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High-bonding Santoprene® TPV

in medical devices

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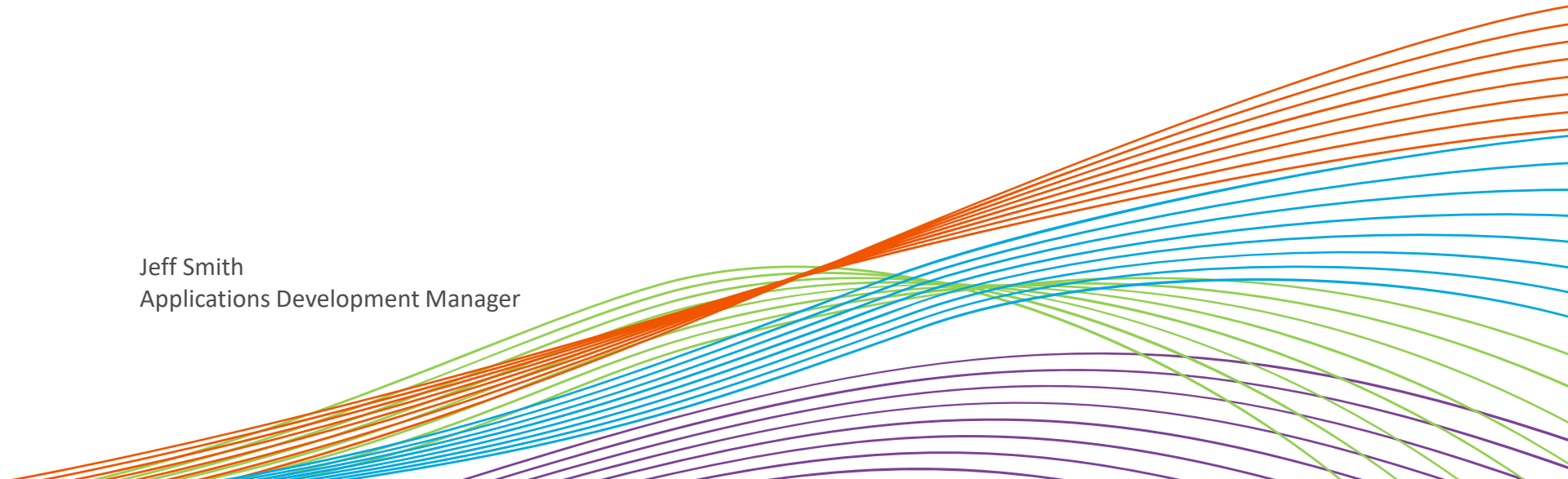
Applications Development Manager



Why new Santoprene® TPV bonding grades?

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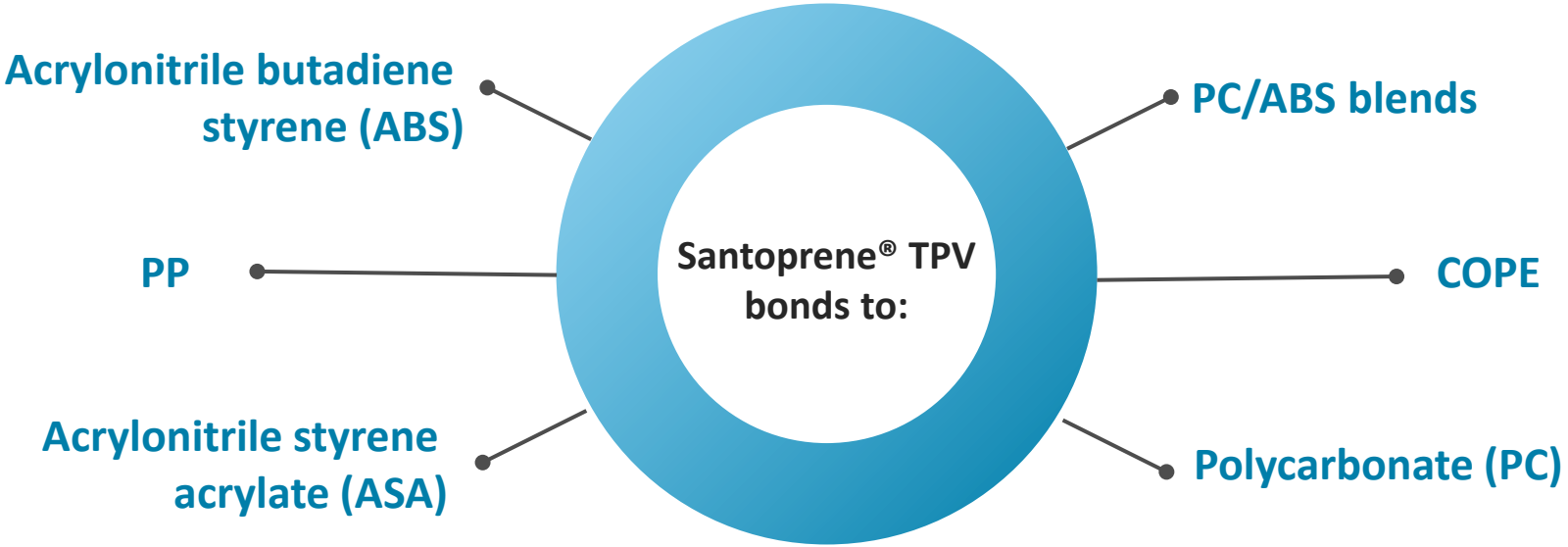
Feature	Benefit	Importance to you
• Bonding via thermoplastic processing	• Eliminate adhesives, bonding agents • Eliminate mechanical interlocks	• Reduction of volatile materials on-site • Ease of manufacturing • Lower processing costs
• Bonding to multiple substrates including ABS, PC, COPE	• Design freedom • Improved function and aesthetics	• Reduced manufacturing and assembly cost • Integrated seal design
• High bond strength and durability	• Excellent bond performance of finished goods	• More durable and higher quality finished parts • Long service life
• Silky feel • Excellent grip	• Easy to integrate soft touch features • Improved comfort	• Improved customer use experience

Bonding capability of Santoprene® TPV



Potential applications with new bonding grades

Evaluating bond strength and durability

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- Physical properties
  - Tensile test based on ASTM D412 Die C
  - Hardness based on ASTM D2240
  - Compression set based on ASTM D395B
- Bond strength measured using
  - Peel test based on ASTM D1876
- Property retention after exposure to various environments
  - Water
  - IPA
  - Bleach
- Biocompatibility testing
- Sterilization stability

Physical properties of new Santoprene® TPV bonding grades

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Physical property	Unit	Test method based on	8281-55B1MED
Hardness	Shore A	ASTM D2240	60
Density	g/cm³	ASTM D792	1.0
Tensile strength at break	Mpa	ASTM D412*	4.5
Modulus, 100%	MPa	ASTM D412*	1.5
Elongation at break	%	ASTM D412*	751
Compression set, RT 22h at 25% strain	%	ASTM D395B	35
Compression set, 125°C 70h at 25% strain	%	ASTM D395B	43

Unlike conventional TPVs, Santoprene® TPV B1MED series does not require drying

*Where applicable, test results based on fan gated, 2.0 mm injection molded plaques. Tensile strength, elongation and tensile stress are measured across the flow direction. Test results are generated by company test methods that may not fully conform to the ASTM and/or ISO methods. Test methods are available upon request.

Cohesive versus adhesive peel value determination

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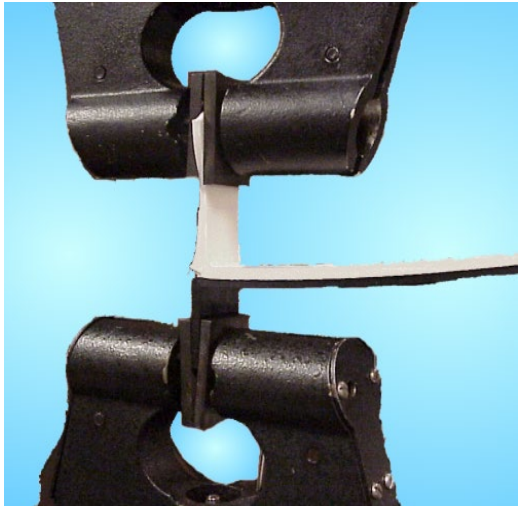
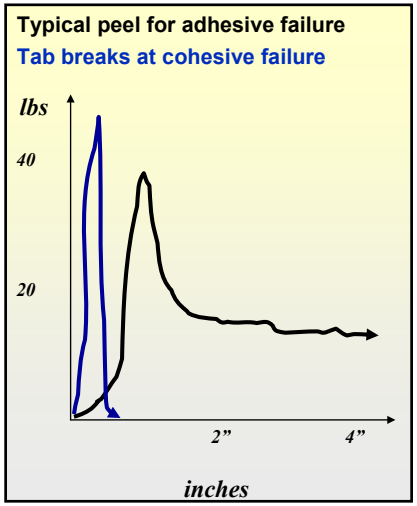
Cohesive failure



Occurs when bond strength between the TPV and engineered thermoplastic* substrate exceeds bulk tensile strength of TPV

bond strength > material strength

Adhesive failure

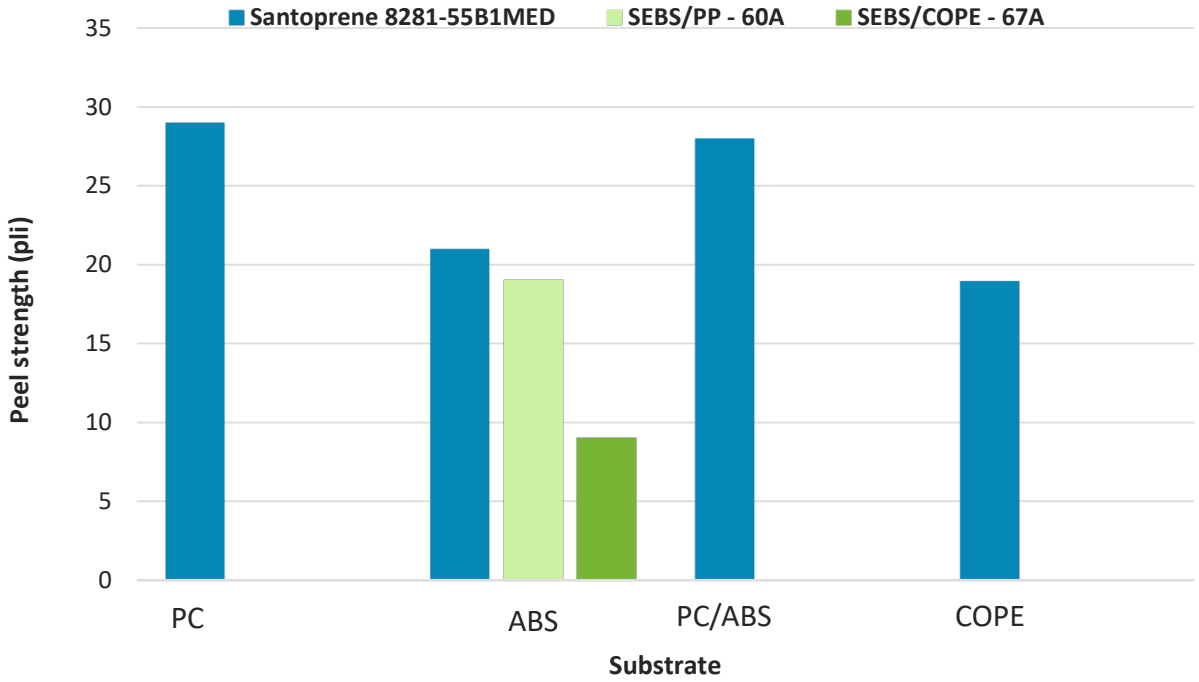


Occurs when bond strength between TPV and engineered thermoplastic is weaker than bulk tensile strength of TPV

bond strength < material strength

* Engineered thermoplastics
T-bars tested per ASTM D1876

Adhesion to various engineered thermoplastic substrates



T-bars tested per modified ASTM D1876. Adhesion samples were insert molded @ 257°C (495°F) at 3mm

Santoprene® TPV B1MED series offer soft-touch silky feel compared with parts made with SEBS based compounds

Santoprene® TPV B1MED series exhibits highest bond strength on many engineered thermoplastic substrates

Property retention in various environments

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		Santoprene® TPV 8281-55B1MED % of original property		
Aging environment	**Test method**	**Tensile strength**	**Elongation @ break**	**Hardness**
Water – 70h, 23°C	ISO 1817	100%	88%	105%
IPA – 70h, 23°C	ISO 1817	120%	115%	100%
Bleach – 70h, 23°C	ISO 1817	95%	94%	100%

Testing conducted on injection molded plaques. Tensile testing as per ASTM D412 and hardness as per ASTM D2240

Santoprene® TPV B1MED series displays high retention of properties in various environments

Sterilization

- **Steam (134°C)**
  Up to 100 repeatable sterilizations
- **Ethylene oxide**
- **Gamma radiation (50kGy)**

Material biocompatibility testing

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Qualified testing for ISO 10993 and USP Class VI for the biocompatibility of material used in contact with injectables and body fluids or tissue

- Heavy metals content
- Cytotoxicity
- Irritation/Intracutaneous
- Muscle implantation
- Systemic

Santoprene® TPV B1MED series meets all biocompatibility requirements for the intended applications

Summary

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Broad portfolio of Santoprene® TPV medical grades for wide array of applications

- New medical bonding grade forms strong bond with various engineering thermoplastic polymers
  - High bond strength values
  - No need for additional primers, bonding agents or adhesives
- High retention of physical properties after exposure to various aging environments
- Additional testing:
  - Steam sterilization (132°C 5 cycles)
  - Gamma sterilization (50kGy)

New Santoprene® TPV medical bonding grades are the right solution for you!


Thank you
www.santoprene.com