

3M Ultra Microlayered Safety & Security Film benefits

Issued March 2007

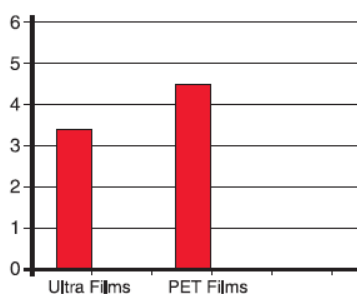
3M offer a comprehensive range of Safety & Security Film options to cover the widest variety of needs. The range starts with the conventional PET SH series and extends up to the Ultra Microlayered Security Films. The range also covers other innovative products such as the CI (Counter Intelligence) films; these have been designed for protection against electronic signals and eavesdropping.

When it comes to Window Films for physical security, **thickness is no substitute for technology**. 3M's Ultra Microlayered Security Films offer unique technology. In fact, ULTRA600 has 42 layers of alternating materials in an optically clear film just 0.15mm thick! This 3M patented technology provides superior performance over conventional PET security films.



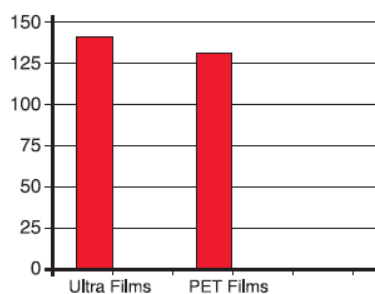
The best way to demonstrate one of the superior properties of the Ultra Microlayered Security Films is to perform a tear test. The tear performance of the Ultra films is exceptional. The Ultra Microlayered Security Films superior tear resistance is the standout feature of the technology, however, it is more than just its tear resistance that gives Ultra its superior performance. Security film performance is about managing and absorbing energy from events such as bomb blasts and flying projectiles (rocks) etc. No individual security film property can give an indication of the films overall performance, below is an explanation of the key material properties that dictate performance.

Young's Modulus
(Mpa)



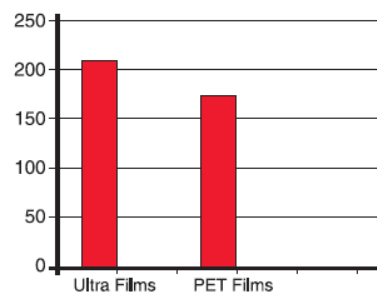
Ultra Microlayered Security Film has a lower Young's modulus (is less stiff) than conventional films. This means that Ultra Microlayered Security Film begins to stretch and absorb energy more easily than conventional PET films.

Elongation
(%)



Ultra Microlayered Security Film also has a greater elongation to break than conventional films. This means that Ultra Microlayered Security Film can stretch more and absorb energy over a longer period of time than conventional films.

Tensile Strength
(Mpa)



Ultra Microlayered Security Film has a higher Ultimate Tensile Strength (UTS) than conventional films. This means per micron thickness, it is ultimately harder to break than conventional film.

All of these properties mean that the Ultra Microlayered Security Films is supremely effective at absorbing and distributing energy, providing increased safety against physical attack.

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Table of Physical Properties

	SH7CLARL	SH8CLARL	SH14CLARL	ULTRA150	ULTRA400 SERIES*	ULTRA600
No of Layers	NA	NA	NA	14	28	42
Thickness	0.178 mm	0.203 mm	0.356 mm	0.051 mm	0.102 mm	0.152 mm
Tensile Strength ¹	172Mpa	172Mpa	172Mpa	207Mpa	207Mpa	207Mpa
Elongation to Break ¹	130 %	130 %	130 %	140 %	140 %	140 %
Break Strength ¹	79kg	91kg	159kg	27kg	54kg	82kg
Youngs Modulus ¹	4.48Gpa	4.48Gpa	4.48Gpa	3.45Gpa	3.45Gpa	3.45Gpa
Graves Area Tear ²	NA	NA	NA	1513N.%	3471N.%	5117N.%
Puncture Propagation Tear ³	NA	NA	NA	8.9N	38.7N	85.4N
Abrasion resistance ⁴	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%
Surface Burn Characteristics ⁵	Class A Interior Use	Class A Interior Use	Class A Interior Use	Class A Interior Use	Class A Interior Use	Class A Interior Use
AS/NZS 2208 Safety glazing compliance ⁶	Grade A	NA	NA	NA	Grade A	Grade A
Blast tested per GSA security Criteria ⁷	Yes	Yes	No	No	Yes	Yes

¹ ASTM D882-95a Tensile Properties of Thin Plastic Sheeting

² ASTM D-1004-94a Initial Tear Resistance of Plastic Film and Sheeting (Graves Area)

³ ASTM D-2582-93 Puncture-Propagation Tear Resistance of Plastic Film and Sheeting

⁴ ASTM D-1044 Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion

⁵ ASTM E-84 Surface Burn Characteristics of Building Materials

⁶ AS/NZS 2208:1996 Safety glazing materials in buildings

⁷ ASTM F-1642-96* Standard Test Method for Glazing Systems Subject to Airblast Loadings

* GSA Security Criteria is an adaptation of this ASTM method

The ULTRA400 series includes ULTRA50, ULTRA70, SCLARL400, S20SIAR400, S25NVAR400, S35NEAR400, S50NEAR400 and CI100B. This range covers applications that require increased security along with solar control or electromagnetic shielding (CI).

UltraFlex Attachment System

The Ultraflex attachment system offers a higher level of physical protection compared to a basic daylight application. The system attaches the Security Film into the window frame by way of a structural silicone bead. The Ultraflex attachment system was developed by 3M to compliment the properties of the Ultra Microlayered Security Film.

If you have any further queries in regard to 3M Safety and Security Films, please contact 3M Customer Service on 136 136.

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