

PROFILON® SECURITY LAMINATES

ARCHITECTURAL INSTALLATION SPECIFICATION

PART 1 GENERAL

1.1 REFERENCE

The publications listed below form part of this specification.

| STANDARDS | |
|-------------------------------------------------------------------------------|-----------------------------------------------|
| U.L. – Underwriters Laboratories | U.L.C. – Underwriters Laboratories Canada |
| A.N.S.I. – American National Standards Institute | A.S. – Australian Standards |
| T.Ü.V. – Technischer überwachungs (<i>Technical control board</i>) | B.S. – British Standards |
| F.I.R.T.O. – Fire Insurer’s Research & Testing Organization | D.I.N. – West German Industry Standard |
| C.E.N. – European Committee for Standardization (<i>European Standards</i>) | C.P.S.C. – Consumer Product Safety Commission |

- ASTM F1642-95 Standard Test Method for Glazing Systems Subject to Air Blast Loadings.
- ASTM F1233-93 Standard Test Method for Security Glazing Materials and Systems.
- ANSI Z97.1 Specification for Safety Glazing used in Buildings.
 - Sec. 5.1 Impact Test: 100 ft. lbs (135J) Minimum
 - Sec. 5.3 Intensified Weathering using Carbon Arc.
- CPSC 16 CFR, for Category I and II used in Buildings.
 - Sec. 16 CFR Impact Test: 150 ft. lbs. (202J) Minimum, Category I.
400 ft. lbs. (538J) Maximum, Category II.
- Sec. 1201.4 Accelerated Weathering using Xenon Lamp.
- ASTM D882-95a Tensile Properties of Plastic Film and Sheeting – Tensile, Elongation, Break and Flexibility (Young’s Modulus).
- ASTM D1004-94a Initial Tear Resistance of Plastic Film and Sheeting – Initial Force to Tear (Graves Area).
- ASTM D2582-93 Puncture-Propagation Tear Resistance of Plastic Film and Sheeting.
- ASTM E903 Standard Test Method of Solar Absorbance, Reflectance and Transmittance of Materials using Integrating Spheres.
- ASTM D1044 Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion.
- ASTM E84-94 Surface Burn Characteristics of Building Materials.
- ULC972 – S332 – Impact, thermal conditioning, high-energy impact testing for burglary resisting glazing material.
- UL972 – Impact, thermal conditioning, high-energy impact testing for burglary resisting glazing material.
- AS2208 – Safety glazing impact test.
- T.Ü.V. – MP3/3733 – Impact, penetration, explosion resistance testing.
- BS476: Part 7 – Surface spread of flame test.
- BS476: Part 6 – Fire propagation test for materials.
- BS476: Part 5 – Ignitability test for materials.
- AS AN/10/004 – Norwich special testing (Gasoline bombs, shotgun, multiple impact human induced).
- BS AN/6+4/004 – Impact/Mechanical strength test.

- BR/25.8/004+2 – Ballistic tests.
- BS5051: Part 1 – Ballistic tests.
- BS6206 – Impact performance requirements for flat safety glass.
- AS2208 – Human impact test.
- PR EN356 (P2) – Security glazing testing and classification of resistance against manual attack.
- DIN 52290 – Impact, penetration, explosion resistance testing.
- DIN 40634 – Ignitability Testing.

1.2 SUBMITTALS

The following shall be submitted in accordance with the Construction Specifications Institute, under Division 8 – Doors and Windows, Section 8860 – Glazing Film, Division 12 – Furnishings, Section 12497 – Glass Fragment Retention Window Film, Division 13 – Special Construction, Sections 13080 – Sound, Vibration and Seismic Control, 13095 – Radio Frequency Shielded Enclosures, and the special contract requirements: submit for approval prior to fabrication samples, brochures, specifications, current test verification and results, and printed data in sufficient detail to indicate compliance with the contract documents, and manufacturer's instructions for installation of the Profilon[®] Security Laminate.

1.3 DESIGN

Profilon[®] is a three-ply polyethylene terephthalate polyester film composite designed to increase the security strengths of glass. Profilon[®] is not to be compared to "safety/security films" of single or multiple plies not meeting the stringent Underwriters Laboratories UL 972 burglar resistant glazing test standard. Profilon[®] applied to 1/4" inch standard commercial glass, meets the same resistance requirement as 9-1/16" inch thick multi-ply laminated glass with a .060 PVB (polyvinyl butyral) interlayer.

Profilon[®] offers excellent resistance to a wide range of attacks, both natural and man-made. Profilon[®] provides excellent break in resistance during various types of violent attacks such as: burglary, riots, hand thrown objects like gasoline bombs, rocks and explosive blast detonations. Profilon[®] is able to withstand significant abuse. Even if the glass is broken, cracked or shattered, Profilon[®] holds it in place and maintains an environmental seal between what is inside and what is outside.

Over its 20 year history, Profilon[®] has numerous documented accounts of saving lives and property during various forced entry and explosive blast detonation incidents.

During a fire Profilon[®] holds windows in place longer, giving people the extra time to escape, (*When a window collapses during a fire, fresh oxygen rushes in to fuel the fire.*) Fire resistant and non-toxic, Profilon[®] will withstand temperatures up to 500° F degrees Fahrenheit and eliminates the need for expensive fireproof glass installations or replacements. The threat of burglary, fire or a natural disaster is reason enough to ensure your security and safety with Profilon[®]. However, protection from flying glass is only one of Profilon's incredible strengths.

Designed with solar UV inhibitors in each layer of adhesive, Profilon[®] will screen out a high percentage of ultraviolet rays (99.7%). These are the rays that ruin carpets, upholstery, woods, artwork and furnishings, Profilon[®] also protects valuable merchandise displayed in store windows from fading or discoloring thereby losing value quickly. Profilon[®] utilizes thicker adhesives between mil plies for additional threat resistance, for a total adhesive thickness of 93 microns or 3.72 mil.

The summer sun can make your building feel like a sauna. But Profilon[®] solar control laminates will take the heat out of such excessive temperatures. Profilon[®] keeps people cooler

and more comfortable, increases the efficiency of existing heating and cooling systems and can save you thousands of dollars throughout the years in energy costs.

Profilon® can also provide EMI/RF shielding protection up to 30 db decibels of reduction through the window with the Profilon® Tempest laminate. This electro magnetic interference/radio frequency shielding protects by neutralizing EMI emissions that effect computer equipment and by reducing the exposure to audio eavesdropping by damping the RF emissions produced by communications and radio transmissions. Combined with a complete EMI/RF shielding protection installation for a room, this protection level can attain a level of 80 db.

Profilarm™ is a Profilon® laminate with alarm sensing capabilities uniquely integrated into the laminate. As soon as the window is attacked the alarm is activated, while the security properties of the laminate work to provide added protection. Standard alarm installations will only sound the alarm, while no protection from smash and grab burglaries would be afforded. *Profilarm™* provides both sensing and security.

Profilon® laminates can be combined in any manner to maximize safety and security by incorporating one or all of the following: Security protection from penetration, Solar reflection, Architectural tints, EMI reduction, *Profilarm™* sensing capabilities, all available in clear or opaque "frosted" laminates.

Profilon® is offered in clear, architectural tints, solar control, frosted, EMI/RF shielding and alarmed variants. Profilon's long term, exceptional resistance and bonding strength is attributed to its adhesives. Profilon® is the only security laminate to use non-hardening, non-drying adhesives that continue to maintain elasticity throughout it's life. This allows for the laminate to expand and contract evenly, which precludes bubbling, peeling and delaminating, even through excessive temperature variances exceeding 50+ degrees during the day, every day. The fact that Profilon® uses a 0 grade PET film which is optically the clearest available and water clear adhesives shows the extent of no exceptions to the use of the highest quality components for a finished product. In addition to that you have UV inhibitors between each layer of adhesive as well as the primary adhesive layer.

Profilon® is the only security laminate/film that can withstand industrial exposure to chemicals without degradation, hazing, cracking, peeling, or discoloration.

1.4 DELIVERY, STORAGE AND HANDLING

Deliver Profilon® materials to the project with the manufacturer's labels intact and legible. Handle all materials with care and prevent damage. Store all materials inside under cover; stack flat and off the floor. Do not stack other crates, pallets, cartons, boxes, materials, etc. on top of the Profilon® to prevent damage. Do not allow direct contact with water.

1.5 WARRANTY

Pinnacle Armor has a policy of handling quality merchandise. All statements, technical information and recommendations regarding such products are based on tests and examinations believed to be reliable. But Pinnacle Armor neither guarantees nor warrants their accuracy or completeness.

It shall be the sole responsibility of the user to determine the suitability of the products or material sold by Pinnacle Armor for each intended use. The user assumes all risks and liability in connection with the use, or inability to use the products or materials.

Pinnacle Armor guarantees the products or materials to be free from defects in materials or workmanship under normal use and service for a period of 10 years from receipt. Our liability under this guarantee is limited to replacement of goods, which is proven upon inspection, to be defective in material or workmanship. No claims for faulty or improper installation, consequent

damages, repairs or back charges will be allowed. This guarantee does not cover defects or damage resulting from vandalism, abuse, attack, improper maintenance, improper storage, shipping or handling, alteration or removal of factory applied finishes. See certificate of warranty for further details.

PART 2 PRODUCTS

2.1 PROFILON® SECURITY LAMINATE

| PROFILON® S AX A1 | |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| THICKNESS | Approximately 360 microns / 15 mil |
| ADHESIVE | On Acrylic basis |
| THICKNESS OF ADHESIVE | 25 microns / 1 mil – primary layer |
| WEIGHT | Approximately 400 g/m ² / .000569 lb/in ² |
| ROLL WIDTH | Standard 1200mms, Some types 1500mms |
| COLOR | Transparent |
| COMPOSITION | Multi-layer laminate, produced in Sandglider Process (System Haverkamp) |
| SURFACE COATING | DURITAL surface hardening sr |
| ADHESIVE STRENGTH | 100% |
| TEMPERATURE RANGE | -75° C to +220° C / -103° F to +428° F |
| MELTING POINT | +265° C / 509° F |
| INGITABILITY | Hard to ignite – Self extinguishing |
| FIRE RESISTANCE | 10 to 29 minutes (FIRTO) |
| YIELD STRENGTH | 92.5 N/mm ² / 5.989 tonf/in ² |
| TENSILE STRENGTH | 170.7 N/mm ² / 11.053 tonf/in ² |
| ELONGATION AT YIELD | 6% |
| ELONGATION AT BREAK | 105% |
| DETONATION RESISTANCE | 70 tons per square meter / 15,555 lb/ft ² |
| LIGHT TRANSMISSION | 6% reduction of visible light |
| RETENTION OF COLOR | 100% color-fast |
| UV ABSORPTION | >99% (300-380 nm) |
| GUARANTEE | 5 years |
| INFLUENCES OF CONDENSED WATER | None |
| IMPAIRMENT BY JOINT FITTING | None |
| CHEMICALLY RESISTANT AGAINST: | Hydrogen superoxide; Ethanol; Sulphuric acid; Mercurochrome; Merkhioate; Acetone; NaOH (10%); Toluol; UM AP – Naphtha; Amoniak; Chlorox; Alchols; Keytones; Esters; Hydrochloric Acid; Alkalis; Chlorinated Phenols; Oils; Greases. |
| FURTHER TESTED BY | KXU/Siemens, VDS, R+V, West German Secret Service, Asial, US Forces, Rheinland, TÜV, ANSI, IRL, Unisearch, ULC, UL, TNO. |

| PROFILON® S AX A1 SOLAR | |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| THICKNESS | Approximately 360 microns / 15 mil |
| ADHESIVE | On Acrylic basis |
| THICKNESS OF ADHESIVE | 25 microns / 1 mil – primary layer |
| WEIGHT | Approximately 400 g/m ² / .000569 lb/in ² |
| ROLL WIDTH | Standard 1200mms, Some types 1500mms |
| COLOR | Gold, Silver, Bronze |
| COMPOSITION | Multi-layer laminate, produced in Sandglider Process (System Haverkamp) |
| SURFACE COATING | DURITAL surface hardening sr |
| ADHESIVE STRENGTH | 100% |
| TEMPERATURE RANGE | -75° C to +220° C / -103° F to +428° F |
| MELTING POINT | +265° C / 509° F |
| INGITABILITY | Hard to ignite – Self extinguishing |
| FIRE RESISTANCE | 10 to 29 minutes (FIRTO) |
| YIELD STRENGTH | 92.5 N/mm ² / 5.989 tonf/in ² |
| TENSILE STRENGTH | 170.7 N/mm ² / 11.053 tonf/in ² |
| ELONGATION AT YIELD | 6% |
| ELONGATION AT BREAK | 105% |
| DETONATION RESISTANCE | 70 tons per square meter / 15,555 lb/ft ² |
| LIGHT TRANSMISSION | 5-73% reduction of visible light |
| SOLAR ENERGY REFLECTANCE | 20-78% according to type |
| SOLAR ENERGY ABSORBANCE | 16-57% according to type |
| SOLAR ENERGY TRANSMISSION | 9-75% according to type |
| UV ABSORPTION | >99% (300-380 nm) |
| GUARANTEE | 5 years |
| INFLUENCES OF CONDENSED WATER | None |
| IMPAIRMENT BY JOINT FITTING | None |
| CHEMICALLY RESISTANT AGAINST: | Hydrogen superoxide; Ethanol; Sulphuric acid; Mercurochrome; Merkhioate; Acetone; NaOH (10%); Toluol; UM AP – Naphtha; Amoniak; Chlorox; Alchols; Keytones; Esters; Hydrochloric Acid; Alkalis; Chlorinated Phenols; Oils; Greases. |
| FURTHER TESTED BY | KXU/Siemens, VDS, R+V, West German Secret Service, Asial, US Forces, Rheinland, TÜV, ANSI, IRL, Unisearch, ULC, UL, TNO, Prins Maurits Lab. |

| PROFILON® S AX A1 SR TEMPEST™ | |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| THICKNESS | Approximately 360 microns / 15 mil |
| ADHESIVE | On Acrylic basis |
| THICKNESS OF ADHESIVE | 25 microns / 1 mil – primary layer |
| WEIGHT | Approximately 300-400 g/m ² / .000569 lb/in ² |
| ROLL WIDTH | Standard 1200mms, Some types 1500mms |
| COLOR | Reflective |
| COMPOSITION | Multi-layer laminate, produced in Sandglider Process (System Haverkamp) |
| SURFACE COATING | DURITAL surface hardening sr |
| ADHESIVE STRENGTH | 100% |
| TEMPERATURE RANGE | -75° C to +220° C / -103° F to +428° F |
| MELTING POINT | +265° C / 509° F |
| IGNITABILITY | Hard to ignite – Self extinguishing |
| FIRE RESISTANCE | 10 to 29 minutes (FIRTO) |
| YIELD STRENGTH | 92.5 N/mm ² / 5.989 tonf/in ² |
| TENSILE STRENGTH | 170.7 N/mm ² / 11.053 tonf/in ² |
| ELONGATION AT YIELD | 6% |
| ELONGATION AT BREAK | 105% |
| DETONATION RESISTANCE | 70 tons per square meter / 15,555 lb/ft ² |
| LIGHT TRANSMISSION | 17% reduction of visible light |
| REDUCTION FACTOR | Approximately 99% |
| SCREEN DAMPENING | 25db ± 3db @ 200-1000 MHz |
| RETENTION OF COLOR | 100% color-fast |
| UV ABSORPTION | >99% (300-380 nm) |
| GUARANTEE | 5 years |
| INFLUENCES OF CONDENSED WATER | None |
| IMPAIRMENT BY JOINT FITTING | None |
| CHEMICALLY RESISTANT AGAINST: | Hydrogen superoxide; Ethanol; Sulphuric acid; Mercurochrome; Merkhioilate; Acetone; NaOH (10%); Toluol; UM AP – Naphtha; Amoniak; Chlorox; Alchols; Keytones; Esters; Hydrochloric Acid; Alkalis; Chlorinated Phenols; Oils; Greases. |
| FURTHER TESTED BY | ANSI, Unisearch, Prins Maurits Lab., NO, west German Secret Service, R+V, KWU-Siemens, Asial, US Forces, VDS, TÜV, FH Aachen. |

2.2 SECURITY LEVEL

| | |
|-------------------------|------------------------------------------------------------------------------------------------------------------|
| Forced Entry Threats | UL972 – Burglar Resistance Rating. ASTM F1233-93 – Class 2, Sequence 2. |
| Explosive Blast Threats | ASTM F1642-95, GSA Threat Level 2 @4PSI BMAG Threat (This is based upon open air arena and shock tube tests.) |

PART 3 EXECUTION

3.1 SUPPORTING STRUCTURE / MEMBERS

Prior to installing the Profilon® system, the new or existing support structure must be verified to withstand the appropriate threat resistance energy transfer without failure. The Profilon® security laminate glazing is designed to be installed directly into the structural framing system of the building. The contractor shall verify that all supports/structural members have been selected

and installed as required to meet the specified threat requirements by the contract documents, risk analysis and/or vulnerability assessment documents, engineering analysis and architectural drawings. The Profilon® security laminate provides for optimum threat resistance when all edges of the laminate are secured into the glazing framing pocket and to each end of the glazing. If this is not practical, utilize a secondary remedial reinforcing attachment such as the Secura Glaze® system manufactured by Pinnacle Armor.

3.2 JOINTS

Any and all joints are to be kept to the minimum. Joints in the center, whether horizontal or vertical, should not exceed .03125". Any adhesive reinforcing is to be at least equal to that of the installed system and shall be sealed to prevent moisture encroachment or weeping.

3.3 APPLICATION

Profilon® security laminates are only to be installed by trained licensed installers of the manufacturer.

Examine glass and surrounding adjacent surfaces for conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected. Beginning of installation means acceptance of conditions.

Environmental Limitations: Do not proceed with film installation when ambient and substrate temperature conditions are outside limits permitted by manufacturer and when glass substrates are wet from frost, condensation, or other causes. Do not proceed with installation when direct exposure from the sun is on the glazing.

Comply with manufacturers written instructions for surface preparation. Immediately before beginning installation of films, clean glass surfaces of substances that could impair glazing film's bond, including mold, mildew, oil, grease, dirt and other foreign materials. Protect window frames and surrounding conditions from damage during installation.

General: Comply with glazing film manufacturers written installation instructions applicable to products and applications indicated, except where more stringent requirements apply. Install film continuously, but not necessarily in one continuous length. If seamed, install with no gaps or overlaps. Install seams vertical and plumb. No horizontal seams allowed unless above eye sight level or accepted by end user. Do not remove release liner from film until just before each piece of film is cut and ready for installation. Install film with mounting solution and custom cut to the glass with neat, square corners and edges and install within the window frame. Remove air bubbles, wrinkles, blisters, and other defects.

After installation, view film from a distance of 10 feet against a bright uniform sky or background. Film shall appear uniform in appearance with no visible streaks, banding, thin spots or pinholes, dirt particles, hair and fibers, adhesive gels, fingerprints, air bubbles, water haze, scoring or scratches, creases, edge lift, nicks or tears. If installed film does not meet this criteria, remove and replace with new film.

Certain laminates with special high-performance coatings may have lengthened cure times. The following table will provide typical curing times for the cleanest view through the laminated window unit.

| Film Thickness in Microns | Film Thickness in Mil | Typical Cure Time (days) |
|----------------------------------|------------------------------|---------------------------------|
| Up to 100 | Up to 4 | 30 |
| 100 to 200 | 4-8 | 60 |
| 200 to 300 | 8-12 | 100 |
| Over 300 but no more than 425 | Over 12 but not more than 17 | 140 |