
- Industrial Material Handling
- Consumer Electronics Stands (printers, CPUs, TV mounts)

Advantages of Using TPE/TPV in Castor Wheels

- Smooth, quiet rolling on delicate or hard surfaces
- Extended lifespan without cracking, flattening, or hardening
- Available in translucent, black, or color-coded options
- Environmentally sustainable and recyclable
- Safer than PVC or thermoset rubber alternatives

Common User Queries Answered by Chatbot

Q: What is the best material for non-marking caster wheels?

A: TPE is ideal for non-marking, silent, and smooth operation on hard floors. For industrial-grade applications, TPV offers better resistance to oils and heat.

Q: Will the wheel deform under weight if left static?

A: No. TPV and high-hardness TPE grades have low compression set and maintain shape under static loading.

Q: Can TPE wheels be used outdoors?

A: Yes. TPV grades, in particular, offer excellent UV and ozone resistance, making them suitable for outdoor or mobile industrial units.

Q: Is the material recyclable?

A: Yes. TPE and TPV are both recyclable thermoplastics, unlike thermoset rubber which cannot be reprocessed.

Q: Are these materials safe for hospital or food service floors?

A: Absolutely. They are non-marking, REACH/RoHS compliant, and resistant to common cleaners and disinfectants.

Application: Eraser (Writing Eraser / Rubber Eraser)

Recommended Material

- Thermoplastic Elastomer (TPE) soft SEBS-based, odorless, phthalate-free grades
- Thermoplastic Rubber (TPR) SBS-based grades for economical, flexible erasers
- Silicone masterbatch not applicable for functional use in erasers, so excluded
- **TPV, Impact Modifiers** not applicable for this application due to rigidity and lack of smear-removal function

Only **TPE** and **TPR** grades are suitable for eraser applications due to their softness, elasticity, clean wipe performance, and safe handling.

What is an Eraser?

An **eraser** is a soft, flexible object used to **remove pencil marks** from paper by gentle abrasion and particle lifting. It must strike a balance between **elasticity**, **softness**, and **friction performance** without smudging or tearing the paper.

Why TPE/TPR for Erasers?

- Soft and Non-Abrasive: Removes graphite without damaging paper fibers
- Clean Erasing: Leaves minimal smudge and fine crumbs
- Non-Toxic and Safe: Phthalate-free, heavy-metal free, and safe for children
- Odorless: Unlike traditional rubber erasers or PVC-based grades
- Moldability: Can be molded into various fun, educational, or functional shapes
- Color Customization: Available in pastel, neon, translucent, or dual-color combinations
- Recyclable: Thermoplastic base allows scrap reprocessing

Key Technical Specifications

Property	Typical Range (TPE/TPR)
Shore Hardness	30 – 55 Shore A (soft enough for paper contact)
Density	$0.95 - 1.10 \text{ g/cm}^3$
Erase Resistance (paper)**	Moderate friction with high elasticity
Compression Recovery	Excellent – retains shape over time
Pigmentability	High (compatible with masterbatches)
Thermal Stability	Up to 80–100 °C processing temp
Safety Grade	EN71, REACH, RoHS compliant

Processing Methods

- **Injection Molding** for shaped erasers (fruit, character, blocks)
- Extrusion & Cutting for rectangular stick erasers
- Overmolding (optional) dual-color or capped design
- Stamping/Branding logo or design engraving during mold stage

Design Flexibility

- Standard Block Erasers rectangular, cylindrical
- Shaped / Novelty Erasers animals, characters, tools, etc.
- Mechanical Pencil Insert Erasers miniature extruded TPE cores
- **Dual-Function Erasers** with plastic grip or dust-free sleeves

Compliance & Safety

- EN71-3 (Toy Safety)
- ASTM F963 (US Children's Products)
- REACH / RoHS Compliant
- Phthalate-Free
- Latex-Free, PVC-Free, BPA-Free
- Migration Testing (saliva and skin contact) Passed

Industries Served

- Stationery Manufacturers
- School & Office Supply Brands
- Promotional Product Companies
- Toy Manufacturers (educational sets)
- Art Material Suppliers

Advantages of Using TPE/TPR in Erasers

- Custom softness and smooth erasing feel
- Environmentally safer than rubber or PVC erasers
- No offensive smell or oily residue
- Recyclable and clean-processing material
- Supports branding and shaping for promotional use

Common User Queries Answered by Chatbot

O: What material is used in modern erasers?

A: Most high-quality erasers today are made from soft TPE or TPR, offering clean erasing, flexibility, and non-toxicity.

Q: Are your erasers safe for children?

A: Yes. Our eraser-grade TPE/TPR complies with EN71, ASTM F963, REACH, and is free from harmful substances like phthalates or heavy metals.

Q: Can erasers be made in different shapes and colors?

A: Absolutely. TPE/TPR is fully moldable and color-compatible, making it ideal for shaped and branded erasers.

Q: Will TPE erasers leave black marks or smudge?

A: No. Our grades are optimized to reduce graphite smearing and produce dry, dust-free erasing performance.

Q: Is the material recyclable?

A: Yes. TPE and TPR are thermoplastics and can be reprocessed, making eraser production more sustainable.

Application: Exercise Band / Grips

Includes resistance bands, hand grips, pull bands, yoga bands, and overmolded handles for gym equipment

Recommended Material

- Thermoplastic Elastomer (TPE) for stretchable, skin-safe resistance bands and soft-touch grips
- **Thermoplastic Rubber (TPR)** for cost-efficient grips with moderate stretch and durability
- Thermoplastic Vulcanizate (TPV) for textured, high-durability grip covers used on dumbbells or gym bars

Note: Silicone masterbatch and impact modifiers are **not used** in this application.

Why TPE/TPR/TPV for Fitness Bands & Grips?

For Exercise Bands:

- **High Elasticity**: Allows controlled resistance across full range of motion
- Soft Skin Contact: Smooth, non-tacky feel even during intense sweating

- Non-Toxic & Hypoallergenic: Ideal for repeated skin exposure
- **Custom Resistance Levels**: Tuned by material formulation and cross-section
- Washable & Recyclable: Can be reused, cleaned, and reprocessed

For Grips / Handles:

- Shock Absorption: Minimizes hand fatigue during workouts
- Anti-Slip Texture: Ensures safe grip, especially when hands are sweaty
- **Durability**: Retains shape even under compression or impact
- Overmolding Friendly: Bonds well to ABS, PP, or metal cores in gym gear

Technical Specifications

Property	TPE / TPR Range
Shore Hardness	20 – 50 Shore A (bands), 60–85 Shore A (grips)
Elongation at Break	600 – 900% (bands), 200 – 400% (grips)
Tensile Strength	5 – 15 MPa
Rebound / Resilience	High – for stretch & release cycles
Slip Resistance	High (grip applications)
Operating Temp	−30 °C to +80 °C
Surface Finish	Matte, grainy, or smooth (customizable)

Processing Methods

- Extrusion: For continuous exercise bands, resistance strips, yoga bands
- **Injection Molding:** For shaped grips, dumbbell handles, grip covers
- **2K Overmolding**: TPE/TPV molded onto rigid PP, ABS, or metal gym tools
- **Texturing**: Molded-in grip patterns for anti-slip performance

Design Options

- Loop Bands used in pilates, yoga, glute exercises
- Flat Resistance Bands for physical therapy, strength training
- **Figure-8 Bands** with molded handles

- **Grips / Hand Pads** overmolded or slip-on for bars, kettlebells, ropes
- **Custom Branding** laser-etched, molded logos, dual-color bands

Compliance & Safety

- **REACH & RoHS Compliant** free from phthalates, heavy metals, SVHCs
- EN71-3 (skin and mouth contact safe)
- Latex-Free Safe for users with latex allergies
- Anti-Sweat Degradation Maintains integrity under exposure to moisture

Industries Served

- Sports & Fitness Equipment Brands
- Yoga & Pilates Product Manufacturers
- Physical Therapy & Rehab Equipment Suppliers
- Gym Machine OEMs (grips for rowing handles, bike bars, etc.)
- Promotional Fitness Kit Providers

Advantages of Using TPE/TPR/TPV in Exercise Bands & Grips

- Customizable resistance or softness
- Safe for skin contact without allergic reactions
- Good tensile memory and surface finish
- Can be co-extruded or overmolded on rigid materials
- Recyclable and eco-friendlier than latex or PVC

Common User Queries Answered by Chatbot

Q: What material is used in resistance exercise bands?

A: High-elasticity TPE is used for most resistance bands due to its stretchability, safety, and non-latex properties.

Q: Are these grips sweat-resistant?

A: Yes. TPE/TPV grips are slip-resistant and maintain their performance even under intense, sweaty conditions.

Q: Will the bands lose elasticity over time?

A: No. Our specially formulated TPE grades have high fatigue resistance and recover even after repeated stretching.

Q: Are the materials safe for people with latex allergies?

A: Absolutely. TPE and TPR are latex-free, phthalate-free, and hypoallergenic.

Q: Can I customize the color and hardness of the grip?

A: Yes. Both bands and grips can be customized in color, Shore hardness, texture, and even branding.

Application: Lunch Box Gasket

Also known as: food container seal, tiffin ring, airtight lid gasket

Recommended Materials

- Thermoplastic Elastomer (TPE) food-grade, soft-touch sealing gaskets
- Thermoplastic Vulcanizate (TPV) for heat- and oil-resistant container applications
- Silicone Masterbatch (as additive) for enhanced slip, anti-stick, and food contact surface performance

TPR and **Impact Modifiers** are **not used** in this application due to regulatory and flexibility constraints.

What is a Lunch Box Gasket?

A lunch box gasket is a flexible, food-grade sealing ring placed in the lid or groove of a food container to create an airtight and leak-proof seal. It ensures preservation of freshness, spillage prevention, and thermal insulation.

Why TPE/TPV for Gasket Seals?

TPE:

- **Soft & Elastic**: Provides tight sealing and easy lid closure
- **Food-Safe**: Complies with global food contact standards
- Color Customizable: Clear, opaque, or colored variants possible
- Low Odor: Odorless even under hot food exposure

TPV:

- **High Heat Resistance**: Suitable for microwave-safe, hot fill containers
- Oil & Grease Resistance: Ideal for Indian oily/masala meals
- Long-Term Elasticity: Retains sealing performance after repeated use/wash cycles

Silicone Masterbatch (Additive in TPE/TPV):

- Enhances surface slip and anti-stick feel
- Improves **mold release** and **dust resistance**
- Maintains **food-grade compliance**

Technical Specifications

Property	TPE / TPV Range
Shore Hardness	30 – 60 Shore A (optimal for soft sealing)
Elongation at Break	300 – 600%
Compression Set	<25% (at 70 °C for 24 hrs)
Operating Temperature	-30 °C to +120 °C (TPE), +135 °C (TPV)
Food Contact Safety	FDA 21 CFR, EU 10/2011, LFGB compliant
Dishwasher Safe	Yes (with proper grade selection)
Oil/Grease Resistance	Excellent (TPV preferred)

Processing Methods

- Injection Molding: For shaped gaskets fitted into container lids
- **Overmolding**: TPE/TPV molded directly onto rigid PP lids or bases
- **Compression Molding**: For flat gasket ring profiles (less common)
- **Co-extrusion** (optional): Dual hardness gasket-lid integration

Design Options

- Flat Ring Gaskets for circular or square lunch boxes
- Channel-Fit Seals inserted into lid grooves
- Overmolded Gaskets integrated into the lid during molding

• Multi-compartment Gasket Systems – for bento or partitioned boxes

Compliance & Safety

- REACH & RoHS Compliant
- FDA 21 CFR 177.2600
- EU 10/2011 and LFGB Germany food contact grades
- Free from PVC, BPA, phthalates, heavy metals
- Odor Migration and Taste Transfer Tests Passed

Industries Served

- Food Storage & Packaging Manufacturers
- Kitchenware & Lunch Box OEMs
- Microwave-Safe and Thermoware Brands
- Retail & Private Label Food Container Brands

Advantages of TPE/TPV in Lunch Box Gaskets

- Flexible and durable seal with repeated opening/closing
- Heat- and oil-resistant suitable for Indian-style meals
- Easy to wash, dishwasher safe, and food safe
- Moldable in transparent or colored finishes
- Recyclable and non-toxic (unlike silicone rubber or PVC)

Common User Queries Answered by Chatbot

Q: What material is used for airtight lunch box gaskets?

A: We use food-grade TPE or TPV that provides a soft, leak-proof seal and is safe for direct food contact.

Q: Is the gasket microwave and dishwasher safe?

A: Yes. TPV is highly heat resistant and can safely be used in microwave-safe and dishwasher-safe containers.

Q: Will the gasket absorb food smells or become oily?

A: No. TPV and properly formulated TPE are resistant to oil and odor absorption. They retain cleanliness after multiple washes.

Q: Are your gaskets food-safe and BPA-free?

A: Absolutely. Our materials comply with FDA, EU 10/2011, and REACH safety standards. They are BPA- and phthalate-free.

Q: Can I get colored or transparent gasket rings?

A: Yes. We can customize TPE/TPV in clear, pastel, neon, or brand-specific colors with food-grade masterbatches.

Application: Gaskets and Seals

Includes static and dynamic seals for enclosures, appliances, automotive, industrial panels, lids, and more

Recommended Materials

- Thermoplastic Elastomer (TPE) for soft, compressible, and reusable gaskets
- Thermoplastic Vulcanizate (TPV) for long-term sealing in harsh environments
- **Silicone Masterbatch** used as an **additive** in TPE/TPV to improve surface slip, anti-stick properties, and long-term flexibility

TPR is not commonly used for structural seals or gaskets due to limited thermal and oil resistance. **Impact modifiers** are not applicable to this use case.

What are Gaskets and Seals?

Gaskets and seals are compressible components used to fill the gap between two mating surfaces to prevent leakage of air, water, dust, oil, or other contaminants. They can be:

- Static seals: Non-moving, like lid gaskets or panel enclosures
- **Dynamic seals**: Interfaces that experience movement or vibration, like automotive door or engine seals

Why TPE/TPV for Gaskets and Seals?

TPE:

- **Soft & Compressible**: Excellent for low-pressure static sealing
- Flexible & Resilient: Maintains shape over multiple open/close cycles

- Color & Transparency Options: Suitable for consumer-facing applications
- **Overmolding Friendly**: Bonds well to PP, ABS, or PC parts

TPV:

- **High Heat Resistance**: Stable up to 135 °C continuous use
- **Excellent Chemical Resistance**: Withstands oils, greases, and cleaners
- Superior UV & Ozone Resistance: Ideal for outdoor/exposed gaskets
- Long-Term Compression Set Performance: Maintains seal integrity over time

Silicone Masterbatch (Additive Use):

- Enhances **surface slip** for easier lid removal or dynamic movement
- Reduces dust attraction and friction
- Improves mold release and surface quality

Key Technical Specifications

Property	TPE / TPV Range
Shore Hardness	30 – 90 Shore A (customizable per sealing pressure)
Compression Set	<25% after 22 hrs at 70 °C
Tensile Strength	8 – 15 MPa
Elongation at Break	200 – 500%
Operating Temperature	-40 °C to +120 °C (TPE), +135 °C (TPV)
Chemical Resistance	Excellent with TPV (oils, cleaners, automotive fluids)
UV/Ozone Resistance	High with TPV and UV-stabilized TPE grades

Processing Methods

- Injection Molding: For complex gasket geometries or integrated sealing features
- Extrusion: Continuous profiles for weatherstrips, panel gaskets, door seals
- **Co-Extrusion**: Rigid + soft sections for clip-on or push-fit seals
- **2K Overmolding:** TPE/TPV sealing ribs on rigid PP/ABS substrates

Application Segments

- **Automotive**: Door seals, window seals, HVAC flaps, battery gaskets
- **Electrical Enclosures**: IP-rated cabinet and junction box seals
- Consumer Goods: Jar lids, lunch boxes, kitchen appliances
- Industrial Machinery: Vibration and chemical-resistant static seals
- Medical & Lab Devices: Non-toxic TPE grades for sample container seals

Compliance & Safety

- REACH & RoHS Compliant
- EN71 / FDA 21 CFR available (for food-contact and toy sealing)
- Low VOC Grades for automotive interiors
- UL 94 HB / ISO 3795 flame resistance available on request
- **Halogen-Free and Latex-Free** suitable for sensitive environments

Advantages of TPE/TPV in Gasket and Seal Applications

- Molded precision with tight tolerances
- Excellent elastic recovery and cycle durability
- Lightweight and recyclable greener than rubber
- Cost-effective in both low and high-volume production
- Compatible with automated sealing system designs

Common User Queries Answered by Chatbot

Q: What material do you recommend for high-heat gaskets?

A: TPV is ideal for high-temperature environments up to $135\,^{\circ}\text{C}$ and offers superior long-term sealing.

Q: Can your seals be used outdoors?

A: Yes. Our TPV grades offer excellent UV, ozone, and weather resistance, perfect for outdoor sealing applications.

Q: Are the materials suitable for food and medical contact?

A: We offer FDA- and EN71-compliant TPE grades that are safe for food and healthcare applications.

Q: Do you offer extruded sealing profiles?

A: Yes. We supply TPE/TPV in continuous extruded profiles as well as injection-molded gaskets.

Q: Will the gasket deform over time?

A: No. Our materials are engineered for low compression set, retaining elasticity even after long-term compression.

Application: Handle Grip

Used in tools, bicycles, appliances, fitness equipment, consumer goods, and packaging

Recommended Materials

- Thermoplastic Elastomer (TPE) soft-touch, ergonomic, and overmolding-compatible
- Thermoplastic Rubber (TPR) cost-effective grips with good elasticity and grip feel
- Thermoplastic Vulcanizate (TPV) for outdoor or chemically exposed handle grips
- **Silicone Masterbatch** (as additive only) for anti-slip, low-friction, and dry-touch surface properties

Impact Modifiers are **not used** directly in handle grips, as they are not standalone elastomers.

What is a Handle Grip?

A handle grip is a molded or overmolded component designed to improve ergonomics, safety, and comfort in any product that is operated by hand. This includes:

- Bicycle handles
- Hand tools (screwdrivers, pliers)
- Kitchen appliances
- Fitness and sports equipment
- Luggage handles and caps

Why TPE/TPR/TPV for Handle Grips?

TPE:

- **Soft-Touch Feel**: Comfortable for long usage
- Excellent Processability: Easily overmolded onto rigid substrates

- Color Customization: Available in custom brand colors
- Slip Resistance: Grippy even when wet or sweaty

TPR:

- **Cost-Effective**: Suitable for mass-market consumer tools
- Moderate Durability: Good for low-to-medium duty grips
- SBS-Based Grades: Ideal for extruded and molded grip sleeves

TPV:

- Weather and Chemical Resistance: Ideal for outdoor tools, automotive grips
- **High Heat Tolerance**: Maintains grip integrity under harsh conditions
- Long-Term Flexibility: Does not crack or harden over time

Silicone Masterbatch (additive use):

- Enhances anti-slip and anti-dust surface
- Improves release properties and touch feel
- Optional for **premium or performance-grade grips**

Technical Specifications

Property	Typical TPE/TPR/TPV Range
Shore Hardness	40 – 90 Shore A (adjustable by product use)
Tensile Strength	8 – 15 MPa
Elongation at Break	250 – 500%
Compression Set	<30%
Grip Coefficient	High (dry and wet conditions)
UV & Chemical Resistance	Good (Excellent in TPV)
Temperature Resistance	-30 °C to +120 °C (TPV), +90 °C (TPE/TPR)

Processing Methods

- Injection Molding: Most common for shaped or textured handle covers
- **2K Overmolding**: TPE/TPV molded over rigid PP, ABS, or metal cores

- **Extrusion**: Tubular sleeves for bike or tool handles
- **Texturing & Embossing**: Molded patterns for enhanced grip and branding

Design Variants

- Ergonomic Grips contoured shape to reduce hand fatigue
- **Dual-Material Grips** rigid inner core + soft elastomer shell
- **Ventilated or Grooved Grips** for airflow and anti-slip
- **Color-Coded Handles** for safety tools or brand identity

Compliance & Safety

- **REACH & RoHS Compliant** free from phthalates and heavy metals
- EN71 / FDA Grades Available for food-contact or children's products
- Low VOC Grades for use in automotive interiors or odor-sensitive applications
- Sweat- and Oil-Resistant Grades ideal for gym, kitchen, or industrial tools

Industries Served

- Tool & Hardware OEMs
- Bicycle & Scooter Manufacturers
- Consumer Appliance Brands
- Health & Fitness Equipment Suppliers
- Packaging (cosmetic tube handles, caps)
- Automotive Interior Trim (e.g., hand brakes, armrest grips)

Advantages of TPE/TPR/TPV in Handle Grips

- Superior comfort and fatigue reduction
- Durable in dynamic, high-use environments
- Bondable to a variety of rigid plastics and metals
- Aesthetic freedom (color, transparency, texture)
- Recyclable and clean-processing alternative to rubber or PVC

Common User Queries Answered by Chatbot

Q: What material is best for soft, non-slip handle grips?

A: TPE is preferred for soft-touch, anti-slip grips, while TPV is ideal for outdoor and high-durability environments.

Q: Can these grips be molded in two colors or materials?

A: Yes. TPE and TPV can be used in 2K (dual-shot) injection molding for stylish, functional two-tone grips.

Q: Are these grips sweat- and oil-resistant?

A: Yes. TPE/TPV materials offer excellent resistance to oils, sweat, and mild chemicals.

Q: Will the grips degrade in sunlight or outdoor use?

A: TPV is UV- and ozone-resistant, making it suitable for outdoor grips on tools, sports gear, or cycles.

Q: Are these grips recyclable and non-toxic?

A: Absolutely. All grades offered are REACH and RoHS compliant, recyclable, and safe for skin contact.

Application: Bush

Also known as: rubber bush, vibration isolator, pivot bushing, suspension damper, or mechanical sleeve

Recommended Materials

- Thermoplastic Elastomer (TPE) for flexible, medium-load mechanical dampening applications
- Thermoplastic Vulcanizate (TPV) for high-load, high-heat automotive and industrial bushings
- Thermoplastic Rubber (TPR) for low-cost, low-stress bushings in consumer goods
- Silicone Masterbatch / Impact Modifiers not directly applicable

Bushings rely heavily on **resilience**, **compression recovery**, and **chemical resistance** — making **TPE and TPV** the most suitable among your offerings.

What is a Bush?

A bush (or bushing) is a cylindrical component inserted between two parts to absorb shocks, reduce vibrations, and dampen motion. It acts as a flexible interface that reduces noise, wear, and mechanical stress. Common types include:

- Pivot bushings
- Suspension bushes
- Steering system bushings
- Tool or machinery vibration dampers

Why TPE/TPV/TPR for Bush Applications?

TPE:

- Moderate Load Absorption: Suitable for consumer appliances and light-duty machinery
- **Soft Damping**: Helps isolate low-frequency vibrations
- **Bondable to Plastics**: Ideal for integrated components in consumer or electronics enclosures

TPV:

- **High Elastic Modulus**: Handles dynamic and static loads in industrial and automotive environments
- Excellent Oil & Heat Resistance: Performs in greasy or engine-adjacent conditions
- Fatigue & Tear Resistant: Ideal for long-life vibration dampening

TPR:

- Flexible & Economical: Cost-effective for low-end bushing or grommet applications
- Easy to Process: Good for insert-molded bushings or protective sleeves

Technical Specifications

Property	TPE / TPV / TPR Range
Shore Hardness	50 – 90 Shore A (based on load requirement)
Compression Set (70 °C)	<25% (TPV), <30% (TPE/TPR)
Tensile Strength	8 – 15 MPa
Elongation at Break	200 – 400%
Dynamic Fatigue Resistance	High (especially TPV)
Operating Temperature	-40 °C to +120 °C (TPV), +90 °C (TPE/TPR)

Processing Methods

- **Injection Molding** for precision-fit bushes used in automotive, white goods, or machinery
- Overmolding to bond elastomeric bush onto rigid substrates (e.g., metal shaft + bushing)
- Insert Molding TPV/TPE molded around a core or bearing
- Compression Molding optional for large or non-uniform bush sizes

Design Configurations

- Cylindrical Bushes common in suspension or vibration mounts
- Flanged Bushes for locked-in axial fit
- Split Bushes allow easy installation post-assembly
- Custom Geometry grooves, ribs, or hollow centers for specific load transfer patterns

Applications by Industry

- **Automotive** Control arms, steering joints, engine mounts
- **Appliances** Washing machine dampers, motor mounts
- Industrial Equipment Anti-vibration pads, mounts for compressors/pumps
- Consumer Electronics Shock mounts in fans, motors, and enclosures
- **Furniture/Packaging** Protective pads and mounts

Advantages of Using TPE/TPV/TPR in Bush Applications

- Tailored hardness and elasticity
- Durable under continuous vibration or rotation
- Chemical and environmental resistance (TPV)
- Easy integration with thermoplastics or metals
- Recyclable and cost-efficient over rubber alternatives

Common User Queries Answered by Chatbot

Q: What material is suitable for heavy-duty bushings in high-heat zones?

A: TPV is recommended due to its superior compression set, heat resistance, and fatigue properties.

Q: Can I use TPE bushes in household appliances?

A: Yes. TPE is suitable for low- to mid-load appliances such as fans, washing machines, or compressors.

Q: Do these bushes degrade when exposed to oil or grease?

A: No. TPV is oil- and grease-resistant, making it suitable for automotive and industrial lubrication environments.

Q: Are your materials moldable over metal shafts or inserts?

A: Yes. Our TPE and TPV grades are overmolding-compatible with various substrates.

Q: Can bushes be made in different colors or durometers?

A: Absolutely. We can customize hardness (Shore A) and pigmentation as per your application.

Application: Intradental Brush

Also known as: interproximal brush, interspace brush, gum cleaner, interdental cleaner

Recommended Materials

- Thermoplastic Elastomer (TPE) for ultra-soft bristles and gum-safe flexible tips
- Thermoplastic Rubber (TPR) for cost-effective molded bristle heads and flexible shafts
- **Silicone Masterbatch** (*optional*) to enhance surface smoothness or dry-touch feel in premium products

TPV and Impact Modifiers are **not used** due to their rigidity and unsuitability for oral contact or fine-tip processing.

What is an Intradental Brush?

An **intradental brush** is a small, flexible cleaning tool designed to **remove plaque and food debris** from between the teeth, especially in tight interproximal spaces that toothbrushes can't reach. The head may consist of:

- A soft elastomeric cone or bristle array
- A **twist-wire shaft** for flexible movement

• A **soft-grip handle** for precision control

Why TPE/TPR for Intradental Brushes?

TPE:

- Ultra-Soft Flexibility: Gently cleans between teeth without damaging gums
- **Biocompatible and Non-Toxic**: Safe for daily oral use
- Moldable into Fine Bristle Geometry: Precision tip profiles possible
- Low Water Absorption: Maintains hygiene and prevents bacterial growth

TPR:

- Low-Cost Alternative: Suitable for disposable or travel variants
- Moderate Elasticity: Sufficient for short-use, medium-soft bristles
- Consistent Moldability: Good flow for multi-cavity molds

Silicone Masterbatch:

- Enhances surface finish and non-stick feel
- Reduces dust or lint attraction
- Optional in premium oral-care variants

Technical Specifications

Property	TPE / TPR Range
Shore Hardness (Bristles)	5 – 30 Shore A (for soft gum-safe tips)
Shore Hardness (Handle)	50 – 70 Shore A
Elongation at Break	300 – 600%
Tensile Strength	5 – 10 MPa
Water Absorption	<0.2%
Processing Temp.	180–220 °C
Biocompatibility	Yes – FDA 21 CFR / ISO 10993 compliant grades available
Taste & Odor	Neutral (low VOC grades)

Processing Methods

- **Micro-Injection Molding**: For fine elastomeric bristle arrays
- **Overmolding**: Soft TPE tip over rigid core or wire brush stem
- **2K Tooling**: Dual-shot TPE handle with a soft-grip or textured surface
- **Insert Molding**: Metal or nylon shaft insert with TPE overmolded bristle

Design Options

- Conical Bristle Tips for tighter interproximal access
- Cylindrical Heads for uniform gap cleaning
- **Angled Handles** for rear molar accessibility
- **Grip Zones** with matte-finished TPE overmolds
- Color-Coded Sizes indicating gap compatibility (e.g., 0.4 mm to 1.5 mm)

Compliance & Safety

- FDA 21 CFR compliant (oral contact safe)
- **ISO 10993** Biocompatibility (upon request)
- EN71-3 (non-toxic elements)
- REACH & RoHS Compliant
- Latex-Free, BPA-Free suitable for sensitive users

Industries Served

- Oral Care & Dental Hygiene Brands
- Private Label Toothbrush Manufacturers
- Healthcare Distributors & Clinics
- Travel Hygiene Kits
- Elderly or Orthodontic Care Products

Advantages of Using TPE/TPR in Intradental Brushes

- Gentle on gums, yet effective in removing plaque
- Safe for daily use inside the mouth

- Highly customizable tip geometries
- Cost-effective and recyclable
- No leaching or taste alteration during use

Common User Queries Answered by Chatbot

Q: What material is safe and soft for gum cleaning?

A: TPE with Shore A 5–20 is ideal for soft, flexible gum-safe bristle tips.

Q: Will the material leave any taste or odor in the mouth?

A: No. We use food- and oral-grade TPE/TPR with neutral taste and low VOC content.

Q: Can the bristle be molded into very fine tips?

A: Yes. TPE micro-injection molding allows precise and ultra-soft tip formation.

Q: Is the material latex-free and hypoallergenic?

A: Yes. All TPE/TPR grades used in this application are latex-free, BPA-free, and non-allergenic.

Q: Can I use TPR for budget intradental brushes?

A: Yes. TPR is suitable for short-use, disposable or economy-range intradental products.

Application: Razor Grip

Also referred to as: shaving razor handle grip, ergonomic razor sleeve, soft-touch grip for razors

Recommended Materials

- Thermoplastic Elastomer (TPE) for a soft, anti-slip, skin-safe gripping surface
- Thermoplastic Rubber (TPR) for cost-effective grip components with flexible texture
- **Silicone Masterbatch** (as additive) for enhanced dry-touch feel and dust resistance in premium razors

TPV and **Impact Modifiers** are not preferred for this application due to reduced softness and tactile performance.

What is a Razor Grip?

A **razor grip** is the elastomeric, often contoured section of a manual shaving razor designed to provide:

- Comfortable handling during wet use
- Anti-slip performance in soap or water
- Aesthetic differentiation and ergonomic control

It is commonly overmolded onto a rigid ABS/PP frame, forming the final product body.

Why TPE/TPR for Razor Grip Applications?

TPE:

- Soft-Touch and Flexible: Enhances comfort and control during shaving
- **High Wet Friction**: Maintains grip in slippery environments
- **Hygienic and Biocompatible**: Safe for prolonged skin contact
- Color Customization: Compatible with brand aesthetics

TPR:

- Budget-Friendly Option: Suitable for mass-market disposable razors
- Good Softness and Elasticity: Provides sufficient grip texture for short-term use
- Moderate Chemical Resistance: Tolerates shaving cream, water, and soaps

Silicone Masterbatch:

- Adds dry-touch and anti-slip texture
- Reduces surface tackiness and improves cleanability
- Optional for **premium grooming tool ranges**

Technical Specifications

Property	Typical TPE / TPR Range
Shore Hardness	30 – 70 Shore A (ideal range for grip comfort)
Elongation at Break	250 – 500%
Surface Friction (wet)	High $(\mu > 0.6)$
Water Absorption	<0.2%
Biocompatibility	Yes – FDA 21 CFR / ISO 10993 available
Chemical Resistance	Resistant to soaps, creams, water
Processing Temperature	180 °C – 220 °C

Processing Methods

- **2K Overmolding** TPE/TPR molded directly onto ABS/PP razor handle core
- Insert Molding Elastomer layer formed around blade mechanism base
- **Textured Molding Surfaces** For grip-enhancing ribbed, dotted, or grooved finishes
- Color Segmentation Dual-color tooling for visual brand identity

Design Features Enabled

- Ergonomic Finger Zones Molded indentations or ribs for control
- **High-Friction Texture** Dot matrix, ridges, or wave patterns
- **Aesthetic Color Blocking** Multi-tone brand aesthetics
- Flush Fitment Seamless integration with blade and handle units

Compliance & Safety

- FDA 21 CFR compliant (skin and hygiene safety)
- REACH & RoHS Compliant
- ISO 10993 medical skin contact grades available
- Free from BPA, latex, and phthalates

Industries Served

- Personal Grooming & Hygiene
- Private Label Razor Manufacturers
- Travel & Disposable Razor Brands
- Premium Grooming Kits
- Skin Care & Cosmetic OEMs

Advantages of Using TPE/TPR in Razor Grips

- Soft and secure feel in both dry and wet hands
- Easy to process with consistent mold flow

- Recyclable and odor-neutral
- Compatible with modern razor designs and automated assembly
- Adds premium tactile appeal at low additional cost

Common User Queries Answered by Chatbot

Q: What material is used in soft-touch razor grips?

A: We use TPE or TPR, which offer a secure, skin-friendly grip even when wet.

Q: Can this material be overmolded onto a plastic razor body?

A: Yes. TPE/TPR grades are designed for 2K overmolding onto PP, ABS, and other engineering plastics.

Q: Is it safe for skin and long-term contact?

A: Absolutely. Our grades comply with FDA 21 CFR and ISO 10993 biocompatibility standards.

Q: Does the grip retain friction in water or soap?

A: Yes. TPE/TPR grips provide high wet-surface traction, essential for safety during shaving.

Q: Do you offer colored or dual-tone grip options?

A: Yes. Both TPE and TPR can be customized for aesthetic finishes, colors, and branding.

Application: Earphone Plug

Also known as: audio jack cover, aux plug sleeve, connector boot, strain relief plug

Recommended Materials

- Thermoplastic Elastomer (TPE) for flexible, overmolded connector boots and plug sleeves
- Thermoplastic Rubber (TPR) for cost-effective jack plug covers with sufficient elasticity
- **Silicone Masterbatch** (*optional additive*) to improve smoothness, flexibility, and anti-dust properties

TPV and **Impact Modifiers** are not suited for this application due to excessive stiffness and limited overmolding compatibility for miniature electronics.

What is an Earphone Plug?

An earphone plug consists of:

- A **metal jack terminal** (usually 3.5 mm or USB-C)
- A strain relief sleeve molded in soft material to protect the wire entry point
- A grip section or boot that allows secure insertion/removal
- Optional branding ring or color-coded cap

TPE or TPR is used to mold this outer layer, which plays a key role in **wire protection**, **aesthetics**, **and handling**.

Why TPE/TPR for Earphone Plug Applications?

TPE:

- Excellent Elasticity & Softness: Provides effective strain relief without cracking
- Overmold Compatibility: Bonds well to ABS, PC, or metal plug stems
- **Precision Molding:** Supports thin-walled, miniature profiles
- Color and Texture Control: Offers aesthetic flexibility in consumer electronics

TPR:

- **Budget-Friendly Option**: Ideal for high-volume audio accessories
- Moderate Flexibility: Supports strain absorption at the wire entry
- Easy Moldability: Works well with single or multi-cavity molds

Silicone Masterbatch (as additive):

- Reduces **dust pick-up** and tackiness
- Adds a premium dry-touch finish
- Enhances **low-temperature flexibility**

Technical Specifications

Property	TPE / TPR Range
Shore Hardness	40 – 70 Shore A
Flexural Fatigue Life	High – engineered for repeated bending cycles
Elongation at Break	300 – 500%
Compression Set	<30%

Surface Friction	Adjustable (grippy or smooth finish)
Operating Temperature	−30 °C to +90 °C
Water & Sweat Resistance	Excellent
Electrical Conductivity	Non-conductive (insulative)

Processing Methods

- Micro-Injection Molding: For thin, precision plug sleeves
- **2K Overmolding**: TPE directly molded over plug stem or wire
- **Insert Molding**: Overmold around cable core or connector terminals
- Embossed/Engraved Grip Textures: For better handling and branding

Design Features Enabled

- Strain Relief Boots to prevent wire snapping near the plug
- Anti-Slip Grips ridged or textured surface for easier unplugging
- **Color Coding** to indicate left/right, microphone, or branding
- Flush or Bulged Styles depending on device form factor

Compliance & Safety

- **RoHS and REACH Compliant** no phthalates, heavy metals, or restricted substances
- Latex-Free & Halogen-Free
- Low VOC Grades safe for consumer contact
- Electrically Insulative protects from accidental current exposure

Industries Served

- Consumer Electronics
- Mobile Accessories
- Audio Equipment & Wearables
- OEM Cable Assemblers
- Travel Gadget Manufacturers

Advantages of Using TPE/TPR in Earphone Plugs

- Durable under repeated plug-in/unplug cycles
- Soft, flexible strain relief for longer cable life
- Enhanced appearance and user comfort
- Customizable design for brand differentiation
- Fully recyclable and low-waste production

Common User Queries Answered by Chatbot

Q: What material is best for the soft cover over audio jacks?

A: TPE is preferred due to its flexibility, durability, and bonding capability with plastics and metals.

Q: Will the plug grip become sticky or dusty over time?

A: No. With optional silicone masterbatch or matte surface finish, the plugs remain smooth and clean.

Q: Can the material be used in very thin sections?

A: Yes. TPE and TPR are suitable for micro-injection molding of thin-walled parts.

Q: Is the material safe and compliant with electronic standards?

A: Yes. All materials are REACH, RoHS, and halogen-free certified, ensuring electrical safety and environmental compliance.

Q: Can I get plugs in different colors and textures?

A: Absolutely. We offer a wide range of colors, finishes, and embossing for functional and aesthetic needs.

Application: Data Cable

Also referred to as: USB cable, Type-C charging cable, mobile cable, OTG cable, Lightning cable

Recommended Materials

- Thermoplastic Elastomer (TPE) ideal for flexible cable jackets, strain reliefs, and connector grips
- Thermoplastic Rubber (TPR) suitable for low-cost jackets and molded plugs

• **Silicone Masterbatch** (as additive) – enhances flexibility, dry-touch surface, and anti-tack behavior

TPV and **Impact Modifiers** are not recommended due to high rigidity and limited wire-coating flexibility.

What is a Data Cable?

A **data cable** is an electrical assembly designed to transfer power and digital signals between devices. The key TPE/TPR components include:

- Outer Sheath (Cable Jacket) protects internal conductors from mechanical damage
- Strain Relief Boot prevents wire fatigue at connector junction
- Connector Overmold forms the plug grip and housing around USB, Lightning, or Type-C terminals

Why TPE/TPR for Data Cable Applications?

TPE:

- **Highly Flexible**: Enables coiling, bending, and twisting without cracking
- **Durable Outer Jacket**: Abrasion-resistant, suitable for daily-use cables
- Safe for Skin Contact: Ideal for consumer electronics
- Low-Temperature Flexibility: Retains performance even in cold conditions

TPR:

- Cost-Effective: Suitable for mass-market or disposable USB cables
- Moderate Elastic Recovery: Performs well for static or limited-movement usage
- Good Molding Performance: Compatible with cable jacketing and plug overmolding

Silicone Masterbatch (additive use):

- Improves smoothness and non-sticky finish
- Reduces **dust attraction**
- Enhances **dry-touch feel** in premium-grade cables

Technical Specifications

Property	TPE / TPR Range
Shore Hardness	45 – 80 Shore A (cable jacket), 60–70 Shore A (plug overmold)
Flexural Modulus	Low (for high cable flexibility)
Elongation at Break	300 – 600%
Abrasion Resistance	Excellent (especially in TPE)
Bending Life (Cable Flex)	>10,000 cycles @ ±90° bend
Electrical Insulation	Non-conductive (suitable for sheath & plug)
Working Temperature Range	−30 °C to +90 °C
Flame Retardancy	UL94 HB grades available

Processing Methods

- Wire Coating (Extrusion) continuous TPE/TPR sheathing over conductor cores
- **Injection Molding** plug housing and strain relief boots
- **2K Overmolding** combining soft grip zone with rigid core plug
- Laser Marking / Branding compatible on surface

Design Variants

- Flat Cable Jackets TPE makes flat or oval cables easy to mold
- Tangle-Free Spiral Designs soft elastic jackets that spring back to shape
- Braided or Coated Options TPE can be used as inner jacket under nylon braiding
- **Dual-Color Overmolds** adds branding and port identification

Compliance & Safety

- **RoHS & REACH Compliant** free from restricted substances
- **Halogen-Free** safer during combustion
- No BPA, Latex, or Phthalates skin- and eco-safe
- Odor-Free & Low VOC Grades ideal for personal electronics

Industries Served

- Mobile Accessories (OEM & ODM)
- Consumer Electronics & Gadgets
- Computer Peripherals
- Charging and Data Cable Assemblers
- Travel & Retail Packaging Cable Kits

Advantages of Using TPE/TPR in Data Cables

- High flexibility for long-term usage
- Resistance to everyday wear and abrasion
- Customizable texture, finish, and color
- Compatible with standard cable production machinery
- Safe for skin contact and daily use
- Environmentally better than PVC or rubber

Common User Queries Answered by Chatbot

Q: What material is used in soft-touch data cable jackets?

A: TPE is widely used for flexible, soft-touch, and durable outer jackets of USB and charging cables.

Q: Is this material safe for consumer contact and indoor use?

A: Yes. TPE and TPR used in cable jackets are RoHS-compliant, latex-free, and safe for prolonged handling.

Q: Do these materials resist cracking or hardening over time?

A: Absolutely. TPE and TPR maintain flexibility and mechanical integrity even under frequent bending and environmental exposure.

Q: Can your material support tangle-free and flat cable designs?

A: Yes. TPE is ideal for flat, spiral, or braided cable architectures.

Q: Will the plugs get sticky or attract dust?

A: No. We can include silicone masterbatch to enhance anti-stick and anti-dust surface characteristics.

Application: Swimming Ear Plugs

Also known as: swim plugs, reusable ear protectors, aquatic ear inserts

Recommended Materials

- Thermoplastic Elastomer (TPE) for ultra-soft, flexible, reusable plugs with skin-friendly properties
- Thermoplastic Rubber (TPR) suitable for budget-friendly variants with moderate softness
- Silicone Masterbatch (optional) enhances comfort, water repellence, and non-tackiness on surface

TPV and **Impact Modifiers** are **not suitable** due to excessive rigidity and poor ear-canal compatibility.

What Are Swimming Ear Plugs?

Swimming ear plugs are **soft**, **non-porous devices** designed to be inserted into the outer ear canal to **prevent water ingress during swimming or water sports**. These plugs must be:

- Soft and hypoallergenic
- Easily moldable to ear shape
- Reusable or disposable depending on design

TPE and TPR are ideal due to their **rubber-like elasticity**, **comfort**, **and safety** for contact with the inner ear.

Why TPE/TPR for Swimming Ear Plugs?

TPE:

- Ultra-Soft Elasticity: Adapts to ear canal shape for watertight seal
- **Biocompatible and Latex-Free**: Safe for daily or prolonged use
- **Reusability**: Maintains integrity over multiple uses
- Low Water Absorption: Prevents bacterial growth and moisture retention

TPR:

• Cost-Effective Option: Suitable for single-use or bulk-packaged plugs

- **Moderate Softness**: Adequate for adult-use plug variants
- Simplified Molding: Good for basic plug geometry production

Silicone Masterbatch (additive use):

- Adds dry, smooth touch
- Reduces dust attraction and stickiness
- Enhances surface feel and skin comfort

Technical Specifications

Property	TPE / TPR Range
Shore Hardness	15 – 40 Shore A (soft enough for inner ear)
Elongation at Break	300 – 600%
Compression Set	<25% (TPE), <30% (TPR)
Water Absorption	<0.2%
Reusability Cycles	>50 cycles (TPE), ~20–30 cycles (TPR)
Skin Contact Safety	FDA / ISO 10993 compliant grades available
Odor	Neutral (low-VOC)

Processing Methods

- Injection Molding for standard or contoured plug designs
- **Multi-Cavity Tooling** efficient mass production
- Overmolding (Optional) for dual-tone, grip-enhanced designs
- Embossing / Brand Marking on plug surface or storage case

Design Variants

- Flanged Plugs multi-step seal design for enhanced fit
- Moldable Ball Plugs customizable shape by user
- Stem or Tab Styles for easy removal
- Floating Plugs specific gravity can be adjusted with compound design

Compliance & Safety

- FDA 21 CFR Compliant for inner body and mucous membrane contact
- **ISO 10993** Biocompatibility grades available
- REACH and RoHS Compliant
- Latex-Free, Phthalate-Free, BPA-Free

Industries Served

- Personal Hygiene & Swim Gear
- Medical & ENT Protection Products
- Sports Equipment OEMs
- Travel & Outdoor Gear Brands
- Baby and Kids Product Lines

Advantages of Using TPE/TPR in Swimming Ear Plugs

- Safe for direct insertion into the ear canal
- Retains shape and seal even after prolonged use
- Non-toxic and odor-free
- Easily sterilizable and water-resistant
- Customizable softness and colors for various age groups

Common User Queries Answered by Chatbot

Q: What is the softest material suitable for reusable swim plugs?

A: TPE with Shore A hardness between 15–25 offers the best balance of comfort and sealing.

Q: Can these plugs be used multiple times without losing shape?

A: Yes. TPE plugs are reusable for dozens of cycles with minimal deformation.

Q: Is the material safe for sensitive ears or children?

A: Absolutely. We offer hypoallergenic, latex-free, FDA-compliant TPE suitable for sensitive users.

Q: Will the material absorb water or become slippery?

A: No. TPE/TPR has very low water absorption, and optional silicone masterbatch ensures non-slip, dry-touch finish.

Q: Do you offer floating variants for water safety?

A: Yes. Density-adjusted TPE compounds can be formulated to float in water.

Application: Shuttlecock

Also known as: synthetic shuttle, nylon shuttlecock, plastic badminton birdie

Recommended Materials

- **Thermoplastic Elastomer (TPE)** for flexible skirt (feather replacement) and shockabsorbing base
- Thermoplastic Rubber (TPR) for durable, moderately elastic skirt and impact-resistant base
- Silicone Masterbatch (optional) enhances bounce consistency and softens base feel

TPV and **Impact Modifiers** are generally not used due to stiffness and incompatibility with elastic feather-like applications.

What Is a Shuttlecock?

A **shuttlecock** is the projectile used in badminton. It features:

- A **feathered or synthetic skirt** (aerodynamic fins)
- A hemispherical base or tip (for racket impact)
- Made from natural feathers or molded thermoplastics for recreational and training purposes

TPE/TPR-based synthetic shuttles offer **consistent flight performance**, **weather resistance**, and **longer lifespan** than feathered alternatives.

Why TPE/TPR for Shuttlecock Applications?

TPE:

- Feather-Like Flexibility: Mimics real feather recoil and flight
- Excellent Impact Recovery: Withstands high-speed racket hits
- **Customizable Stiffness**: Skirt stiffness can be tuned for beginner, intermediate, or pro speeds
- Lightweight with Dimensional Stability

TPR:

- Tough and Durable: Suitable for rough recreational or outdoor play
- Moderate Elasticity: Acceptable flex-return for skirt elements
- **Cost-Effective**: Ideal for mass-market shuttle production

Silicone Masterbatch (optional):

- Improves **shock absorption** and **grip texture** on the base
- Adds a **dry-touch** feel to prevent stickiness during hot or humid play

Technical Specifications

Component	TPE / TPR Range
Skirt Shore Hardness	40 – 70 Shore A (flexible yet recoilefficient)
Base Shore Hardness	60 – 80 Shore A (firm but cushioned contact)
Specific Gravity	0.9 – 1.1 (lightweight for proper lift)
Rebound Energy	High (for accurate bounce off racket)
UV Stability	Yes (optional additives)
Operating Temperature	−20 °C to +70 °C
Weather Resistance	Excellent (vs. feathered types)

Processing Methods

- **Injection Molding** for base and skirt as separate or integrated parts
- **2K Molding** soft skirt with harder base in dual-shot assembly
- Blow Molding (in limited use) for hollow skirt design in low-cost shuttles
- **Color Compounding** customizable for speed coding (red, blue, green tips)

Design Variants Enabled

- One-Piece Shuttles skirt and base molded as a single unit
- Two-Piece Shuttles detachable or bonded base + skirt designs
- Color Coded Tips indicate speed (slow/medium/fast)

• **Textured Base Ring** – for improved racket feel and durability

Compliance & Safety

- REACH & RoHS Compliant
- Free from BPA, Latex, and Heavy Metals
- Odor-Neutral ensures player comfort
- Non-toxic Grades Available for Youth or School Use

Industries Served

- Sports & Athletic Equipment OEMs
- School and Institutional Sports Suppliers
- Recreational Toy Brands
- Training & Practice Equipment Manufacturers

Advantages of Using TPE/TPR in Shuttlecocks

- Durable under repeated high-velocity impacts
- Provides feather-like flex for recreational play
- Retains performance in all weather conditions
- Lightweight and safe for indoor use
- Fully recyclable material alternatives to feathered types

Common User Queries Answered by Chatbot

Q: What material is used in synthetic shuttlecock skirts?

A: TPE is ideal, offering a good combination of flexibility, resilience, and consistent flight.

Q: Are the shuttle bases soft or hard?

A: The base is usually firmer (60–80 Shore A) to absorb impact while giving accurate rebound, especially with TPE or TPR.

Q: Can the skirt mimic real feather performance?

A: Yes. Specially formulated TPE can simulate the aerodynamic flutter and flexibility of real feathers.

Q: Are these materials weatherproof for outdoor play?

A: Yes. TPE/TPR shuttlecocks perform consistently in humidity, heat, and light rain.

Q: Is the shuttle material recyclable and safe?

A: Absolutely. Our materials are eco-safe, RoHS/REACH compliant, and suitable for all ages.

Application: Cricket Bat Grip

Also known as: bat handle grip, rubber grip sleeve, sports bat grip

Recommended Materials

- Thermoplastic Elastomer (TPE) preferred for high-friction, shock-absorbing bat grips
- Thermoplastic Rubber (TPR) suitable for economical, elastic grip sleeves
- **Silicone Masterbatch** (as additive) enhances dry-touch, reduces tackiness, and adds antislip properties

TPV and **Impact Modifiers** are **not suitable** due to higher rigidity and poor elastomeric rebound behavior.

What is a Cricket Bat Grip?

A **cricket bat grip** is the elastomeric sleeve that covers the handle of a cricket bat to provide:

- Firm hold and anti-slip control
- Shock absorption during ball impact
- Sweat resistance and comfort
- Branding, texture, and visual styling

Why TPE/TPR for Cricket Bat Grip Applications?

TPE:

- Superior Grip & Comfort: Maintains high friction even in sweaty hands
- Vibration Damping: Absorbs shock during high-impact strokes
- Patterned Texture Compatibility: Supports ribbed, chevron, or honeycomb patterns
- Weather Resistant: Does not degrade in sun or rain

TPR:

- **Cost-Effective**: Ideal for budget or mass-market sports accessories
- Moderate Elastic Recovery: Retains form under repeated use
- Easier Molding: Suited for standard extrusion or compression molding

Silicone Masterbatch (optional):

- Provides dry-touch feel
- Improves grip in humid or dusty environments
- Adds anti-stick and anti-dust surface characteristics

Technical Specifications

Property	TPE / TPR Range
Shore Hardness	40 – 70 Shore A (depending on user preference)
Elongation at Break	300 – 600%
Coefficient of Friction	High (anti-slip)
Compression Set	<25%
Specific Gravity	0.9 - 1.1
UV Resistance	Optional grades available
Operating Temp. Range	−20 °C to +80 °C

Processing Methods

- Extrusion primary method for cylindrical sleeve formation
- **Compression Molding** for textured, patterned, or dual-tone grips
- **Dip Molding (Less Common)** for ultra-soft or custom-fit grips
- Embossing & Branding logos or design features molded into surface

Design Features Enabled

- **Ribbed / Chevron Patterns** improves tactile feedback
- **Dual Hardness Zones** combines soft grip with firm control
- **Color Variants** easy identification and customization
- **Sweat-Wicking Grooves** designed for longer match comfort

Compliance & Safety

- REACH and RoHS Compliant
- Latex-Free, BPA-Free, and Phthalate-Free
- Low VOC / Odor-Free Grades
- Non-toxic for sports and prolonged hand contact

Industries Served

- Sports Equipment Manufacturers (Cricket, Baseball, etc.)
- OEM Sports Accessory Brands
- Kids and Youth Sports Product Lines
- Retail & Training Equipment Suppliers

Advantages of Using TPE/TPR in Cricket Bat Grips

- Soft, non-slip control for better batting performance
- Durable under high friction and frequent use
- Does not degrade with sweat or UV exposure
- Multiple textures, finishes, and color customizations
- Recyclable and non-toxic alternative to rubber grips

Common User Queries Answered by Chatbot

O: What is the best material for non-slip cricket bat grips?

A: TPE is ideal due to its soft, high-friction surface and long-lasting flexibility.

Q: Do the grips stay firm in hot or sweaty conditions?

A: Yes. TPE and TPR are formulated to retain grip and shape in sweat and heat.

Q: Are these grips reusable or replaceable?

A: They are reusable for extended use but easily replaceable with standard bat handle sizes.

Q: Can you provide patterned or dual-tone grips?

A: Yes. Textures, colors, and branding can all be customized via compression or dual extrusion molding.

Q: Are your bat grips safe for kids and youth players?

A: Absolutely. All our grip materials are REACH/RoHS compliant and free from harmful additives.

Application: TT Bat Pads

Also known as: Table Tennis bat grips, racket handle pad, paddle overgrip, soft grip cushion

Recommended Materials

- Thermoplastic Elastomer (TPE) for soft-touch, slip-resistant grip wraps or molded pads
- Thermoplastic Rubber (TPR) for basic grip sleeves and value-focused options
- **Silicone Masterbatch** (*optional*) enhances anti-slip surface, reduces sweat tackiness, and improves tactile feedback

TPV and **Impact Modifiers** are not suitable due to higher stiffness and poor elasticity in soft touch applications.

What Are TT Bat Pads?

TT bat pads are **ergonomic layers or sleeves** applied to the handle of table tennis paddles to:

- Improve **grip and control** during high-speed rallies
- Provide comfort and shock absorption
- Reduce **vibration fatigue** for longer play sessions
- Prevent slipping in humid or sweaty conditions

They are either:

- Molded elastomeric grips that slide over the handle
- Wrap-style pads or overgrips that adhere or stretch around the handle

Why TPE/TPR for TT Bat Pad Applications?

TPE:

- **High Elasticity & Softness** conforms easily to the paddle handle
- Excellent Grip Under Moisture performs well even during sweat build-up
- Shock Absorption dampens vibrations for enhanced control

• **Skin-Friendly Surface** – suitable for long-duration use

TPR:

- **Cost-Efficient Solution** ideal for disposable or training-use grips
- Moderate Cushioning decent comfort and impact control
- Color Variety & Branding compatible with multiple dyes and surface designs

Silicone Masterbatch (optional):

- Adds a **dry-touch feel** to TPE surfaces
- Enhances anti-dust and anti-slip characteristics
- Reduces **surface stickiness** in hot climates

Technical Specifications

Property	TPE / TPR Range
Shore Hardness	30 – 60 Shore A (varies with grip thickness)
Elongation at Break	300 – 500%
Compression Set	<25% (TPE), <30% (TPR)
Coefficient of Friction	High (non-slip)
Water Absorption	<0.5%
Specific Gravity	0.9 - 1.1
UV Resistance	Optional
Working Temperature	−20 °C to +70 °C

Processing Methods

- Extrusion for continuous wrap strips or grip sleeves
- **Compression Molding** for embossed, contoured, or ribbed grips
- Injection Molding for customized ergonomic handle pads
- Surface Embossing brand logos, anti-slip textures, or moisture channels

Design Features Enabled

• Embossed Patterns – chevron, dotted, or ribbed grip textures

- **Dual-Color Layers** for style differentiation
- **Sweat-Wicking Channels** grooves to route away moisture
- **Custom Branding** embossed or printed logos

Compliance & Safety

- RoHS & REACH Compliant
- Latex-Free, Phthalate-Free, and Odorless
- Low VOC Formulations suitable for prolonged hand contact
- Safe for Youth and Tournament Use

Industries Served

- Sports Equipment Manufacturers (Table Tennis)
- Training Gear & Accessories OEMs
- School & Recreational Sports Suppliers
- Branded TT Paddle Makers

Advantages of Using TPE/TPR in TT Bat Pads

- Soft and ergonomic hold for precision gameplay
- Consistent grip across climate and sweat conditions
- Easily moldable for contoured or flat wraps
- Customizable in texture, color, and branding
- Durable yet recyclable material alternative to rubber

Common User Queries Answered by Chatbot

Q: What material gives the best grip for table tennis bats?

A: TPE is ideal for high-friction, soft-touch grips that provide control and comfort.

Q: Do the grip pads absorb moisture or become sticky?

A: No. With TPE + silicone masterbatch, the grip remains dry and non-sticky even in sweat.

Q: Are these pads reusable or replaceable?

A: Yes. They are reusable, washable, and can be easily replaced or interchanged.

Q: Are the pads safe for kids and youth players?

A: Absolutely. All our materials are certified non-toxic, latex-free, and RoHS/REACH compliant.

Q: Can you supply custom textures or embossed designs?

A: Yes. We offer compression-molded pads with customized patterns and branding.

Application: Badminton Racket Grip

Also known as: racket handle grip, overgrip tape, replacement grip, badminton overwrap

Recommended Materials

- **Thermoplastic Elastomer (TPE)** for premium soft-touch, sweat-resistant, and slip-free grips
- **Thermoplastic Rubber (TPR)** suitable for economical grip designs with moderate elasticity
- **Silicone Masterbatch** (as additive) enhances anti-slip, dry-touch, and anti-tack performance

TPV and **Impact Modifiers** are not recommended due to excessive rigidity and reduced cushioning properties.

What is a Badminton Racket Grip?

A **badminton grip** is an elastomeric layer or sleeve applied over the racket handle to provide:

- Enhanced grip control and shock absorption
- Sweat resistance and tactile comfort
- Surface **texture for non-slip performance**
- Cushioning and hand fatigue reduction

They may be:

- **Molded sleeves**, directly slid over the handle
- Overwrap tapes, helically wound with adhesive
- Replacement grips, covering the entire handle core

Why TPE/TPR for Badminton Grip Applications?

TPE:

• **High Friction Coefficient**: Prevents racket slipping during gameplay

- Superior Soft-Touch Feel: Comfortable for extended playing hours
- Sweat & Weather Resistant: Retains grip even in humid environments
- Elastic Recovery: Maintains tightness and shape without permanent deformation

TPR:

- Cost-Effective: Ideal for entry-level or training gear
- Good Moldability: Suitable for sleeve or extrusion-based grip styles
- Moderate Cushioning: Sufficient for short-match durations or school-level equipment

Silicone Masterbatch:

- Adds anti-stick surface feel
- Provides dry-touch and anti-dust effect
- Improves comfort under sweaty conditions

Technical Specifications

Property	TPE / TPR Range
Shore Hardness	30 – 60 Shore A (soft and flexible)
Elongation at Break	300 – 600%
Compression Set	<25%
Friction Coefficient	High – Non-slip under dry or wet hands
Water Absorption	<0.2%
Rebound / Shock Absorption	High (TPE variants)
Specific Gravity	0.9 – 1.1
Operating Temperature	−20 °C to +70 °C

Processing Methods

- Extrusion for wrap-style tapes or continuous sleeves
- Compression Molding textured grip sleeves or pads
- **Injection Molding** custom-fit grip modules with branding
- Surface Embossing ribbed, chevron, or dotted grip textures

Design Features Enabled

- Perforated Textures for moisture wicking
- Grooved Patterns improve airflow and grip pressure
- Embossed Branding logos and grip zone indicators
- **Multi-Color Options** for professional or youth series

Compliance & Safety

- RoHS & REACH Compliant
- Free from Latex, Phthalates, and BPA
- Odorless and Skin-Safe
- Grades suitable for prolonged hand contact

Industries Served

- Sports Equipment Manufacturers (Badminton, Squash, Tennis)
- Branded Athletic Gear OEMs
- Recreational Sporting Goods
- Youth Training & School Equipment

Advantages of Using TPE/TPR in Badminton Racket Grips

- High grip performance across all playing conditions
- Comfortable cushioning with long-term durability
- Recyclable, safe alternative to natural rubber or PU foams
- Customizable in color, texture, and performance level
- Sweat resistance with low odor and clean surface retention

Common User Queries Answered by Chatbot

Q: What material offers best comfort and anti-slip performance for racket grips?

A: TPE is ideal — soft, flexible, and non-slip even under sweaty hands.

Q: Will the grip material degrade in heat or rain?

A: No. Our TPE/TPR compounds are weather-resistant and UV-stable.

Q: Can you supply wrap-style or molded grips?

A: Yes. Both continuous wraps (extruded) and molded sleeves are available in TPE and TPR.

Q: Are these grips safe for long-duration contact with skin?

A: Absolutely. Our grades are RoHS/REACH compliant, latex-free, and odor-neutral.

Q: Do you offer anti-stick or dry-touch finishes?

A: Yes. We can incorporate silicone masterbatch to enhance surface feel and reduce tackiness.

Application: Mobile Phone Cover

Also known as: mobile case, back cover, phone protector, smartphone bumper

Recommended Materials

- Thermoplastic Elastomer (TPE) premium soft, flexible, and impact-absorbing case material
- Thermoplastic Rubber (TPR) used in cost-effective phone covers with decent elasticity
- Silicone Masterbatch (as additive) improves tactile feel, anti-slip performance, and dry-touch surface

TPV and **Impact Modifiers** are not preferred due to stiffness and lower soft-touch compatibility for handheld devices.

What is a Mobile Phone Cover?

A **mobile phone cover** is a soft protective enclosure that wraps around the back and sides of a smartphone to:

- Absorb mechanical shock from drops or impacts
- Prevent surface scratches, dust, and wear
- Offer grip and aesthetic appeal
- Protect ports and camera housing through design cutouts

Why TPE/TPR for Mobile Phone Cover Applications?

TPE:

- Soft & Flexible: Easily molds around phone geometry and button layouts
- Shock Absorption: Protects device during drops and collisions
- Scratch-Resistant: Retains appearance over time
- Non-Tacky & Skin Friendly: Pleasant to hold, even for long durations
- Excellent Moldability: Suited for precise fit and fine details

TPR:

- **Economical Alternative**: For budget or promotional phone covers
- Moderate Protection: Adequate for minor impacts and handling protection
- Good Surface Finish Compatibility: Accepts printing, coating, or texturing

Silicone Masterbatch:

- Enhances dry-touch surface and grip
- Reduces stickiness and lint attraction
- Adds anti-slip behavior to side walls and corners

Technical Specifications

Property TPE / TPR Range

Shore Hardness 45 – 80 Shore A (depending on cover

type)

Elongation at Break 250 – 500%

Tear Resistance High (for drop protection)

Compression Set <25%

Density $0.9 - 1.1 \text{ g/cm}^3$

Operating $-30 \,^{\circ}\text{C}$ to $+85 \,^{\circ}\text{C}$

Temperature

UV Resistance Available on request (UV-stable grades)

Flame Resistance UL94 HB (optional grades)

Processing Methods

- Injection Molding preferred for 1-piece wrap-around cases
- **2K Overmolding** soft TPE shell molded over rigid polycarbonate frame
- Textured Mold Finishing enables anti-slip surface or matte effect
- Pad/UV Printing for branding or personalization

Design Features Enabled

- Corner Buffers / Air-Pockets improve drop protection
- Non-Slip Grip Zones ribbed or dimpled side panels
- Camera & Port Cutouts precision molded
- Transparent / Translucent Skins for aesthetic appeal
- Color Variants solid, pastel, neon, or metallic finishes

Compliance & Safety

- RoHS & REACH Compliant
- Latex-Free, BPA-Free, and Non-Toxic
- Low-VOC, Odorless grades available
- Skin Contact Safe suitable for prolonged handheld use

Industries Served

- Mobile Accessories & OEMs
- Consumer Electronics
- Promotional Product Suppliers
- Custom Phone Case Brands
- Retail Packaging and E-commerce Markets

Advantages of Using TPE/TPR in Mobile Phone Covers

- Superior drop protection with flexibility
- Customizable softness, color, and texture
- Environmentally safer than PVC or silicone rubbers
- Excellent fit for various phone models and tolerances
- Compatible with printing, overmolding, and soft-touch finishes

Common User Queries Answered by Chatbot

Q: Which material offers soft, grippy, yet protective phone cases?

A: TPE is best-suited—it combines flexibility, shock absorption, and grip without becoming sticky.

Q: Will the phone cover become sticky or attract dust?

A: No. With silicone masterbatch, TPE cases retain a dry-touch, anti-stick surface.

Q: Can these covers handle frequent bending or stretching?

A: Yes. TPE and TPR both have high elongation and tear resistance, ensuring long-term durability.

Q: Is the material skin-safe for daily handheld use?

A: Absolutely. Our compounds are RoHS/REACH compliant, free from phthalates and other toxins.

Q: Are these cases recyclable or eco-friendly?

A: Yes. TPE and TPR cases are recyclable and safer than many alternatives like PVC.

Application: Air Bag Cover

Also known as: airbag housing lid, driver-side airbag door, steering wheel airbag cover

Recommended Materials

- Thermoplastic Elastomer (TPE) used in selective designs requiring flexible, low-temperature performing covers
- Thermoplastic Rubber (TPR) used in less-critical outer trim applications or nondeployment covers
- Silicone Masterbatch (as additive) used to improve tear-initiation control and tactile surface properties

Note: In high-end OEM airbag covers, advanced engineering plastics like modified polypropylene or PC-ABS blends are common. However, **TPE can be used in secondary covers, mock-up assemblies, or outer trims**, not in high-velocity deployment lids unless explicitly co-developed with tier-1 OEMs.

What Is an Air Bag Cover?

An **air bag cover** is a carefully engineered part that conceals the airbag module within the steering wheel or dashboard and:

- Must open instantaneously upon airbag deployment
- Requires predictable tear seams
- Should resist UV, heat, and mechanical aging
- Must integrate well with aesthetic and tactile elements of the vehicle's interior

Where Can TPE/TPR Be Used in Airbag Covers?

- Outer Trim Layers: For dual-shot molded leather-like surfaces over rigid substrate
- **Decorative Pads**: For co-molded emblem zones or soft-feel overlays
- Prototypes or Test Modules: Low-speed mock deployment models using soft TPE
- **Pre-weakened Zones**: Specific TPE grades can be engineered with controlled tear behavior for development-stage parts

Why Use TPE/TPR for Airbag Cover Trim Applications?

TPE:

- **High Elastic Recovery**: Prevents permanent deformation from sunlight or cabin heat
- Low Temperature Flexibility: Performs well in cold climates (-30 °C and below)
- Fine Tear Control: Supports laser scoring or mold-integrated weakening
- **Paintable and Texturable**: Compatible with grain patterns or soft-touch finishes

TPR:

- Cost-effective and easy to mold
- Moderate weather and UV stability for outer trim
- Good adhesion to rigid plastics for dual-shot processing

Silicone Masterbatch:

- Improves slip, dry-touch, and non-stick surface
- Enhances tear directionality and release behavior in scored zones
- Reduces dust attraction and surface tack

Technical Specifications

Property TPE / TPR Range

Shore Hardness 60 - 80 Shore A

Elongation at Break 300 – 450%

Tear Strength High, with controlled scoring possible

Operating Temperature -40 °C to +100 °C

UV Resistance Enhanced with stabilizers

Weathering Resistance Excellent (with optional additives)

Odor / Emissions Low-VOC grades available for automotive

(VOC) interiors

Processing Methods

- Injection Molding primary method for producing soft covers with precise tolerances
- **2K Molding (Dual-shot)** allows TPE to be overmolded on PC/ABS or PP substrates
- Laser Scoring / Mold Scoring pre-weakening the deployment seam
- **Texture Embossing** enables leather-like or matte finishes

Design Features Enabled

- Controlled Tear Seams predictable airbag deployment path
- Soft-Touch Feel Zones enhances driver contact comfort
- Embossed Logos or Symbols compatible with TPE topcoats
- Color-Matched Interiors available in automotive-grade pigment blends

Compliance & Safety

- Automotive Interior Standards (VDA, ISO 3795, SAE J1356 compliant grades)
- UV & Thermal Aging Tested
- REACH, RoHS, and VOC-compliant
- Non-sticky and odor-neutral grades available

Industries Served

- Automotive OEMs (Steering Systems)
- Tier 1 Safety System Suppliers
- Automotive Interior Trim Manufacturers
- EV & Mobility Startups (Prototype Modules)

Advantages of Using TPE/TPR in Airbag Trim Applications

- Enhances aesthetics without compromising safety
- Supports dual-shot overmolding on hard plastics
- Good scratch and abrasion resistance
- Can be tuned for **controlled scoring and tear behavior**
- Low emission and odor-safe for enclosed cabin use

Common User Queries Answered by Chatbot

Q: Can TPE be used in actual airbag deployment covers?

A: TPE can be used in the outer trim or co-molded layer, but the primary deployment lid is usually made from PC-ABS or modified PP for consistent breakaway behavior.

Q: Does the TPE surface degrade under sunlight or cabin heat?

A: No. UV-stabilized TPE grades maintain mechanical properties even after prolonged exposure.

Q: Is the material safe for interior air quality?

A: Yes. We supply automotive-grade low-VOC and odor-neutral TPE/TPR grades.

Q: Can logos or symbols be molded onto the cover?

A: Absolutely. TPE can be embossed or overmolded with emblems during molding.

Q: Is dual-shot molding with PC/ABS possible?

A: Yes. Adhesion-optimized TPE grades are available for overmolding on rigid substrates like PC/ABS.

Application: Toy Wheel

Also known as: toy car wheels, flexible wheels, plastic toy tires, overmolded toy wheels

Recommended Materials

- Thermoplastic Elastomer (TPE) for soft, grippy, and durable wheel treads or tires
- Thermoplastic Rubber (TPR) for cost-effective, moderately elastic wheels
- Thermoplastic Vulcanizates (TPV) for higher weather resistance and long-lasting flexibility
- Silicone Masterbatch (as additive) for enhanced surface smoothness and bounce control

Impact Modifiers are not used in toy wheels, as they are intended for improving base PP properties, not suitable for elastomeric parts.

What is a Toy Wheel?

A toy wheel is a miniature rolling component used in:

- Toy cars, trucks, and bikes
- Ride-on toys or walkers
- Remote-controlled (RC) hobby vehicles
- Educational and mechanical kits

It often consists of:

- A rigid plastic hub (ABS, PP, etc.)
- A **soft elastomeric tread** (for grip and cushioning)

Why TPE/TPR/TPV for Toy Wheel Applications?

TPE:

- Excellent Grip and Traction: Prevents slipping on smooth floors
- Shock Absorption: Reduces noise and provides smoother rolling
- **High Elasticity**: Allows cushioning and safe indoor use
- Customizable Hardness: Available for soft baby toys to rugged RC models

TPR:

- Low-Cost Elasticity: Suitable for low-speed and simple toys
- Mild Cushioning: Offers basic softness and durability
- Good Colorability: Vibrant, child-safe color options possible

TPV:

- Long-Term Durability: Resists cracking or hardening over time
- Enhanced UV and Weather Resistance: Good for outdoor ride-on toys
- Superior Elastic Recovery: Mimics rubber in function but is recyclable

Silicone Masterbatch:

- Used to reduce surface tack
- Enhances **non-marking** properties (wheels don't leave streaks)
- Improves mold release and bounce uniformity

Technical Specifications

Property	TPE / TPR / TPV Range
Shore Hardness	40–80 Shore A (based on toy type)
Specific Gravity	0.9 - 1.1

Property TPE / TPV Range

Elongation at Break 300 – 600%

Rebound Resilience Moderate to high

Tear & Abrasion

Resistance

Good to Excellent

Operating Temperature $-30 \,^{\circ}\text{C}$ to $+80 \,^{\circ}\text{C}$

UV Resistance Optional (TPV grades best for outdoors)

Child Safety Compliance EN 71-3, RoHS, REACH-compatible

grades

Processing Methods

• **Injection Molding** – for both solid wheels and overmolded tires

- **2K Overmolding** TPE/TPR/TPV molded over rigid hub (ABS, PP, etc.)
- Compression Molding for basic circular wheels in bulk production
- Textured Molds for tread pattern (zigzag, block, radial, etc.)

Design Possibilities

- Soft Outer Tire + Hard Inner Hub
- Embossed Brand Logos or Tread Designs
- Color Coding by Function (e.g., blue for baby toys, red for RC)
- Silent Wheels for nursery or indoor toys
- **Non-marking Tires** for household flooring

Compliance & Safety

- Phthalate-Free, BPA-Free, Latex-Free
- RoHS & REACH Certified
- EN 71-3 Compliant Grades for child safety
- Odor-Neutral and Food-Grade Possible (for infant toys)

Industries Served

- Toy and Hobby Manufacturers
- OEMs of Educational Kits
- RC and Robotics Toy Brands
- Ride-on Toy Makers
- Private-Label and OEM Toy Suppliers

Advantages of Using TPE/TPR/TPV in Toy Wheels

- Noise-free, cushioned rolling
- Soft yet durable for indoor and outdoor play
- Vibrant colors and fine detailing possible
- Safe for children and babies
- Moldable into complex tread geometries

Common User Queries Answered by Chatbot

Q: What material gives soft, silent wheels for indoor toys?

A: TPE or TPR with Shore A 50–60 gives ideal softness and quiet rolling.

Q: Can these wheels be used outdoors?

A: Yes. TPV-based wheels offer excellent UV and weather resistance.

O: Do the wheels leave marks on floors?

A: No. With silicone masterbatch, TPE/TPR wheels are non-marking.

Q: Are these materials safe for baby toys?

A: Absolutely. Our compounds are EN 71-3 compliant and free from harmful chemicals.

Q: Can TPE be molded over a hard plastic hub?

A: Yes. 2K overmolding allows elastomer tires to bond seamlessly with rigid wheel hubs.

Application: Shower Nozzle

Also known as: shower head nozzle tips, water outlet pins, anti-lime nozzles

Recommended Materials

- Thermoplastic Elastomer (TPE) for soft, elastic, and anti-clogging nozzles
- Thermoplastic Rubber (TPR) suitable for low-cost elastic tips
- Thermoplastic Vulcanizates (TPV) for higher thermal and chemical resistance
- Silicone Masterbatch (as additive) to improve lime scale shedding, water repellence, and tactile feel

Impact Modifiers are not applicable here, as they are not suited for elastomeric or sealing functions in nozzles.

What is a Shower Nozzle?

A **shower nozzle** refers to the **individual soft outlet tip** of a shower head from which water is sprayed. These nozzles must:

• Flex to **dislodge mineral deposits** (anti-lime/anti-clog feature)

- Offer consistent water flow
- Withstand **hot water, pressure cycling**, and chemical cleaners
- Remain soft and elastic over time without cracking or hardening

Why TPE/TPR/TPV for Shower Nozzle Applications?

TPE:

- Excellent Elastic Recovery: Resists deformation and enables flex cleaning
- **Soft Surface**: Can be pressed to dislodge calcium or scale
- Water & Chemical Resistant: Withstands bathroom cleaners, hard water
- Low Compression Set: Maintains shape and flow performance

TPR:

- **Economical Alternative**: Ideal for basic hand showers and mass-market SKUs
- Moderate Elasticity: Adequate for domestic flow applications
- Good Moldability: Easy for extrusion and tip insert molding

TPV:

- Superior Weather & Heat Resistance: Suitable for hot water showers
- **High Chemical Resistance**: For hard water areas and cleaning agents
- Enhanced Lifecycle Durability: Ideal for premium models

Silicone Masterbatch:

- Improves water repellence
- Reduces mineral deposit adhesion
- Adds smooth tactile finish
- Enhances anti-dust and anti-tack surface

Technical Specifications

Property TPE / TPV Range

Shore Hardness 40 - 70 Shore A (soft to medium)

Elongation at Break 300 – 500%

Tear Resistance Medium to high

Water Absorption <0.5%

Chemical Resistance

Moderate (TPR) to High (TPV)

Heat Resistance Up to 100 °C (TPV grades)

Compression Set <25%

UV Resistance Optional in TPV grades

Property

TPE / TPR / TPV Range

Safety Compliance

RoHS, REACH, EN 71-3 compliant grades available

Processing Methods

- Injection Molding for precision-molded nozzle tips
- **Insert Molding** for dual-shot overmolding onto shower head bases
- Multi-Cavity Molds high-volume production for consumer brands

Design Features Enabled

- Anti-Scale Flexing Tips allows physical cleaning by squeezing
- Soft Touch for Comfort better user experience
- Color Coding aesthetic matching with chrome or matte housings
- Anti-Microbial Additive Compatibility optional for hygiene-focused models

Compliance & Safety

- REACH & RoHS Compliant
- BPA, Latex, Phthalate-Free
- Low VOC Grades suitable for domestic water flow
- Optional Food-Grade Compliant Grades (for high-end use)

Industries Served

- Sanitaryware and Bathroom Fittings Manufacturers
- Shower Head OEMs and ODMs
- Faucet and Handheld Shower Brands
- Hygiene-focused Product Suppliers

Advantages of Using TPE/TPR/TPV in Shower Nozzles

- Self-cleaning, scale-repellent soft tips
- Long service life in wet and warm environments
- Easy molding and integration with standard shower assemblies
- Recyclable and eco-friendlier than rubber
- Suitable for modern and minimalist shower designs

Common User Queries Answered by Chatbot

Q: What material prevents lime scale build-up in shower nozzles?

A: TPE and TPV are best for anti-lime, soft-touch nozzles that resist mineral accumulation.

O: Can these nozzles handle hot water?

A: Yes. TPV grades perform well at up to 100 °C and resist deformation under hot water.

Q: Are they safe and compliant with hygiene standards?

A: Yes. We offer RoHS, REACH, and EN 71-3 compliant grades for safe use.

Q: Can the material be overmolded on plastic or metal shower heads?

A: Yes. TPE and TPV can be used in dual-shot or insert molding processes.

Q: Does the nozzle become sticky or discolored over time?

A: No. With silicone masterbatch and UV stabilizers, surfaces stay clean, dry, and fade-resistant.

Application: Tourniquet

Also known as: medical tourniquet, blood draw band, surgical tourniquet strap, emergency constriction band

Recommended Materials

- Thermoplastic Elastomer (TPE) best suited for skin-contact, stretchable, latex-free bands
- Thermoplastic Rubber (TPR) cost-effective and elastic alternative to natural rubber
- **Silicone Masterbatch** *(optional)* used to improve surface softness, dry-touch feel, and anti-stick properties

TPV and **Impact Modifiers** are not recommended for tourniquets due to excessive rigidity and poor skin-compliance. This application demands **soft-touch**, **latex-free**, and **biocompatible** elastomers only.

What is a Tourniquet?

A **tourniquet** is an elastic strap or band used to constrict blood flow temporarily during:

- Intravenous (IV) insertion
- Blood sample collection
- Surgical procedures
- Emergency trauma or hemorrhage control

They must be:

- Stretchable and firm for quick tensioning
- Latex-free and skin-safe for patients and healthcare workers
- Reusable or single-use, depending on application

Why TPE/TPR for Tourniquet Applications?

TPE:

- High Elasticity & Snapback: Enables secure wrapping and rapid release
- Skin-Friendly & Hypoallergenic: Free from latex, BPA, and phthalates
- Soft Surface Contact: Prevents irritation during prolonged contact
- **Sterilizable Grades**: Available for reusable medical devices
- Adjustable Hardness & Tensile Strength: Tuned based on use case (blood draw vs. trauma care)

TPR:

- Lower-Cost Option for disposable tourniquets
- Moderate Elastic Performance: Suitable for non-critical applications
- Easy to Process: Supports extrusion, molding, or die-cutting

Silicone Masterbatch:

- Enhances **anti-stick** surface to avoid clinging during application
- Improves tactile comfort and dry touch
- Reduces static and dust pickup in storage conditions

Technical Specifications

Property	TPE / TPR Range
Shore Hardness	30 – 60 Shore A
Elongation at Break	500 - 800%
Tensile Strength	8 – 12 MPa
Tear Strength	High (for repeated use)
Compression Set	<25%
Density	0.9 - 1.1
Sterilization Compatibility	Ethylene Oxide (EtO), Gamma (select grades)
Biocompatibility	Available (ISO 10993 compliant grades)

Processing Methods

- Extrusion for continuous band rolls
- **Die Cutting** single-use disposable strips
- Injection Molding integrated clips or latching mechanisms
- Pad Printing or Laser Marking for logos or lot codes

Design Features Enabled

- Flat Bands or Ribbed Grip Options
- Adjustable or Quick-Release Ends
- Color Coding for pediatric, adult, or emergency use
- Custom Textures for grip and sweat control
- Single-Use or Reusable Grades

Compliance & Safety

- RoHS, REACH, and ISO 10993 (medical grade) compliance
- Latex-Free, BPA-Free, and DEHP-Free
- Biocompatible Skin-Contact Safe Formulations
- Low Odor and Non-Irritant

Industries Served

- Medical Device OEMs
- Diagnostic Laboratories
- Hospitals and Healthcare Facilities
- Emergency Medical Services (EMS)
- First Aid Kit Manufacturers

Advantages of Using TPE/TPR in Tourniquets

- Non-allergenic and safe for all patient demographics
- Durable under repeated stretching and cleaning
- Moldable and extrudable into various forms and finishes
- Supports branding, sizing, and color variations
- · Recyclable and sustainable alternatives to natural rubber

Common User Queries Answered by Chatbot

Q: What material is best for latex-free medical tourniquets?

A: TPE is ideal—it is hypoallergenic, soft, and highly elastic, meeting medical compliance standards.

Q: Can the tourniquet be reused after sterilization?

A: Yes. We offer sterilizable TPE grades compatible with EtO or gamma sterilization.

Q: Is the material skin-safe for children or sensitive users?

A: Absolutely. Medical-grade TPE and TPR are biocompatible and ISO 10993 certified.

O: Do the bands leave marks or cause irritation?

A: No. TPE bands offer soft compression with low friction and dry-touch surfaces when blended with silicone masterbatch.

Q: Are color-custom and quick-release designs possible?

A: Yes. We support extrusion, injection molding, and customized surface finishing to meet OEM requirements.

Application: Waterproofing Membrane

Also known as: flexible sealing sheet, damp-proof membrane, elastomeric waterproof layer

Recommended Materials

- Thermoplastic Elastomer (TPE) used for flexible waterproofing membranes with excellent elasticity and weldability
- Thermoplastic Vulcanizates (TPV) preferred for UV- and weather-resistant outdoor membranes
- **Impact Modifiers (for PP blends)** used to improve toughness and flexibility of PP-based waterproof membranes

TPR and Silicone Masterbatch are generally not suitable for this application due to limitations in UV stability and continuous sheet performance.

What is a Waterproofing Membrane?

A waterproofing membrane is a flexible sheet or film that prevents water ingress in:

- Rooftops and terraces
- Building foundations
- Basements and retaining walls
- Tunnels and subways
- Decks, balconies, and wet areas

These membranes are applied as continuous barriers either above or below concrete layers.

Why Use TPE/TPV/Impact-Modified PP for Membrane Applications?

TPE:

- Highly Flexible: Adapts to substrate contours and thermal expansion
- **Heat Weldable**: Enables seamless joints without adhesives
- Good Chemical Resistance: Resists construction chemicals and wastewater
- Low-Temperature Flexibility: Performs well in cold climate installations

TPV:

- Excellent UV & Ozone Resistance: Ideal for exposed rooftop applications
- High Long-Term Elastic Recovery: Retains integrity under stress and load
- Superior Aging Properties: Minimal degradation over 20+ years
- Thermal Stability: Operates in a wide temperature range

Impact Modifier + PP:

- Used to enhance toughness and flexibility of polypropylene-based membranes
- Improves cold flexibility, preventing brittleness during handling or laying
- Cost-effective option for multi-layer construction with PP as the base

Technical Specifications

Property TPE / TPV / Impact Modified PP R	Range
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Thickness Range 0.5 - 3.0 mm (depending on type)

Shore Hardness 70–90 Shore A

Elongation at Break 300 – 600%

Water Vapor Transmission

 $< 0.05 \text{ g/m}^2/\text{day}$

Tensile Strength

6-12 MPa

Tear Resistance

High

UV Resistance

Excellent (TPV), Moderate (TPE), Variable

(PP+IM)

Weldability

High (TPE/TPV grades)

Flexibility at -25 °C

No cracking (for outdoor membranes)

Processing Methods

- Extrusion Sheet/Film Line continuous rolls of membrane
- Calendering for smoother, flat membranes
- Lamination multi-layer structure with protective barriers
- **Hot-Air Welding** for field jointing and detailing

Design Options

- Smooth or Textured Surfaces
- Geo-Membrane Compatible (with HDPE backing)
- Printed Logos or Instructions
- Edge Reinforcement Zones
- Multi-Layer Co-Extruded Sheets

Compliance & Safety

- REACH and RoHS Compliant
- Root Resistance Tested (for green roof membranes)
- Weather and Chemical Aging Verified (per ISO 527, ASTM D638)
- Halogen-Free Grades Available
- **Bitumen-Resistant Formulations** (for hybrid systems)

Industries Served

- Construction & Civil Engineering
- Infrastructure and Metro Projects
- Green Building & Roofing Systems
- Waterproofing Product Manufacturers
- DIY and Pre-Engineered Building Systems

Advantages of Using TPE/TPV in Waterproofing Membranes

- Long service life (>20 years outdoor)
- Environmentally safer than PVC or bituminous membranes
- Fully recyclable and sustainable options available
- Easy to weld on-site with hot-air tools
- Compatible with mechanical fixing and insulation systems

Common User Queries Answered by Chatbot

Q: Which material offers UV-stable membranes for rooftop waterproofing?

A: TPV is highly recommended for outdoor applications due to excellent UV, ozone, and thermal resistance.

Q: Can these membranes be welded on-site?

A: Yes. TPE and TPV membranes are hot-air weldable for seamless joints.

Q: Are these membranes suitable for underground or wet basement applications?

A: Absolutely. TPE membranes are chemically resistant and flexible, ideal for below-ground structures.

Q: What is the difference between TPV and TPE membranes?

A: TPV has superior weathering and long-term stability, while TPE offers better softness and processing ease.

Q: Can PP be used for waterproofing membranes?

A: With impact modifiers, PP membranes gain sufficient flexibility and toughness for layered waterproofing systems.

Application: Car Bellows

Also known as: automotive bellows, flexible boots, dust covers, CV bellows, gaiters

Recommended Materials

- Thermoplastic Elastomer (TPE) for light-duty bellows with moderate flexibility and ease of molding
- Thermoplastic Vulcanizates (TPV) ideal for under-the-hood applications requiring superior heat, oil, and ozone resistance
- **Impact Modified PP** used in outer casing or connector flanges, not the flexible bellow part

TPR and **Silicone Masterbatch** are typically not preferred for bellows due to lower temperature and fatigue performance under dynamic automotive conditions.

What Are Car Bellows?

Car bellows are flexible, accordion-like protective covers designed to:

- Accommodate axial and lateral movement
- Protect internal mechanical or electronic parts from dust, water, oil, and vibration
- Maintain sealing and articulation in CV joints, rack & pinion systems, steering boots, clutch/brake systems, and suspension shafts

Why TPE/TPV/Impact Modified PP for Car Bellows?

TPE:

- Flexible and Easily Moldable
- Good for **light-duty bellows** (interior or cabin use)
- Can be used in HVAC ducts or dashboard articulation covers
- Cost-effective and recyclable

TPV:

- Superior Fatigue Resistance for dynamic applications (e.g., suspension, drive shafts)
- Performs under temperature extremes (-40 °C to +130 °C)
- Excellent chemical resistance (grease, brake fluid, road salt)
- UV and Ozone Resistant long outdoor lifespan
- Maintains flexibility over time and resists cracking under repetitive motion

Impact Modified PP:

- Suitable for outer casing, mounting base, or retainer rings
- Enhances toughness and impact resistance of rigid support parts

• Weldable to soft bellow materials (in co-extruded parts)

Technical Specifications

Property	TPE	TPV
Shore Hardness	50–80 Shore A	55–90 Shore A
Elongation at Break	300-600%	250–450%
Flex Fatigue Resistance	Moderate	Excellent
Operating Temperature Range	−30 °C to +100 °C	–40 °C to +130 °C
UV & Ozone Resistance	Optional	High
Oil/Grease Resistance	Moderate	High
Recyclability	Yes	Yes (automotive compliant grades)

Processing Methods

- Injection Molding single-piece bellow covers
- **2K Molding** overmolding TPV onto PP flanges
- Blow Molding for larger flexible ducts
- Extrusion (for longer ducts) HVAC flexible bellows

Design Possibilities

- Single, Double, or Multi-convoluted Bellows
- Mounting Flanges or Snap-fit Rings
- Integrated Sealing Lips or Hose Connectors
- Color-Coded or Textured Surfaces
- Variable Wall Thickness to control stiffness/flexibility

Compliance & Automotive Standards

- RoHS & REACH Compliant
- Weathering Tests per SAE J2020, ASTM D1171
- ISO 16750 for Thermal Aging & Vibration
- **OEM-specified fluid resistance tests** (e.g., grease, DOT fluid, washer fluid)

Industries & Vehicle Applications

Passenger Cars and EVs

- Commercial Vehicles and Off-Highway Equipment
- Tier-1 & Tier-2 Automotive Suppliers
- HVAC Ducting and Underbody Systems
- Electric Steering and Suspension Systems

Advantages of Using TPE/TPV in Car Bellows

- Long flex life in dynamic environments
- Excellent sealing and resistance to abrasion
- Lightweight, recyclable, and cost-efficient
- Lower NVH (noise, vibration, harshness) characteristics
- Compatible with automated molding and assembly lines

Common User Queries Answered by Chatbot

Q: What material lasts longest under flexing and grease exposure?

A: TPV is preferred—it has excellent fatigue resistance and high chemical stability under greased or oil-splashed conditions.

Q: Are these bellows UV- and weather-resistant?

A: Yes. TPV grades are UV and ozone stable, ideal for underbody and engine bay exposure.

Q: Can TPE be used for structural or high-heat bellows?

A: TPE is best for low-stress environments (e.g., HVAC, cabin applications), while TPV handles higher loads and heat.

Q: Can we mold flexible and rigid parts together?

A: Yes. Using 2K molding, TPV can be overmolded onto impact-modified PP to create integrated flanges.

Application: Stretch Band

Also known as: resistance band, therapy band, exercise band, pull band, mobility band

Recommended Materials

- Thermoplastic Elastomer (TPE) preferred for high-stretch, latex-free, medical-grade and fitness bands
- Thermoplastic Rubber (TPR) cost-effective elastic alternative with acceptable elongation
- Silicone Masterbatch (optional) enhances surface smoothness, dry feel, and skin grip

TPV and Impact Modifiers are not used in this application due to insufficient elasticity and excessive hardness.

What is a Stretch Band?

A **stretch band** is a flat, elastic, and portable strip used for:

- Muscle strengthening and rehabilitation
- Pilates, yoga, and home workouts
- Warm-ups and flexibility training
- Post-surgery recovery and physical therapy routines

It must be:

- Highly stretchable and elastic
- Non-allergenic and skin-contact safe
- Resistant to tearing, sweat, and repeated elongation

Why TPE/TPR for Stretch Band Applications?

TPE:

- Superior Stretch & Recoil: Elongates 400–600% without permanent deformation
- Latex-Free & Hypoallergenic: Safe for all users including latex-sensitive patients
- Silky Surface Finish: Feels smooth, doesn't stick to skin
- Customizable Resistance: Can be tuned for light, medium, or heavy resistance

TPR:

- Budget-Friendly: Ideal for basic bands or promotional fitness kits
- **Decent Elasticity**: Suitable for general home workouts
- Easy to Color and brand with logos or printed instructions

Silicone Masterbatch:

- Enhances dry feel, prevents tackiness during exercise
- Improves UV stability and surface texture
- Reduces **dust pickup** in storage

Technical Specifications

Property	TPE / TPR Range
Shore Hardness	20 – 60 Shore A
Elongation at Break	400 – 700%
Tensile Strength	5 – 10 MPa
Tear Resistance	Medium to High

Property TPE / TPR Range

Surface Finish Smooth or satin with anti-slip

Odor Odorless (TPE), mild (TPR)

Density 0.9 - 1.2

Skin Compatibility ISO 10993 and REACH-compliant

grades

UV Resistance Optional (with additives or silicone MB)

Processing Methods

• Extrusion Flat Sheet – continuous film bands in various thicknesses

- **Die-Cutting & Slitting** to create bands of specific resistance levels
- Pad Printing or Embossing for branding or exercise instructions
- **Color Coding** to indicate different strength levels

Design Features Enabled

- Flat or Looped Bands
- Textured Surface for Grip
- Color Grading by Strength (e.g., yellow = light, blue = medium, black = strong)
- Printable with Workout Guides
- Custom Packaging for Clinics, Gyms, OEM Brands

Compliance & Safety

- RoHS & REACH Compliant
- Phthalate-Free, BPA-Free, Latex-Free
- Biocompatible Grades Available (ISO 10993)
- Non-Toxic Colors and Additives

Industries Served

- Fitness & Wellness Equipment Manufacturers
- Physiotherapy and Rehabilitation Centers
- Home Exercise Brands and Retailers
- Hospitals and Orthopedic Clinics
- Promotional & Sports Brands

Advantages of Using TPE/TPR in Stretch Bands

- Long-term elasticity without permanent deformation
- Safe and soft for skin-contact usage
- Easy to clean and odor-neutral
- Recyclable alternatives to latex or silicone
- Compatible with branding, printing, and custom packaging

Common User Queries Answered by Chatbot

Q: What is the best material for latex-free exercise bands?

A: TPE is ideal. It's soft, stretchable, safe, and hypoallergenic.

Q: Can these bands be used in clinical settings?

A: Yes. We offer ISO 10993 biocompatible grades for rehabilitation and hospital use.

Q: How much do they stretch?

A: TPE bands can elongate up to 600%, depending on grade and thickness.

Q: Are these bands reusable and easy to clean?

A: Yes. TPE/TPR bands are washable, long-lasting, and odor-resistant.

Q: Can I customize resistance levels and colors?

A: Absolutely. Bands can be produced in different Shore hardness and thicknesses to match resistance levels.

Application: Hair Rubber Bands

Also known as: hair ties, ponytail bands, elastic hair loops, soft rubber bands

Recommended Materials

- Thermoplastic Elastomer (TPE) preferred for high-stretch, soft-touch, and odor-free hair bands
- Thermoplastic Rubber (TPR) commonly used for basic bands with lower-cost elastic performance

TPV and Impact Modifiers are not used due to high rigidity. Silicone Masterbatch is typically not required, but can be optionally added to reduce surface tack in premium hair ties.

What Are Hair Rubber Bands?

Hair rubber bands are small, elastic loops used to tie or style hair. They must offer:

- Consistent stretch and recovery
- Soft and skin/hair-friendly surface

- Odor-free, non-sticky material
- Resistance to sweat, oil, and repeated pulling

Why TPE/TPR for Hair Band Applications?

TPE:

- Superior Elasticity: Offers controlled stretch without snapping
- Silky Surface Finish: Gentle on hair and scalp, no pulling or snagging
- Odorless and Non-Sticky: Ideal for daily personal use
- Color Customizable: Can be produced in transparent, pastel, or solid shades
- Latex-Free: Suitable for all age groups and allergy-prone users

TPR:

- Cost-Efficient: Perfect for high-volume production
- Moderate Elastic Recovery: Works well in single-use or low-tension applications
- Colorable and Printable: Supports branding or character-themed designs

Technical Specifications

TPE / TPR Range
30–60 Shore A
400 – 700%
Medium
Odorless (TPE), mild (TPR)
Smooth, dry-touch
Excellent
Optional (with additives)
RoHS, REACH & ISO 10993-compliant grades available

Processing Methods

- Extrusion + Cutting continuous extruded bands sliced to desired width
- **Injection Molding (for shaped ties)** floral or novelty designs
- Color Masterbatching pastel, neon, or transparent tones
- **Embossing/Branding** optional for fashion brands

Design Possibilities

- Flat or Round Cross-Sections
- Seamless Loops or Heat-Fused Ends
- Glitter, Neon, or Matte Finishes
- Scented or Unscented Options
- Character or Fashion Tie-ins

Compliance & Safety

- RoHS & REACH Compliant
- Phthalate-Free and BPA-Free
- Biocompatible Grades Available
- No Sulfur, Latex, or Protein Allergens

Industries Served

- Hair Accessory Manufacturers
- Kids' and Fashion Brands
- Supermarkets and Grooming Chains
- Promotional Gifting and Merchandising
- Health & Hygiene Accessories (e.g., baby hair care)

Advantages of Using TPE/TPR in Hair Rubber Bands

- Smooth, non-sticky, and gentle on hair
- Long service life and reusability
- Hypoallergenic and safe for sensitive users
- Fully recyclable with minimal environmental impact
- Custom moldable for OEM/ODM brands

Common User Queries Answered by Chatbot

Q: Are these hair ties safe for children or allergy-prone users?

A: Yes. TPE and TPR hair bands are latex-free, BPA-free, and comply with RoHS & REACH.

Q: Do these bands pull or damage hair?

A: No. TPE bands offer a soft, smooth surface that avoids hair breakage or snagging.

O: Can the material be colored or customized?

A: Absolutely. TPE and TPR can be color-matched to fashion palettes, or produced in transparent, glitter, or solid tones.

Q: Will they lose elasticity after use?

A: High-quality TPE bands retain elasticity and snapback performance over repeated uses.

Q: Are they suitable for hot/humid climates?

A: Yes. These elastomers resist sweat, humidity, and mild UV exposure.

Application: Door Stoppers

Also known as: door wedges, buffer stops, anti-slam stoppers, soft door cushions

Recommended Materials

- Thermoplastic Elastomer (TPE) preferred for soft-touch, flexible stoppers
- Thermoplastic Rubber (TPR) budget-friendly option for simple plug-type or wedge stoppers
- Thermoplastic Vulcanizate (TPV) suitable for durable outdoor-use or UV-exposed applications

Impact Modifiers and **Silicone Masterbatch** are generally not used here, as door stoppers require self-contained elastomeric parts rather than polymer blends or enhanced additives.

What Are Door Stoppers?

Door stoppers are used to:

- Prevent doors from slamming or hitting walls/furniture
- Hold doors open in a fixed position
- Protect door surfaces and flooring
- Reduce noise and impact damage

They come in various styles:

- Wedge-type
- Wall-mounted bumpers
- Floor-mounted or adhesive plug types
- Over-molded doorbase inserts

Why TPE/TPR/TPV for Door Stoppers?

TPE:

- Soft, Non-Marking Surface: Prevents damage to floors, tiles, and walls
- **High Friction Coefficient**: Stays in place without slipping
- Easy Color Customization: Matches interior design or brand color
- Non-Toxic and Odorless: Safe for residential and school use
- Recyclable and eco-friendly

TPR:

- Cost-Effective for general-purpose stoppers
- Moderate Elasticity and Impact Absorption
- Softer Feel for interior or under-door uses

Good Surface Grip

TPV:

- UV and Weather Resistant: Suitable for outdoor, industrial, or commercial door stops
- High Durability and Flex Fatigue
- Thermal Stability: Withstands sunlight, heat, and cleaning chemicals
- Excellent Long-Term Compression Set Resistance

Technical Specifications

Property	TPE / TPR / TPV Range
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Shore Hardness 50–90 Shore A

Tensile Strength 5 - 12 MPa

Elongation at Break 200 – 600%

Compression Set < 25%

Surface Friction High (non-slip behavior)

UV & Weather High (TPV), Moderate (TPE/

Resistance TPR)

Odor Odorless (TPE/TPV), mild (TPR)

Processing Methods

- Injection Molding for complex shaped stoppers with integrated features
- **2K Overmolding** soft TPE or TPV over rigid core (PP or ABS)
- Extrusion + Cutting for basic wedge-type stoppers

Design Possibilities

- Wedge, Plug, or Ring Shapes
- **Dual Hardness Stoppers** with rigid handle + soft buffer
- Embedded Magnets or Screws for fixture-based designs
- Anti-Slip Texturing or grooved surface for extra grip
- Wall-Protecting Caps for door levers or knobs

Compliance & Safety

- RoHS & REACH Compliant
- Phthalate-Free, Latex-Free
- Child-Safe Grades Available (EN 71-3)
- Non-Skid, Non-Marking, and Floor-Safe Materials

Industries Served

- Residential Hardware and Interiors
- Office & Commercial Real Estate Projects
- Hotels, Schools, Hospitals (Quiet Closure Systems)
- Door & Hardware OEMs
- Promotional or Branding Merchandise

Advantages of Using TPE/TPR/TPV in Door Stoppers

- Strong yet soft contact for vibration damping
- Safe for all types of floors (wood, tile, vinyl, laminate)
- Long life under repeated impact or compression
- Odor-free and washable for indoor hygiene
- Custom moldable with textures and logos

Common User Queries Answered by Chatbot

Q: Which material is best for non-slip door stoppers?

A: TPE and TPR are both excellent for high-friction surfaces that stay firmly in place.

Q: Are your door stoppers suitable for outdoor use?

A: Yes. TPV is UV- and weather-resistant, making it ideal for outdoor or industrial door stops.

Q: Will these materials damage my floor or tiles?

A: No. TPE and TPR are non-marking, soft-surface elastomers that are safe on all flooring types.

Q: Can the material resist compression over time?

A: Yes. Especially TPV, which has excellent compression set resistance and long-term shape retention.

Q: Can I get dual-hardness stoppers for branding?

A: Yes. We can co-mold soft elastomer with rigid plastic inserts and add logos or labels.

Application: Tennis Balls

Also known as: practice tennis balls, toy tennis balls, pet balls, soft tennis trainers

Recommended Materials

- Thermoplastic Rubber (TPR) commonly used for pet-safe and training-grade tennis balls
- Thermoplastic Elastomer (TPE) offers soft-touch, non-toxic variants for children's and indoor use
- TPV (optional) suitable for added durability in rugged pet or recreational variants

Impact Modifiers and **Silicone Masterbatch** are generally not applicable here, as these balls are single-shot molded elastomeric products and not blend-based or coated.

What Are TPE/TPR-Based Tennis Balls?

These are **non-pressurized**, **molded balls** used for:

- Recreational practice
- Dog toys or fetch games
- Soft tennis in schools or training
- Promotional or branded merchandise

Unlike professional felt-coated pressurized balls, these are:

- Made entirely of elastomer (single or dual-shot molding)
- Designed for durability, safety, and versatility
- Often softer and quieter than standard balls

Why TPE/TPR/TPV for Tennis Ball Applications?

TPR:

- Bouncy and Resilient ideal for casual or pet usage
- High Impact Absorption less risk of injury or surface damage
- Low Cost widely used in large-scale promotional and pet markets
- Colorable and Odor-Free

TPE:

- Soft-Touch Surface safe for children and indoor play
- Non-Toxic & Latex-Free excellent for skin and pet contact
- Custom Shore Hardness tune ball stiffness based on use (indoor, practice, fetch)

TPV (optional):

- Improved Abrasion and UV Resistance suitable for outdoor or heavy-duty training balls
- Maintains Elasticity Over Time

Technical Specifications

Property Typical TPE/TPR/TPV Range

Shore Hardness 40–80 Shore A

Specific Gravity 0.95 - 1.2

Bounce Height (drop 50 - 80% rebound (varies by

test) grade)

Surface Finish Matte / Textured / Polished

UV Resistance Moderate (TPE/TPR), High (TPV)

Compliance RoHS, REACH, EN 71-3 (toy

safe)

Processing Methods

• Injection Molding – two-piece ball shell or solid one-shot molding

- **2K Molding (optional)** dual-layer construction for core + skin
- Color Masterbatching vibrant shades or glow-in-dark variants
- Embossing/Branding company logos or textures

Design Possibilities

- Hollow or Solid Core
- Textured Grip for Dogs or Training Use
- Various Diameters (e.g., standard tennis, mini tennis, pet-sized)
- UV-Resistant Outdoor Balls
- Scented or Flavored Coatings (for pet toys)

Compliance & Safety

- RoHS and REACH Compliant
- EN 71-3 Certified (Toy Safety)
- Phthalate-Free, Latex-Free, BPA-Free
- Pet-Safe and Chew-Tested (for TPR grades)

Industries Served

- Sports & Fitness Equipment
- Toy Manufacturers
- Pet Accessories Brands
- School Sports Programs

Advantages of Using TPE/TPR/TPV in Tennis Balls

- Long-lasting bounce and shape retention
- Safer alternative to rubber for kids or pets
- No risk of bursting or pressure loss (non-pressurized)
- Fully recyclable and non-toxic
- Can be tailored for softness, elasticity, and durability

Common User Queries Answered by Chatbot

Q: Are these balls suitable for dogs and pets?

A: Yes. TPR balls are non-toxic, chew-resistant, and commonly used in pet toys.

Q: What's the difference between these and regular tennis balls?

A: These are non-pressurized, molded from TPE or TPR, softer, safer, and ideal for training or casual use—not for tournament play.

Q: Do these balls maintain their bounce?

A: Yes. TPR and TPE balls offer good elastic recovery and can retain bounce over extended use.

Q: Can I get custom sizes and colors?

A: Absolutely. We support OEM customization for size, color, and branding.

Q: Are these balls recyclable or eco-friendly?

A: Yes. TPE and TPR are thermoplastics and can be reprocessed for sustainable production.

Application: Yoga Mats

Also known as: fitness mats, pilates mats, exercise mats, non-slip workout mats

Recommended Materials

- Thermoplastic Elastomer (TPE) premium option for lightweight, eco-friendly, and high-performance mats
- Thermoplastic Rubber (TPR) cost-effective alternative for budget-conscious fitness mats

TPV is not suitable due to higher rigidity. Silicone Masterbatch is not needed as TPE/TPR can be tuned to achieve dry-touch, soft surfaces without it.

What is a TPE/TPR-Based Yoga Mat?

A **yoga mat** is a textured, cushioned sheet used for:

- Yoga, Pilates, floor workouts, and physiotherapy
- Providing non-slip support, joint protection, and shock absorption
- Offering a hygienic barrier on floors during exercise

Why TPE/TPR for Yoga Mat Applications?

TPE:

- Soft and Resilient Cushioning provides excellent support for knees, elbows, and back
- Non-Toxic and Odor-Free free from latex, PVC, and harmful plasticizers
- **Dual-Layer Construction Possible** for improved grip and traction
- Excellent Tear Strength & Rebound maintains shape under pressure
- Lightweight and Recyclable

TPR:

- **Economical** suitable for entry-level or mass-market mats
- Good Anti-Slip Performance
- Easily Moldable into Sheet Form
- Moderate Elastic Recovery

Technical Specifications

•	
Property	TPE / TPR Range
Shore Hardness	20–40 Shore A
Thickness Range	4 mm – 10 mm typical
Elongation at Break	300 – 500%
Density	0.85 – 1.0 g/cm³ (TPE foam grades)
Surface Friction (dry/wet)	High (non-slip)
Tear Resistance	High
Toxicity & Emissions	Low-VOC, free from heavy metals
Recyclability	Yes

Processing Methods

- Sheet Extrusion + Foaming to produce closed-cell or open-cell mat sheets
- Lamination dual-color or dual-texture top/bottom sides
- Embossing textured surface for anti-slip or visual branding
- **Die Cutting / Roll Conversion** customized dimensions and shapes

Design Possibilities

- Dual-Color, Dual-Layer Mats
- Custom Surface Textures mandala patterns, dots, stripes

- Hot-Stamped Branding or Logos
- Perforated or Foldable Designs
- Laser-Cut Alignment Guides

Compliance & Safety

- RoHS & REACH Compliant
- EN 71-3 (Toy Safety) Certified Grades Available
- Free from PVC, Latex, BPA, and Phthalates
- Low VOC Emissions indoor air-safe
- Anti-Microbial Additives Available (optional)

Industries Served

- Fitness & Wellness Brands
- Yoga Equipment Manufacturers
- Sports & Athletic Retailers
- Corporate Wellness Programs
- Promotional and Custom Gifting

Advantages of Using TPE/TPR in Yoga Mats

- Lightweight and portable
- Non-slip, skin-safe surface with soft foot feel
- Odorless and free from heavy metals
- Durable for high-repetition workouts
- Eco-friendly and recyclable

Common User Queries Answered by Chatbot

Q: Is TPE better than PVC or EVA for yoga mats?

A: Yes. TPE mats are softer, more eco-friendly, non-toxic, and more comfortable for skin-contact use.

Q: Are TPE yoga mats non-slip and durable?

A: Absolutely. TPE provides excellent traction, even in sweaty conditions, and retains its cushioning over time.

Q: Can I clean and reuse these mats daily?

A: Yes. TPE/TPR mats are washable, resistant to water and oils, and quick-drying.

Q: Are these safe for children and pregnant users?

A: Yes. Our TPE grades are RoHS, REACH, and EN 71-3 compliant, with no phthalates or latex.

Q: Do these mats have any odor?

A: No. TPE and TPR are virtually odor-free, unlike traditional rubber or PVC mats.

Application: Car Mats

Also known as: automotive floor mats, footwell liners, rubber mats, vehicle floor liners

Recommended Materials

- Thermoplastic Elastomer (TPE) ideal for flexible, odorless, weather-resistant floor mats
- Thermoplastic Vulcanizate (TPV) preferred for OEM-grade mats due to improved heat and oil resistance
- Thermoplastic Rubber (TPR) economical option for standard mats with acceptable surface finish

TPE and TPV dominate the premium automotive mat market. TPR is used where cost is a priority. **Impact Modifiers** and **Silicone MB** are not used in this application.

What Are Car Mats?

Car mats are molded sheets placed on a vehicle's floor to:

- Protect from dirt, water, grease, and wear
- Improve cabin aesthetics
- Offer anti-slip and sound-damping properties
- Provide easy maintenance and durability

Why TPE/TPV/TPR for Car Mat Applications?

TPE:

- Odorless & Flexible: Suitable for cabin interiors with no VOC issues
- Excellent Moldability: Captures textures, branding, and intricate geometry
- **Hydrophobic Surface**: Repels water, mud, snow, and chemicals
- Fully Recyclable: Preferred for sustainable auto interiors

TPV:

- Superior Thermal Stability: Withstands hot cabin floors in summer climates
- Enhanced Oil, Grease, and UV Resistance
- High Compression Set Resistance: Prevents permanent deformation under heel pressure
- Meets OEM Specs: Widely used in injection or extrusion-grade floor mats

TPR:

- Cost-Effective: Used in aftermarket and budget vehicle models
- Moderate Anti-Slip and Elasticity
- Acceptable Odor Control (not as neutral as TPE)

Technical Specifications

Property Typical TPE / TPV / TPR Range

Elongation at Break 200 – 500%

Tear Strength High

Specific Gravity 0.95 - 1.2

Compression Set <25% (TPV offers better

performance)

Operating $-40^{\circ}\text{C to } +110^{\circ}\text{C (TPV grades)}$

Temperature —40 C to +110 C (11 v grades

UV/Oil Resistance High (TPV), Moderate (TPE/TPR)

Recyclability Yes

Processing Methods

• **Injection Molding** – for precision-molded tray mats or 3D molded liners

- Sheet Extrusion + Thermoforming for flat mats or rollable profiles
- **2K Molding** combines soft-touch zones with structural base
- Textured Mold Surface for branding, heel pads, anti-slip ribs

Design Possibilities

- 3D Floor Contour Fit
- Water Channel Grooves
- Raised Edges to Trap Liquids
- Dual-Tone or Embossed Logos
- Removable Carpet Inserts (optional)
- Custom Shapes for Driver/Passenger/Trunk Areas

Compliance & Safety

- RoHS & REACH Compliant
- Low-VOC Grades (Cabin Safe)
- Odorless Options Available
- UV-Stable and Fire-Retardant Grades on Request
- Meets Global Automotive Interior Specs (OEM approved)

Industries Served

- OEM Automotive Component Suppliers
- Aftermarket Auto Accessories Brands

- Electric Vehicle Interior Manufacturers
- Fleet Vehicle Outfitting
- Luxury and Utility Vehicle Segment

Advantages of Using TPE/TPV/TPR in Car Mats

- Long service life with flexibility and toughness
- Resistant to water, mud, grease, and harsh chemicals
- Offers strong grip and stability underfoot
- Environmentally safer than PVC-based mats
- Fully customizable and recyclable

Common User Queries Answered by Chatbot

Q: Which material is best for odorless car mats?

A: TPE is ideal. It's VOC-free, odor-neutral, and safe for enclosed spaces like cabins.

Q: Can these materials withstand hot temperatures inside cars?

A: Yes. TPV is highly heat-stable and perfect for tropical or summer conditions.

Q: Do these mats crack or deform over time?

A: No. Our elastomer grades are engineered for compression set resistance and durability.

Q: Can I design textured surfaces and logos?

A: Absolutely. Injection molding and surface texturing enable custom logos and anti-slip zones.

Q: Are these mats environmentally friendly?

A: Yes. TPE, TPV, and TPR are all recyclable and safer than traditional PVC options.

Application: Side Beadings

Also known as: body side moldings, door edge beadings, side trims, anti-scratch strips

Recommended Materials

- Thermoplastic Vulcanizate (TPV) ideal for exterior-grade automotive trim due to excellent UV and weather resistance
- Thermoplastic Elastomer (TPE) suitable for flexible, paintable trims in less exposed areas
- Thermoplastic Rubber (TPR) economical option for non-critical or decorative trims

Impact Modifiers and **Silicone Masterbatch** are not suitable here, as side beadings require long-term UV/weather durability and dimensional stability.

What Are Side Beadings?

Side beadings are flexible external trims mounted on car doors or body panels to:

• Protect against scratches, dents, and side impacts

- Enhance vehicle aesthetics with contours or accents
- Seal and dampen vibration at door seams (in some designs)
- Cover up panel gaps or manufacturing tolerances

They are typically **co-extruded** or **injection molded** parts attached with adhesives or clips.

Why TPV/TPE/TPR for Side Beading Applications?

TPV:

- Excellent UV, Ozone & Weather Resistance
- **High Heat Resistance** for exterior automotive environments
- Low Compression Set resists permanent deformation
- **OEM-Grade Durability** for long service life

TPE:

- Flexible and Moldable ideal for tight curves and contours
- Paintable Surface accepts coatings or color-matching
- Soft Touch useful in door edge protectors or hidden trims

TPR:

- Cost-Effective for non-exposed or cosmetic trims
- Moderate Durability suitable for short-term use or low-end vehicles

Technical Specifications

Property	Typical TPV / TPE / TPR Range
Shore Hardness	60–90 Shore A
	Evaluat (TDV) Madarata (TDE/

UV Resistance Excellent (TPV), Moderate (TPE/TPR)

Tensile Strength 8 - 14 MPa Elongation at Break 200 - 400%

Heat Aging Resistance Up to 120°C (TPV)

Cold Flexibility —40°C (TPV), –20°C (TPE)

Specific Gravity 0.95 - 1.1

Recyclability Yes

Processing Methods

- Extrusion (Mono or Co-Extrusion) continuous profiles with rigid + soft zones
- Injection Molding for end caps or clip-on trims

- **2K Overmolding** TPE over ABS or PP for aesthetic + functional combination
- Texturing & Coating matte, gloss, or paintable surface finishes

Design Possibilities

- Solid Color or Dual-Tone Profiles
- Decorative Chrome Inserts or Textures
- Peel-and-Stick Adhesive Backing
- Clip-on or Groove-Fit Systems
- Custom Cross-Sections for Aerodynamic Styling

Compliance & Safety

- RoHS & REACH Compliant
- OEM Specification Grades Available
- UV-Stabilized and Non-Chalking Formulations
- No Heavy Metals or Halogenated Additives

Industries Served

- Automotive OEMs & Tier-1 Suppliers
- Aftermarket Auto Accessories
- EV and Hybrid Car Manufacturers
- Commercial Vehicle Upfitters
- Automotive Design and Styling Studios

Advantages of Using TPV/TPE/TPR in Side Beadings

- Long-term weather and UV durability (especially TPV)
- Consistent flexibility over wide temperature range
- Scratch-resistant and paint-compatible surface
- Enables lightweight and recyclable vehicle components
- Seamless integration with exterior styling and trim lines

Common User Queries Answered by Chatbot

Q: Which material is best for exterior side moldings?

A: TPV is ideal due to its superior UV and weather resistance, making it OEM-approved.

Q: Will these beadings fade or crack over time?

A: No. TPV-based beadings maintain integrity under sun, rain, and temperature cycles.

Q: Can these be painted or color-matched?

A: Yes. TPE and TPV grades can be formulated to accept paints or molded-in color.

Q: Are these components recyclable?

A: Absolutely. All recommended materials (TPE, TPV, TPR) are recyclable and eco-friendlier than PVC-based trims.

Q: Are co-extruded dual-material profiles possible?

A: Yes. Rigid-soft combinations (e.g., TPV + PP) are commonly used for strength and flexibility.

Application: Roof Rail Gasket

Also known as: roof molding gasket, roof rail seal, longitudinal roof seal, drip rail gasket

Recommended Materials

- Thermoplastic Vulcanizate (TPV) primary material for automotive sealing applications due to superior UV and weather resistance
- Thermoplastic Elastomer (TPE) suitable for certain co-extruded or overmolded profiles in less demanding zones

TPR, **Silicone Masterbatch**, and **Impact Modifiers** are not applicable here, as roof rail gaskets demand long-term environmental durability, which is best delivered by TPV.

What is a Roof Rail Gasket?

A **roof rail gasket** is a continuous elastomeric profile placed along the vehicle's roof edge or between roof panels and rail bars. It serves to:

- Seal against water, dust, and wind intrusion
- Provide aerodynamic smoothness
- Dampen vibration and reduce noise (NVH)
- Visually finish the rail area or hold trim covers in place

These gaskets are often part of the **body-in-white (BIW) trim and sealing systems**, designed for long-term exposure to sun, rain, snow, and thermal cycling.

Why TPV/TPE for Roof Rail Gasket Applications?

TPV:

- Superior UV and Ozone Resistance critical for exposed roof regions
- Heat Resistance maintains elasticity across –40°C to +125°C
- Low Compression Set ensures long-lasting sealing pressure
- Excellent Flex Fatigue suitable for tight corners and continuous profiles
- Adheres Well to PP or PA Trims via Co-Extrusion

TPE:

- Used in Soft Touch Zones or as secondary sealing fins
- More Processable for complex geometry (inserts, corner blocks)
- Paintable Grades Available for visible trim integration

Technical Specifications

Property

Typical TPV / TPE Range

Shore Hardness

55-85 Shore A

Property Typical TPV / TPE Range

Elongation at Break 300 – 500%

Compression Set (100°C,

24hr)

< 25%

UV Resistance Excellent (TPV)

Operating Temperature Range -40°C to +125°C

Bonding Substrates PP, ABS, PA (co-extruded or insert

molded)

Recyclability Yes (both materials)

Processing Methods

Continuous Extrusion – for linear or rollable roof sealing profiles

- Co-Extrusion with Rigid PP/PA Core to combine sealing function with structural stiffness
- Corner Injection Molding for complex end caps or T-junctions
- Surface Texturing matte, grain, or painted options for exposed edges

Design Possibilities

- Hollow Bulb Seals or Solid Ribs
- **Dual Hardness Zones** soft sealing fins + rigid mounting base
- Clip or Channel Mount Integration
- Aesthetic Coatings or Low-Friction Surface Finishes
- Aerodynamic Channel Profiles to direct water flow or reduce drag

Compliance & Safety

- OEM Automotive Weatherseal Standards
- RoHS and REACH Compliant
- Low Fogging and VOC Emissions (Cabin Safe)
- UV and Heat Aging Tested as per SAE / ISO specs

Industries Served

- Passenger Vehicle OEMs
- Commercial Vehicle Manufacturers
- Automotive Tier-1 Seal Suppliers
- Electric Vehicle Body Trim Designers

Advantages of Using TPV/TPE in Roof Rail Gaskets

- Long-lasting weather sealing in extreme environments
- · Retains flexibility without hardening or cracking
- Allows co-extrusion with rigid substrates
- Lightweight and recyclable
- Suitable for painted or visible edge applications

Common User Queries Answered by Chatbot

Q: What is the best material for roof rail gaskets?

A: TPV is ideal due to its high UV, ozone, and thermal resistance required for external sealing applications.

Q: Can these materials withstand sunlight and rain for years?

A: Yes. TPV is specially formulated for long-term outdoor exposure and complies with automotive aging standards.

Q: Are roof rail gaskets flexible enough to bend around curves?

A: Absolutely. TPV and TPE offer excellent flex fatigue and can be extruded into complex, bendable profiles.

Q: Can TPV gaskets be co-extruded with rigid materials?

A: Yes. TPV is often co-extruded with PP or PA to combine flexibility with mounting strength.

Q: Are these seals recyclable?

A: Yes. TPV and TPE are both recyclable thermoplastics, offering sustainable alternatives to EPDM or PVC.

Application: Car Wipers

Also known as: wiper blade lips, wiper edges, wiper squeegees, windshield wiper blades

Recommended Materials

- Thermoplastic Elastomer (TPE) ideal for flexible, low-friction wiping lips
- Thermoplastic Vulcanizate (TPV) suitable for structural or frame-integrated sealing parts in premium blades

TPR is not typically used due to limited UV/weather performance. **Silicone Masterbatch** is not preferred for wipers as standalone silicones may lack the dimensional stability required. **Impact Modifiers** are not applicable.

What Are Car Wiper Components?

Car wiper systems include a blade that must:

- Maintain surface contact and flexibility for clean wiping
- Withstand UV, ozone, rain, snow, and temperature cycling
- Retain shape and rebound over repeated strokes
- Fit into frame, hybrid, or beam-type wiper assemblies

Wiper materials must offer **elasticity**, **surface integrity**, **and weatherability**, particularly for the wiper lip (blade edge).

Why TPE/TPV for Car Wiper Applications?

TPE:

- Low Friction Coefficient ensures streak-free wiping on glass
- **High Rebound Elasticity** returns to shape after each wipe
- Weather Resistant handles sun, rain, and cold without cracking
- Consistent Performance from –30°C to +80°C
- Easily Injection Moldable for lips or overmolded edges

TPV:

- Improved Structural Integrity ideal for molded frame or spoiler seal integration
- Long-Term UV/Ozone Resistance maintains elasticity outdoors
- Lower Compression Set retains wiping force for extended lifecycle
- Compatible with PP or PA-based assemblies (frame-insert bonding)

Technical Specifications

Property Typical TPE / TPV Range

Shore Hardness 60–85 Shore A

Property Typical TPE / TPV Range

Flex Fatigue Resistance Excellent

Low-Temp Flexibility Up to -40°C

UV Resistance High (especially in TPV)

Compression Set (100°C,

24hr)

<20%

Surface Friction Tunable (for quiet/noiseless

wiping)

Service Temperature Range -30°C to +90°C

Color Availability Black, Grey (customizable)

Processing Methods

• **Precision Injection Molding** – for blade lips and overmolded tips

- Co-Extrusion for multi-durometer blade edge + spine parts
- Texturing or Anti-Stick Coating optional low-friction surface finish
- Laser Marking or Logo Integration for branding

Design Possibilities

- Beam Wiper Edge with uniform contact pressure
- Spoiler Seal Lip for aerodynamic performance
- **Dual-Component Blade (TPV+TPE)** rigid + elastic zones
- Low-Noise Profile Edges with optimized curvature

Compliance & Safety

- RoHS & REACH Compliant
- Low VOC / Cabin Safe Grades
- Weatherability Tested to SAE J1960 / ISO 4892-2
- Resistant to Detergents, Washer Fluids, and Road Salts

Industries Served

- Passenger Car OEMs
- Aftermarket Wiper Blade Manufacturers
- Electric Vehicle Accessory Makers
- Windshield Component Suppliers

Advantages of Using TPE/TPV in Car Wipers

- Long-term resistance to deformation and cracking
- Superior wiping efficiency and rebound under harsh weather
- Odorless and non-marking surface
- Easy to mold into complex, aerodynamic profiles
- Fully recyclable and sustainable vs EPDM or chlorinated rubbers

Common User Queries Answered by Chatbot

Q: Can TPE wiper blades withstand hot and cold climates?

A: Yes. TPE grades used in wipers maintain elasticity from -30°C to +90°C without cracking.

Q: Will the wiper lip lose its wiping ability over time?

A: No. Low compression set and high rebound elasticity ensure consistent contact and streak-free wiping.

Q: Is TPV suitable for the whole wiper blade?

A: TPV is ideal for structural or sealing elements but not typically used for the blade lip due to its higher stiffness.

Q: Are these wiper materials safe for use with windscreen washer fluids?

A: Yes. TPE and TPV grades are resistant to alcohol-based and mild detergent washer fluids.

Q: Can these be customized for different car models or blade designs?

A: Absolutely. Both TPE and TPV can be tailored for fitment in OEM, hybrid, or frameless blade assemblies.

Application: Mud Flaps

Also known as: splash guards, fender guards, wheel arch guards, tyre flap liners

Recommended Materials

- Thermoplastic Elastomer (TPE) preferred for flexible, non-cracking mud flaps
- Thermoplastic Vulcanizate (TPV) ideal for long-term exposure to UV, heat, and road chemicals
- Thermoplastic Rubber (TPR) suitable for standard applications with moderate durability requirements

Silicone Masterbatch and **Impact Modifiers** are not applicable in this use-case due to the need for structural toughness, abrasion resistance, and outdoor exposure.

What Are Mud Flaps?

Mud flaps are polymeric panels installed behind wheels to:

- Block mud, gravel, slush, and debris from being thrown onto the vehicle or nearby vehicles
- Protect vehicle body panels and undercarriage
- Enhance styling and road safety
- Comply with regulatory splash/spray suppression guidelines

They are exposed to harsh mechanical and environmental stress, making material performance critical.

Why TPE/TPV/TPR for Mud Flap Applications?

TPE:

- **Highly Flexible & Impact Resistant** doesn't crack or shatter under stone hits or cold conditions
- Odorless and Moldable suitable for direct-fit aftermarket flaps
- Colorable often used in black, grey, or custom tones
- Recyclable & Lightweight eco-friendly and fuel-efficient

TPV:

- Superior UV & Weather Resistance withstands sun, rain, snow, and road chemicals
- **Heat Stable** performs in hot climates or close to exhaust zones
- OEM Approved Grades Available

TPR:

- Cost-Effective for Aftermarket
- Sufficient Toughness & Impact Tolerance
- Moderate Weatherability for use in temperate regions or low-end vehicles

Technical Specifications

Property Typical Range (TPE/TPV/TPR)

Shore Hardness 75–95 Shore A

Impact Resistance High

UV/Ozone Resistance Excellent (TPV), Good (TPE)

Operating Temperature

Range

 -40° C to $+110^{\circ}$ C

Tear Strength Moderate to High

Specific Gravity 0.95 - 1.15

Recyclability Yes

Processing Methods

- Injection Molding for contoured, logo-bearing flaps
- **Compression Molding** for thicker or heavy-duty designs
- Extrusion + Sheet Cutting for flat, rectangular truck flaps
- **2K Overmolding** soft edge integrated with hard mounting zone

Design Possibilities

- Textured or Branded Surface (automaker logos, matte finish)
- **Rigid** + **Flexible Zones** (TPV base with soft trailing edge)
- Extended Length for Off-Road/Commercial Vehicles
- Customized Mounting Hole Patterns or Bracket Integration

Compliance & Safety

- RoHS and REACH Compliant
- Low VOC & Odor-Free Formulations Available
- High Resistance to Water, Oils, Road Salts, and Slush
- Tested per Automotive Exterior Durability Standards (SAE/ISO)

Industries Served

- Passenger and Commercial Vehicle OEMs
- Heavy Vehicle & Trailer Manufacturers
- Aftermarket Accessory Brands

Agricultural and Off-Road Vehicle Assemblers

Advantages of Using TPE/TPV/TPR in Mud Flaps

- Durable, crack-resistant, and impact-absorbing under real-world driving conditions
- Maintains flexibility in hot and freezing environments
- Resistant to UV fading and chemical splatter
- Easy to mold and customize
- Recyclable and safer than PVC-based rubber alternatives

Common User Queries Answered by Chatbot

Q: Will TPE or TPV mud flaps crack in winter?

A: No. These materials remain flexible and durable down to -40°C.

Q: Are the materials resistant to road salts and chemicals?

A: Yes. TPV especially offers excellent chemical resistance for extended outdoor use.

Q: Can these mud flaps be branded with our logo?

A: Absolutely. Injection-molded TPE/TPV flaps can be custom textured, embossed, or printed.

Q: Are these suitable for trucks and off-road vehicles?

A: Yes. TPE and TPV can be processed into thick-duty formats ideal for commercial applications.

Q: Can I recycle old mud flaps made from these materials?

A: Yes. TPE and TPV are thermoplastics and can be recycled into new products.

Application: Spectacle Parts

Also known as: eyeglass components, temple grips, nose pads, ear socks, overmolded frames

Recommended Materials

- Thermoplastic Elastomer (TPE) widely used for soft-touch and skin-contact eyewear components
- Thermoplastic Rubber (TPR) economical substitute offering acceptable elasticity and softness
- Thermoplastic Vulcanizate (TPV) used for more durable, UV-stable outdoor eyewear applications

Silicone Masterbatch and **Impact Modifiers** are not suitable for optical-grade or soft interface parts like these.

Where Are Elastomers Used in Spectacles?

- Temple Tips / Ear Socks provide grip and comfort behind the ears
- Nose Pads ensure soft, anti-slip contact on the nose bridge
- Frame Overmolding for flexible hinges or soft-touch inner lining

• Sport Frame Pads – for impact cushioning and sweat resistance

These parts must remain skin-safe, flexible, lightweight, and resistant to environmental exposure such as sweat, oils, and UV light.

Why TPE/TPR/TPV for Spectacle Applications?

TPE:

- Soft & Skin-Friendly excellent for direct contact applications
- Non-Allergenic safe for sensitive skin; phthalate-free
- **High Grip Coefficient** anti-slip properties for nose/ear comfort
- Easy to Overmold bonds well with PC, TR-90, nylon, and ABS frames
- Color Customizable supports transparent and tinted finishes

TPR:

- Cost-Effective commonly used in budget and promotional eyewear
- Moderate Softness & Elasticity suitable for non-performance specs
- Good Colorability available in many shades with matte finishes

TPV:

• High UV and Sweat Resistance – good for outdoor, sports, and rugged eyewear

Typical Range (TPE/TPR/TPV)

- Better Recovery & Shape Retention avoids permanent deformation
- Preferred for Wraparound Frames or Active Use

Technical Specifications

Property

Troperty	Typical Range (TTE/TTR/TTV)
Shore Hardness	30–80 Shore A
Skin Contact Safety	Excellent (non-irritant, latex-free)
Grip Performance	High
Specific Gravity	0.90 - 1.10
UV/Ozone Resistance	Moderate (TPE/TPR), High (TPV)
Sweat/Oil Resistance	Good to Excellent
Overmolding Compatibility	PC, PA, TR-90, ABS, Metal Inserts
Recyclability	Yes

Processing Methods

- **2K Injection Molding** for direct overmolding on temples or bridges
- **Insert Molding** elastomer layer molded over rigid frame core

- Compression Molding (rare) for standalone nose pads
- Custom Coloring for brand-matching ear socks or translucent styles

Design Possibilities

- **Soft Touch Zones** on temple arms
- **Dual Hardness Frames** with rigid front + soft tips
- Sweat-Resistant Inner Linings
- Matt/Gloss/Transparent Finishes
- Ergonomic, Contoured Nose Pads

Compliance & Safety

- REACH & RoHS Compliant
- EN ISO 10993-10 (Optional) irritation/sensitization safe
- Free from Latex, BPA, Phthalates, Heavy Metals
- No VOC/Odor Issues

Industries Served

- Prescription Eyewear OEMs
- Sports & Outdoor Sunglasses
- Kids' Safety Glasses
- Fashion & Promotional Eyewear
- Industrial Safety Goggles (non-lens components)

Advantages of Using TPE/TPR/TPV in Spectacle Parts

- Enhanced wearer comfort due to softness and skin compatibility
- Strong grip prevents slipping during movement or sweating
- Supports stylish designs with transparency, colors, and textures
- Bonds with engineering plastics like TR-90, PC, or PA
- Safe, recyclable, and cost-effective compared to silicone or rubber

Common User Queries Answered by Chatbot

Q: Which material is best for soft temple grips?

A: TPE is ideal for temple grips due to its comfort, flexibility, and anti-slip properties.

Q: Are these materials safe for sensitive skin?

A: Yes. TPE and TPR grades are hypoallergenic, latex-free, and compliant with safety standards.

Q: Can these elastomers be used in premium sports eyewear?

A: Yes. TPV is especially suited for outdoor eyewear due to superior UV and sweat resistance.

Q: Can elastomers be molded over spectacle frames?

A: Absolutely. TPE and TPV can be overmolded on polycarbonate, nylon, or TR-90 frames.

Q: Are these recyclable and eco-safe?

A: Yes. All materials (TPE, TPR, TPV) used in spectacle parts are recyclable and free from harmful additives.

Application: Disposable Syringe Gasket

Also known as: plunger tip, piston seal, syringe rubber stopper, syringe plunger gasket

Recommended Material

• Thermoplastic Elastomer (TPE) – suitable for medical and pharmaceutical-grade syringe gaskets due to its excellent sealing properties, clean processing, and compatibility with sterilization

Only **medical-grade TPE** should be used for this application. TPV, TPR, Silicone Masterbatch, and Impact Modifiers are not used in critical disposable medical devices like syringes.

What is a Syringe Gasket?

A syringe gasket is a **soft elastomeric component located at the tip of the syringe plunger**. It functions to:

- Create a liquid-tight seal within the syringe barrel
- Allow smooth plunger movement with minimal friction
- Ensure precise dosage delivery
- Maintain integrity under sterilization and storage conditions

These gaskets are used in:

- Disposable single-use syringes (2 mL to 50 mL)
- Pre-filled syringes
- Vaccination, insulin, and blood collection syringes

Why TPE for Syringe Gasket Applications?

Key Properties:

- Soft, Rubber-like Elasticity conforms tightly to barrel for leak-proof performance
- Medical-Grade Biocompatibility safe for direct human contact
- Low Extractables and Leachables doesn't contaminate medication
- Sterilization Compatible withstands gamma, ETO, and steam sterilization
- Low Friction Surface smooth plunger action and consistent dosing
- PVC and Latex-Free no allergenic or harmful residues

Technical Specifications

Property	Typical TPE Medical Grade Range
Shore Hardness	40–70 Shore A
Compression Set	< 25% (for sealing effectiveness)
Tensile Strength	5 – 10 MPa

Property Typical TPE Medical Grade Range

Elongation at Break > 300%

Sterilization Gamma, ETO, Autoclave

Compatibility
Extractables &

Very Low (as per USP Class VI)

Leachables

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Biocompatibility USP Class VI, ISO 10993-5 compliant

Odor and Taste Transfer Negligible

Transparency/ Available in translucent or tinted

Colorability versions

Processing Methods

- Injection Molding (Micro or Multi-Cavity) suitable for high-volume, precise gasket production
- Overmolding on Plungers TPE directly molded onto rigid PP plungers
- Automated Assembly-Compatible Design allows fast integration into syringe barrel

Design Possibilities

- Single-Ring or Double-Ring Gasket Tips
- Lubricant-Free Grades eliminates need for silicone oil
- Low-Tack Surface Formulations reduces plunger sticking
- Color-coded Tips for syringe volume or drug-type differentiation

Compliance & Safety

- USP Class VI Compliant
- ISO 10993 (Biocompatibility) Certified
- FDA CFR 21 Compliant (as required for medical applications)
- Free from Latex, Phthalates, BPA, and Heavy Metals
- Gamma / ETO / Steam Sterilizable

Industries Served

- Medical Device Manufacturers
- Pharmaceutical Packaging Companies
- Disposable Syringe Producers
- Healthcare OEMs
- Diagnostic & Laboratory Equipment Suppliers

Advantages of Using TPE in Syringe Gaskets

- Clean, repeatable molding for mass production
- Reduces contamination risk due to low extractables
- Eliminates need for lubricants (optional)
- Lightweight, recyclable, and PVC-free
- Safer alternative to traditional rubber or latex seals

Common User Queries Answered by Chatbot

Q: What is the best material for syringe gaskets?

A: Medical-grade TPE is ideal due to its sealing performance, biocompatibility, and ease of sterilization.

Q: Can these gaskets be sterilized?

A: Yes. TPE gaskets can be sterilized via gamma radiation, ethylene oxide (ETO), or autoclaving.

Q: Are TPE gaskets safe for pharmaceutical contact?

A: Absolutely. They comply with USP Class VI and ISO 10993-5 standards for medical and drug-contact safety.

Q: Can TPE be molded directly on plungers?

A: Yes. TPE is widely used in 2K overmolding with polypropylene plungers for integrated plunger tips.

Q: Is the material latex-free?

A: Yes. TPE is latex-free, phthalate-free, and hypoallergenic.

Application: IV Cannula Parts

Also known as: Intravenous catheter parts, cannula flashback chamber seal, injection port plug, valve cap, cannula housing gasket

Recommended Material

- Medical-Grade Thermoplastic Elastomer (TPE) suitable for non-intrusive, non-blood-contact soft components such as:
 - Flashback chamber seals
 - Injection port valves
 - Protective caps
 - Soft overmolded seals on Luer connections or hubs

Note: Components in direct vascular contact (e.g., catheter tubes) are typically made of PTFE, PU, or FEP—not TPE. Your TPE grades should only be promoted for **external or non-invasive cannula components**.

Why TPE for IV Cannula Parts?

- **Biocompatibility** meets ISO 10993 and USP Class VI standards for medical use
- Sterilizable compatible with gamma, EtO, and autoclave methods
- Softness & Sealing Ability ideal for caps, gaskets, and valves
- Latex-Free & Non-Allergenic safe for patient skin contact
- Color Customization supports color-coded valve plugs and caps
- Bonding to Polypropylene suitable for overmolding onto cannula housings

Technical Specifications

Property	Typical TPE Medical Grade Range
Shore Hardness	40–70 Shore A
Elongation at Break	> 300%
Compression Set	< 25% (for sealing caps)
Sterilization Methods	Gamma, ETO, Steam
Biocompatibility	USP Class VI, ISO 10993
Extractables & Leachables	Low

Friction / Tack Level Customizable (high-grip or

lubricated)

Odor / Taste Neutral

Processing Methods

- Multi-Cavity Injection Molding suitable for flashback chamber seals, plugs, caps
- **Insert or Overmolding** over polypropylene or polycarbonate housings
- Precision Tooling for dimensional control of small parts

Design Possibilities

- Valve Plug Seals soft, resealable, color-coded
- Protective Needle Caps tight sealing with easy manual removal
- Overmolded Soft Zones grip or comfort zones on connector hubs
- Low Particulate Grades for cleanroom molding applications

Compliance & Safety

- ISO 10993 & USP Class VI Certified
- FDA CFR 21 Compliant (as applicable)
- Latex-Free, Phthalate-Free, Heavy Metal-Free
- Gamma/ETO/Steam Sterilization Compatible
- No VOC or Odor Transfer

Industries Served

- Medical Device Manufacturers
- IV Cannula OEM Suppliers
- Disposable Medical Kit Assemblers
- Hospital-Grade Consumables Producers

Advantages of Using TPE in IV Cannula Parts

- Offers soft yet resilient sealing for tight connections
- Provides comfortable grip zones or removable plugs
- Sterilization-ready without leaching harmful substances
- Replaces latex or silicone in certain non-invasive roles
- Reduces risk of allergies and patient irritation

Common User Queries Answered by Chatbot

Q: Can TPE be used for the catheter tubing of IV cannulas?

A: No. TPE is not suitable for intravascular tubing. It is ideal for external components like plugs, caps, and seals.

O: Is medical TPE safe for use in blood-contact devices?

A: Only if certified. For cannula use, TPE should be limited to non-blood-contact areas unless explicitly tested for such use.

Q: Can the TPE parts be sterilized?

A: Yes. Medical-grade TPE is compatible with gamma, EtO, and steam sterilization processes.

Q: Can TPE be used to make color-coded valve caps?

A: Absolutely. TPE can be color-matched and molded with precision for coded sealing systems.

O: Is TPE latex-free?

A: Yes. TPE is completely free from latex and safe for latex-sensitive patients.

Application: BP Machine Bulb

Also known as: sphygmomanometer bulb, inflation bulb, air pump bulb for blood pressure monitor

Recommended Materials

- Thermoplastic Elastomer (TPE) preferred for durability, medical-grade performance, and ease of molding
- Thermoplastic Rubber (TPR) cost-effective alternative for non-critical, non-hospital applications

Note: TPV is too rigid for optimal bulb compressibility. Silicone Masterbatch and Impact Modifiers are not relevant here.

Function of the BP Bulb

- Inflates the BP cuff manually by repeated squeezing
- Requires high elastic recovery, low compression set, and airtight sealing
- Often integrates a one-way valve or release valve assembly
- Should be **skin-contact safe**, odorless, and withstand repeated cycles

Why TPE or TPR for BP Bulb Applications?

TPE:

- Excellent Elastic Memory returns to shape instantly after each squeeze
- Soft yet Tough provides controlled compression without collapsing
- Biocompatible Options Available suitable for FDA & ISO 10993 compliance
- Smooth Surface Finish enhances hygiene and aesthetic appeal

• Customizable Hardness – typically in the 40–70 Shore A range

TPR:

- Low-Cost Alternative suitable for personal/home use BP monitors
- Moderate Elasticity adequate for limited-cycle performance
- Easily Colorable for consumer product lines (grey, black, blue, etc.)

Technical Specifications

Property	Typical Range (TPE/TPR)
Shore Hardness	45–70 Shore A
Tensile Strength	5 – 10 MPa
Elongation at Break	300% - 600%
Compression Set	< 25% (for repeated inflation)
Specific Gravity	0.90 - 1.15
Operating Temperature Range	-20°C to +60°C
Biocompatibility (TPE grades)	USP Class VI / ISO 10993-5
Sterilization Compatibility	EtO or Gamma (TPE grades)

Processing Methods

- Injection Molding single-shot molding of the bulb body
- **Insert Molding** optional valve seat or nozzle integration
- Surface Texturing matte finish for anti-slip grip
- Flash-Free Molding critical for airtight seal and valve function

Design Possibilities

- Single or Dual Nozzle Outlets
- Molded-in Valve Seat or Cap Interface
- Textured Grip Zones
- Transparent or Opaque Grades
- Custom Branding or Markings

Compliance & Safety

REACH and RoHS Compliant

- Medical TPE Grades USP Class VI & ISO 10993 compliant
- Latex-Free, Phthalate-Free, BPA-Free
- Sterilization Safe (TPE)
- Odor-Free Formulations Available

Industries Served

- Medical Device Manufacturers
- BP Monitor OEMs and Kit Assemblers
- Home Healthcare Device Producers
- Surgical Equipment Packaging Suppliers

Advantages of Using TPE/TPR in BP Bulbs

- Resilient for repeated manual compressions
- Maintains inflation performance over extended use
- Skin-friendly and safe for direct contact
- Easy to mold and customize for different device designs
- More sustainable than latex or rubber-based alternatives

Common User Queries Answered by Chatbot

Q: What material is best for BP bulb manufacturing?

A: TPE is ideal due to its elasticity, biocompatibility, and excellent recovery after compression.

Q: Can these materials be sterilized?

A: Yes. Medical-grade TPE can be sterilized by EtO or gamma. TPR is more suitable for non-sterile, consumer-grade devices.

O: Is the bulb latex-free?

A: Yes. TPE and TPR are latex-free, hypoallergenic, and safer alternatives to rubber.

Q: Can this be used for hospital-grade BP monitors?

A: Yes, when made with medical-grade TPE compliant with ISO 10993 and USP Class VI.

Q: How long do these bulbs last?

A: TPE and TPR bulbs are engineered to withstand thousands of inflation cycles without cracking or deforming.

Application: Blow Molded Parts

Also known as: hollow molded elastomer parts, flexible containers, ducts, reservoirs, air ducts, soft bottles

Recommended Materials

- Thermoplastic Elastomer (TPE) suitable for soft, squeezable, or flexible parts
- Thermoplastic Vulcanizate (TPV) ideal for automotive or weather-resistant parts requiring durability and UV stability
- Thermoplastic Rubber (TPR) used for low-cost and consumer-grade applications

Silicone Masterbatch and **Impact Modifiers** are not used directly in blow molding processes. Blow molding is typically reserved for 100% elastomeric compounds or co-extruded systems with PP or PE.

Typical Blow Molded Products from TPE/TPV/TPR

- Air ducts and bellows (automotive HVAC)
- Squeeze bottles and cosmetic containers
- Fuel hoses and vapor recovery tubes
- Flexible medical pump chambers
- Toy balls, baby bulbs, and enclosures
- Expandable bellows and dust covers

Why TPE/TPV/TPR for Blow Molded Applications?

TPE:

- Good Melt Strength and Recovery
- Squeeze Flexibility ideal for dispensers or medical bulbs
- Soft Touch with Elastic Memory
- Recyclable and Lightweight

TPV:

- Superior Heat and UV Resistance
- Automotive Grade Durability good for ducts, bellows, and tubing
- Chemical Resistance withstands oils, fuels, and under-hood fluids
- Color Stability in Outdoor Environments

TPR:

- Cost-Efficient for Toy and Household Items
- Acceptable Blow Moldability in Thin Wall Parts
- Moderate Strength and Good Aesthetics

Technical Specifications

Property Typical Range (TPE/TPV/TPR)

Shore Hardness 40 - 95 Shore A

Density $0.90 - 1.15 \text{ g/cm}^3$

Flexural Modulus Low (soft, flexible parts)

Elongation at Break 300% – 600%

Blow Mold Extrusion and Injection Blow

Compatibility Molding

Recyclability Yes

UV and Ozone

Good (TPV)

Resistance

-40°C to 130°C (TPV)

Processing Methods

Temperature Resistance

- Extrusion Blow Molding for ducts, hoses, flexible tubes
- Injection Blow Molding for precise bottles or chambers
- **Co-Extrusion Blow Molding** TPE/TPV over PP or PE substrates
- Parison Programming used to control wall thickness for flexible parts

Design Capabilities

- Variable Wall Thickness squeeze zones or soft bellows
- **Molded Threads or Ports** for valves and closures
- Complex Hollow Geometries elbows, Y-ducts, accordion folds
- Textured or Smooth Finish depending on mold cavity
- Color-Coded or Transparent Grades

Compliance & Safety

- REACH and RoHS Compliant
- Food Contact (optional TPE grades) for cosmetic or pharma dispensers
- Auto OEM Approved TPVs for HVAC, under-the-hood, and air ducting
- No Phthalates, Latex, or BPA
- Can be sterilized (gamma/EtO for medical variants)

Industries Served

- Automotive (engine bay parts, HVAC ducts, air guides)
- Medical (bulb chambers, squeeze aspirators)
- Personal Care (bottle bulbs, droppers, nozzles)
- Toys and Sports Goods (balls, inflatable items)
- Consumer Products (dust bellows, pipe guards)

Advantages of Using TPE/TPV/TPR in Blow Molded Parts

- Flexibility and elasticity for deformation-based functions
- Moldable into complex, hollow, or collapsible geometries
- High resilience and crack resistance even in cold environments
- Recyclable, lightweight, and free from plasticizers
- Safer and cleaner than PVC-based alternatives

Common User Queries Answered by Chatbot

Q: Can TPE be used for blow molded bottles?

A: Yes. TPE is excellent for squeeze bottles, pumps, and chambers where soft touch is needed.

Q: Which material is best for automotive ducts or bellows?

A: TPV is preferred due to its thermal and UV stability under the hood.

Q: Is TPE suitable for baby products?

A: Yes, medical/food-grade TPE is safe for baby bulbs and dispensers when certified.

Q: Can these elastomers be co-extruded with PP?

A: Yes. TPE and TPV grades can be co-extruded or overmolded with PP, especially in tubing or multi-layer ducting.

Q: Are these materials recyclable?

A: Absolutely. TPE, TPV, and TPR are thermoplastics and fully recyclable.

Application: Water Bottle Gasket

Also known as: bottle seal ring, lid gasket, cap liner, anti-leak ring

Recommended Materials

- Thermoplastic Elastomer (TPE) primary choice for hygienic, flexible, and food-contact compliant seals
- Thermoplastic Vulcanizate (TPV) for high-heat resistance (e.g., hot beverage bottles)
- Thermoplastic Rubber (TPR) cost-effective for simple, non-thermal bottle designs

Silicone Masterbatch and Impact Modifiers are not applicable for sealing gaskets.

Functional Requirements of Water Bottle Gaskets

- Provide airtight and watertight sealing under pressure
- Must be flexible, non-toxic, and odor-free
- Should withstand frequent wash cycles, including dishwashing
- Must retain shape under compression, twisting, or pulling
- Require **FDA** or food-grade compliance when used in drinking water bottles

Why TPE/TPV/TPR for Water Bottle Gaskets?

TPE:

- Food-Grade and BPA-Free safe for drinking water applications
- Soft Elastic Recovery ensures consistent sealing across cycles
- Excellent Clarity/Colorability supports branding and product visibility
- Compatible with Recyclable Plastics PP, PE, Tritan, PC, PET

TPV:

- **Heat-Resistant and Durable** useful for hot-fill or thermally exposed bottles
- High Compression Set Resistance gaskets retain shape longer
- UV and Chemical Resistance ideal for outdoor or rugged bottles

TPR:

- **Economical and Flexible** used in lower-cost or promo bottles
- Acceptable Water Resistance limited dishwasher cycles

Technical Specifications

Property	TPE / TPV / TPR Range
Shore Hardness	40 – 70 Shore A
Compression Set	< 25% (after 24 hrs @ 70°C)
Water Absorption	< 0.5%
Operating Temperature	-20°C to 100°C (TPV up to 130°C)
Food Contact Compliance	Available (TPE)
Odor / Taste Transfer	Negligible
Elongation at Break	300 - 600%
Sterilization Compatibility	Yes (gamma, steam for TPE/TPV grades)

Processing Methods

- Injection Molding high-volume production of precision gasket rings
- Insert Molding TPE/TPV gasket integrated into lid during molding
- Overmolding on PP or PC for permanent sealing caps
- Compression Molding not preferred for thermoplastics but possible for low runs

Design Possibilities

- Circular, Oval, or Custom Profiles
- Single or Double-Lip Seals
- Snap-Fit Rings with Pull Tabs
- Transparent or Colored Gaskets
- Textured Surfaces for Anti-Slip Fit

Compliance & Safety

- REACH and RoHS Certified
- Food Contact Approved (EU 10/2011, FDA CFR 21)
- Latex-Free, Phthalate-Free, BPA-Free
- Odor-Free and Taste-Neutral
- Non-Staining, Non-Leaching

Industries Served

- Consumer Goods (bottles, flasks, thermoses)
- Food & Beverage Packaging
- Sports and Travel Gear
- Baby Products (sipper and straw bottles)
- Household and Reusable Bottle Brands

Advantages of Using TPE/TPV/TPR in Water Bottle Gaskets

- Long-lasting sealing performance across temperature cycles
- High resilience and flexibility with no deformation
- Safe for human contact and food-grade usage
- Can be co-molded with various bottle materials (PP, PC, Tritan)
- Supports brand customization through color and texture

Common User Queries Answered by Chatbot

Q: What material is best for reusable water bottle gaskets?

A: Food-grade TPE is preferred due to its softness, compliance, and non-leaching properties.

Q: Can these gaskets handle hot water or dishwashing?

A: Yes. TPV and high-grade TPE variants are dishwasher-safe and thermally stable.

Q: Are the gaskets recyclable?

A: Yes. All TPE, TPV, and TPR gaskets are recyclable thermoplastics.

Q: Is there any taste or odor with TPE gaskets?

A: No. Certified food-grade TPE is neutral in taste and odor, unlike low-grade rubber or PVC.

Q: Can gaskets be permanently molded onto bottle caps?

A: Yes. TPE and TPV can be overmolded onto PP or PC caps for permanent integration.

Application: Slipper

Also known as: flip-flops, EVA-style slippers, casual footwear, sole & strap components

Recommended Materials

- Thermoplastic Elastomer (TPE) for cushioned, flexible, and colorful soles or straps
- Thermoplastic Rubber (TPR) for more rigid yet elastic outsoles with good wear resistance
- Thermoplastic Vulcanizate (TPV) optional for anti-fatigue insoles or oil/UV resistant variants

Note: Silicone Masterbatch and Impact Modifiers are not applicable in direct sole applications but may be used in tooling release systems or PP-based packaging elements.

Material Mapping in Slippers

Component	Recommended Material
Sole (main body)	TPE, TPR
Outsole layer	TPR, TPV
Straps or Inserts	TPE
Cushion layer	TPE soft grade
Color Inlays / Logos	TPE injection molded

TPE:

- Soft and Comfortable Underfoot
- Excellent Colorability allows vibrant strap or sole colors
- **Recyclable** eco-friendly production
- Shock Absorbing reduces heel impact while walking
- Slip-Resistant Grades Available

TPR:

- Higher Abrasion Resistance ideal for outsoles
- **Rubber-Like Traction** improves grip on wet surfaces
- Stiffer Structure better support for daily wear

TPV:

- Superior UV and Oil Resistance for rugged/outdoor footwear
- Anti-Fatigue Properties useful for insole overlays
- Excellent Tear Strength

Technical Specifications

Property	TPE / TPR / TPV Range
Shore Hardness	45 – 80 Shore A (TPE)
	60 – 95 Shore A (TPR/TPV)
Flexibility	High (TPE), Moderate (TPR)
Slip Resistance (COF)	≥ 0.45
Density	$0.89 - 1.20 \text{ g/cm}^3$
Elongation at Break	200% - 500%
Recyclability	Yes (All)
UV Resistance	Excellent (TPV), Good (TPR)
Abrasion Resistance	High (TPR)
Water Absorption	Negligible

Processing Methods

- **Injection Molding** for soles, inlays, straps, logos
- Co-Injection Molding dual-color sole and grip pads
- Extrusion Sheet + Die Cutting for flat sole blanks (mass volume)

- Compression Molding in some traditional footwear lines
- Overmolding strap over sole without adhesives

Design Flexibility

- Single Color or Dual Density Soles
- Anti-Skid Patterns Molded In
- Textured, Matte, or Glossy Finishes
- Color Matched Straps and Soles
- Custom Branding or Logos Embedded

Compliance & Safety

- REACH and RoHS Certified
- Phthalate-Free and Non-Toxic
- Odor-Free Formulations
- Anti-Microbial Options Available (via additive compounding)
- No Heavy Metals or Latex

Industries Served

- Footwear Manufacturers
- Domestic and Promotional Footwear Brands
- Children's and Orthopedic Footwear
- Industrial Use Slippers (TPV)
- Home and Spa Footwear Suppliers

Advantages of Using TPE/TPR in Slippers

- Comfortable for long-term use
- Available in vibrant, UV-stable colors
- Lightweight, recyclable, and flexible
- Superior slip resistance and cushioning
- Compatible with low-cost mass production

Common User Queries Answered by Chatbot

Q: Is TPE suitable for slipper soles?

A: Yes. TPE offers softness, grip, and comfort, making it ideal for casual and indoor slippers.

Q: How is TPR different from TPE in slippers?

A: TPR is stiffer and more wear-resistant, suitable for outsole grip and longevity, while TPE is softer and more flexible.

Q: Can I make dual-density slippers?

A: Yes. You can co-inject a soft TPE upper layer with a hard TPR or TPV outsole for better performance.

Q: Are these slippers waterproof?

A: Yes. TPE, TPR, and TPV are non-porous and do not absorb water.

Q: Are these materials safe for kids' slippers?

A: Absolutely. Phthalate-free, non-toxic TPE and TPR grades are safe for children's footwear.

Application: Shoe Heel Pads

Also known as: heel inserts, heel cushions, anti-shock heel pads, orthopedic heel cups

Recommended Materials

- Thermoplastic Elastomer (TPE) for soft, cushioning performance with skin contact safety
- Thermoplastic Rubber (TPR) for slightly firmer pads with improved durability
- Thermoplastic Vulcanizate (TPV) optional for UV and fatigue resistance in performance insoles

Note: Heel pads require materials that offer long-term elasticity, impact absorption, and non-irritant properties — which are best met by TPE-based formulations.

Function of Heel Pads

- Provide shock absorption at heel-strike to reduce joint impact
- Enhance **comfort** during walking, standing, or running
- Used in sports shoes, orthopedic footwear, or daily wear
- Often used as aftermarket accessories or integrated insoles
- Require skin-safe, odor-free, and high rebound material

Why TPE / TPR / TPV for Heel Pads?

TPE:

- Gel-like Softness mimics silicone feel but with thermoplastic recyclability
- Elastic Rebound cushions each heel strike and recovers instantly
- Non-Toxic & Biocompatible safe for direct foot contact
- Customizable Hardness various densities for soft or medium support

TPR:

- Good Compression Strength maintains form under pressure
- **Durable and Long-Lasting** resists permanent set
- Cost-Effective Alternative to PU and rubber pads

TPV:

- High Fatigue Resistance useful for athletic or prolonged standing footwear
- Weather Stability won't crack in outdoor use
- Optional use in Dual-Layer Pads

Technical Specifications

Property Typical Range (TPE/TPR/TPV)

Property Typical Range (TPE/TPR/TPV)

Compression Set < 20%

Rebound Resilience High (> 40%)

Specific Gravity $0.90 - 1.15 \text{ g/cm}^3$

Elongation at Break > 300%

Odor / Skin

Irritation

None (Non-allergenic)

Slip Resistance

Optional Surface Textures

Recyclability Yes

Processing Methods

• Injection Molding – for standalone heel pads or inserts

- Overmolding heel pads integrated into full insoles
- **Insert Molding** with fabric or EVA layers
- Embossed Branding / Texture for grip and anti-slip base

Design Possibilities

- Gel-Type Transparent Pads
- **Dual Hardness Zones** central soft core with firmer edge
- Textured Bottom Layer prevents slipping in shoe
- **Ventilation Channels** for breathability
- Washable and Reusable Forms

Compliance & Safety

- REACH and RoHS Compliant
- Phthalate-Free, Non-Toxic
- **Skin-Safe Formulations** Latex-Free
- Washable Grades Available
- No Heavy Metals or Allergens

Industries Served

- Footwear OEMs (casual, sports, orthopedic)
- Insole and Footcare Brands
- Medical and Orthopedic Product Manufacturers

• Wellness and Performance Gear Suppliers

Advantages of Using TPE/TPR for Heel Pads

- Provides excellent cushioning and comfort
- Long-lasting compression recovery
- Safe for skin contact and reusable
- Easy to mold into ergonomic, anatomical shapes
- Available in transparent, tinted, or colored forms

Common User Queries Answered by Chatbot

Q: What material is best for anti-shock heel pads?

A: TPE is ideal due to its gel-like softness and high impact rebound.

Q: Can heel pads be made in transparent form?

A: Yes. TPE and TPR can be molded in clear or tinted transparent versions.

Q: Are these pads reusable and washable?

A: Yes. TPE/TPR pads are washable and can be reused many times without loss of performance.

Q: Do these pads retain shape over time?

A: Yes. With low compression set, they retain cushioning performance across extended use.

Q: Can we customize heel pads with branding?

A: Absolutely. Molds can be created with embossed logos, patterns, or anti-slip textures.

Application: Gym Equipment Components

Also known as: fitness accessories, strength training tools, resistance devices, grip coverings

Recommended Materials

- Thermoplastic Elastomer (TPE) primary choice for grips, handles, and flexible resistance tools
- Thermoplastic Rubber (TPR) for molded handles and pads with better surface durability
- Thermoplastic Vulcanizate (TPV) for weather-exposed outdoor gym parts or premium fatigue-resistant uses
- Silicone Masterbatch for soft-touch, anti-slip coatings on PP/TPE bases
- Impact Modifiers only for internal PP components that require shock absorption

Key Product Applications in Gym Equipment

Component	Preferred Material
Dumbbell and barbell grips	TPE, TPR, TPV
Resistance bands and exercise tubes	TPE (gel-grade or stretchable type)
Yoga roller edges and foam rollers	TPE or TPV
Gym mat edging and corners	TPE, TPV
Handles on machines or accessories	TPR, TPE (overmolded on metal or PP)
Kettlebell handle covers	TPR, TPV
Suspension training grips	TPE
Skipping rope grips	TPE, TPR
Adjustable dumbbell dials	TPE with Impact Modified PP
Floor protection pads	TPV

Why TPE/TPR/TPV for Gym Equipment?

TPE:

- Soft Touch and Elastic Recovery suitable for grips and resistance tools
- Non-Toxic and Odor-Free ideal for skin contact
- Customizable Hardness from gel-like to semi-rigid
- Washable and Easy to Clean

TPR:

More Durable Surface – excellent for equipment subjected to rough handling

- Good Slip Resistance enhances grip stability
- **High Abrasion Resistance** better longevity

TPV:

- Superior Weather Resistance suitable for outdoor or exposed gym tools
- Higher Fatigue Resistance ideal for components in daily-use gym accessories
- Better Thermal Stability holds shape in both hot and cold environments

Silicone Masterbatch (used as additive):

- Enhanced Grip Texture soft, anti-slip feel in coatings
- Improves Tactile Finish ideal for premium gym accessories

Technical Specifications

TPE/TPR/TPV Range
30 – 90 Shore A
< 25%
300 – 700%
$0.90 - 1.25 \text{ g/cm}^3$
Excellent (customizable finish)
High $(TPR > TPV > TPE)$
High (TPV)
Yes
None
REACH, RoHS, Non-Phthalate

Processing Methods

- **Injection Molding** grips, pads, rollers, plates
- Extrusion resistance tubes, bands
- Overmolding TPE/TPR on metal rods, PP or nylon handles
- Compression Molding for dual-density performance pads
- **Texturing/Embossing** for anti-slip or ergonomic zones

Design Features Enabled

• Ergonomic Handle Grips – contoured, anti-fatigue

- Textured Zones enhanced control even with sweat
- **Dual-Color Co-Molding** for aesthetic gym products
- Reinforced Grips high-tensile formulations for resistance training
- Matte, Glossy, or Satin Finish as per brand identity

Industries Served

- Fitness Equipment OEMs
- Resistance Gear Manufacturers
- Home Gym and Wellness Brands
- Sports Goods Distributors
- Physical Therapy Equipment Designers

Advantages of Using TPE/TPR/TPV in Gym Products

- Provides shock absorption and comfort
- Long-term grip retention under sweaty or humid conditions
- Free of harmful plasticizers, phthalates, or latex
- Customizable elasticity for resistance tools
- Supports premium branding via surface finish and texture

Common User Queries Answered by Chatbot

Q: Which material is best for resistance bands?

A: TPE is ideal due to its high elongation and recovery without permanent deformation.

Q: Are TPE grips washable and hygienic?

A: Yes. TPE and TPV are both washable and resistant to sweat, bacteria, and odor.

Q: What is the best material for dumbbell handle grips?

A: TPR offers superior grip and abrasion resistance, making it best for regular-use weights.

Q: Can gym equipment made of these materials be used outdoors?

A: Yes. TPV is recommended for UV, moisture, and weather resistance.

Q: Are these gym materials safe for skin contact?

A: Yes. TPE, TPR, and TPV are phthalate-free and skin-friendly for extended use.

Application: Stationery Products

Also known as: school and office supplies, writing accessories, educational plastic items

Recommended Materials

- Thermoplastic Elastomer (TPE) ideal for soft-touch grips, erasers, and child-safe edges
- Thermoplastic Rubber (TPR) good for durable, flexible parts in pens and geometry tools

- Thermoplastic Vulcanizate (TPV) used in anti-fatigue and UV-exposed products like long-life geometry tools
- Silicone Masterbatch enhances grip texture, matte finish, and anti-slip surface feel
- Impact Modifiers optional use in PP-based stationary bodies for drop impact and crack resistance

Common Stationery Products Using TPE/TPR/TPV

Component	Material
Pen grips	TPE, TPR
Pencil toppers and grips	TPE (food-grade available)
Erasers	TPE, TPR
Geometry box edges	TPR or TPV
Safety scissors handles	TPE overmolded on PP
Rulers (flexible)	TPE, TPR
Compass or divider rings	TPE
Marker caps	TPR, TPE
Sticky note holders & stands	TPE molded
Anti-slip pads	TPE, TPV
School toy add-ons	TPE (soft-touch)

Why Use TPE/TPR/TPV in Stationery Products?

TPE:

- **Soft and Non-Toxic** safe for children's contact
- Excellent Elasticity and Grip ideal for pen and pencil grips
- Odor-Free and Taste-Neutral suitable for school use
- **Highly Colorable** supports vivid, playful color ranges

TPR:

- Superior Abrasion Resistance improves product life
- **Moderate Flexibility** great for rulers, holders, caps
- Economical cost-effective for high-volume production

TPV:

- Enhanced Weather & UV Resistance used in long-lasting tools
- Superior Tear and Fatigue Resistance useful for rubber bands or snap rings

Silicone Masterbatch:

- Improves Touch Sensitivity enhances tactile finish
- Reduces Friction and Stickiness ideal for writing grips

Technical Specifications

Property	Typical Range
Shore Hardness	20 – 80 Shore A
Elongation at Break	200 – 600%
Tear Strength	Moderate to High (TPV > TPR > TPE)
Specific Gravity	$0.90 - 1.25 \text{ g/cm}^3$
Slip Resistance	Customizable with texture
Food Contact Safety	Available (TPE food grade)
Recyclability	Yes (all thermoplastic grades)

Processing Methods

- Injection Molding grips, erasers, caps, soft components
- **Extrusion** rulers, flexible bands
- Overmolding handles and caps with PP/Nylon cores
- Multi-Material Molding colored or dual-hardness designs
- Embossing/Texturing for branded stationery grip zones

Design Capabilities

- Child-Friendly Shapes and Textures
- Bright and Custom Color Matching
- **Dual-Material Integration (PP + TPE)**
- High Clarity or Matte Finish Options
- Soft, Rounded Edges for Safety

Compliance & Safety

- REACH and RoHS Compliant
- Phthalate-Free, Non-Toxic, BPA-Free
- Food-Contact Grades Available

- No Latex, No Heavy Metals
- Washable and Stain-Free Grades

Industries Served

- School and Office Supply OEMs
- Promotional Stationery Brands
- Writing Instrument Manufacturers
- Educational Toy Brands
- Custom Plastic Molded Accessories

Advantages of Using TPE/TPR/TPV in Stationery

- Safe for children and extended handling
- Soft-touch ergonomics for fatigue-free writing
- Flexible designs with high visual appeal
- Environmentally friendly (recyclable)
- Versatile across multiple components (caps, grips, erasers)

Common User Queries Answered by Chatbot

Q: Are these elastomer materials safe for school use?

A: Yes. TPE, TPR, and TPV can be formulated to be phthalate-free, food-contact safe, and compliant with child safety norms.

Q: Can TPE be used in erasers?

A: Yes. Soft-grade TPE is widely used for dust-free, PVC-free erasers.

Q: Can pen grips be molded with color and texture?

A: Absolutely. TPE and TPR are highly colorable and support various textures for grip enhancement.

Q: Do these materials have any smell or residue?

A: No. Properly compounded TPE/TPR are odorless and do not leach or stain.

Q: Are these grips recyclable?

A: Yes. All thermoplastic elastomers used in stationery are recyclable.

Application: Pickleball Components

Also applies to: paddle grips, edge guards, vibration dampeners, flexible balls

Recommended Materials

• TPE (Thermoplastic Elastomer) – soft grips, flexible grommets, edge guards

- TPR (Thermoplastic Rubber) paddles and handle grips with enhanced abrasion resistance
- TPV (Thermoplastic Vulcanizate) for UV and fatigue-resistant outdoor accessories
- Silicone Masterbatch for surface softness, anti-slip finish, and color enhancement in grips
- **Impact Modifiers** used in PP core paddles to improve shock absorption and structural resilience

Typical Pickleball Product Components Using These Materials

Component	Material
Paddle handle grips	TPE, TPR
Edge protectors	TPE, TPV
Overgrip wraps	TPE
Paddle face inserts	TPR (non-core variants)
Vibration dampeners	TPE
Flexible pickleballs	TPR, TPE
Core structure (PP-based)	Impact Modified PP
Carry handles/pads	TPV

Why Use TPE / TPR / TPV in Pickleball Equipment?

TPE:

- Excellent Elasticity suitable for grips and shock-absorbing elements
- Skin-Safe and Sweat-Resistant ideal for prolonged grip use
- **Highly Colorable** branding and team customization possible
- Soft-Touch Comfort reduces hand fatigue and slip

TPR:

- **Durable and Abrasion Resistant** for outdoor grips and flexible balls
- Good Impact Resistance aids in performance accessories
- Anti-Slip Properties dry or sweaty conditions

TPV:

- Superior UV and Fatigue Resistance suitable for outdoor edge guards
- Tear Resistance excellent for heavy-use applications
- Thermal and Chemical Stability extended life

Silicone Masterbatch:

• Improves Surface Texture – soft matte feel, ideal for premium paddle grips

- Non-Sticky Feel enhances handling comfort and sweat resistance
- Color Depth and Gloss Control used in custom aesthetics

Impact Modifier:

- Used in PP Paddle Core enhances structural durability and shock resilience
- Improves Toughness critical in injection-molded paddle core layers

Technical Specifications

Property	Typical Values (TPE/TPR/ TPV)
Shore Hardness	40 – 90 Shore A
Elongation at Break	300 – 700%
Tensile Strength	6 – 15 MPa
Specific Gravity	$0.90 - 1.25 \text{ g/cm}^3$
UV Resistance	Excellent (TPV)
Slip Resistance (COF)	> 0.45
Recyclability	Yes (all thermoplastics)
Odor	Odorless, non-irritating
Skin Compatibility	Excellent

Processing Methods

- Injection Molding grips, vibration dampeners, ball components
- Overmolding handle grip over PP/metal base
- Extrusion edge guards or wraps
- Texturing embossed logos, anti-slip zones
- **Dual-Material Designs** soft/hard combo for ergonomic handles

Design Flexibility

- Multi-Color Grip Combinations
- Sweat-Wicking Textured Surfaces
- Logo or Branding Molding
- Replaceable Grip Covers
- Aerodynamic Ball Shells (TPR)

Compliance & Safety

- REACH and RoHS Certified
- Phthalate-Free, Non-Toxic
- Sweat-Resistant and Skin-Friendly
- Latex-Free and BPA-Free
- Washable and UV-Stable Grades Available

Industries Served

- Sports Equipment Manufacturers
- Premium and Mass-Market Paddle Brands
- Outdoor Fitness Gear OEMs
- Accessories and Spare Parts Suppliers

Advantages of TPE/TPR/TPV in Pickleball

- Enhances grip, feel, and comfort during gameplay
- Improves vibration damping and control
- Supports long-term outdoor exposure
- Customizable for color, hardness, and finish
- Lightweight, recyclable, and performance-driven

Common User Queries Answered by Chatbot

Q: What grip material is best for pickleball paddles?

A: TPE and TPR provide soft, durable, and sweat-resistant grips for superior control.

Q: Can these materials be used in outdoor paddles?

A: Yes. TPV is especially suitable for UV-resistant, outdoor-use edge protectors and grips.

Q: Is the material recyclable and safe for long use?

A: Absolutely, TPE, TPR, and TPV are recyclable, phthalate-free, and skin-friendly.

Q: Do elastomer grips lose shape over time?

A: No. These materials have excellent compression set resistance and retain performance for extended use.

Q: Can we add brand logos or textures on grips?

A: Yes. Injection molds can be customized with logos, patterns, and multi-texture finishes.

Application: Plastic Cricket Bats and Grips

Also includes: junior cricket bats, bat handles, overgrips, toy cricket sets

V Recommended Materials

- **TPE** (Thermoplastic Elastomer) ideal for soft, elastic grips and flexible bat edges
- **TPR** (Thermoplastic Rubber) provides rubber-like durability in grips and bat inserts
- TPV (Thermoplastic Vulcanizate) used in outdoor or high-fatigue bat handles
- Impact Modifier (for PP Bat Body) enhances toughness and impact resistance of plastic bat shells
- Silicone Masterbatch (optional) added to TPE for smoother, anti-slip grip finish

🔪 Material Mapping

Component	Recommended Material
Bat body (injection molded)	PP + Impact Modifier
Handle grip	TPE, TPR, TPV

Edge cushioning **TPE**

Shock absorbing inserts TPE (soft gel grade)

TPE with Silicone Overgrip with texture Masterbatch

TPE Color accents or branding



Why These Materials?

TPE:

- Soft-touch and vibration-dampening
- Safe for children's toys and beginner bats
- Available in bright, attractive colors
- Easily molded into textured, ergonomic grips

TPR:

- Rubber-like strength with better abrasion resistance
- Ideal for high-friction bat grip zones
- Good for mass-market molded grips

TPV:

High fatigue and tear resistance for pro-level or repeated play

- UV-stable for outdoor cricket playsets
- Suitable for co-molding with rigid handles

Impact Modifier:

- Used in **PP bat shell** for improving:
 - Crack resistance
 - Drop durability
 - Cold weather toughness

Silicone Masterbatch:

- Optional use in grip layer for anti-slip surface
- Improves matte finish and hand-feel without stickiness

Technical Specifications

Property	Typical Range (TPE/TPR/ TPV)
Shore Hardness	40–80 Shore A
Elongation at Break	300-700%
Rebound Resilience	High
Specific Gravity	$0.90 - 1.20 \text{ g/cm}^3$
Compression Set	< 25%
UV Resistance	Good (TPR), Excellent (TPV)
Skin Contact Safety	Excellent
Recyclability	Yes

Processing Methods

- **Injection Molding** bat body, handle inserts, colored accents
- **Overmolding** grip molded directly onto the bat handle
- **Extrusion** for overgrip sleeves or protective tubes
- **Dual Material Molding** handle + insert + grip integration
- **Surface Texturing** embossed branding, anti-slip patterns



🧩 Design Features Enabled

Ribbed or spiral grip textures

- Vibrant, multi-color bat grips
- Soft zones for anti-shock comfort
- Branding integration into mold
- Matte or gloss grip finishes

Compliance & Safety

- **REACH and RoHS Certified**
- Phthalate-Free, Non-Toxic for Child Use
- **Latex-Free and BPA-Free**
- Skin-Compatible, No Odor
- Washable and Weather-Resistant

Industries Served

- Toy Manufacturers
- Sports Equipment OEMs (Junior & Recreational)
- Promotional and Custom Gift Bats
- PE Equipment Suppliers for Schools

Renefits of Using TPE/TPR/TPV for Plastic Bats

- Improved grip control and comfort
- Enhanced impact resistance
- Recyclable and environmentally safer
- Ideal for both toy and entry-level training bats
- Easily customized for branding or aesthetics

Common User Queries Answered by Chatbot

Q: What is the best material for a plastic bat handle grip?

A: TPE or TPR are ideal for soft, durable, and slip-resistant grips.

Q: Can TPE grips be used for kids' bats?

A: Yes. TPE is non-toxic, phthalate-free, and safe for children.

Q: How can I prevent the plastic bat from cracking?

A: Use PP with Impact Modifier for the body to enhance impact strength and durability.

Q: Do these grips wear out quickly with sweat or sunlight?

A: No. TPV and TPR have excellent UV and wear resistance for long-lasting performance.

Q: Can grips be textured or colored?

A: Absolutely. These materials are highly colorable and can be molded with ergonomic textures.

Application: Baby Teethers

Also applies to: teething rings, chew toys, baby-safe soothers

V Recommended Materials

- **TPE** (Thermoplastic Elastomer) primary material for softness, flexibility, and foodgrade safety
- **TPR** (Thermoplastic Rubber) for slightly firmer designs requiring higher tear strength
- TPV (Thermoplastic Vulcanizate) used in select long-life or outdoor-safe designs
- Silicone Masterbatch (optional) blended into TPE for improved smoothness and matte finish
- **Impact Modifier not used**, as no rigid PP cores are involved in teethers



Material Mapping for Teethers

Component	Recommended Material
Chewable ring body	TPE (food-grade, soft-touch)
Textured surfaces	TPR, TPE with soft hardness
Dual-hardness elements	TPE overmolded on TPE/TPV
Squeezable hollow form	TPE (low-durometer grade)
Multi-color designs	TPE, TPR (multi-shot molding)
Gripping handles	TPE or TPV (more durable)



Why Use TPE/TPR/TPV for Teethers?

TPE:

- Soft and Chewable mimics silicone while being recyclable
- Food-Contact Approved BPA-free, phthalate-free, EN 71-3 compliant
- Safe for Babies no sharp edges, no odor
- **Brightly Colorable** attractive to infants

TPR:

- **High Tear Strength** withstands bite cycles
- Elastic Yet Durable better for textured or ribbed surfaces
- Cleanable and Dryable dries faster than silicone

TPV:

- **Enhanced Fatigue and Weather Resistance** for outdoor-safe or rugged variants
- Suitable for Older Toddlers' Chewables firmer yet safe

Silicone Masterbatch:

- Used in TPE to improve surface feel ultra-smooth and non-sticky
- Gives Premium Matte Texture without compromising safety



Technical Specifications

Shore Hardness 20 - 50 Shore A

> 400% Elongation at Break

< 20% Compression Set

Tear Resistance High (TPR > TPV > TPE)

 $0.90 - 1.10 \text{ g/cm}^3$ Specific Gravity

Taste and Odor None

Hot water, dishwasher safe Washability

Recyclability Yes (all thermoplastics)

BPA/Phthalate/Latex-

Free

Yes

EN 71-3, REACH, RoHS, FDA (upon Standards

formulation)



Processing Methods

- Injection Molding teethers with complex shapes or patterns
- Overmolding soft grip over a firmer base
- **Multi-Component Molding** dual texture/color teethers
- **Texturing** / **Embossing** soft bumps, grooves for gum massage
- **Ultrasonic Welding (assembly)** if multi-part



🧬 Design Flexibility

- **Bright, Multi-Colored Parts**
- **Textured Zones for Gum Relief**
- Ring, Rattle, or Animal Shapes
- **Custom Branding or Logos**
- **Squeezable and Non-Squeezable Variants**

Compliance & Safety

- **EN 71-3 Compliant**
- **REACH and RoHS Certified**
- **BPA-Free**, Phthalate-Free, Latex-Free
- **Food Contact Safe Grades Available**
- No Taste or Odor Transfer
- **Non-Toxic and Pediatrician Approved Formulations**

Industries Served

- **Baby Product Manufacturers**
- **Infant Toy OEMs**
- Private Label Teether Brands
- Pediatric & Daycare Product Designers

Renefits of Using TPE/TPR/TPV in Baby Teethers

- Soft and safe for chewing by infants
- Easy to sterilize or boil-clean
- Attractive aesthetics with safe pigments
- Molded in complex shapes and textures
- Non-sticky, odorless, and recyclable

Common User Queries Answered by Chatbot

Q: Is TPE safe for baby teethers?

A: Yes. Food-grade TPE is BPA-free, phthalate-free, and conforms to EN 71-3 safety standards.

Q: Can the teether be sterilized or washed in a dishwasher?

A: Yes. TPE/TPR-based teethers are washable and heat-resistant to boiling water.

Q: Do these teethers have any smell or taste?

A: No. Properly compounded TPE and TPR are odorless and do not leach chemicals.

Q: Can you make multicolor or animal-shaped teethers?

A: Absolutely. TPE and TPR support dual-injection and color segmentation for appealing designs.

Q: Are these materials better than silicone?

A: TPE offers similar softness but is easier to process, recyclable, and supports overmolding and texturing more easily.

Application: PLB Conduit Pipes

Also known as: Pre-Lubricated HDPE Pipes, Duct Pipes for Fiber Optics, Telecom Cable Conduits

V Recommended Materials

Component	Material
Pipe Body (HDPE Base)	HDPE + Impact Modifier
Inner Lubrication Layer	HDPE or PE + Silicone Masterbatch
Sealing End Caps / Bushings	TPE, TPV
Flexible Couplers / Connectors	TPV, TPE
Gasket/O-Ring for Jointing	TPE, TPV

Material Roles in PLB Pipes

Impact Modifier (HDPE Pipe Body)

- Enhances **impact strength**, especially in cold conditions
- Reduces **brittle failure risk** during transportation, laying, and trenchless installation
- Allows higher duct flexibility without cracking
- Improves stress crack resistance under soil loads

Silicone Masterbatch (Lubricating Layer)

- Provides a low-friction internal surface
- Reduces cable pulling force significantly
- Enhances blowability of optical fibers
- Maintains coefficient of friction < 0.15
- Can be co-extruded with PE in the inner layer

TPE/TPV (End Caps, Gaskets, Couplers)

- Used for sealing ends, joints, and flexible accessories
- Ensures **weather-proof**, **dust-tight** performance
- Offers UV resistance, thermal cycling durability, and long-term flexibility
- Can be overmolded on rigid connectors or fabricated as slip-fit gaskets

Technical Specifications

Property Typical Range

< 0.15 (with Silicone Coefficient of Friction (Inner Layer)

Masterbatch)

Drop Impact Resistance (HDPE +

IM)

 $> 10 \text{ ft-lb/in}^2$

Shore Hardness of Seals (TPE/TPV) 50-80 Shore A

UV Resistance (TPV, Gasket) Excellent

Operating Temp Range -20°C to +70°C

Elongation at Break (Seals) > 300%

Compression Set (Gaskets) < 20%

Compliance RoHS, REACH

Processing Methods

- Extrusion (Pipe Body): HDPE + Impact Modifier for strength
- **Co-Extrusion (Inner Layer)**: PE + Silicone Masterbatch
- Injection Molding (Caps, Gaskets): TPE / TPV
- Overmolding (Sealing Components): TPE over connectors or bodies
- Ultrasonic Welding: For end closures and high-integrity seals

Performance Benefits

- **Impact Toughness Enhanced** reduces breakage during handling and laying
- Lower Pulling Force ensures faster and safer optical cable installation
- **Sealed End Cap Compatibility** prevents water/dust ingress
- Weather & UV Resistance suitable for exposed telecom infrastructure
- **Custom Colorability** color-coded ducts for various cable lines

End-Use Applications

- Telecom Ducting for Optical Fiber
- **Electrical Cable Routing**
- Railways and Highway Ducting
- Urban Infrastructure (Smart Cities)
- Trenchless Cable Installations (HDD)

Common User Queries Answered by Chatbot

Q: How does Silicone Masterbatch help in PLB pipes?

A: It lowers the coefficient of friction inside the pipe, allowing fiber optic cables to be blown in with less resistance, improving speed and safety.

Q: Why use Impact Modifier in the pipe?

A: It enhances the duct's impact strength, especially in cold or rugged installations, reducing crack formation during laying or HDD drilling.

Q: Are your gaskets and end caps reusable?

A: Yes. TPE and TPV seals are reusable, UV-stable, and maintain elasticity over time.

Q: What is the expected lifespan of your sealing materials?

A: With UV- and weather-resistant TPV grades, gaskets and seals can last over 15 years in field conditions.

Q: Can you provide colored PLB pipes with matching sealing components?

A: Yes. All our materials are colorable and matchable across pipe body and accessory components.

Application: Droppers

Also applies to: dropper bulbs, liquid dispensers, pharma droppers, oral solution caps

V Recommended Materials

Recommended Material Component

Squeezable bulb TPE, TPR

Protective cap **TPV**

Inner seal or gasket TPE, TPV

Overmolded ring **TPE with Silicone Masterbatch**

(optional) zone



Why Use These Materials in Droppers?

TPE (Thermoplastic Elastomer)

- Highly elastic and soft ideal for squeezable dropper bulbs
- Food-grade and medical-grade formulations available
- Low extractables, tasteless, and odorless
- Compatible with hot fill and sterilization (depending on grade)
- Customizable hardness (30–60 Shore A)

TPR (Thermoplastic Rubber)

- Offers better tear strength and abrasion resistance
- Suitable for long-cycle squeezable bulbs
- Excellent compression recovery

TPV (Thermoplastic Vulcanizate)

- Suitable for protective caps and higher temperature applications
- Excellent resistance to oils, lotions, and alcohol-based solutions
- UV and weather resistant (suitable for cosmetics packaging)

Silicone Masterbatch (optional)

- Can be used in TPE to enhance surface finish and slip properties
- Helps avoid sticking in multi-cavity molds
- Enhances soft-touch feel in premium products



Technical Specifications

Property Typical Range

Shore Hardness (Bulb) 30-60 Shore A **Property** Typical Range

Elongation at Break 300–600%

Compression Set (24hr @ 250/

23°C)

< 25%

Taste/Odor Neutral

FDA / EU 10/2011 Compliance Possible with proper grade

Alcohol/Essential Oil Moderate to High (TPV >

Resistance TPE)

UV Resistance High (TPV-based

components)

Recyclability Yes

🏰 Processing Methods

- Injection Molding for bulbs, caps, and sealing components
- Overmolding for dual-shot dispensers or sealing ridges
- Extrusion + Cutting for tube-like droppers
- **Texturing** for anti-slip grip or branding

V Design Capabilities

- Multi-hardness designs: soft bulb + rigid collar
- Branding through molded logos or texture
- Available in clear, translucent, or opaque variants
- Heat-sealable or plug-fit types
- Available in colored or natural (medical) versions

Compliance & Safety

- REACH and RoHS Certified
- Phthalate-Free, BPA-Free, Latex-Free
- EN 71-3 (for child-safe packaging)
- FDA and EU Food Contact Grades Available (on request)
- Odorless and Biocompatible Grades available for pharma use

Industries Served

Pharmaceutical Packaging

- **Nutraceutical and Supplement Bottling**
- Personal Care and Cosmetic Liquids
- Essential Oils and Aromatherapy
- Lab Drop Dispensers

Common User Queries Answered by Chatbot

Q: Are your dropper bulbs safe for oral medicine use?

A: Yes. We offer food-grade and medical-grade TPE and TPR suitable for oral and topical medicine contact.

Q: Will these materials withstand repeated squeezing?

A: Absolutely. TPR and soft TPE grades maintain elasticity and compression recovery even after extended use.

Q: Can these bulbs be sterilized?

A: Depending on the grade, many TPEs can withstand steam or EO sterilization. Please confirm the required method.

Q: Is there any smell or plastic taste?

A: No. Our compounded TPE/TPR materials are odorless and tasteless.

Q: Can we make dual-color or soft-touch droppers?

A: Yes. Dual-shot molding is possible with TPE overmolded on rigid collars or colored bases.

Application: Ice Trays

Also applies to: flexible ice molds, ice cube trays, barware freezing trays



Recommended Materials

Component	Material	
Tray body (flexible)	TPE, TPR	
Rigid tray frame (optional)	TPV or rigid PP	
Demolding enhancement	TPE + Silicone Masterbatch	



Why Use These Materials in Ice Trays?

TPE (Thermoplastic Elastomer)

- Soft and flexible easy release of ice cubes
- Non-stick surface for fast demolding
- Available in **food-grade** and **BPA-free** variants
- Recyclable and odorless
- Stain and temperature resistant

TPR (Thermoplastic Rubber)

- Slightly firmer than TPE retains shape well
- Higher tear strength better for repeated cycles
- Good elasticity and cold temperature performance

TPV (Thermoplastic Vulcanizate)

- Used in tray frame or support edge
- High fatigue resistance
- Offers rigid-soft combination when co-molded

Silicone Masterbatch (Optional)

- Used in TPE to lower coefficient of friction
- Enhances anti-stick and release behavior
- Provides a premium matte finish without tackiness

Technical Specifications

Property	Typical Range
Shore Hardness	30–60 Shore A
Cold Temperature Resistance	Up to -40°C
Compression Set	< 20%
Elongation at Break	> 400%
Taste & Odor Transfer	None
Washability	Dishwasher-safe
Recyclability	Yes
Food Contact Compliance	Yes (with appropriate grade)
BPA/Phthalate-Free	Yes



Processing Methods

Injection Molding – common method for shaped ice molds

- Co-Injection Molding soft tray with rigid PP/TPV frame
- Multi-Cavity Tooling mass production of various shapes
- Texturing logo imprints or mold surface effects

Solution Design Capabilities

- Flexible ice cube, ball, or character shapes
- Multi-color molding for aesthetic appeal
- Branding via embossed logos or icons
- Stackable and foldable tray variants
- Transparent, translucent, or opaque finishes

✓ Compliance & Safety

- REACH and RoHS Certified
- FDA and EU Food Contact Grades Available
- BPA-Free, Phthalate-Free
- No Taste or Odor Migration
- Freezable and Dishwasher-Safe

Industries Served

- Kitchenware and Barware Manufacturers
- Food Packaging and Consumer Goods
- OEM Suppliers of Silicone-Free Alternatives
- Hospitality and Beverage Accessories

Common User Queries Answered by Chatbot

Q: What material is used for flexible ice cube trays?

A: Food-grade TPE or TPR is typically used for its softness and safe demolding properties.

Q: Is it safe to use TPE trays for making ice?

A: Yes. Properly formulated TPEs are food-contact safe, odorless, BPA-free, and compliant with FDA and EU standards.

Q: Do TPE trays crack in the freezer?

A: No. TPE and TPR remain flexible even at sub-zero temperatures and do not shatter like rigid plastics.

Q: Can we make colored or branded trays?

A: Absolutely. TPE and TPR are easily colorable and can be molded with logos, characters, or bar themes.

Q: What's the benefit of adding silicone masterbatch?

A: It improves demolding ease and surface finish, offering a premium user experience without actual silicone.

Material: Siloxane Masterbatch

Also known as: Silicone Masterbatch, Silicone Additive Masterbatch, Siloxane Dispersed Concentrate



What is Siloxane Masterbatch?

Siloxane Masterbatch is a high-performance processing and surface-enhancing additive composed of ultra-high molecular weight siloxane polymer dispersed in a thermoplastic carrier resin such as TPE, PE, PP, or TPU. It is typically used at low dosages (0.2%–2%) to improve:

- Processability (flow, dispersion, release)
- Surface finish (smoothness, lubricity, matte effect)
- Mechanical behavior (friction reduction, scratch resistance)
- Wear and abrasion resistance

It is **not a base polymer**, but a **functional additive**, integrated during compounding or directly in injection/extrusion processes.



Key Benefits

- **Reduces Coefficient of Friction (COF)**
- Improves mold release and demolding efficiency
- Enhances surface smoothness and anti-scratch properties
- Minimizes die drool and melt fracture in extrusion
- Improves flowability and dispersion of pigments/fillers
- Reduces stickiness in soft-touch TPE/TPR surfaces
- **Enhances abrasion and wear resistance** in moving parts
- **Improves extruder throughput** and lowers energy consumption



Carrier Resins Available at USP Polymers LLP

Carrier II.a Casa

Grade	Carrier Resin	Use Case
Siloxane MB-PP	Polypropylen e	Automotive, injection molded parts
Siloxane MB-PE	Polyethylene	PLB conduit pipes, films
Siloxane MB-TPR	TPR	Grips, gaskets, footwear
Siloxane MB-TPU (on demand)	TPU	Specialty engineering elastomers



Technical Specifications

Parameter	Typical Value
Siloxane Content	40-60% by weight
Appearance	Translucent pellets
Processing Temperature Range	160–250°C (depends on carrier)
Dosage Level	0.2% to 2% (by weight)
Specific Gravity	0.90-1.05 g/cm ³
Compatibility	Excellent with TPE, PP, PE, TPR
Shelf Life	24 months in sealed, dry condition
Packaging	25 kg laminated bags



Applications

Used across various industries to improve part quality and production efficiency:



- Scratch-resistant interior trims
- Smoother dashboard and door pad surfaces
- Improved injection flow in complex geometries



Consumer & Lifestyle

- Non-sticky TPE for pen grips, toys, soft handles
- Cosmetic packaging smoother cap closures
- Anti-slip phone cases, soft plugs



& Toys & Baby Care

- Softer feel and matte texture in TPE toys
- Enhanced release in multi-cavity baby teethers
- Dust-resistant, low-tack surfaces

Packaging & Films

- Reduced die buildup in blown films
- Lower surface friction for easy bag handling
- Enhanced surface slip and anti-blocking

Industrial Components

- Overmolded seals, bellows, and gaskets
- Tool grips and machine knobs with improved texture
- Reduction of internal stress in extrusion

Performance Enhancements in TPE/TPR

Property	Improvement with Siloxane MB
Mold Release	Easier ejection, less residue
Surface Friction	↓ 30–70% (depending on dosage)
Wear Resistance	Improved by 20–40%
Flow Behavior	Smoother, fewer defects
Surface Aesthetics	Matte finish, anti-stick
Extruder Stability	Less melt fracture, cleaner die



Compliance & Safety

- **REACH Compliant**
- **RoHS** Certified
- Halogen-Free
- FDA Food Contact Grades available upon request
- Safe for Toys and Baby Products with suitable formulation

Common Chatbot Responses

Q: What is the purpose of using Siloxane Masterbatch?

A: It enhances surface smoothness, reduces friction, and improves processability in polymers like TPE, PP, PE, and TPR.

Q: Is it safe for food or baby products?

A: Yes, food-grade and toy-safe grades are available and comply with REACH, RoHS, and FDA regulations.

Q: Will it make my product slippery?

A: It reduces tackiness without making the surface too slippery. The dosage can be adjusted based on your application.

Q: How much should I add in my compound?

A: Typical dosage ranges from 0.5% to 2% depending on the desired surface effect and application.

Q: Is it compatible with all TPE grades?

A: Yes, it is designed to blend uniformly with SEBS-based TPE, TPR, PP, and PE systems.

Material: Scratch Resistant Masterbatch

Also referred to as: Anti-Scratch Additive Masterbatch, Anti-Abrasion Modifier



What is Scratch Resistant Masterbatch?

Scratch Resistant Masterbatch is a functional additive concentrate formulated to reduce the visibility and occurrence of scratches on polymer surfaces. It is typically based on siloxane, oleamide blends, or surface modifiers, and is used in low to moderate dosages (0.5%-2%).

This masterbatch enhances surface durability and aesthetic life in soft polymers like TPE, TPV, and also rigid thermoplastics like **PP or PE** when used with **impact modifiers**.



Key Functions

- **Reduces surface friction** to minimize abrasion
- Forms a lubricating boundary layer on polymer surface
- Improves resistance to scuffs, mar marks, and nail scratches
- Prevents white stress marks on soft TPE surfaces
- Maintains surface aesthetics in high-wear environments



Recommended Material Integrations

Base Polymer	Compatible Carrier
TPE (SEBS-based)	TPE + Scratch Resistant Additive
TPR	TPR + Scratch Resistant Masterbatch
TPV	TPV-compatible anti-abrasion blends
PP/PE (with IM)	PP or PE + Scratch MB + Impact Modifier
Silicone MB enhanced	TPE/TPV + Siloxane-based Scratch MB



Typical Technical Effects

Property	Without MB	With Scratch MB
Surface COF (Coefficient of Friction)	~0.5–0.6	↓ to ~0.15–0.3
Visible Scratch Depth (microns)	>30	↓ up to 70%
Gloss Retention	Moderate	Improved under abrasion

Without MB With Scratch MB **Property**

Wear Resistance (cycles) Up to $2-3 \times$ increase Low

Unchanged or slightly Surface Energy

reduced

Tactile Feel Matte/soft-touch improved



Use Cases in USP Polymers Product Ecosystem

TPE / TPR:

- Pen grips, erasers, tool handles, mobile cases
- Prevents surface whitening or rubber fatigue under fingernail pressure

TPV:

- Automotive trims, HVAC knobs, gear knobs
- Improved gloss retention and abrasion resistance for OEM-grade finishes

PE / PP + IM:

- Injection molded dashboards, blow molded ducts, battery trays
- Better scuff resistance and mar-free surface finish during installation

With Silicone Masterbatch:

- Co-functional masterbatches can combine scratch resistance with demolding ease
- Enhanced synergy in matte or satin-finished consumer goods

🕌 Processing Guidelines

- **Dosage**: 0.5% to 2.0% of total polymer weight
- Mixing: Can be dry blended or compounded during pelletization
- **Processing Temperature**: 160°C to 260°C (depending on carrier resin)
- Compatible with: Injection molding, extrusion, blow molding, overmolding

Regulatory and Quality Assurance

- **REACH and RoHS Compliant**
- Halogen-Free
- Low VOC (for automotive interiors)
- Non-toxic and non-migratory (does not bloom to surface)
- Safe for toys and skin-contact applications (grade dependent)



Packaging and Handling

- 25 kg PE-lined bags or moisture-barrier packaging
- Store in dry, cool conditions away from direct sunlight
- Shelf life: 12–18 months when stored properly

... Common Chatbot Responses

Q: Will this masterbatch reduce scuff marks on my mobile covers?

A: Yes. When added to TPE/TPR compounds, it reduces surface friction and helps prevent visible scratches and whitening.

Q: Can I use it with PP for automotive interiors?

A: Yes. When combined with impact modifiers, it helps PP/PE parts retain gloss and resist scratches during installation and use.

Q: Does this affect paint adhesion?

A: No. Most scratch-resistant masterbatches do not interfere with paint or printing if properly formulated.

Q: Will it change the softness or flexibility of TPE?

A: No. It is used in very low quantities and does not significantly impact mechanical softness or elasticity.

Q: Is it safe for children's products?

A: Yes. Compliant grades are available that meet EN71-3 and are free from phthalates or heavy metals.

Material: TPV (Thermoplastic Vulcanizate)

Also referred to as: Thermoplastic Rubber (TPR-V), Dynamically Vulcanized TPE



What is TPV?

TPV is a category of **Thermoplastic Elastomer** made by dynamically vulcanizing a rubber phase (typically EPDM) within a thermoplastic matrix (usually polypropylene). This results in a twophase system where cross-linked rubber particles are finely dispersed in the thermoplastic phase.

It combines the elasticity and chemical resistance of rubber with the processability and recyclability of thermoplastics.



Key Characteristics

- **Rubber-like Elasticity**
- **High Temperature Resistance**
- **Excellent Fatigue & Flex Resistance**
- **UV and Ozone Resistance**
- **Good Compression Set Properties**
- Chemical Resistance to Oils, Grease, and Acids
- 100% Recyclable and Halogen-Free



Typical Technical Properties

Property	Range / Typical Value
Shore Hardness	35A to 60D
Tensile Strength	6 – 12 MPa
Elongation at Break	300 – 500%
Compression Set (70°C, 22hr)	< 35%
Specific Gravity	0.89 - 1.05
Service Temperature Range	-50°C to +135°C
Melt Flow Index (230°C)	1-20 g/10 min
Weathering & UV Resistance	Excellent
Processing Methods	Injection, Extrusion, Blow Molding

Processing Advantages

- Compatible with standard thermoplastic equipment
- Fast cycle times compared to thermoset rubber
- Supports overmolding onto PP substrates
- Easily colorable and reprocessable
- Enables multi-component part design (e.g. soft-touch over rigid parts)

Compliance & Safety

- **RoHS & REACH Compliant**
- Halogen-Free
- **Grades Available for:**
 - **Automotive (low fogging, UV stabilized)**
 - **Consumer Goods (skin-contact safe)**
 - Food Contact (FDA/EU compliant)
 - Medical (ISO 10993 biocompatible grades)

Applications of TPV by USP Polymers LLP

📤 Automotive

- Weatherstrips & Door Seals
- **HVAC Seals & Bellows**
- Mud Flaps & Grommets
- Airbag Covers
- Gear Knob Overmolding
- Roof Rail and Windshield Gaskets

Consumer Goods

- Toothbrush Grips
- Razor Handles
- **Door Stoppers**
- Kitchen Utensil Grips
- Cosmetic Packaging Seals

🧸 Toys & Sports

- **Racket Grips**
- Teether Components (Non-oil migrating grades)
- Sports Handles and Grips

Soft Edges for Toys

Healthcare

- Medical Gaskets & Seals
- IV Canula Components
- BP Machine Bulbs
- Intradental Brush Hubs

Industrial & Electrical

- Vibration Isolation Pads
- Grommets, Cable Glands, Bushings
- Waterproofing Membranes
- Car Mat Edges
- Cable Management Components

Weight State of the Control of the

Grade Code	Shore Hardness	Application Notes
TPV-45A	45A	Soft-touch grips, seals, hygiene products
TPV-65A	65A	Automotive interior seals, bellows
TPV-75A	75A	Cable glands, footwear, sports parts
TPV-85A/ 90A	85–90A	Mud flaps, HVAC, vibration dampers
TPV-55D	55D	Industrial plugs, gaskets, functional parts

Customized color, UV packages, and food-contact compliance available on request.

Sustainability Benefits

- Fully recyclable with polyolefins
- Reduces scrap generation compared to rubber curing
- Can be reprocessed multiple times without performance loss
- No vulcanization agents or hazardous waste generated

Common Chatbot Queries

O: Is TPV suitable for outdoor use?

A: Yes, TPV has excellent UV, ozone, and weather resistance — ideal for automotive and outdoor applications.

Q: Can TPV be overmolded on PP?

A: Yes, it has excellent bonding with polypropylene in 2K or overmolding processes.

Q: What's the difference between TPE and TPV?

A: TPV is a vulcanized version of TPE, offering better heat, oil, and fatigue resistance — especially suited for demanding environments.

Q: Is TPV safe for skin contact or toys?

A: Yes, we offer grades compliant with EN71-3, REACH, and skin-contact norms suitable for toys, baby products, and grips.

Q: Is it recyclable?

A: Yes, TPV is 100% recyclable and processable like standard thermoplastics.

Material: TPR (Thermoplastic Rubber)

Also known as: Thermoplastic Elastomer Rubber, Styrenic Block Copolymer (SBS-based TPE), TPE-S



What is TPR?

TPR is a class of thermoplastic elastomer typically based on styrene-butadiene-styrene (SBS) block copolymers. It combines the elastic properties of rubber with the ease of processing of plastics, making it suitable for low to moderate performance applications requiring softness, flexibility, and recyclability.

TPR is processed like plastic but behaves like rubber in the final product.

Key Characteristics

- Soft and rubbery feel
- High elongation and flexibility
- Good surface finish and tactile grip
- Low-temperature flexibility
- Recyclable and reusable
- Bonds well with **PP**, **PE**, and other polyolefins

Cost-effective alternative to TPV and TPU in many consumer goods

Technical Specifications

Property	Typical Range
Shore Hardness	30A to 90A
Tensile Strength	4 – 9 MPa
Elongation at Break	300 – 750%
Specific Gravity	0.90 - 1.05
Compression Set (23°C)	< 35%
Service Temperature Range	-30°C to +80°C
Tear Strength	Moderate
Recyclability	100%
Processing Methods	Injection, extrusion, blow molding



Processing Advantages

- No vulcanization needed (unlike rubber)
- Quick cycle times
- Overmolding on rigid plastics (especially PP, PE)
- Compatible with multi-shot and co-injection tools
- Easily colorable with masterbatches
- Supports surface texturing and branding (logos, grip patterns)

Regulatory Compliance (as per grade)

- **EN 71-3** (Toy safety)
- FDA / EU Food Contact (on request)
- **REACH and RoHS** Compliant
- Halogen-Free Grades Available
- Phthalate-Free Grades Available



🖴 Applications of TPR by USP Polymers LLP



Nationery & School Products

- Erasers
- Pen Grips
- Rulers with soft edges
- Rubber bands

Toys & Kids' Goods

- Sticky toys
- Crazy balls
- Squeezy toys
- Bath toys
- Teether parts (non-oil migrating grades)

Consumer & Household

- Razor grips
- Toothbrush handles
- Bottle caps and overcaps
- Kitchen utensil grips
- Lunch box gaskets
- Slippers and sole inserts

Hardware & Tools

- Handle grips
- Door stoppers
- Bushing covers
- Non-slip mats

🚣 Fitness & Sports

- Resistance bands
- Dumbbell grips
- Racket grips
- Cricket and TT bat pads

○ Electronics

- Cable protectors
- Earphone plugs
- Soft touch mobile covers

TPR vs Other Elastomers (Quick Guide)

Feature TPR TPV TPE (SEBS)

Feature	TPR	TPV	TPE (SEBS)
Softness	Excellent	Moderate to soft	Excellent
Oil Resistance	Low to moderate	High	Moderate
UV/Ozone Resistance	Low	Excellent	Good
Cost Efficiency	High	Medium	Medium
Processing Ease	Very easy	Easy	Easy
Recyclability	Yes	Yes	Yes

Common Chatbot Responses

Q: What is TPR used for?

A: TPR is widely used in grips, toys, erasers, kitchenware, and footwear. It's soft, flexible, and easy to mold.

Q: Is TPR food-safe or child-safe?

A: Yes, specific grades of TPR are EN 71-3 and FDA compliant, making them safe for toys and food contact applications.

Q: Can TPR be molded over plastic?

A: Yes, TPR adheres well to PP and PE substrates, ideal for overmolding applications like toothbrush grips or tool handles.

Q: Is TPR better than TPV?

A: TPR is softer and more cost-effective for low to mid-performance applications. TPV is preferred for higher heat or chemical resistance needs.

Q: Does TPR degrade in sunlight?

A: TPR has limited UV resistance. For outdoor applications, TPV is recommended instead.



✓ What is PU?

Polyurethane (PU) is a family of polymers formed through the reaction of isocyanates with polyols. It is used in both thermoplastic and thermoset forms depending on the application.

PU materials can be soft, rigid, or elastomeric and are known for:

- High elasticity
- Superior abrasion resistance
- Good oil and chemical resistance
- Long-term mechanical strength

TPE/TPR/TPV vs PU: Material Comparison

Property	PU (Polyurethane)	TPE / TPR / TPV
Abrasion Resistance	Excellent	Good to Excellent (TPV)
UV Stability	Moderate	Excellent (TPV), Good (TPE)
Chemical Resistance	Excellent	Moderate to Good (TPV)
Recyclability	Difficult	Easy – fully recyclable
Processability	Moisture-sensitive	No drying needed
Cost	High	Medium to Low
Skin Contact Safety	Medical grades available	EN71-3, FDA grades available
Adhesion to Polyolefins	Weak	Excellent (TPV, TPE)
Overmolding Flexibility	Moderate	High
Soft Touch Feel	Good	Excellent

Chatbot Sample Responses

Q: Do you supply polyurethane (PU) or TPU grades?

A: USP Polymers LLP does not supply PU or TPU materials. However, we offer high-performance alternatives such as TPE, TPR, and TPV, which are recyclable, skin-safe, and easier to process.

Q: What's a good alternative to PU for soft grips?

A: TPE or TPR can replicate the soft-touch feel of PU, with added benefits like recyclability and better adhesion to PP.

Q: Is there a TPE grade that can replace PU in footwear or toys?

A: Yes. For flexible soles, soft grips, or squeezy toys, TPR is a cost-effective alternative to PU. It is also compliant with toy safety standards (EN71-3).

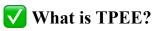
Q: Can TPV replace PU in automotive interiors?

A: Yes. TPV offers excellent UV, heat, and fatigue resistance—making it suitable for dashboards, weatherstrips, and gear knob covers.

When to Recommend TPE/TPV Instead of PU

Application	PU Common Use	Recommended USP Alternative
Soft-touch handles & grips	PU foam or TPU overmold	TPE / TPR (easy overmolding)
Automotive interiors	PU films & foams	TPV (high UV & heat stability)

Application	PU Common Use	Recommended USP Alternative
Toy & Baby Goods	TPU elastomers	TPE / TPR (EN71-3 compliant)
Industrial bushings, pads	PU elastomers	TPV (durable & oil-resistant)
Footwear midsoles	PU foams	TPR or TPE-based blends



TPEE is a **high-performance thermoplastic elastomer** made by combining crystalline polyester with amorphous soft segments (typically polyether). It exhibits excellent elastic recovery, chemical resistance, fatigue strength, and dimensional stability at elevated temperatures.

TPEE sits between rubber and engineering thermoplastics, used where mechanical and chemical durability are key.

Key Characteristics of TPEE

- High flexural fatigue resistance
- Excellent recovery under stress
- Good hydrolysis and chemical resistance
- Wide service temperature range (-40° C to $+140^{\circ}$ C)
- Superior creep resistance compared to TPE, TPV
- Good resistance to oils, fuels, and solvents
- High modulus and tensile strength



! Why TPEE is Not Part of Our Portfolio

USP Polymers LLP specializes in soft-touch, flexible, and recyclable elastomers like:

- TPE (SEBS-based) soft, elastic, food/contact safe
- **TPV** (**PP** + **EPDM**) for higher temp, oil, and UV resistance
- **TPR (SBS-based)** ideal for grips, toys, general goods

TPEE, while durable, is:

- Costlier than TPE/TPV
- Harder to process (drying needed, higher melt temperature)

- Less suitable for soft-touch or overmolding
- Not recyclable with polyolefin systems

TPEE vs TPV / TPE / TPR

Property	TPEE	TPV	TPE (SEBS)	TPR (SBS)
Heat Resistance (°C)	~140°C	~130°C	~100°C	~80°C
Chemical Resistance	Excellent	Good	Moderate	Low
Softness (Shore A)	Moderate (60– 95A)	Good	Excellent	Excellent
Recyclability	Moderate	Excellent	Excellent	Excellent
UV Resistance	Good	Excellent	Good	Poor
Compression Set	Very Low	Low	Moderate	Moderate
Fatigue Resistance	Excellent	Very Good	Good	Moderate
Processing Complexity	High (needs drying)	Easy	Easy	Very Easy

When to Recommend Alternatives to TPEE

TPEE Application	Suggested USP Material
Cable sheaths & tubing	TPV (for heat and chemical stability)
Automotive bellows, boots	TPV (UV + oil resistant)
Soft grips with resilience	TPE / TPR (softer, easier to mold)
Footwear flex parts	TPR (high elasticity)
Flexible industrial couplings	TPV (durability + fatigue resistance)

Chatbot Responses (TPEE Queries)

Q: Do you supply TPEE elastomers?

A: We currently do not offer TPEE. However, we manufacture high-performance alternatives like TPV, TPE, and TPR, which meet most soft-touch, automotive, and toy application requirements.

Q: I need high fatigue resistance like TPEE.

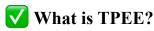
A: Our **TPV grades** offer excellent fatigue strength, oil resistance, and UV stability — ideal for automotive and sealing applications.

O: What to use instead of TPEE for flexible seals?

A: For weatherstrips, bellows, or chemical-exposed seals, TPV is a cost-effective and recyclable alternative.

Q: Is TPEE better than TPV?

A: TPEE excels in high fatigue resistance but is costlier and less recyclable. TPV is often preferred for its versatility, processability, and UV/oil resistance.



TPEE is a high-performance elastomer composed of hard crystalline polyester segments and soft polyether segments. It delivers a balance between rubber-like elasticity and thermoplastic processability with high resilience, temperature resistance, and chemical durability.

Key Properties of TPEE

- Excellent flex fatigue resistance
- Withstands high service temperatures (up to 140°C)
- Resists hydrolysis, chemicals, and oils
- Strong elastic recovery under stress
- Good abrasion and impact strength
- High dimensional stability
- Available in Shore hardness from 40D to 72D



! Why USP Polymers LLP Doesn't Supply TPEE

We specialize in flexible, recyclable elastomers suited for consumer, automotive, toy, healthcare, and industrial applications — specifically:

- **TPE** (SEBS-based) excellent soft-touch and processability
- TPV heat, oil, UV-resistant, suited for sealing and automotive
- TPR (SBS-based) cost-effective rubbery materials for toys, footwear, handles

TPEE, while high performing, is:

- More expensive than SEBS- or SBS-based elastomers
- **Harder to process** (requires drying, higher melt temp)
- Not suitable for soft-touch overmolding
- Incompatible with polyolefin recycling streams

TPEE vs. TPE / TPV / TPR – Material Substitution Guide

Property	TPEE	TPV	TPE (SEBS)	TPR (SBS)
Max Temp Resistance	~140°C	~130°C	~100°C	~80°C
Oil/Chemical Resistance	Excelle nt	Good	Moderate	Low
Fatigue Life	Excelle nt	Very Good	Good	Moderate
Recyclability	Moderat e	Excellent	Excellent	Excellent
Cost	High	Medium	Medium	Low
Process Ease	Moderat e	Easy	Very Easy	Very Easy
Overmolding Applications	Poor	Excellent (PP)	Excellent (PP/PE)	Excellent (PP)

TPEE Typical Applications (with USP Alternatives)

Use Case	TPEE Function	USP Polymer Alternative
Cable jackets, tubing	High flex fatigue	TPV or TPE (SEBS-based)
Automotive bellows, boots	Chemical, heat resistance	TPV
Flexible gears, couplings	Creep and fatigue resistance	TPV with Impact Modifier
Footwear midsole supports	Elastic recovery	TPR
Textile reinforcement or fasteners	Spring-like elasticity	TPE

Chatbot-Ready Responses

Q: Do you supply TPEE elastomers?

A: No, we do not offer TPEE. USP Polymers LLP specializes in TPE, TPV, TPR, and masterbatches — offering alternatives with high durability and process efficiency.

Q: I need something similar to TPEE for chemical resistance.

A: You can consider **TPV** — it offers excellent chemical and thermal stability and is widely used in automotive and industrial sealing.

Q: What can I use instead of TPEE for cable jacketing?

A: Our **TPV grades** provide high flex life, UV stability, and oil resistance — ideal for automotive and power cable protection.

Q: Can I replace TPEE in footwear?

A: Yes. For cushioning and flexible applications, TPR offers a soft, cost-effective alternative.

What is TPO?

TPO is a blend of polypropylene (PP) and elastomeric materials (usually EPDM or PE-based rubber). It is a non-vulcanized, partially crystalline polyolefin-based elastomer designed for high stiffness, impact resistance, and durability, especially in large molded parts.

TPO is widely used in automotive, roofing membranes, and industrial parts due to its costeffectiveness and mechanical strength.

Key Characteristics of TPO

- Excellent **impact strength**, especially at low temperatures
- High stiffness-to-weight ratio
- Good UV and chemical resistance
- Low density (~0.9 g/cm³)
- Recyclable with PP-based waste streams
- Ideal for injection molding, extrusion, and thermoforming
- Typically harder and less rubbery than TPV or TPE

! Why USP Polymers LLP Does Not Supply TPO

We focus on elastomeric materials designed for soft-touch, sealing, cushioning, and overmolding. TPO is primarily used in rigid or semi-rigid structural applications, which fall outside our material performance targets.

We instead offer:

- **TPV** With dynamic vulcanization for superior elasticity and durability
- **TPE** For soft, flexible, skin-safe applications
- TPR For grip, toys, handles, footwear, and general molding

TPO vs TPV vs TPE vs TPR

Property	TPO	TPV	TPE (SEBS)	TPR (SBS)
UV Resistance	Moderate– Good	Excellent	Good	Poor
Chemical Resistance	Moderate	High	Moderate	Low
Shore Hardness Range	40D-70D	35A-60D	5A-90A	10A-90A
Recyclability	Yes	Yes	Yes	Yes
Overmolding Capability	Poor	Excellent	Excellent	Excellent
Soft Touch / Grip	Poor	Good	Excellent	Excellent
Heat Resistance	Up to ~100°C	Up to ~130°C	~100°C	~80°C



TPO Common Applications and USP Alternatives

TPO Use Case	TPO Function	USP Recommended Material
Automotive bumpers, fascia	Impact resistance, structural stiffness	TPV (for flexible zones)
Roofing membranes	UV resistance, sheet stability	TPV (for gaskets, sealing components)
HVAC ducts, liners	Molded rigidity	TPV (for flexible connectors)
Mudguards, trims	Scratch resistance, moldability	TPV + Impact Modifier
Footwell linings, car mats	High wear surface	TPV or SEBS-based TPE



Chatbot Responses to TPO Inquiries

Q: Do you supply TPO compounds or sheets?

A: We do not manufacture TPO. However, USP Polymers LLP offers advanced alternatives like TPV, TPE, and TPR, suited for sealing, soft-touch, and automotive interior applications.

Q: I need TPO for car interior parts. What can I use instead?

A: For interior sealing, mats, trims, and gaskets, TPV offers superior weatherability, flexibility, and adhesion to PP substrates.

Q: What is the difference between TPO and TPV?

A: TPO is semi-rigid and non-vulcanized; TPV is dynamically vulcanized with rubber properties and better flexibility, ideal for automotive and sealing.

Q: Can TPV or TPE replace TPO in under-the-hood parts?

A: Yes. TPV offers better thermal and chemical resistance for applications like air duct connectors, grommets, and bellows.

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- **TPR** For grip, toys, handles, footwear, and general molding

TPO vs TPV vs TPE vs TPR

Property	ТРО	TPV	TPE (SEBS)	TPR (SBS)
Elastic Recovery	Low	High	High	Moderate

Property	TPO	TPV	TPE (SEBS)	TPR (SBS)
UV Resistance	Moderate– Good	Excellent	Good	Poor
Chemical Resistance	Moderate	High	Moderate	Low
Shore Hardness Range	40D-70D	35A-60D	5A-90A	10A-90A
Recyclability	Yes	Yes	Yes	Yes
Overmolding Capability	Poor	Excellent	Excellent	Excellent
Soft Touch / Grip	Poor	Good	Excellent	Excellent
Heat Resistance	Up to ~100°C	Up to ~130°C	~100°C	~80°C



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Footwell linings, car mats	High wear surface	TPV or SEBS-based TPE



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Q: Can TPV or TPE replace TPO in under-the-hood parts?

A: Yes. TPV offers better thermal and chemical resistance for applications like air duct connectors, grommets, and bellows.

What is TPU?

TPU is a versatile **thermoplastic elastomer** known for combining the elasticity of rubber with the processability of thermoplastics. It belongs to the polyurethane family and is widely recognized for its:

- **Excellent abrasion resistance**
- High elasticity and tear strength
- Good transparency and chemical resistance
- Long-term durability under dynamic stress

It is available in polyether, polyester, and polycaprolactone-based types — each offering slightly different mechanical and chemical resistance properties.

Key Properties of TPU

Property	Typical Range
Shore Hardness	60A - 75D
Tensile Strength	25 – 50 MPa
Elongation at Break	400 - 700%
Abrasion Resistance	Excellent
Tear Strength	High
Flexural Fatigue Resistance	Excellent
Oil & Chemical Resistance	Very Good
UV Resistance	Moderate
Service Temperature	-40°C to +90°C (continuous)



! Why USP Polymers Does Not Supply TPU

USP Polymers LLP focuses on polymers that offer:

- **Better recyclability**
- Lower moisture sensitivity
- Superior overmolding with PP/PE

- Simplified, faster processing
- Excellent soft-touch feel for toys, automotive, and consumer goods

TPU, while durable, is:

- More expensive than SEBS or TPV-based systems
- Requires drying before processing
- Incompatible with polyolefin overmolding
- Less recyclable in closed-loop systems

TPU vs TPE / TPV / TPR – Material Substitution Guide

Parameter	TPU	TPE (SEBS)	TPV	TPR (SBS)
Elasticity & Recovery	Excellent	Excellent	Very Good	Good
Abrasion Resistance	Excellent	Good	Good	Moderate
Oil/Chemical Resistance	Very Good	Moderate	Good	Poor
UV Resistance	Moderate	Good	Excellent	Low
Shore Hardness Range	60A – 75D	5A – 90A	35A – 60D	10A – 90A
Overmold on Polyolefins	Weak	Excellent	Excellent	Excellent
Moisture Sensitivity	High	None	None	None
Recyclability	Low– Moderate	Excellent	Excellent	Excellent

TPU Applications and USP Polymer Alternatives

TPU Common Use	Function	USP Material Recommendation	
Mobile phone covers	Shock absorption, grip	TPE or TPR	
Wearables, fitness bands	Flexibility, comfort	TPE	
Toys, baby teethers	Softness + chew safety	TPE (EN71-3/FDA compliant)	
Cable jackets & strain reliefs	Flex fatigue, chemical resistance	TPV	
Automotive bellows & boots	Toughness + oil resistance	TPV	

TPU Common Use

Function

USP Material Recommendation

Footwear midsoles

Cushioning + rebound

TPR

Chatbot-Ready Responses

Q: Do you offer TPU compounds?

A: USP Polymers LLP does not supply TPU. We focus on TPE, TPR, TPV, and specialized masterbatches — engineered for flexibility, durability, and recyclability.

Q: What can I use instead of TPU in toy or wearable applications?

A: TPE is a perfect substitute — offering softness, skin safety, and compliance with toy and foodcontact regulations.

Q: Is TPU better than TPE?

A: TPU offers higher abrasion resistance, but TPE is more cost-effective, recyclable, and easier to process — ideal for consumer goods.

Q: What's the closest alternative to TPU for automotive parts?

A: TPV delivers excellent UV, chemical, and heat resistance — widely used in grommets, seals, ducts, and bellows.