

The more you know...

Urethane's Toughness And Durability Ensure Reliability and Long Life for Pneumatic Bellows

A pneumatic bellows fabricated by Sealtech, Inc., Athens, Tennessee, plays a crucial role in the effective operation of high-tech rehabilitation equipment. This medical equipment is used to increase muscle strength and mobility for patients recovering from strokes, broken limbs and other injuries. The bellows face a variety of end-use environments over their life span, including use in hospitals, rehabilitation centers and even in patients' homes. The equipment may be used almost constantly, or only on occasion with long idle periods in between.

Because the equipment has a long working life and may face a variety of end-use environments, the bellows needed to be exceptionally strong and long lasting. Stevens Urethane was chosen over other materials because its strength, flex fatigue resistance, and durability ensured reliable bellows performance.

The Winning Combination For Urethane

Material selection was critical to the success of the pneumatic bellows. Filled with air and constantly flexing,



the bellows require a material with high puncture and abrasion resistance, high flex fatigue resistance, and proven durability. The finished product is fabricated from 15 mil Stevens Urethane sheet, radio frequency sealed together.

Strength

Urethane's tensile strength makes the bellows rugged and durable. The rehab equipment may be used by patients with little experience or knowledge, possibly resulting in improper adjustment. This may subject the bellows to excessive strain, flexing, abrasion, or other stress. Urethane provided the strength and durability to

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Why Stevens Urethane from JPS Elastomerics was chosen

PRODUCT	TEAR STRENGTH #/IN (GRAVES)	ABRASION RESISTANCE	ELONGATION %	MIGRATION	FLEX STRENGTH
PVC	100-400	Fair	200-400	Poor-Good	Fair
URETHANE	400-800	Excellent	350-800	Excellent	Excellent

withstand such stress without puncture or tearing. With high tear and tensile strengths, a thin sheet of Stevens Urethane outperforms PVC and other plastics.

Durability

The bellows are subject to constant flexing when the equipment is in use, and must provide reliable operation for at least three years. To ensure integrity and peak performance, a long lasting material with excellent flex

fatigue resistance, like urethane, must be used. Materials such as PVC contain plasticizers or other additives that may leach to the surface over time, causing brittleness and impairing performance. Urethane, on the other hand, remains strong and pliable, ensuring reliable performance for many years.

Technical Support

The high level of service and support from JPS Elastomerics' technical staff was also key to

specifying Stevens Urethane over other materials. The company develops different formulations of TPU to meet specific performance specifications, and offers materials and procedures that comply with many certifications needed for medical applications.

About TPUs

- Stevens Urethane is a thermoplastic polyurethane, or TPU. TPUs are versatile elastomers that combine the best properties of both rubber and plastic to offer a unique combination of high performance properties.
- Stevens Urethane offers exceptional strength and durability, so a thinner gauge of TPU can be used when compared to PVC and other materials.
- TPU offers excellent resistance to a wide range of chemicals, as well as moisture and fungus.
- TPU is non-irritating, and is ideal for applications requiring contact with human skin.
- Because it contains no plasticizers, TPU offers excellent low temperature performance. It also lasts longer whether stored or in use.
- TPU can be produced in a wide range of durometers, 75-95 Shore A, from a relatively stiff material to a soft material with a non-plastic feel.
- Stevens Urethane is available as sheet, film, tubing, cord and profile extrusions. A range of colors, opacities, and surface finishes suits any application's aesthetic requirements.
- Stevens Urethane is easy to work with and can be fabricated in many ways: die-cut, radio frequency sealed and thermally

Product Features of Stevens Urethane

	MP-1880	MP-1882	MP-1890
Tensile Properties (D638)			
Modulus @ 100% strain psi	1000	800	1500
Modulus @ 300% strain psi	2000	1100	3000
Modulus at break psi	7000	6000	8000
Modulus of elasticity up to 10% strain psi	35	25	50
Elongation @ break, %	450	550	400
Set @ break, %	35	40	25
Tear Properties			
Die C, D624, pli	400	375	500
Abrasion Resistance			
Mg. weight loss per 1000 cycles, 1000 gm. load, H18, C501, mg.	30	100	25
Maximum Service Temperatures			
Continuous, °F	-60 to 200	-65 to 175	-60 to 225
Durometer (D2240)			
	87A	82A	90A
Thermal Properties			
Melting point range, °F	350 to 390	290 to 330	380 to 420
Specific Gravity (D792)			
	1.12	1.14	1.14
Yield Factors			
Square feet/pound/mil thickness	171.8	168.8	168.8
Humid Aging Resistance			
90% relative humidity at 160°F / 70°C	Excellent	Excellent	Excellent

bonded, vacuum formed, heat laminated, and adhesive bonded to itself or other materials. It can also be printed or silk-screened.

- JPS Elastomerics' technical support includes chemists, quality control personnel, technical sales staff and production experts. These people are ready to work with you to find the best solution to your design challenge.

STEVENS
Urethane
Film & Sheet