

ProPell™ Low Friction Compounds

About Coefficient of Friction (CoF)

- Physical property commonly used to define lubricity of a medical device
- Ratio of the force of friction between two bodies and the force pressing them together
- Also a system property
- Affected by environmental conditions such as temperature and moisture
- Dependent on the material used

Significance of Low Friction

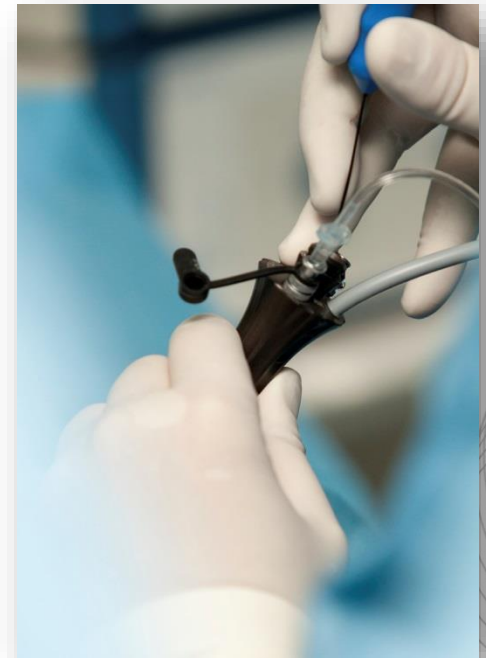
- Low CoF implies improved lubricity in medical devices
- Increased lubricity contributes to ease of insertion & removal from the body
- Medical device applications requiring low friction:

Catheter Tubing

Handle Triggers

Buttons

Gears



ProPell™ Low Friction Technology

- Uses non-migratory additives to enhance the surface to reduce inherently high friction of soft polymers
- Retains desired mechanical properties
- Improves manufacturing and application performance
- Reduces tackiness of flexible medical device components
- Well-suited for extrusion and injection molding applications
- USP Class VI compatible



ProPell™ Pebax® Compounds

Property	Test Method	Units	ProPell PEBA 72D 0118A	Pebax* 7233 (control)	ProPell PEBA 35D 0114B	Pebax* 3533 (control)
Tensile Strength @ break	ASTM 638	psi	8,640	7,870	5,580	5,340
Tensile Elongation @ break	ASTM 638	%	205	215	825	920
Tensile Modulus	ASTM 638	psi	159,670	131,470	1,670	1,020
Static Coefficient of Friction	ASTM D1894	-	0.035	0.041	0.085	0.531

Pebax® is a registered trademark of Arkema

ProPell™ Pellethane® Compounds

Property	Test Method	Units	ProPell TPU 55D 0118A	PUET 55D (control)	ProPell TPU 80A 0118J	PUET 80A (control)
Tensile Strength @ break	ASTM 638	psi	10,940	11,010	7,170	5,435
Tensile Elongation @ break	ASTM 638	%	375	420	530	550
Tensile Modulus	ASTM 638	psi	18,500	12,740	1,790	1,820
Static Coefficient of Friction	ASTM D1894	-	0.031	0.041	0.051	0.151

Pellethane® is a registered trademark of Lubrizol

ProPel™ Low Friction Advantage

- ProPel™ TPU parts have a dry coefficient of friction of **0.05** representing a **66% reduction** compared to the unmodified polymer with a hardness of 80 Shore A.
- ProPel™ PEBA parts have dry coefficient of frictions of .084 representing a **84% reduction** than the unmodified polymer with a hardness of 35 Shore D



Additional Low Friction Technologies

Perfluoropolyether Synthetic Oil

- Colorless, odorless, nonflammable, radiation stable, chemically inert additive that meets USP Class VI biocompatibility.
- Performs as a processing aid for polymers to prevent gels in film applications
- Very low addition level
- Good bondability after addition

Additional Low Friction Technologies

PTFE Additives

- Low – high additions (up to 15%) into melt processible polymers significantly improve dynamic frictional properties in dry conditions.
- Good bondability with adhesives
- Good low friction results when used in conjunction with perfluoropolyether technology