

# **3M** Scotchshield™ Safety and Security Window Films

## **Key Reasons Why Ultra Is Better:**

**Break Strength  
Tensile Strength**

**Elongation**

**Graves Tear**

**Modulas**

**Puncture Propagation**



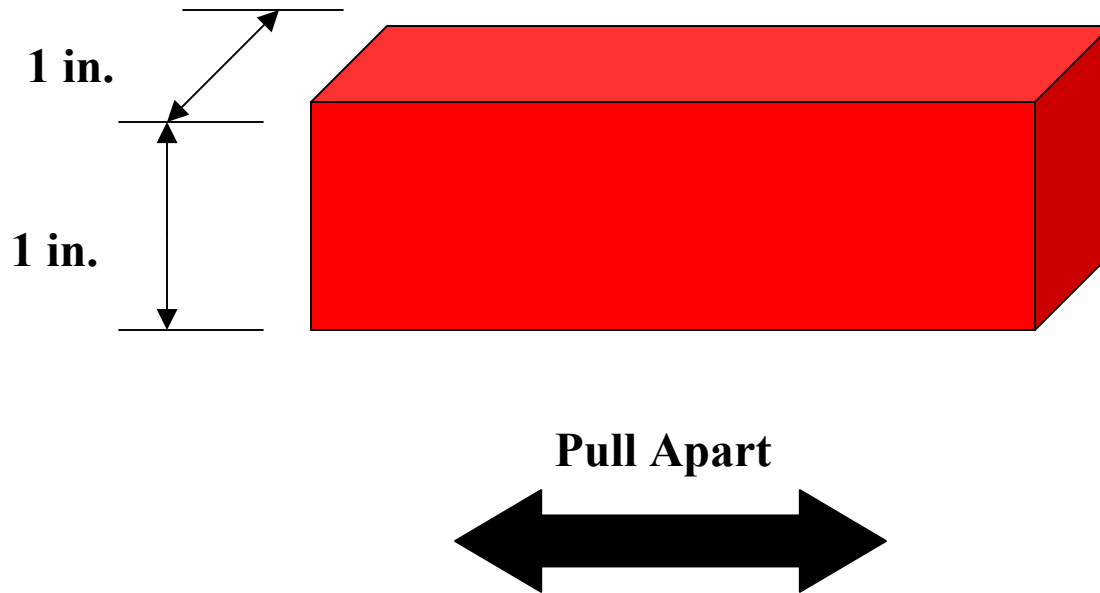
# Tensile Strength

The resistance of a material to a force tending to pull it apart. Calculated from Break Strength.

Relates to how strong the product is when subjected to impact.

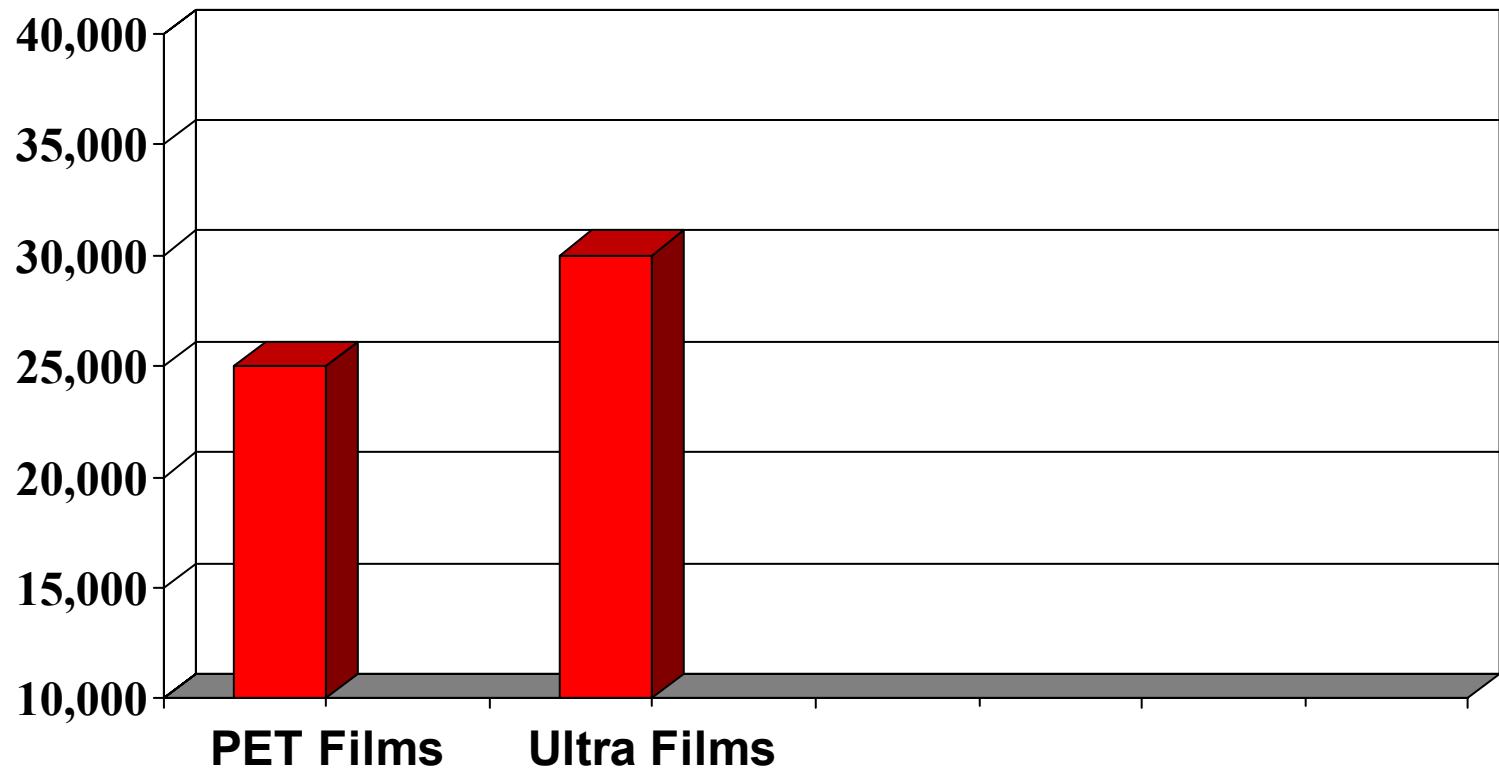


# Tensile Strength



# Tensile Strength

PSI



**Only 3M Has  
this  
Technology**

## **Break Strength**

Relates to the force needed to pull a safety film product apart. Tensile comes from this number.

Ultra films mil per mil have a higher Break Strength than PET.



# Break Strength

Film Sample

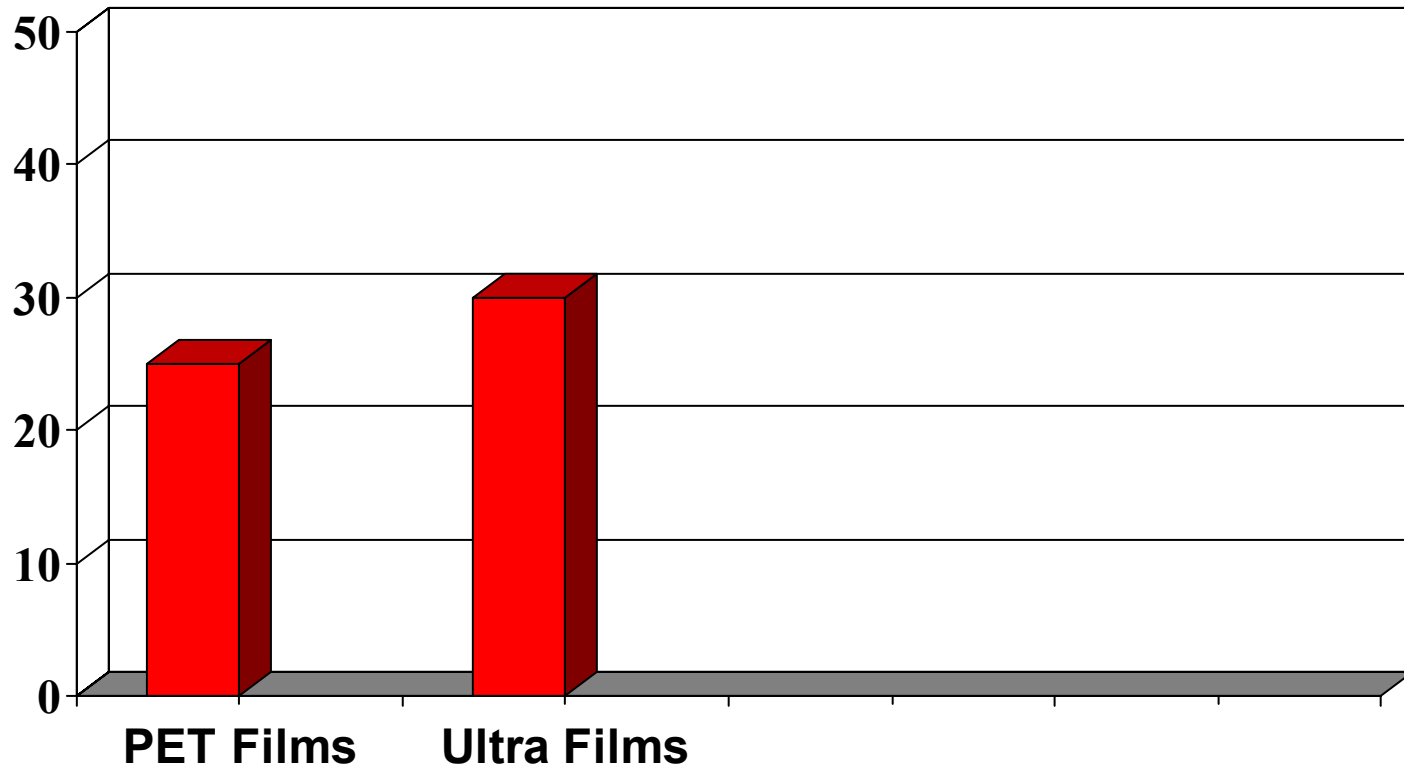


Pull Apart



# Break Strength

Pounds/mil



# Elongation

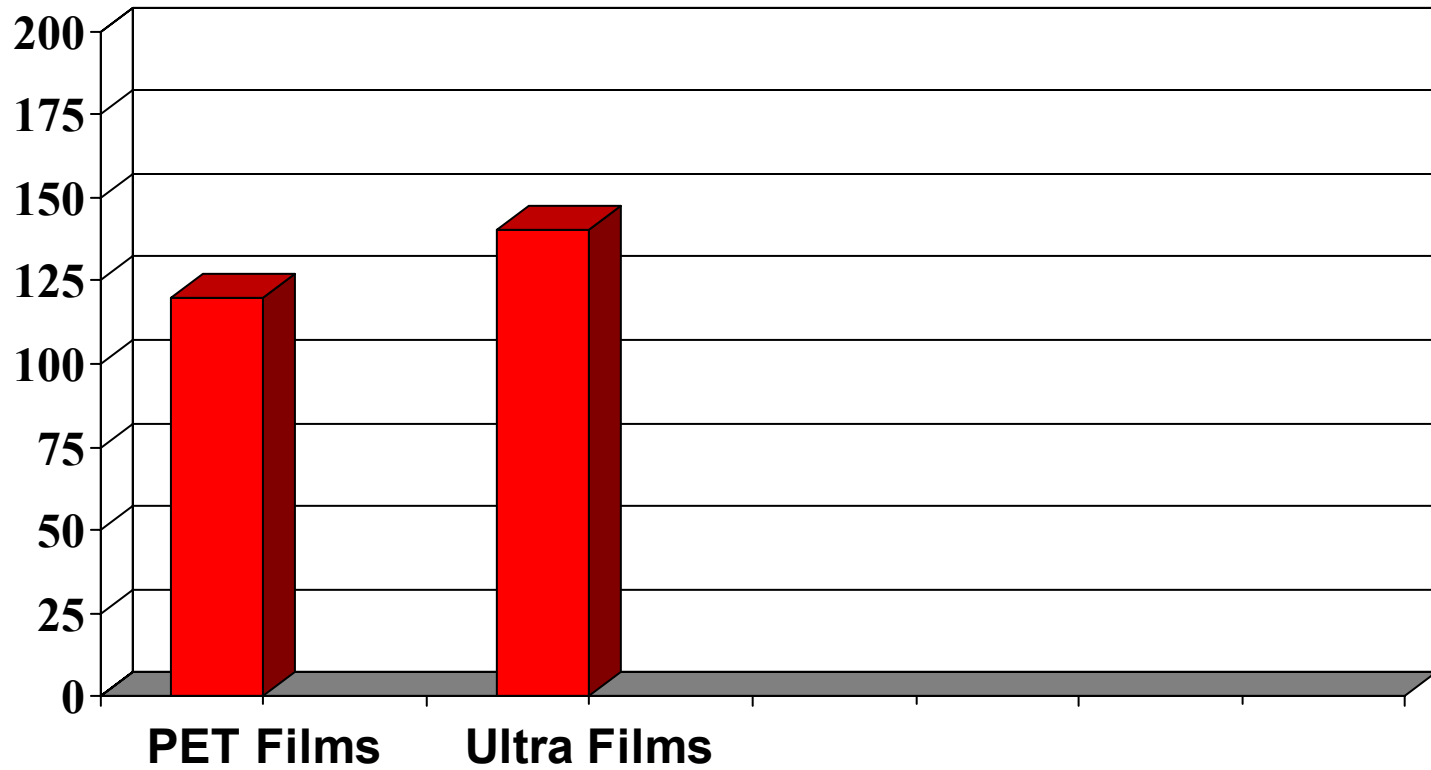
Ability to stretch

Greater Elongation allows the film to hold the glass together by stretching and absorbing energy.



# Elongation

%



# Graves Tear

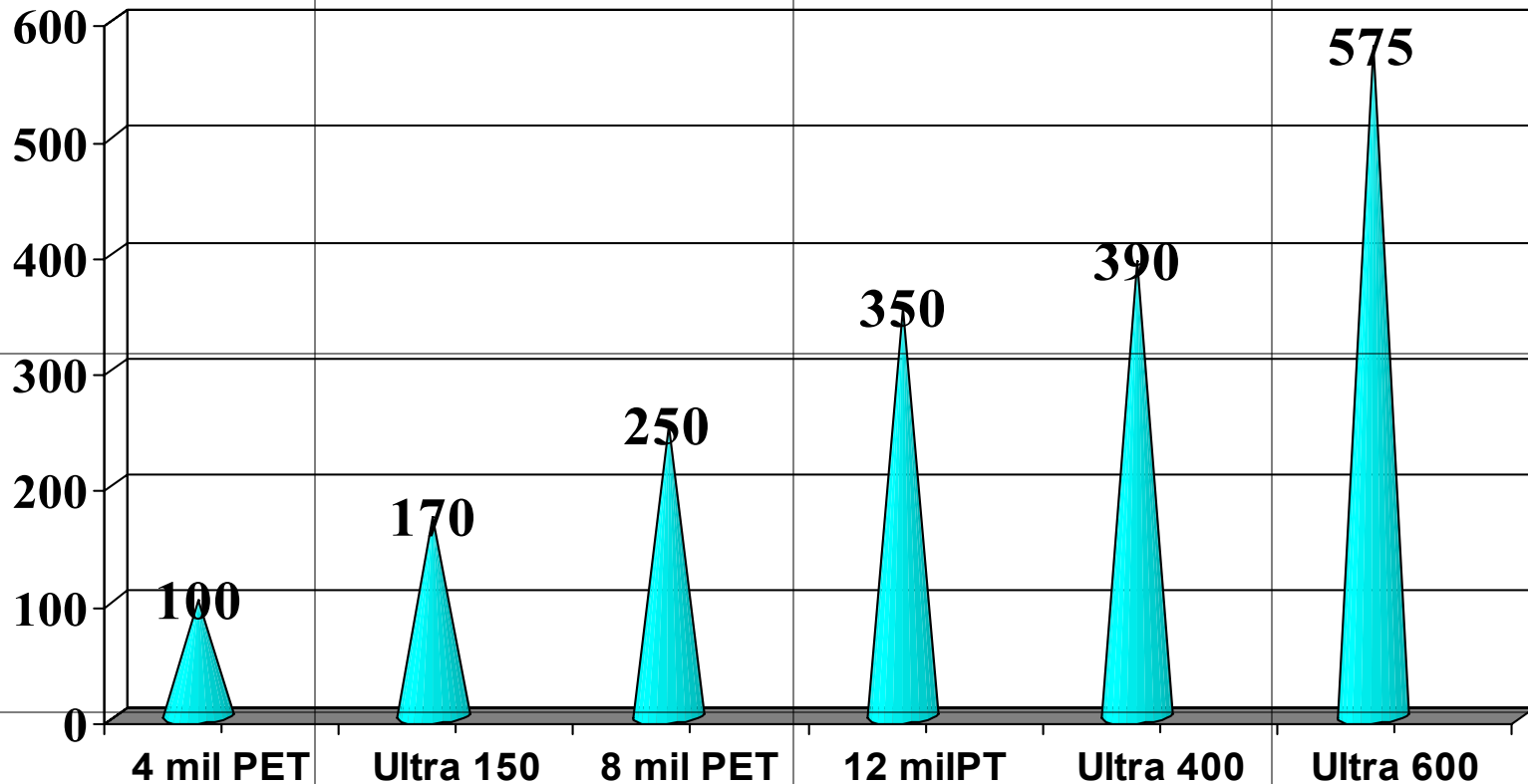
## Combination of Break Strength and Elongation

*When punctured Ultra film will  
continue to have high strength.*



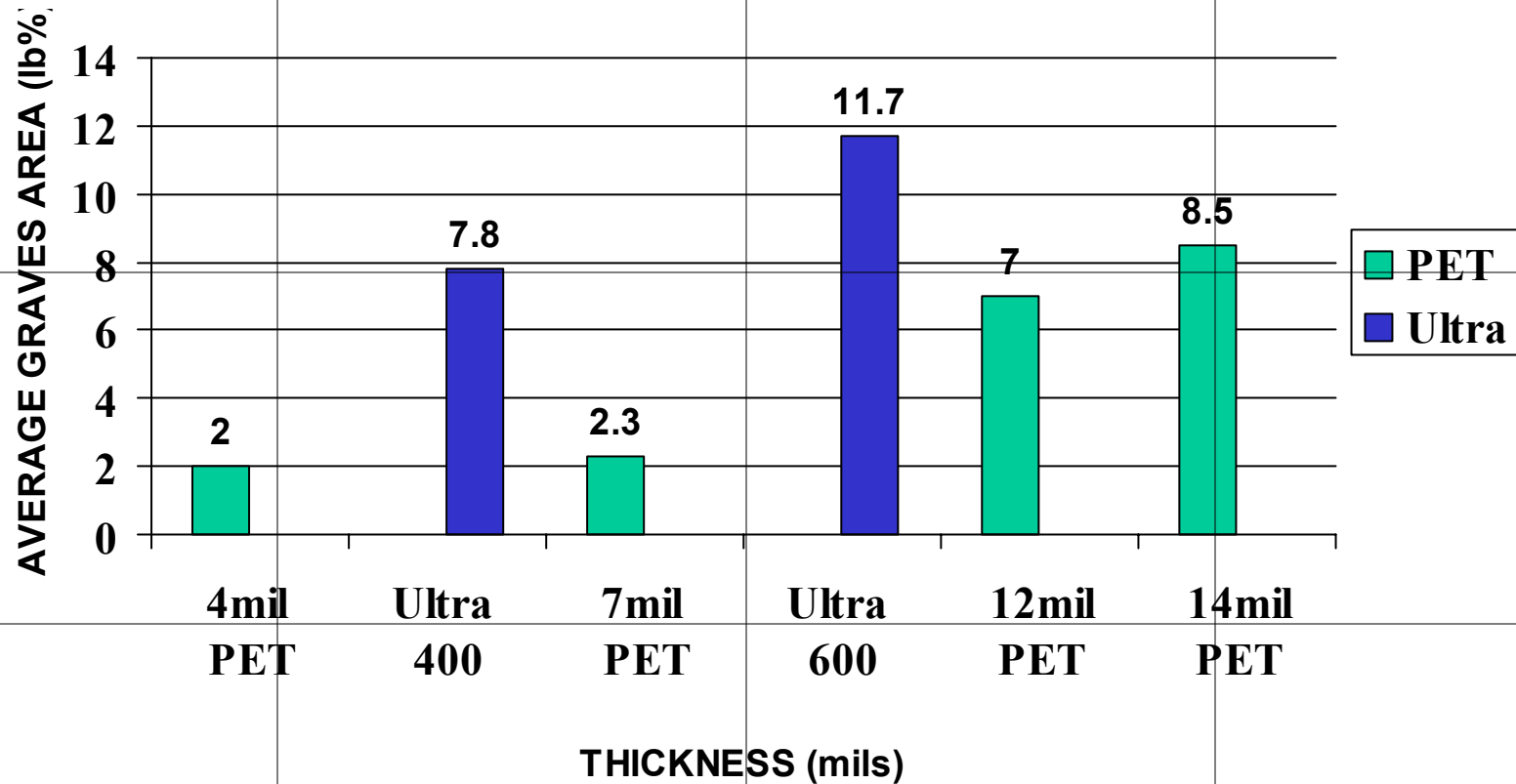
# Graves Area, Lb%

ASTM D1004-94a

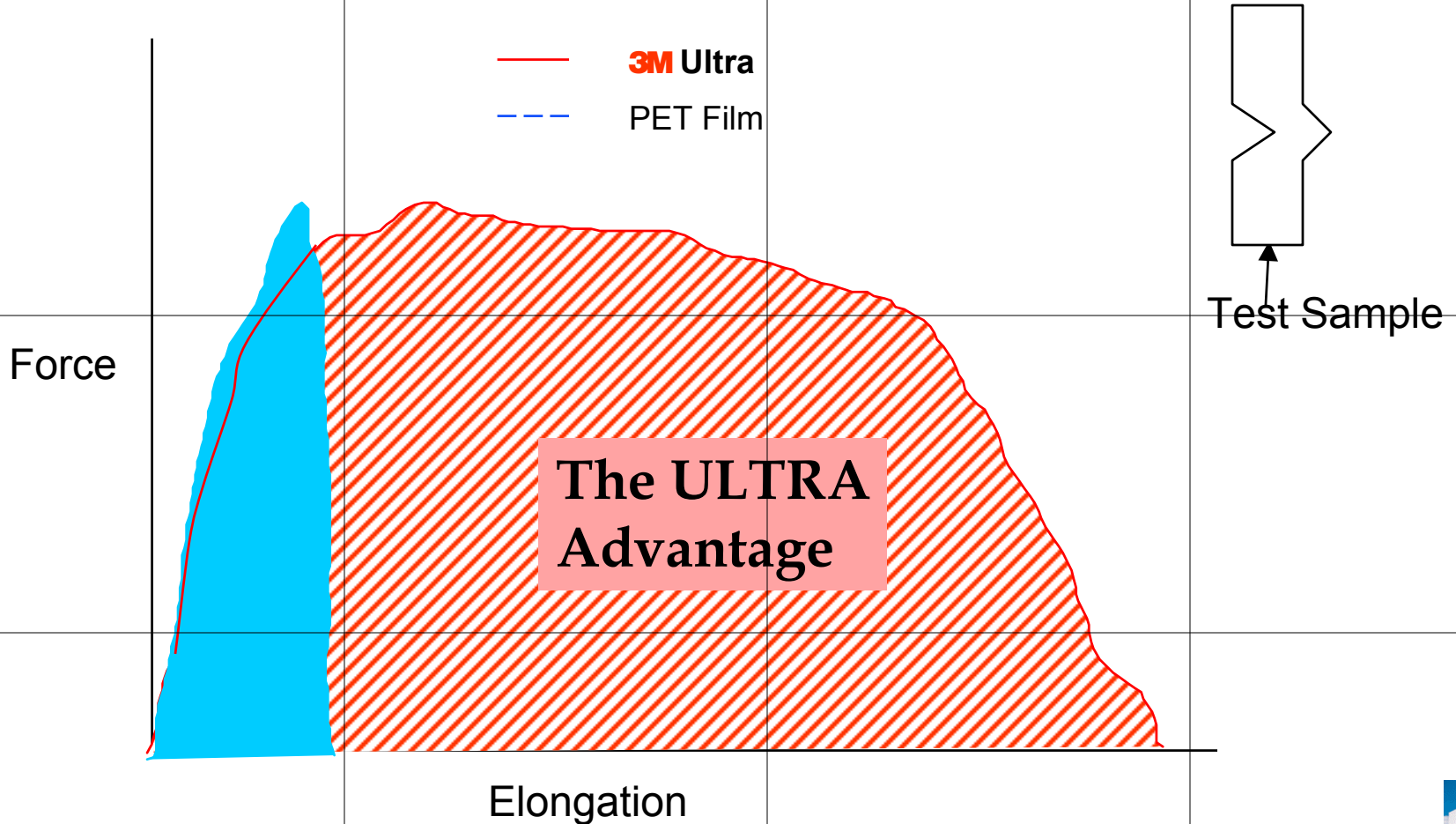


# GRAVES AREA

## 3M Ultra VS. PET



# GRAVES TEAR TEST



# Modulus

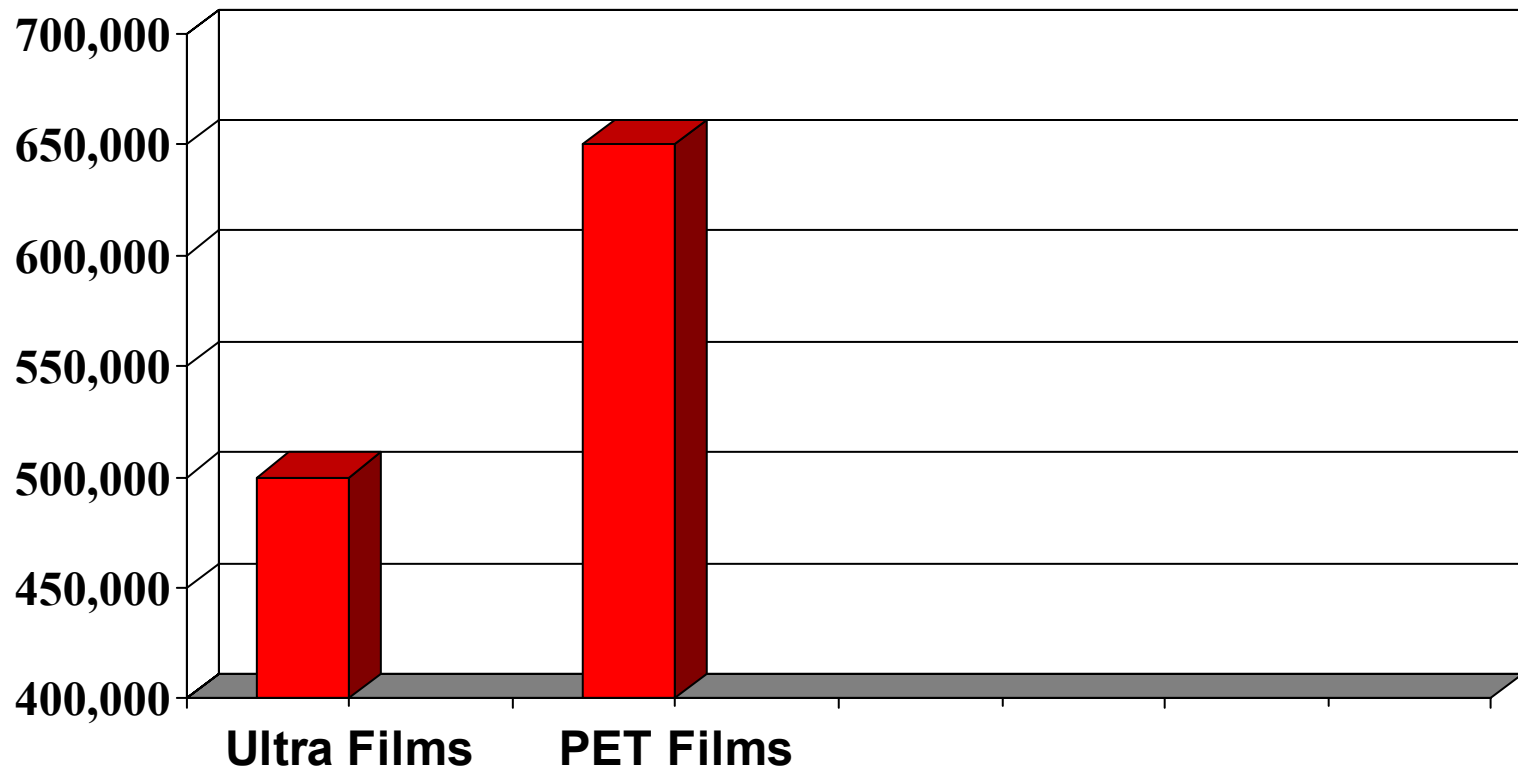
A measurement of  
polymer flexibility

A more flexible (less boardy)  
film is easier to install.



# Modulus in PSI

ASTM D882-95a



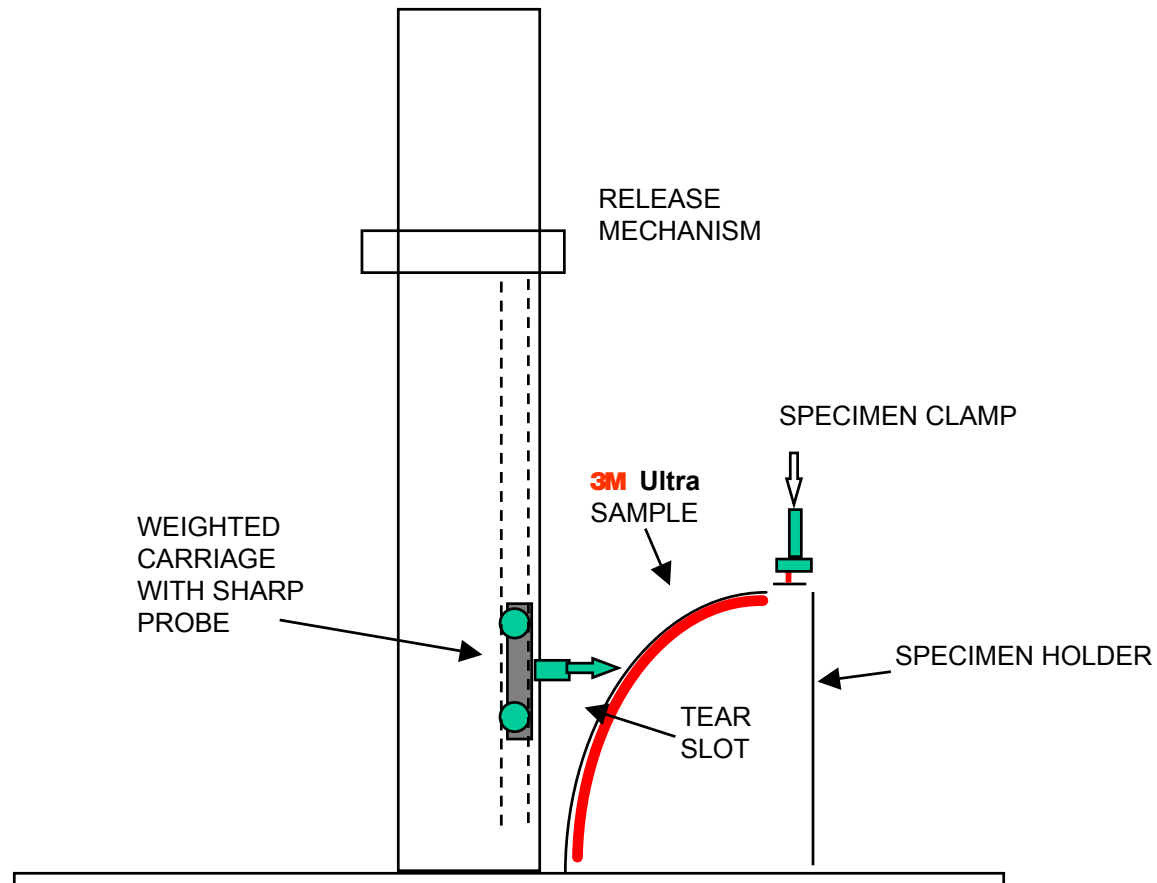
# Puncture Propagation

**Resistance to Puncture and Tear.**

*Greater resistance to Puncture and Tear means higher resistance to forced entry, bomb blast, storm cycling.*

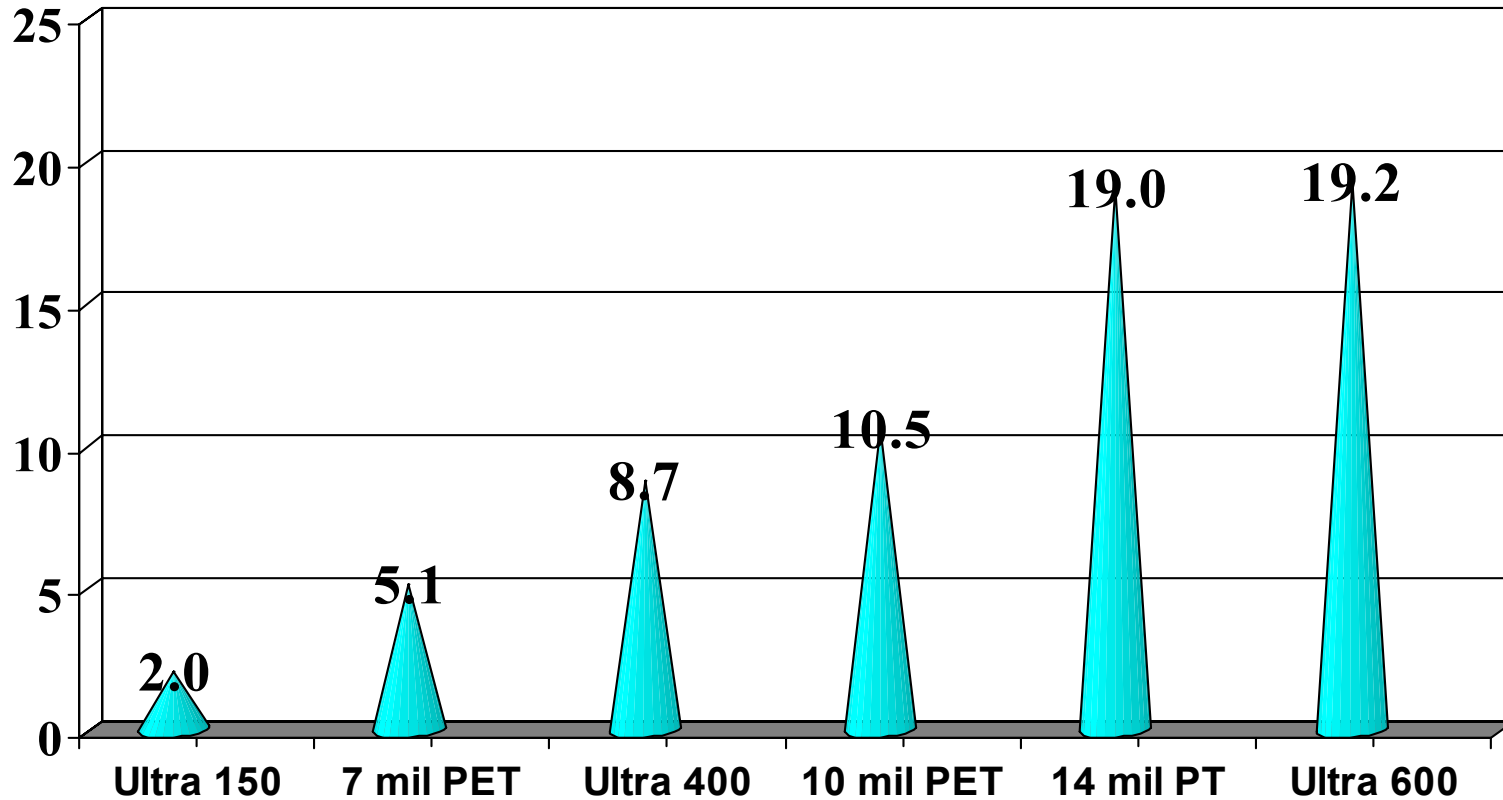


# PUNCTURE-PROPAGATION-TEAR TEST (PPT)



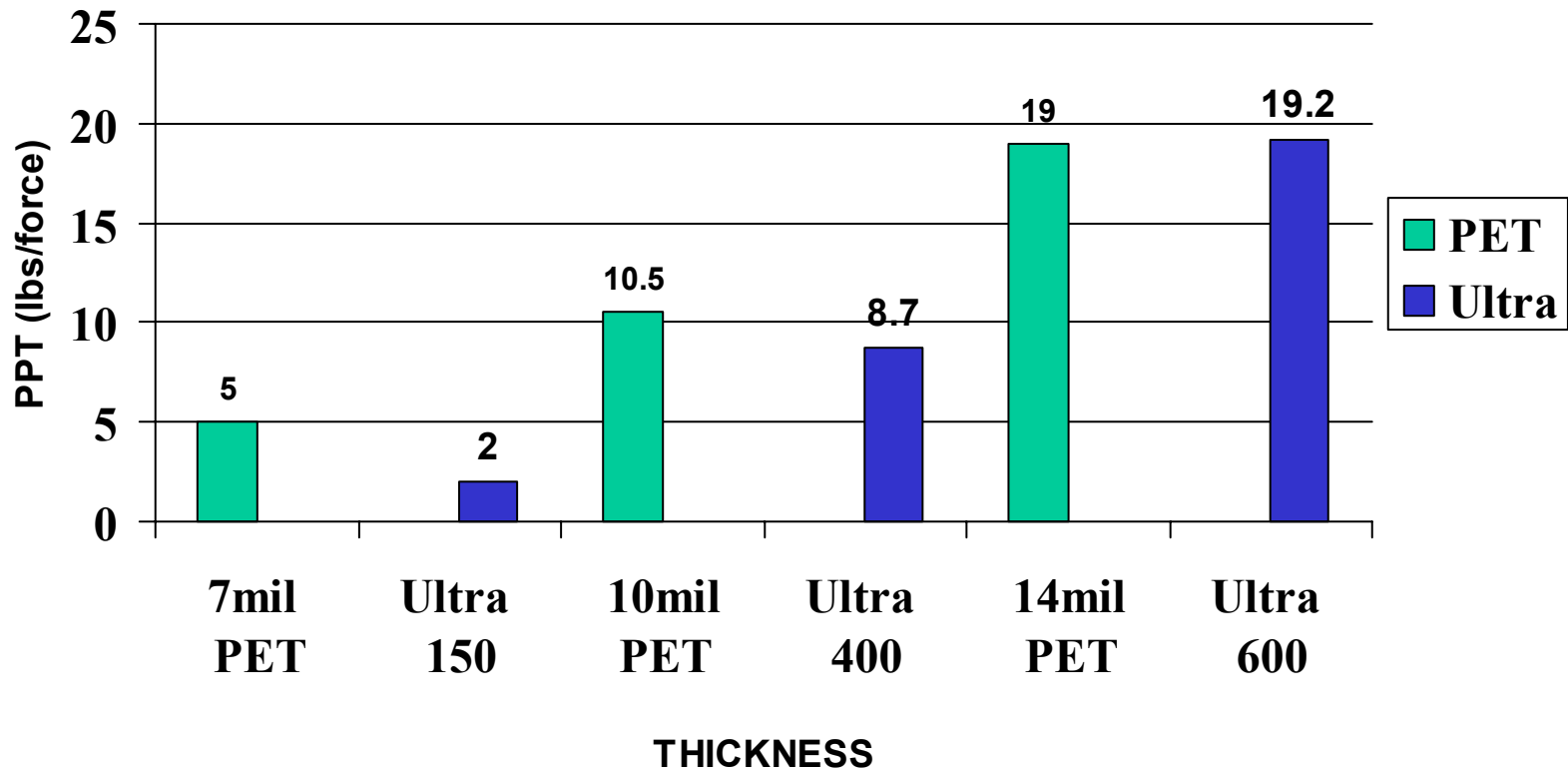
# Puncture Propagation, lbs.

## ASTM D2582-93



# PPT

## 3M Ultra VS. PET



Call 866-933-3456 for a professional assessment or email us at: [support@windowfilmdepot.com](mailto:support@windowfilmdepot.com)

