

EXTRUSION PROCESSING SHEET

Forprene™ Thermoplastic Elastomers (TPEs) are based on Thermoplastic Vulcanizate (TPV) technology that delivers the performance of a rubber in a thermoplastic material based upon polyolefin resins and cross-linked EPDM. This elastomer technology provides excellent performance in applications requiring higher use temperatures, resistance to oils and hydrocarbons, abrasion resistance, and low compression set. These products can be extruded as a single material or co-extruded with many polypropylene-based polymers and will bond chemically. They can also be extruded as a dense or foam profile, flat sheet, blow molded, or thermoformed. They are offered in both black and natural grades.

EXTRUSION TEMPERATURE PROFILE

<p>These temperatures should be used as a reference point and can vary <math>\pm 5^{\circ}\text{C}</math> (<math>\pm 10^{\circ}\text{F}</math>). These temperatures should be used as a starting condition and can be increased to a maximum <math>+10^{\circ}\text{C}</math> (<math>+20^{\circ}\text{F}</math>). It is important that the temperature profile is increasing to allow proper shear heating in the material at the rear zone.</p>	MATERIAL	MELT °C (°F)	DIE °C (°F)	HEAD °C (°F)	ZONE 3 °C (°F)	ZONE 2 °C (°F)	ZONE 1 °C (°F)	FEED °C (°F)
	35-55A	190 (375)	195 (380)	195 (380)	190 (370)	180 (360)	175 (350)	170 (340)
	60-65A	190 (375)	195 (380)	195 (380)	190 (370)	180 (360)	175 (350)	170 (340)
	70-75A	200 (390)	200 (395)	200 (395)	195 (385)	190 (370)	180 (360)	175 (350)
	80-85A	200 (390)	200 (395)	200 (395)	195 (385)	190 (370)	180 (360)	175 (350)
	40-60D	200 (395)	205 (400)	205 (400)	200 (390)	195 (380)	190 (370)	180 (360)

<p>Successful extrusion of Forprene TPEs is accomplished using standard thermoplastic equipment. These recommendations should be used.</p>	PROCESSING & EQUIPMENT	RECOMMENDATIONS
	<b>Extruder</b>	L/D ratio 24:1 or higher
	<b>Screw Type</b>	General purpose polyolefin screw Compression ratio 2.5:1 – 3.5:1
	<b>Screen Pack</b>	100/60/40/20 Mesh
	<b>Back Pressure</b>	50 bar (700 psi) minimum
	<b>Purge Compound</b>	Polypropylene
	<b>Drying</b>	Drying is not required when using material from an unopened package. Drying is recommended for 3 hours at $82^{\circ}\text{C}$ ( $180^{\circ}\text{F}$ ) with a desiccant drying system when using material from an opened bag or container. Overall, Forprene TPEs absorb less moisture than most competitive TPVs.
	<b>Recycling</b>	Forprene TPEs are fully recyclable. Conventional granulators with sharp blades should be used. Consistent regrind usage up to 20% is permissible.
<b>Coloring</b>	Polypropylene color carriers should be used and blended at 3%-5%.	

TROUBLESHOOTING PROBLEM	RECOMMENDATIONS CAUSE	SOLUTION
<b>Rough Extrudate</b>	Cold melt	1. Increase extruder temperature 2. Increase die temperature
	Melt not mixed	1. Use higher compression ratio screw or screw with mixing section
	Poor die design	1. Decrease land length
	Heater(s) not working	1. Check thermocouples and heater bands
<b>Uneven Cross-Section</b>	Surging	1. Decrease extrusion rate 2. Use screw with longer feed or metering section 3. Use more restrictive screen pack to increase back pressure 4. Decrease die temperature
<b>Black Specks or Undispersed Lumps</b>	Contamination	1. Purge with polypropylene 2. Check that color concentrate is based on polypropylene
<b>Voids</b>	Moisture	1. Dry material using desiccant drying system 2. Use virgin material
<b>High Extruder Pressure and Low Throughput</b>	Melt too cold	1. Increase extruder temperature 2. Increase die temperature
	Clogged screen packs	1. Clean screen pack 2. Replace if necessary
	Heater(s) not working	1. Check thermocouples and heater bands

The information and recommendations contained in this bulletin are, to the best of our knowledge, accurate and reliable, but no guarantee of their accuracy is made. All products are sold upon condition that purchasers shall make their own tests to determine the suitability of such products for their particular purposes and uses, and purchasers assume all risks and liability for the results of use of the products, including use in accordance with seller's recommendations. Nothing in this bulletin constitutes permission or a recommendation to practice or use any invention covered by any patent owned by this company or by others. There is no warranty of merchantability, and there are no other warranties for the products described.

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