# CHOOSING THE RIGHT TPE

## The 7 Essential Considerations

### 1. INTENT

**What is the intent for selecting a new TPE material?**

- Replacing another TPE
- Replacing a different material

### 2. MANUFACTURING PROCESS

**How will the TPE part be manufactured?**

- Co-extrusion
- Injection Molding
- Blow Molding
- Extrusion
- Overmolding

### 3. COST TARGETS

**Do you have a target cost for the material or the part?**

- Material: Cost per pound (or kg)
- Part: Cost per piece

### 4. ENVIRONMENTAL CONDITIONS

**Where and how will the TPE part be used?**

- Temperature Requirements
- Usage
- Exposure to weather / UV
- Chemical Exposure

### 5. REGULATORY CONCERNS

**Does the TPE require certification by a regulatory body or is it subject to restrictions?**

- UL
- FDA
- NSF
- ISO

### 6. LOOK & FEEL

**What are the aesthetics considerations?**

- Surface Feel / Haptics
- Scent
- Color & Clarity
- Surface Finish

### 7. MATERIAL PERFORMANCE

**Are there performance or physical property requirements?**

- Resistance to Bending
- Tear Strength
- Compression Set
- Abrasion Resistance
- Hardness
- Stretch & Bounce Back

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## 1. INTENT FOR TPE SELECTION
New Grade or Material Replacement

*Specify.*

**Current Material Used:**

**Why the change?**

**Any Special Requirements?**

## 2. MANUFACTURING PROCESS
Formulating for Processability

*Check which apply.*

☐ Injection Molding ☐ Extrusion ☐ Blow-Molding
☐ Overmolding ☐ Co-extrusion

**For overmolding and co-extrusion, specifiy substrate:**

## 3. COST TARGETS
Balancing Price & Performance

*Specify.*

**Material:** Cost per pound (or kg)

**Part:** Cost per piece

## 4. ENVIRONMENTAL CONDITIONS
Use and Exposure

*Comment.*

**Temperature Requirements:** Minimum and maximum constant use temperature, time exposed to extreme temperatures

**Exposure to UV** or extreme weather conditions

**Chemical exposure:** Is splash resistance required or will the part be submerged? Temperature during the exposure? Chemical type: acid, base, oil, cleaning solution, etc.?

**Usage:** Is the part under load, or will it be repeatedly flexed or extended?

## 5. REGULATORY CONCERNS
Industry and Market

*Comment.*

**Electrical/Wire & Cable:** UL certification or listing may be required, REACH SVHC compliance

**Automotive:** OEM material specification approval

**Consumer Products, Housewares, Toys:** Compliance with the FDA for food contact in the US, or European directives for Food Contact (EU 1935/2004 and PIM 10/2011) and Toy Safety: 2009/48/EC and EN-71-3

**Medical & Healthcare:** ISO 10993-5 compliant recipes for biocompatibility

**Building & Construction:** NSF 51 and NSF 61 certification for use with potable water

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## 6. AESTHETICS & SURFACE APPEARANCE

Determine Look & Feel

*Circle which apply.*

**Surface Feel/Haptics**

- ☐ High surface friction or "grippy" to the touch
- ☐ Dry feel or silicone-like
- ☐ Silky-smooth or lubricious

**Surface Finish**

- ☐ Glossy (able to mimic high gloss levels of PVC)
- ☐ Matte (low gloss, rubber-like look & feel)

**Color**

- ☐ Clear
- ☐ Translucent
- ☐ Opaque
- ☐ Pre-colored

## 7. MATERIAL PERFORMANCE

Property Prioritization

*Provide Information.*

**Hardness:** Although the Shore A scale is most often used, TPEs can be measured on Shore OO, A, or D scales, and can range from a super soft gel (think shoe inserts) to a hard plastic like polypropylene.

*Requirement:*

*Comments:*

**Stretch and Bounce-Back:** By definition, a TPE can be stretched to twice it's length and return back to it's original shape. How a TPE stretches and "bounces back" is indicated by it's tensile and elongation properties.

*Requirement:*

*Comments:*

**Compression Set:** Will the TPE part be under load, or expected to hold a seal over a long period of time? Under what conditions; elevated or low temperatures? Compression set requirements will determine what family of TPEs to choose.

*Requirement:*

*Comments:*

**Abrasion Resistance or Resistance to Wear:** Is this a disposable product, or something that needs to withstand repeated use over a long period of time? The "toughness" of the TPE depends on its chemistry.

*Requirement:*

*Comments:*

**Tear Strength or Puncture Resistance:** Consider how the product will be used, for example, for baby products, you'll want a TPE with resistance to biting and tear. Tear strength can be measured, and TPEs can be optimized for maximum tear and puncture resistance.

*Requirement:*

*Comments:*

**Resistance to Bending:** Will the TPE be bent or flexed during use? This may translate into a flexural modulus requirement, which measures the TPE's tendency to bend.

*Requirement:*

*Comments:*

**Adhesion to Other Materials:** Will the TPE be over-molded onto a rigid plastic like polycarbonate, like in a power tool handle? Will it be co-extruded with polypropylene to create a hard/soft seal? The substrate material is important when selecting the appropriate TPE.

*Requirement:*

*Comments:*

**Special Requirements:** Consider any special characteristics or attributes that may be needed for the TPE. Some examples:

- Energy absorption for acoustic dampening
- Recycled content
- Mineral reinforced
- Anti-microbial

*Requirement:*

*Comments:*