Table of Optical Properties

		Shading Coefficient	Visible Light			Total Solar Energy Rejected	Emissivity	U Value W/m^2K	Heat Gain Reduction	Heat Loss reduction	Glare Reduction	UV Blocked
			Reflected (interior)	Reflected (exterior)	Transmitted							
CLEAR	SH7CLARL	0.9	9%	9%	86%	NA	0.87	6.19	4%	0%	2%	98%
	SH8CLARL	0.9	9%	9%	86%	21%	0.84	6.02	3%	0%	5%	98%
	SH14CLARL	0.91	10%	10%	86%	22%	0.84	6.02	3%	0%	5%	96%
	SCLARL150	0.92	11%	11%	87%	NA	0.87	6.02	2%	0%	1%	98%
	ULTRA400	0.91	11%	11%	86%	NA	0.87	6.02	3%	0%	2%	98%
	S20SIAR400	0.26	NA	58%	19%	77%	0.65	5.40	72%	10%	78%	99%
	S25NVAR400	0.43	13%	28%	24%	64%	0.72	4.66	54%	1%	72%	99%
	S35NEAR400	0.51	17%	20%	37%	56%	0.84	6.02	45%	0%	58%	99%
	S50NEAR400	0.66	NA	15%	51%	43%	0.84	6.02	30%	0%	42%	98%
	ULTRA600	0.9	10%	10%	84%	NA	0.89	6.25	6%	0%	2%	99%
	CI100T	0.48	9%	8%	70%	58%	0.73	5.51	49%	5%	21%	99.9%
	CI100B	0.47	11%	11%	68%	59%	0.73	5.45	50%	6%	23%	99.9%
TINTED	SH7CLARL	0.67	8%	8%	49%	NA	0.87	6.19	3%	0%	2%	99%
	SH8CLARL	0.67	7%	8%	49%	37%	0.84	6.02	1%	0%	4%	98%
	SH14CLARL	0.68	8%	8%	49%	38%	0.84	6.02	1%	0%	4%	98%
	SCLARL150	0.68	7%	7%	49%	NA	0.87	6.02	1%	0%	2%	99%
	ULTRA400	0.68	7%	6%	48%	NA	0.87	6.02	1%	0%	4%	99%
	S20SIAR400	0.3	NA	20%	10%	74%	0.65	5.40	57%	10%	80%	99%
	S25NVAR400	0.43	13%	13%	15%	66%	0.72	4.66	38%	1%	70%	99%
	S35NEAR400	0.45	16%	9%	22%	61%	0.84	6.02	35%	0%	56%	99%
	S50NEAR400	0.48	NA	6%	25%	58%	0.84	6.02	30%	0%	50%	99%
	ULTRA600	0.68	7%	6%	47%	NA	0.89	6.25	1%	0%	6%	99%
	CI100T	0.44	7%	6%	42%	62%	0.73	5.51	40%	5%	21%	99.9%
	CI100B	0.43	9%	7%	41%	63%	0.73	5.45	41%	6%	23%	99.9%
DOUBLE CLEAR	SH7CLARL	0.79	17%	17%	75%	NA	0.87	2.84	2%	0%	4%	99%
	SH8CLARL	0.79	15%	17%	75%	30%	0.84	2.84	2%	0%	4%	98%
	SH14CLARL	0.79	16%	17%	75%	31%	0.84	2.84	2%	0%	4%	96%
	SCLARL150	0.78	NA	17%	77%	NA	0.87	2.84	4%	0%	1%	99%
	ULTRA400	0.79	NA	18%	75%	NA	0.87	2.84	2%	0%	0%	99%
	S20SIAR400	0.34	NA	55%	17%	70%	0.65	2.67	58%	6%	78%	99%
	S25NVAR400	0.5	13%	28%	23%	56%	0.72	2.39	38%	5%	71%	99%
	S35NEAR400	0.58	NA	24%	33%	50%	0.84	2.84	28%	0%	58%	99%
	S50NEAR400	0.65	NA	20%	45%	43%	0.84	2.84	20%	0%	42%	99%
	ULTRA600	0.79	NA	18%	73%	NA	0.89	2.84	2%	0%	6%	99%
	CI100T	0.55	13%	15%	63%	52%	0.73	2.61	32%	2%	20%	99.9%
	CI100B	0.55	15%	17%	61%	52%	0.73	2.61	32%	2%	23%	99.9%
DOUBLE TINTED	SH7CLARL	0.54	8%	8%	43%	NA	0.87	2.84	2%	0%	4%	99%
	SH8CLARL	0.54	7%	8%	45%	50%	0.84	2.84	2%	0%	2%	98%
	SH14CLARL	0.54	15%	8%	45%	50%	0.84	2.84	2%	0%	2%	98%
	SCLARL150	0.53	NA	8%	47%	NA	0.87	2.84	4%	0%	2%	99%
	ULTRA400	0.55	NA	8%	42%	NA	0.87	2.84	0%	0%	7%	99%
	S20SIAR400	0.28	NA	20%	9%	76%	0.65	2.67	49%	6%	80%	99%
	S25NVAR400	0.39	13%	15%	14%	66%	0.72	2.39	29%	5%	69%	99%
	S35NEAR400	0.43	NA	10%	19%	63%	0.84	2.84	22%	0%	58%	99%
	S50NEAR400	0.48	NA	9%	28%	58%	0.84	2.84	13%	0%	38%	99%
	ULTRA600	0.55	NA	8%	41%	NA	0.89	2.84	0%	0%	8%	99%
	CI100T	0.42	12%	8%	37%	63%	0.73	2.61	29%	2%	22%	99.9%
	CI100B	0.42	14%	9%	36%	63%	0.73	2.61	29%	2%	24%	99.9%

For more information or the name of your local 3M Licenced Installer,

Call 136 136 or visit **www.3m.com.au**

3M Innovation

3M Safety & Security
Window Film Specification Guide

As a leader in both adhesive and film technologies, 3M brings together these disciplines to create the finest products available for residential, commercial and government buildings.

Our films reduce up to 99% of the sun's ultraviolet rays and reject up to 79% of the solar heat that may otherwise come through a window.

3M Safety and Security Films provide fragment retention by helping to hold glass together during destructive weather, smash and grab crimes and vandalism or even acts of terrorism. They help to seal out the water, the primary cause of property damage and they have a toughness that allows these films to withstand day-to-day abuse.

3M Innovation

Safety & Security Films

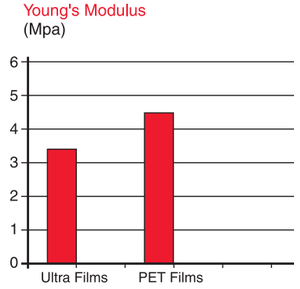
3M™ offer a comprehensive range of Safety & Security Film options to cover the widest variety of needs. The range starts with the conventional PET SH series and extends up to the Ultra Microlayered Security Films. The range also covers other innovative products such as the CI (Counter Intelligence) films. 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 films.

The best way to demonstrate the superior properties of the Ultra Microlayered Security Films is to perform a tear test. Inside this folder you will find a set of film samples, each sample has a slit through one side. Start with the standard PET film sample, grip the film with each hand either side of the slit and tear the sample, you will find that it tears quite easily. Now repeat the process with the Ultra Microlayered Security Film. You will find a significant difference in the tear performance of the products.

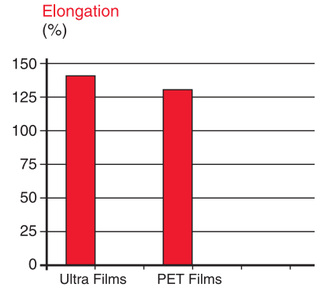
The Ultra Microlayered Security Films superior tear resistance is the standout feature of the technology. However, it is more than just its tear resistance that gives Ultra its superior performance. Security film performance is about managing and absorbing energy from events such as bomb blasts and flying projectiles (rocks) etc. No individual security film property can give an indication of the film's overall performance. Below is an explanation of the key material properties that dictate performance.

Young's Modulus
(Mpa)



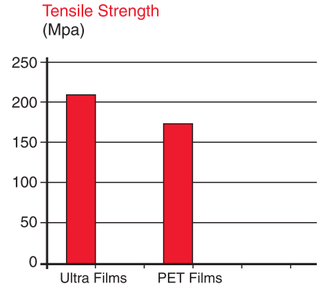
Ultra Microlayered Security Film has a lower Young's modulus (is less stiff) than conventional films. This means that Ultra Microlayered Security Film begins to stretch and absorb energy more easily than conventional PET films.

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 films.

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

The Ultraflex attachment system was developed by 3M to compliment the properties of the Ultra Microlayered Security Film. The system attaches the Security Film into the window frame by way of a structural silicone bead. This flexible attachment system coupled with the Ultra Security Film acts to soften the impact that is transferred into the window frames during a physical event.

3M *Innovation*

Table of Physical Properties

	SH7CLARL	SH8CLARL	SH14CLARL	ULTRA150	ULTRA400 SERIES*	ULTRA600
No of Layers	NA	NA	NA	14	28	42
Thickness	0.178mm	0.203mm	0.356mm	0.051mm	0.102mm	0.152mm
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 SCLARL400, S20SIAR400, S25NVAR400, S35NEAR400, S50NEAR400 and CI100B. This range covers applications that require increased security along with solar control or electromagnetic shielding (CI).

Further Definitions

Graves Area Tear: The measurement of a material to resist both initial tear as well as continued tearing.
When punctured Ultra films will continue to have high strength.

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

Abrasion Resistance: Measures the ability of the film's surface to resist scratching.
The lower the % change in haze, the more durable the film is to maintain appearance after many cleanings.

Blast Tests: The results demonstrated that glass treated with 3M ULTRA400 & ULTRA600 offered significantly increased protection against the dangers of flying glass caused by explosive blast loads.

Warranty and Maintenance. When installed by a 3M Licensed Installer, 3M Window Films are backed with a comprehensive warranty of up to 12 years for Commercial and a limited lifetime warranty for Residential applications. 3M Window Films can be cleaned using the same non-abrasive cleaning methods as are used on normal glass.