

The more you know...

PART 5

## Two New Flame Retardant Stevens Urethanes Offer a Range of Performance Characteristics

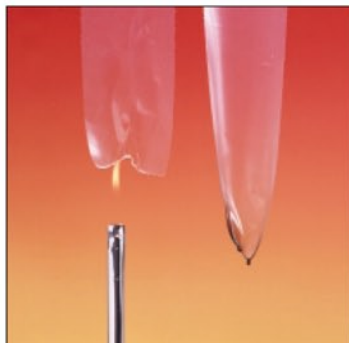
Stevens offers two grades of flame retardant thermoplastic polyurethane (TPU) designed to offer a choice of characteristics to best meet the performance demands of specific applications. Both grades, Stevens Urethane ST-1796 and ST-1776, meet UL-94-VTM-0 standard for flame resistance (tested at 2 mil thickness), and are ideal for applications requiring flame retardant thin films, such as fire fighting gear and life vests.

### Halogen-based flame retardant

Stevens ST-1796 is a standard VTM-0 package using an antimony oxide synergist with a halogen-based flame retardant. The ST-1796 may be more cost-effective in some applications while offering some performance advantages such as more efficient flame retardant properties in thin gauges, when compared with non-halogen-based systems. Halogens may also represent a potential source of toxic emissions during a fire situation.

### Non-halogen-based system

Stevens ST-1776 is designed with an alternate, non-halogen-based flame retardant that challenges conventional FR chemistry. In addition to eliminating the possibility of toxic halogen emissions, this non-halogen-based TPU offers better fabricability and more simplified downstream converting. Stevens can also develop custom flame resistant TPUs to meet your specific application requirements.



### Both Grades Offer the Superior Performance Characteristics of TPU

In applications like fire fighting gear and life vests, TPU characteristics such as flexibility, toughness and tensile strength, thermal properties and oil and chemical resistance add value to the finished product.

### Toughness and Tensile Strength

TPU's inherent toughness makes it highly resistant to damage from tearing and punctures. Often, because it is significantly stronger than PVC and other materials, a thinner gauge film can be used to achieve comparable performance. Stevens flame retardant TPU is available in thicknesses from 1 to 60 mil.

### Thermal Properties

The ability to retain its strength and flexibility through frequent temperature variations is another important benefit of TPU, considering the wide range of environments to which fire fighting gear and life vests may be subjected. Stevens Urethane is unaffected by temperature changes.

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### Oil & Chemical Resistance

Stevens Urethane offers excellent oil resistance as well as excellent resistance to hydrocarbons, ozone, bacteria, fungus, moisture and a wide variety of chemicals, many of which are common in the harsh environments in which products made with Stevens flame resistant TPUs must endure.

### 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.
- 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.

### Product Features of Stevens Flame Retardant Urethanes

	ST-1776-80	ST-1796-87
<b>Durometer, D2240</b>	80A	87
<b>Specific Gravity, D792</b>	1.15	1.19
<b>Thermal Properties:</b>		
<b>Maximum Service Temperatures</b>		
• continuous	°F -65° to +160° °C -54° to +71°	-40° to +200° -40° to +93°
• melting point range	°F 320° to 350° °C 160° to 177°	320° to +360° 160° to 182°
<b>Tensile Properties, D638:</b>		
Modulus @ 100% strain	1,400 psi	900 psi
Modulus @ 300% strain	2,200 psi	1,500 psi
Modulus @ break	4,000 psi	6,000 psi
Modulus of elasticity up to 10% strain	25 psi	N/A
Elongation at break	425%	550%
Set @ break	50%	40%
<b>Tear Properties, D624:</b>		
Die C	425 pli	450 pli

*Note: When mentioning "flame retardant" it refers to the use of additives to improve flammability properties which are measured in small scale laboratory tests. These tests provide relative burning rates. There is no association with our product performance in actual fire situations. Like all organic materials, these products will burn under the right conditions.*

- Stevens Urethane is easy to work with and can be fabricated in many ways: die-cut, radio frequency sealed, thermally bonded, vacuum formed, heat laminated, and adhesive bonded to itself or other materials. It can also be printed or silk-screened.
- Technical support includes chemists, quality control personnel, technical sales staff and production experts who are ready to work with you to find the best solution to your design challenge.



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