

- Advanced Urethane Chemistry
- Enhanced Toughness
- Low Color
- Superior Elongation
- High Hardness



**Introduction:**

EXOTHANE™ Elastomers represent the most recent advances in Esstech’s urethane chemistry. These versatile materials offer performance enhancements across a broad range of demanding formulations.

Table 1 contains results comparing Esstech’s novel EXOTHANE Elastomers alongside the well-known industry standard urethane dimethacrylate (UDMA / X-850-0000) and a blend of bisphenol A glycidyl methacrylate and triethylene glycol dimethacrylate (BisGMA:TEGDMA Blend).

**Table 1. Summary of Properties**

Item #	Item Name	Color (APHA)	Average Hardness	Tensile Strength (N/mm <sup>2</sup> )	% Elongation	Viscosity (PaS)
X-850-0000	Urethane Dimethacrylate	18	82	56.99	8.99	8.5
X-726-0000	Exothane 9	21	70	17.03	32.96	1.9
X-930-0000	Exothane 10	29	73	28.5	64.45	70
X-891-0000	Exothane 8	30	69	17.31	79.28	30
X-892-0000	Exothane 26	24	53	5.90	45.69	16
X-893-0000	Exothane 24	26	93	28.54	4.78	3.7
X-894-0000	Exothane 32	17	37	2.88	33.77	5.9
BisGMA:TEGDMA Blend (70:30)	For Reference	14	72	470	6.21	0.41

Esstech, Inc. • PO Box 39 • 48 Powhattan Avenue • Essington, PA 19029  
[www.esstechinc.com](http://www.esstechinc.com) • 1-800-245-3800 • 1-610-521-3800 • Fax 1-610-521-4600

**Disclaimer of Liability:**

Esstech, Inc. warrants to customer, but to no third parties or others, the specifications for the product referenced herein shall fall within a generally recognized range for typical physical properties of the product established by Esstech, Inc. when the product departs Esstech, Inc.' point of origin.

Esstech, Inc. makes no other warranty or guarantee of any kind, express or implied, including no implied warranty of merchantability or fitness for a particular purpose for the product. Customer understands that Esstech, Inc. will give the customer the benefit of its best judgment in making interpretations of data, but does not guarantee the accuracy or correctness of such interpretations.

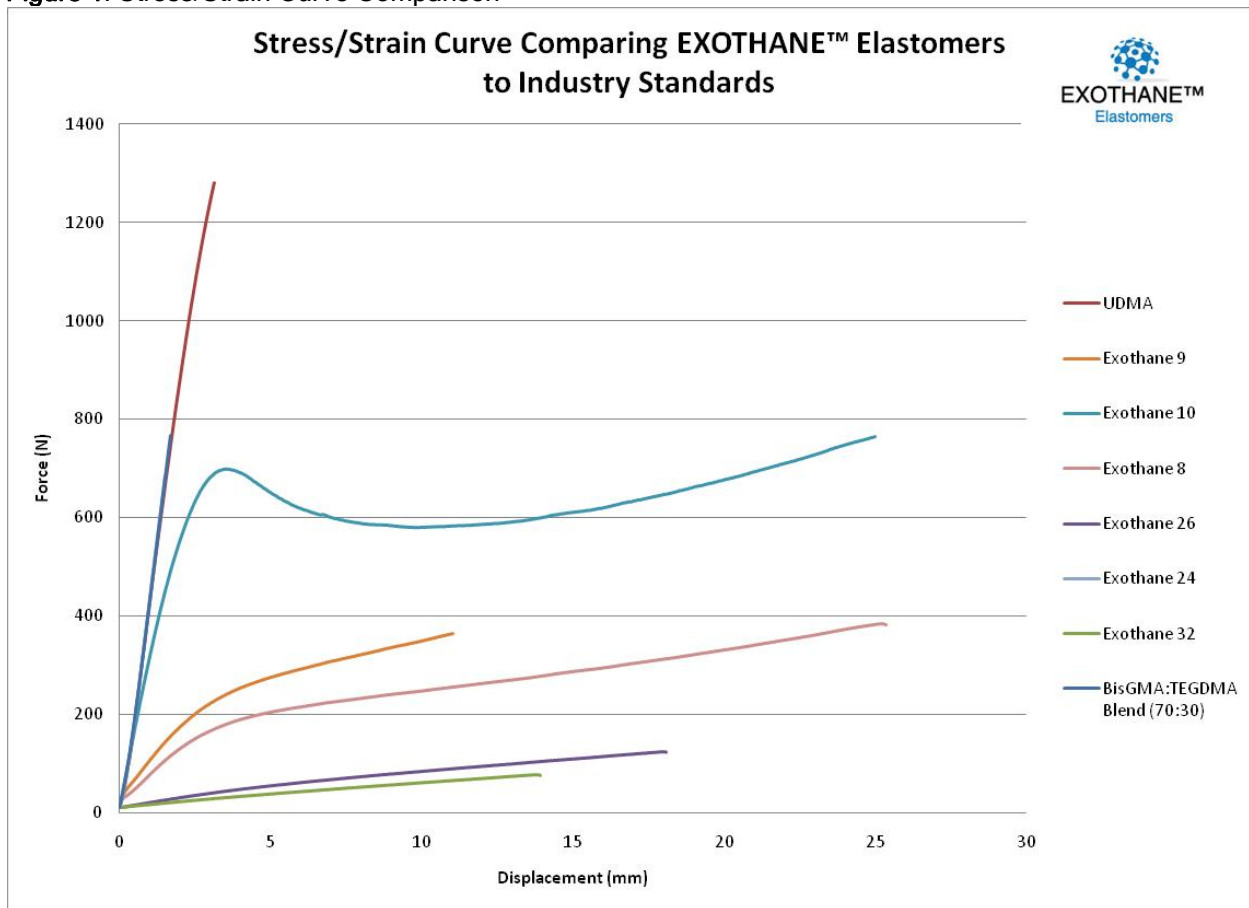
Esstech, Inc.' recommendations contained herein are advisory only and without representations as to the results. Esstech, Inc. shall not be liable for any indirect, special, punitive, exemplary or consequential damages and losses, including, without limitation, damages for lost production, lost revenues, lost product, lost profits or lost business or business interruptions for any cause whatsoever including but not limited to its negligence, and customer releases Esstech, Inc. in this regard.

**Mechanical Testing:**

As shown on Figure 1 below, EXOTHANE Elastomers present a variety of unique stress / strain properties.

The mechanical testing data was obtained by curing the EXOTHANE Elastomers and standards with 3% (w/w) Esacure KTO46 under a 600 Watt, UVA light. Specimens were prepared using a Type IV tensile testing molds in accordance with ASTM D638-10. Stress/strain curves for these materials were obtained using a Shimadzu Autograph Series AGS-J Universal Tester with a 5 kN load cell and a crosshead speed of 10 mm/min. All specimens were tested to failure.

**Figure 1. Stress/Strain Curve Comparison**



Esstech, Inc. • PO Box 39 • 48 Powhattan Avenue • Essington, PA 19029  
[www.esstechinc.com](http://www.esstechinc.com) • 1-800-245-3800 • 1-610-521-3800 • Fax 1-610-521-4600

**Disclaimer of Liability:**

Esstech, Inc. warrants to customer, but to no third parties or others, the specifications for the product referenced herein shall fall within a generally recognized range for typical physical properties of the product established by Esstech, Inc. when the product departs Esstech, Inc.' point of origin.

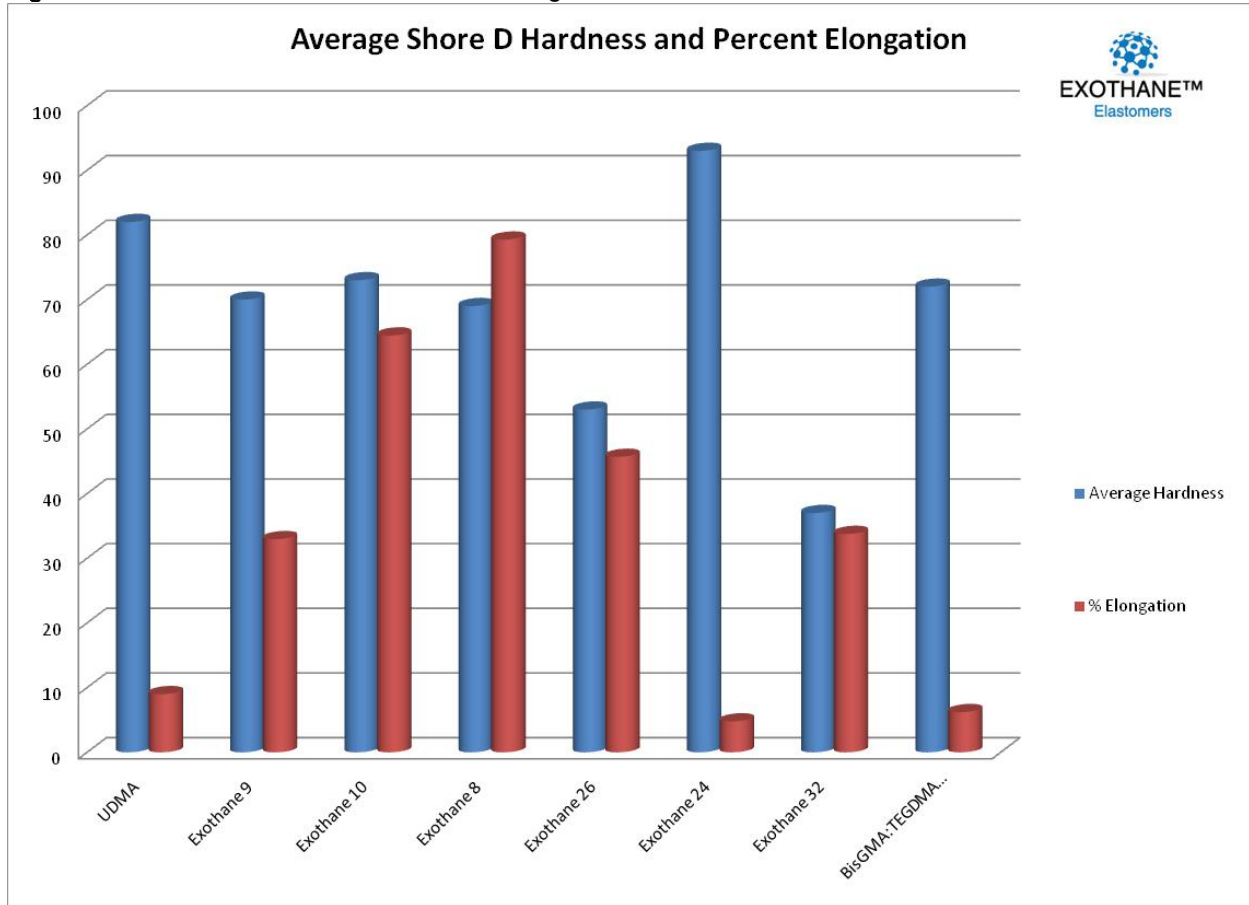
Esstech, Inc. makes no other warranty or guarantee of any kind, express or implied, including no implied warranty of merchantability or fitness for a particular purpose for the product. Customer understands that Esstech, Inc. will give the customer the benefit of its best judgment in making interpretations of data, but does not guarantee the accuracy or correctness of such interpretations.

Esstech, Inc.' recommendations contained herein are advisory only and without representations as to the results. Esstech, Inc. shall not be liable for any indirect, special, punitive, exemplary or consequential damages and losses, including, without limitation, damages for lost production, lost revenues, lost product, lost profits or lost business or business interruptions for any cause whatsoever including but not limited to its negligence, and customer releases Esstech, Inc. in this regard.

Mechanical Testing (continued):

EXOTHANE Elastomers can also provide higher percent elongation and Shore D hardness (Figure 2). The percent elongation of Exothane 8 and Exothane 10, 79% and 64% respectively, far exceeds the industry-standard urethane dimethacrylate. The Shore D hardness of Exothane 24 is unique as it exceeds that of urethane dimethacrylate and the BisGMA:TEGDMA Blend typically used in dental composites.

**Figure 2.** Shore D Hardness and Percent Elongation



Esstech, Inc. • PO Box 39 • 48 Powhattan Avenue • Essington, PA 19029  
[www.esstechinc.com](http://www.esstechinc.com) • 1-800-245-3800 • 1-610-521-3800 • Fax 1-610-521-4600

**Disclaimer of Liability:**

Esstech, Inc. warrants to customer, but to no third parties or others, the specifications for the product referenced herein shall fall within a generally recognized range for typical physical properties of the product established by Esstech, Inc. when the product departs Esstech, Inc.' point of origin.

Esstech, Inc. makes no other warranty or guarantee of any kind, express or implied, including no implied warranty of merchantability or fitness for a particular purpose for the product. Customer understands that Esstech, Inc. will give the customer the benefit of its best judgment in making interpretations of data, but does not guarantee the accuracy or correctness of such interpretations.

Esstech, Inc.' recommendations contained herein are advisory only and without representations as to the results. Esstech, Inc. shall not be liable for any indirect, special, punitive, exemplary or consequential damages and losses, including, without limitation, damages for lost production, lost revenues, lost product, lost profits or lost business or business interruptions for any cause whatsoever including but not limited to its negligence, and customer releases Esstech, Inc. in this regard.

### Summary:

Every application is unique and requires its own specific set of attributes. Use the unique properties of EXOTHANE Elastomers to modify formulations, without sacrificing the effects caused by non-reactive additives.

#### **X-726-0000, Product Name: Exothane 9**

Exothane 9 or PEG 400 Extended Urethane Dimethacrylate is commonly used in photo-cure applications. The PEG 400 backbone creates a flexible polymer upon curing and can increase the fracture toughness of UDMA. Exothane 9 also has low viscosity and low color.

#### **X-930-0000, Product Name: Exothane 10**

Exothane 10 provides low shrinkage, good conversion and enhanced toughness. Exothane 10's high viscosity enables it to be a rheological modifier in UV-cure formulations that require improved mechanical properties. The resulting homopolymer of Exothane 10 is hard, tough and shiny.

#### **X-891-0000, Product Name: Exothane 8**

Exothane 8 is a low color urethane that is a viscous liquid at room temperature. Upon cure, Exothane 8 creates a shiny, "soft" yet tough polymer with percent elongation near 80%.

#### **X-892-0000, Product Name: Exothane 26**

The homopolymer of Exothane 26 has the unique ability to re-adhere to itself at lower tensile strength. Exothane 26 is relatively low in viscosity and exhibits high flexibility when cured.

#### **X-893-0000, Product Name: Exothane 24**

Exothane 24 has increased cross-linking capacity and is low in color and viscosity. Neat polymers of Exothane 24 have very high Shore D hardness values.

#### **X-894-0000, Product Name: Exothane 32**

Like Exothane 26, Exothane 32 also has the ability to temporarily re-adhere to itself after breaking. It is very low in color and viscosity and provides improved flexibility to formulations.

### Conclusion:

Like many of Esstech's other products, potential applications involving EXOTHANE Elastomers can vary across many industries, from medical devices and cosmetic products, to curable coatings and adhesives. Contact us to discuss your unique application challenges and request samples.

Visit our website for additional information regarding these products and others, [www.esstechinc.com](http://www.esstechinc.com).

Esstech, Inc. • PO Box 39 • 48 Powhattan Avenue • Essington, PA 19029  
[www.esstechinc.com](http://www.esstechinc.com) • 1-800-245-3800 • 1-610-521-3800 • Fax 1-610-521-4600

---

#### Disclaimer of Liability:

Esstech, Inc. warrants to customer, but to no third parties or others, the specifications for the product referenced herein shall fall within a generally recognized range for typical physical properties of the product established by Esstech, Inc. when the product departs Esstech, Inc.' point of origin.

Esstech, Inc. makes no other warranty or guarantee of any kind, express or implied, including no implied warranty of merchantability or fitness for a particular purpose for the product. Customer understands that Esstech, Inc. will give the customer the benefit of its best judgment in making interpretations of data, but does not guarantee the accuracy or correctness of such interpretations.

Esstech, Inc.' recommendations contained herein are advisory only and without representations as to the results. Esstech, Inc. shall not be liable for any indirect, special, punitive, exemplary or consequential damages and losses, including, without limitation, damages for lost production, lost revenues, lost product, lost profits or lost business or business interruptions for any cause whatsoever including but not limited to its negligence, and customer releases Esstech, Inc. in this regard.