Trexprene™ by mcpp

Processing Guide

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INTRODUCTION

MCPP's TREXPRENE® series of Vulcanized PP/EPDM based Thermoplastic Elastomers (TPE) are Heat and UV stabilized, in hardness levels from 55 Shore A to 50 Shore D. TREXPRENE® is available in Black, Natural and matching pre-colored form for interior, exterior and under the hood application.

TREXPRENE® can be processed on most injection molding equipment without difficulty. Pre-drying is recommended especially if packaged in an octobin, or the bags have been open for an extended time. TREXPRENE® is shear-dependent, so it will flow better with a higher injection rate than a higher melt temperature. This processing guide is for typical applications of our standard grades, unique applications or custom products may require parameters outside the recommendations of this guide.

SAFETY GUIDELINES

Processing TREXPRENE® involves potentially dangerous heat, electrical and mechanical forces, always use the industry best safety practices when processing TREXPRENE® .

- Check all safety systems at least once per day
- Completely purge the machine with PP or PE. TREXPRENE® is not compatible with some other thermoplastic materials (PVC, POM)
- Wear personal protective equipment at all times during processing
- Follow machine manufacturers safety requirements

Please refer to the TREXPRENE® Material Safety Data Sheet prior to handling for the first time.

TREXPRENE® **Storage and Handling:** TREXPRENE® is available in 50Lb (22.7 Kg.) Poly bags (up to 1250 Lb. or 568 Kg. Per pallet) or 1400 Lb. (635 Kg.) Polyethylene lined gaylords. It has storage life of several months.

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EQUIPMENT

Most injection molding machines capable of processing polyolefin materials are adequate for molding TREXPRENE®

General purpose screws with a compression ratio between 2:1 and 2.5:1 is sufficient. Mixing screws are acceptable also since TREXPRENE® has better flow characteristics when a high level of shear is present

To maintain optimal melt temperature and avoid degradation, the shot weight should be between 20%-80% of the barrel capacity (1.5-5 shots in the barrel).

TREXPRENE® does not require a special nozzle. The nozzle orifice should be 10% smaller than the opening of the sprue bushing. Hot runner systems can be used with TREXPRENE®, it is recommended that the hot runner temperatures be set

Clamping force requirements are dependent on many factors including gate size and design, part geometry, and part thickness. The recommended range for TREXPRENE® is between 3-5 tons/ in^2 (4.0-6.9 kN/cm^2).

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INJECTION MOLDING

GENERAL CONDITIONS

- Fill time .5-2.0 seconds for optimum shear
- Relatively low injection pressures
- Approximate melt temperature of 205°C (400°F)
- Best performance at less than 0.06% moisture
- Cooling time between 10-40 seconds

START-UP

Purge machine completely with PP or other acceptable purging compound

TREXPRENE® is not compatible with PVC or POM, purge machine completely if these resins were in the previously in the machine

Melt Temperature		370°F – 430°F (188°C – 221°C)
Barrel Temperature	Rear Middle Front Nozzle	360°F – 420°F (182°C – 216°C) 370°F – 420°F (188°C – 216°C) 370°F – 420°F (188°C – 216°C) 390°F – 430°F (199°C – 221°C)
Mold temperature		80°F – 120°F (27°C – 50°C)
Back Pressure		25 – 150 psi
Screw Speed		100-200 RPM

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MOLD FILLING

Shear has more effect on viscosity than temperature, so faster injection rates are typically better than slower ones. Injection pressure is dependent on many variable like melt temperature, part thickness, flow length, etc. It is important to have enough injection pressure to obtain the desired injection speed.

Fill the cavity to between 95-99% full before switching to pack/hold. Packing and holding pressure should be between 50-80% of the peak injection pressure.

Typical cushion should be between 3-6 mm (0.125”-0.250”) to ensure adequate packing.

DRYING

When exposed to air, TREXPRENE® absorbs moisture. We recommend pre-drying TREXPRENE® for 2 to 4 hours at 180°F (82°C) to obtain moisture content of less than 0.06% before injection molding, especially for appearance parts.

The following precautions are recommended:

- Open bag or Box immediately before use
- Partially used bag or box must be closed as soon as possible.
- Bring cold pellets up to ambient temperature while bag is closed.

REGRIND

TREXPRENE® can be reground and reprocessed without issue if the regrind does not become contaminated. The general guideline is to have less than 25% regrind in order to maintain processing consistency. It is recommended that reground material be dried to ensure optimal surface appearance.

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SHRINKAGE

TREXPRENE® MOLD SHRINKAGE GUIDELINES

Many factors can influence Thermoplastic Elastomer part shrinkage. The data provided is intended as a basic guideline for the construction of molds. It was generated using ISO 2577 test procedures with test plaques 4" x 6" x 0.125". It cannot encompass all possible processing conditions and designs. Some adjustment may be required depending upon type of mold, flow path, gate design and location.

Typical Shrinkage ranges: Melt Temperature between 370°F to 420°F (188°C – 221°C)
Mold Temperature between75°F to 125°F (24°C –49°C)

Hardness Shore°	**Parallel Flow shrinkage %**		**Cross-Flow shrinkage %**	
Flow	Minimum	Maximum	Minimum	Maximum
55 A	1.6	2.1	1.3	1.7
64A	1.2	1.7	1.2	1.6
73A	1.2	1.6	1.1	1.5
80A	1.1	1.5	1.1	1.4
88A	1.1	1.5	1.1	1.4
40D	1.2	1.7	1.2	1.6
50D	1.3	1.8	1.4	1.9

These values are based on observations under certain conditions.

Please consult with MCPP to discuss the specific requirements of your project.

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DESIGN

SPRUES AND RUNNERS

Sprues should be as short as possible with a minimum of 5˚ draft to minimize sticking. Hot sprues can be used to eliminate sprue sticking issues.

Full-round and trapezoid runners are recommended for TREXPRENE®. Trapezoid runners should have a minimum of 5˚ draft per side. A cold slug well should be added at the end of each runner. Half round runners are not recommended.

GATES

Most gating techniques can be used for TREXPRENE® successfully, but there are restrictions to how the gates are designed for optimal processing.

SUB GATES – Frequently used because they are automatic de-gating. Typical TREXPRENE® sub gates range in orifice size from .8 mm-1.5 mm (.03”-.06”) Sub gates should be as short as possible to aid in ejection and have 20˚-30˚ draft angle on the “cone” section.

CASHEW GATES- this type of gate can be used, but must also be as short as possible with the most amount of draft possible, orifice diameters are similar to that of sub gates.

EDGE GATES – Edge gates are often used on large flat parts. The typical edge gates are between .5-1.5mm thick and between 2-8mm wide.

Other gating styles are possible with TREXPRENE® , it is recommended that the chosen gate be evaluated in a prototype mold to ensure that it is capable. Please contact your local Mitsubishi Chemical Performance polymers representative to discuss specific gating for your project.

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VENTING

Venting is very important to successfully molding TREXPRENE®. In addition to parting line vents on the molded part, ejector pins, lifters, slides and runners also require adequate venting. Vent depth where the vent intersects the edge of the part should be no deeper than 0.001" (0.025 mm)

MOLD SURFACE

TREXPRENE® does not release well from polished surfaces. It is recommended to vapor-hone or blast the mold surfaces with glass beads to allow for the vacuum to be broken when a part is ejected from the mold. Textured surfaces also provide a much better surface appearance than polished ones.

EJECTION

Due to the flexibility of TREXPRENE® ejection systems must be designed to effectively eject parts from the mold. The use of lifters and large ejector pins is recommended. Ejection should be designed to lift the details of the part evenly from the mold.

MULTI-SHOT MOLDING

TREXPRENE® is widely used in multi shot, or 2K applications. TREXPRENE® will bond to olefinic materials well such as PP, TPO, and PE. If being applied to a non-olefinic material (ABS, PA, PC, PS, etc.) the bond must be mechanical. A mechanical bond is one where the soft material completely wraps around the rigid to encapsulate the rigid substrate.

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TROUBLESHOOTING

ISSUE	POSSIBLE SOLUTION
Uneven surface/ tiger stripes	Increase injection speed Increase mold temperature Increase melt temperature Blast or texture the mold Dry material
Sink marks	Increase shot size Add pack/hold time and/or pressure Cool down mold temp Clean/ open vents
Burn marks	Slow injection rate down Add or open existing vents
Warpage	Increase cooling time Reduce hold pressure/time Increase mold temperature
Visible or weak knit lines	Increase injection speed Increase mold temperature Increase melt temperature Increase hold pressure Clean/ open vents

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EXTRUSION

TREXPRENE® is easily processed using single screw extruders. TREXPRENE® is can also be used for co - extrusion profile with Polypropylene, Polyethylene and similar olefinic plastics.

GENERAL CONDITIONS

Melt Temperature	390°F – 430°F (199°C – 221°C)
Barrel Temperature: Rear Middle Front Die	350°F – 420°F (174°C – 216°C) 370°F – 420°F (188°C – 216°C) 370°F – 420°F (188°C – 216°C) 390°F – 420°F (199°C – 221°C)
Screen Pack	20 to 80 Mesh
Screw Type L:D Screw Compression	24:1 minimum 2.8 - 3:1

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MATERIAL PREPERATION

Moisture contaminates the plastic resin causing several quality problems in the finished product. It will decrease the strength of the finished product and causes a poor surface finish. These defects force the customer to scrap the product.

The first parameter in the production of quality extrusions is the moisture content (%) and temperature of the resin. There are two major classes of thermoplastics; hygroscopic and non-hygroscopic.Non-hygroscopic resins accumulate surface moisture due to condensation which will affect both surface appearance and dimensional stability.

When hygroscopic materials are exposed to moisture, the water particles bond with polymer inside the pellet. If not dried correctly, streaks, bubbles, degradation, and brittleness can result in the extrusion profile.To remove moisture from hygroscopic materials, a Desiccant Dryer is required.The higher the processing temperatures in the extruder, the lower amount of moisture can be tolerated.Higher processing temperatures will produce a larger amount of steam from the same level of moisture.Improper or incomplete drying of the raw material will create problems, whether during processing or when the product is in use.

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