

3M Scotchshield™ Safety and Security Window Films

Key Reasons Why Ultra Is Better:

Break Strength
Tensile Strength

Elongation

Graves Tear

Modulas

Puncture Propagation



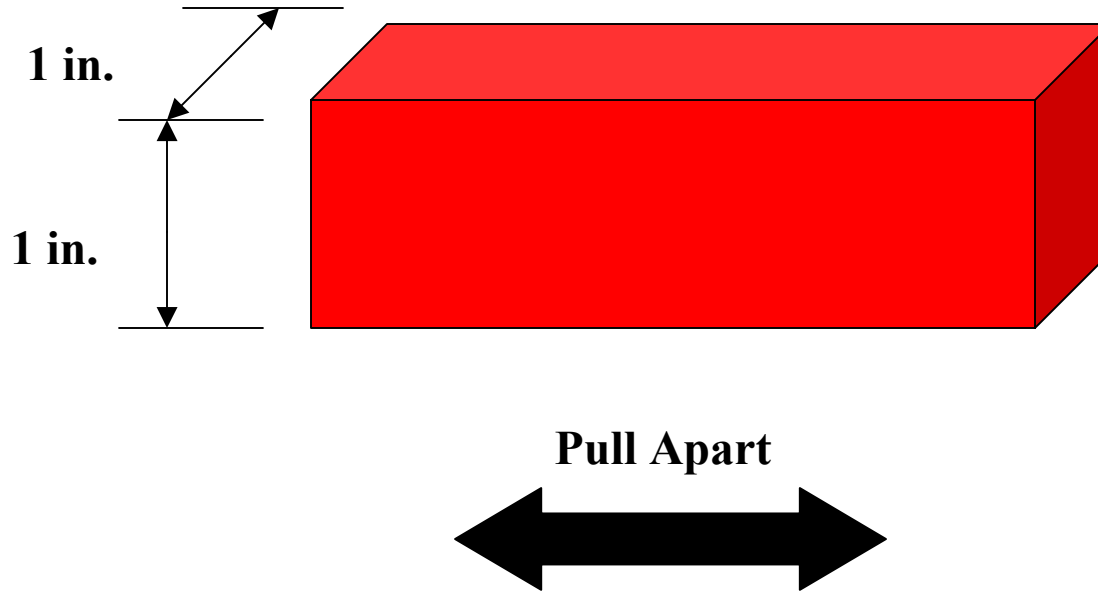
Tensile Strength

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.

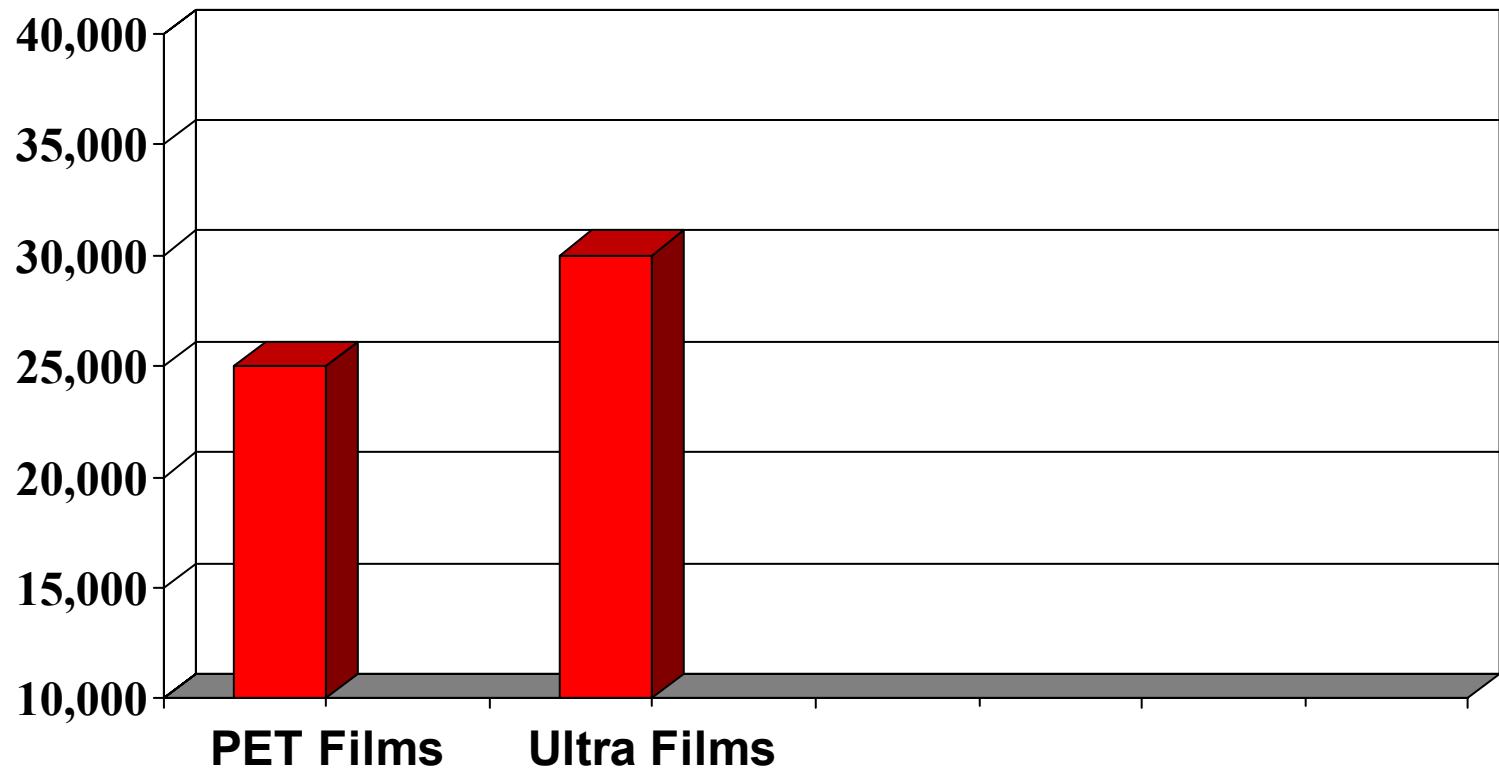


Tensile Strength



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

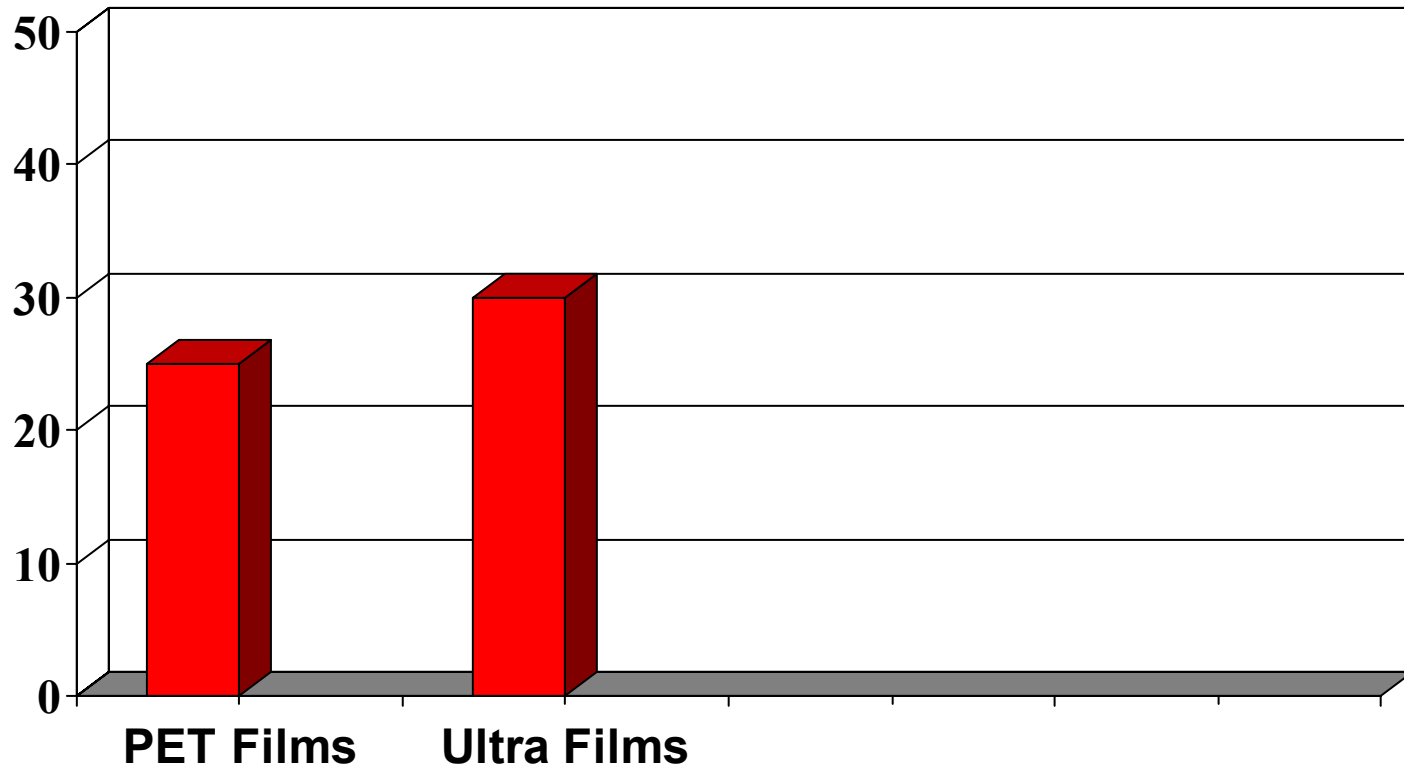


Pull Apart



Break Strength

Pounds/mil



Elongation

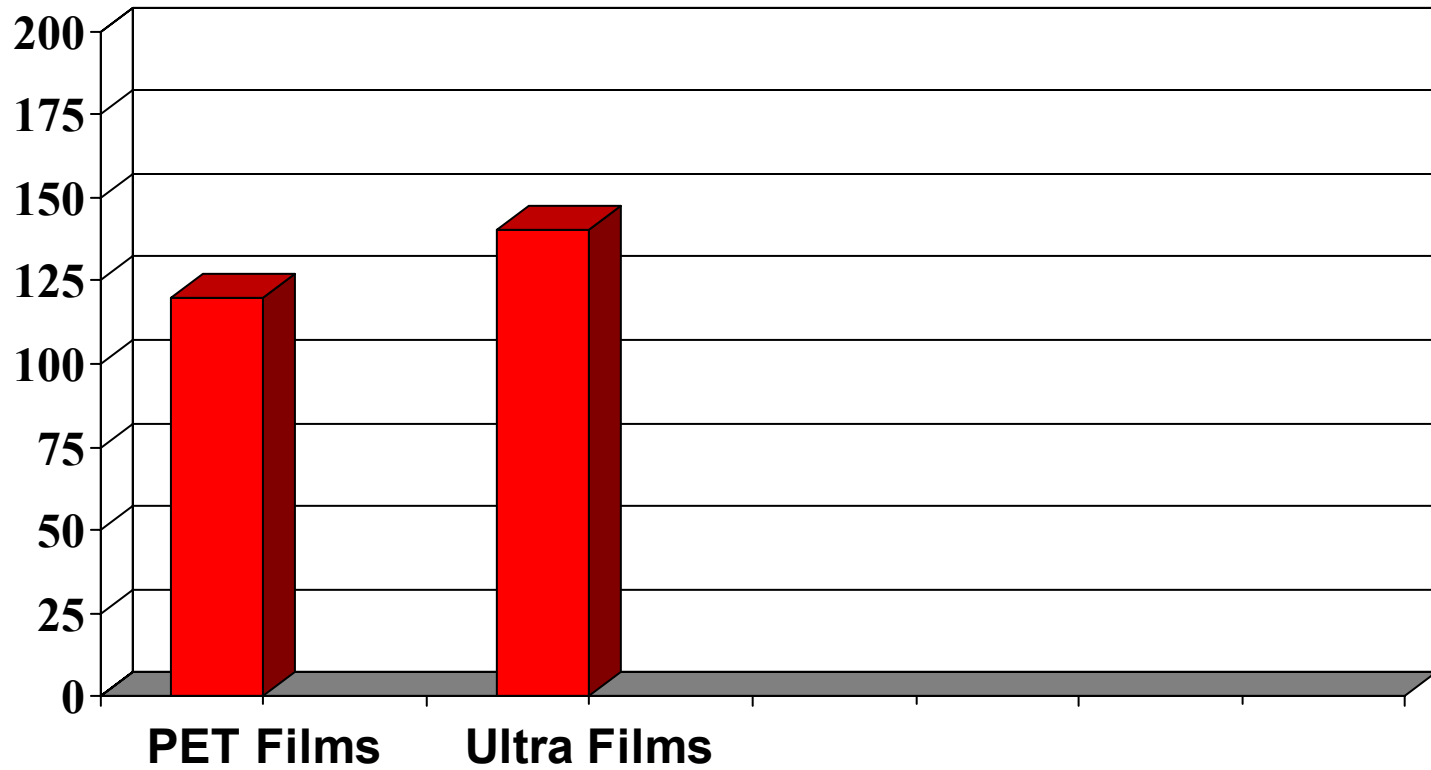
Ability to stretch

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



Elongation

%



Graves Tear

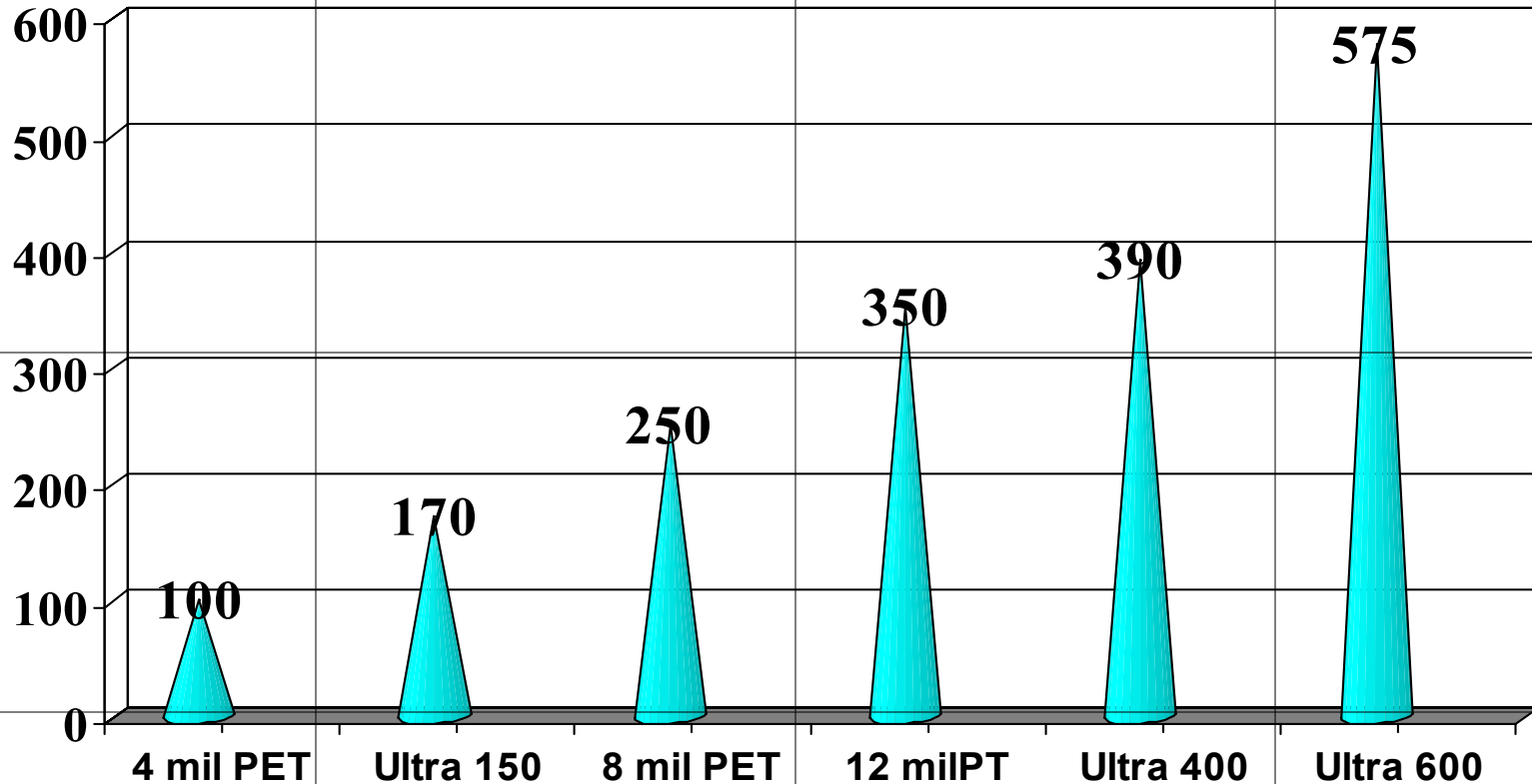
Combination of Break Strength and Elongation

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



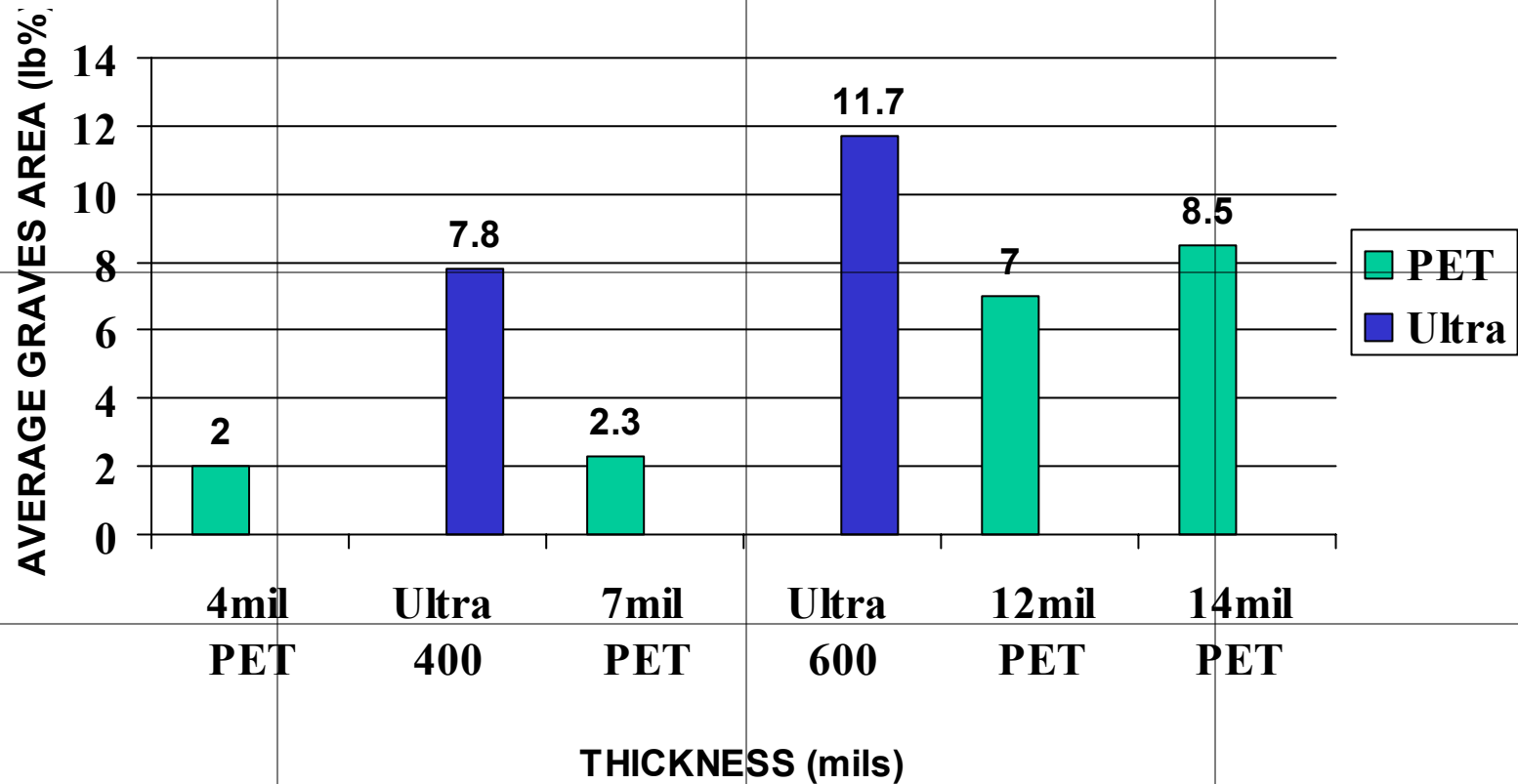
Graves Area, Lb%

ASTM D1004-94a

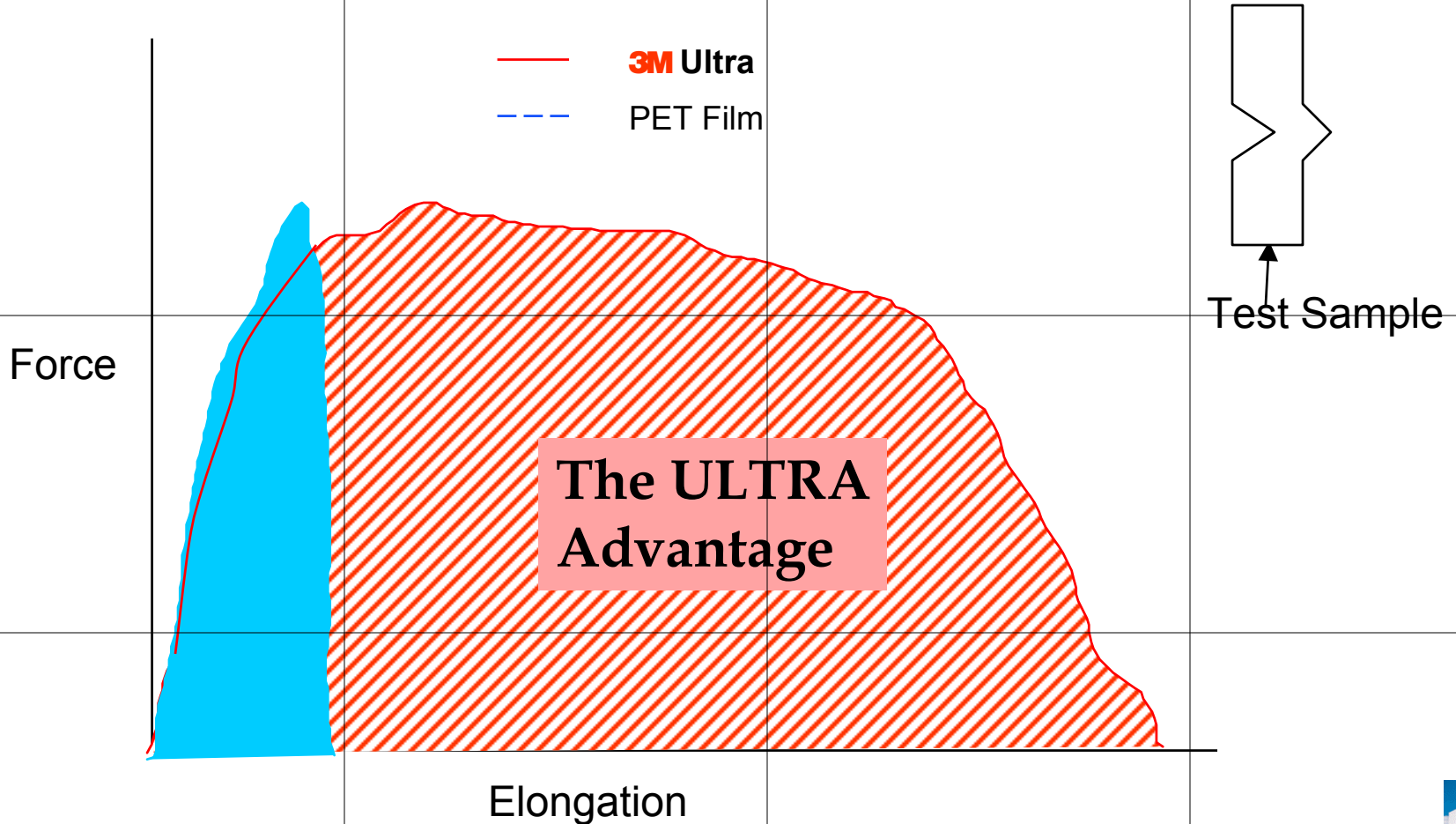


GRAVES AREA

3M Ultra VS. PET



GRAVES TEAR TEST



Modulus

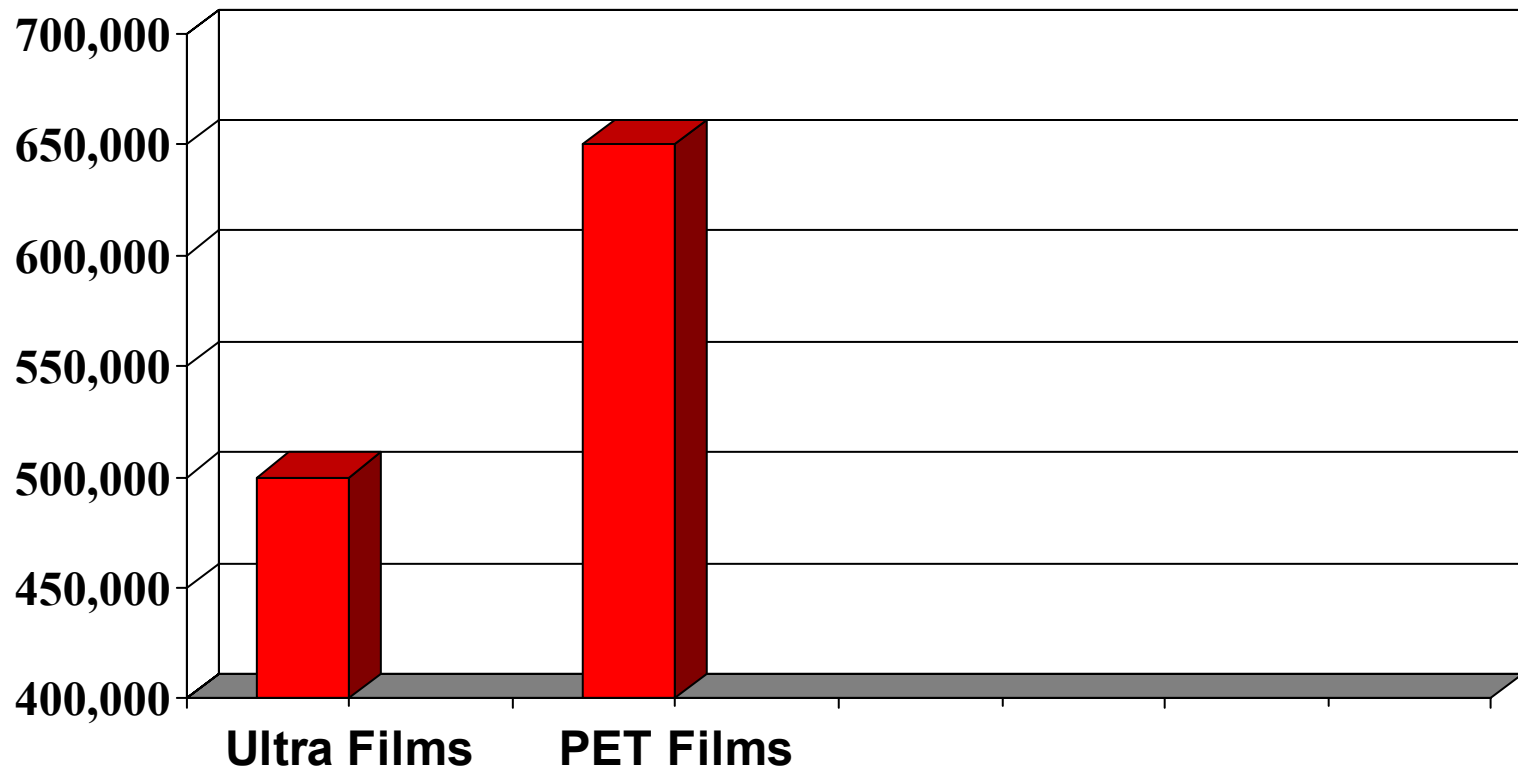
A measurement of
polymer flexibility

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



Modulus in PSI

ASTM D882-95a



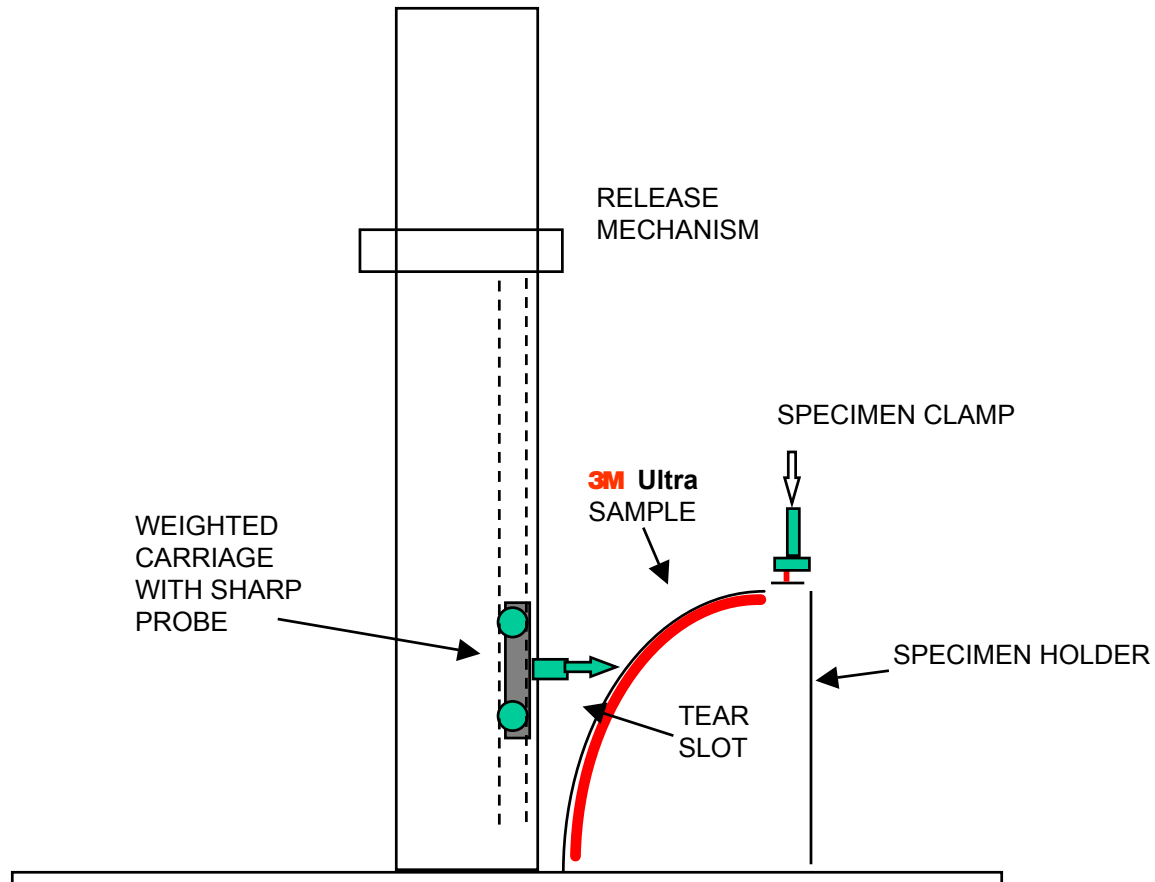
Puncture Propagation

Resistance to Puncture and Tear.

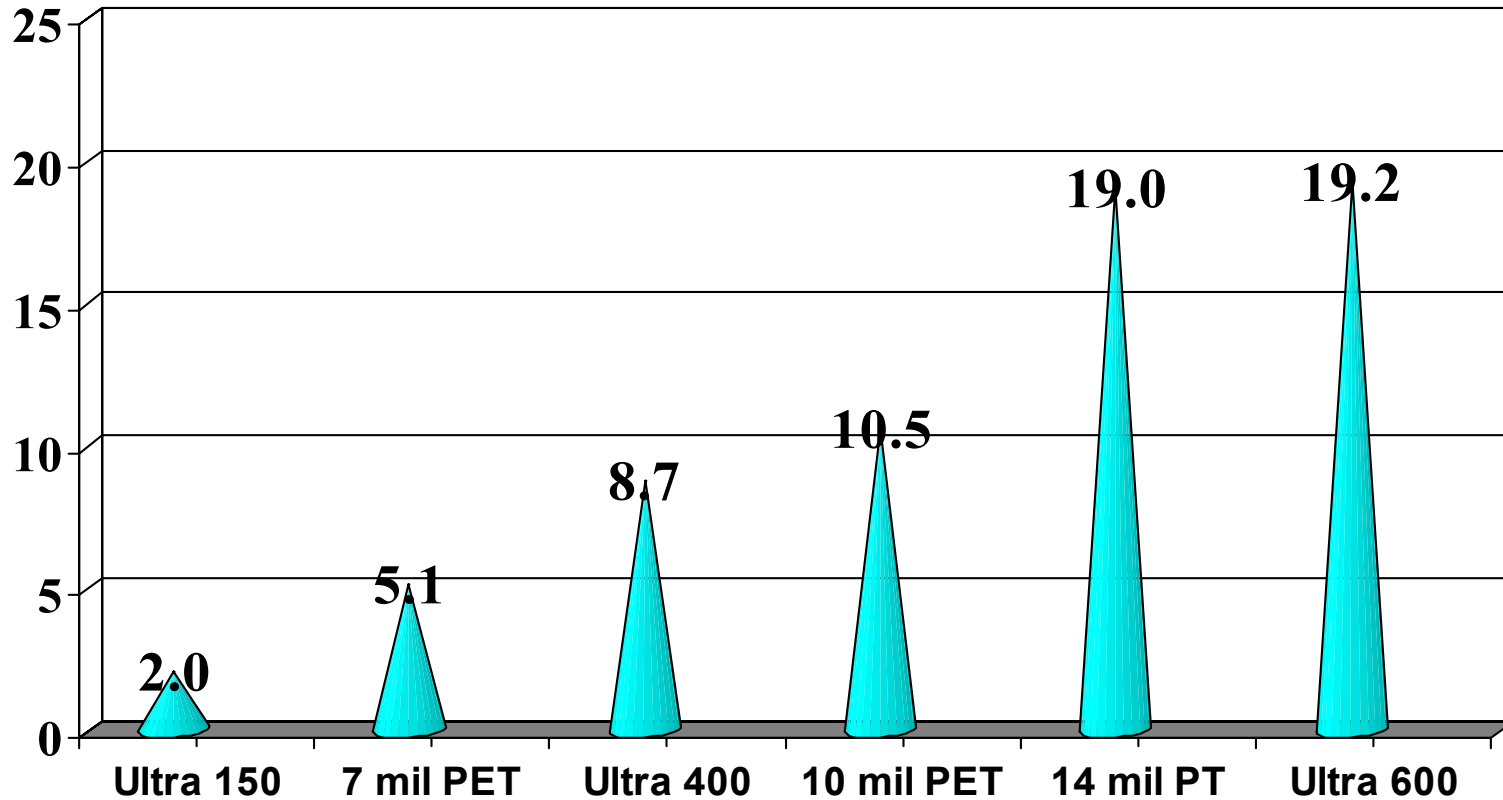
Greater resistance to Puncture and Tear means higher resistance to forced entry, bomb blast, storm cycling.



PUNCTURE-PROPAGATION-TEAR TEST (PPT)



Puncture Propagation, lbs. ASTM D2582-93



PPT

3M Ultra VS. PET

