Abstract: A removable overlay system for a window comprising attachment means to maintain one or more components of the overlay system in position and optionally comprising one or more of clear, tinted (removable or permanent) or sun responsive thermochromic (SRT) overlays.
Improvements relating to overlays

Background of the invention:

Traditional glazing systems are expensive to replace and inflexible as they are not readily removable. There is a need for a simple, cost effective system to enable adaptation of windows to changing environmental conditions and other needs of the lifter.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgement of any form of suggestion that the prior art forms part of the common general knowledge.

Summary of the invention:

According to a first aspect of the invention, there is provided a removable overlay system for a window comprising an attachment to maintain one or more components of the overlay system in position and optionally comprising one or more dear, tinted or shut responsive, thermochromic (5RT) overlays.

In some embodiments, there is provided a removable overlay system comprising at least one gap between adjacent surfaces to provide enhanced thermal, acoustic and/or other insulation wherein the adjacent surfaces comprise one or more of a window and an overlay, a plurality of overlays or an overlay and another surface and the gap optionally comprises a vacuum, air, an inert gas (optionally argon) or the like. In some embodiments, the gap is adjustable so as to adjust the thermal, acoustic and/or other insulation properties.

In some embodiments, there is provided a removable overlay system comprising a plurality of overlays and a plurality of attachments so as to enable a user to adjust the type of overlay(s) and any gap(s) between them, a window or another surface, depending on seasonal, temporal, light, sound or other requirements.

Some embodiments provide a removable window overlay comprising any one or more of the following characteristics:

- Total luminous reflection from the glass surface shall be at least nominal when measured with an integrating sphere spectrophotometer as referenced by ASTM E-308 using Standard OIK Source C for average daylight.
- Total luminous transmittance of solar ultraviolet radiation of air mass = 2 over the spectral range of 3000 to 3800 angstroms in the range 85.0% to 95.0% when measured with an integrating sphere spectrophotometer as referenced by ASTM E-308.
- An IR transmission of not more than 10% and preferably not more than 3% when measured between 800-1000 nanometers.
Improvements relating to overlays

- **Shading coefficient at least nominal (at 60 Degrees) as measured per ASTM E-0303 and computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.**
- **Total Solar Energy Rejected shall be at least nominal (at 60 Degrees) as measured per ASTM E-0303 and computed in accordance with the established procedures defined by the ASHRAE Handbook of Fundamentals.**

In some embodiments, there is provided a removable overlay for a system according to the invention which optionally comprises a film with an optional thickness of 350 to 700 micron, or a polycarbonate/acrylic sheet with optional thickness in the range 2.5 mm to 11 mm, and optionally one of 3.0mm, 4.5mm, 6.0mm, 7.5mm or 9.0mm, or a sealed lamination of acrylic-sheets and SRT interlayer with optional thickness in the range 6.7mm to 21.5mm.

The invention also comprises a removable overlay for a system according to the invention suitable for use with one or more of a building or a vehicle and optionally on the inside or outside.

In some embodiments, there is provided a removable overlay for a system according to the invention comprising one or more of the following characteristics:

- the invention means comprising one or more of a magnetic strip, malchpull magnetic strips, steel strapping, channel profiles and/or slidable guide;
- an edging (or profile) which at least partially surrounds the perimeter of the overlay (and preferably substantially so) which comprises ABS or another suitable polymer, resin, fibre glass or the like and which is preferably extruded;
- a grip to allow ready removal and / or placement of the overlay on a window which is optionally a comb grip and optionally as depicted in Figure 2 herein;
- any one or more of the features described herein by reference to any one of the Figures.

There is also provided according to the invention, an overlay for a window comprising at least one standard film (optionally polyester security film (100-350 micron), laminated to a tint film (optionally Silver 20 or non-metallised dyed Nightsky 10) and optionally comprising a layer of standard film laminated to each side of the tint film.

In some embodiments, there is provided a removable, uvcrlay for a window comprising a tint such that removal and replacement of the overlay allows for seasonal adaptation of the level of visible light transmission through the window aperture and optionally wherein the overlay may be applied in conjunction with one or more other overlays which are optionally not tinted.
Improvements relating to overlays

In one aspect there is provided a laminated poly methyl methacrylates cast sheet with a sun responsive thermochromatic interlayer for use with or in an overlay according to the invention.

In some embodiments, there is provided a removable overlay according to the invention may for example comprise any one or more of the following characteristics:

- Total luminous reflect ion from the glass surface at least nominal when measured with an integrating sphere, spectrophotometer as referenced by ASTM E-903 and calculated per ASTM E-308 using Standard C13. Source "C" for average daylight.
- Total transmission of solar ultraviolet radiation of air mass 2 over the spectral range of 3000 to 3800 angstroms in the range 85.0% to 94.9% when measured with an integrating Sphere Spectrophotometer as referenced by ASTM E-903.
- An IR transmission of not more than 10% and preferably not more than 3% when measured between 2.5-10.00 nanometers.
- Luminous reflectance at least Nominal.
- Shading coefficient at least nominal (860 Degrees) as measured per ASTM E-903 and computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.
- Total Solar Energy Rejected shall be at least nominal (at 60 Degree.) as measured per ASTM E-903 and computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.

In some embodiments a removable overlay according to the invention may optionally comprise a laminated film (lamination) which optionally has a thickness of 370 to 720 micron, or an optically clear polycarbonate or PMMA (Poly Methyl Methacrylate) acrylic sheet with optional thickness in the range 2.5 mm to 7mm, and optionally one of 3.0mm, 4.5mm, 6.0mm, 7.5mm or 10.0mm, or a lamination of two PMMA cast acrylic sheets with an SRT interlayer with a total optional thickness in the range of 7.0mm to 12mm.

In some embodiments, the removable overlay of the invention is suitable for use with one or more of a building or a vehicle and optionally on the Inside or outside.

In some embodiments, the removable overlay according to the invention may comprise one or more of the following characteristic:

The attachment means comprising one or more of a magnetic strip or an arrangement of separate rare earth magnets attaching in a magnetic strip or a steel strip fixed to the existing window frame or installed sub-frame, or a slidable guide.
Improvements relating to overlays

5 An edging (or profile) which at least partially surrounds the perimeter of the overlay and preferably substantially so which comprises a suitable material (which may for example be ABS or any other UV stable plastic or fiberglass or suitable construction material which is optionally extruded or profiled);

A grip to allow ready removal and/or placement of the overlay on a window which is optionally a corner grip or remotely stored suction cap grip and optionally as depicted in Figure 2 herein;

Any one or more of the features described herein by reference to the Figures.

Throughout this specification (including any claims which tuHow), unless the context requires otherwise, the word 'comprise', and variations such as 'comprises' and 'comprising', will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

Brief description of the drawings:

Figure 1 is a cross sectional view of a secondary glazing system according to the present invention.

Figure 2 is a front elevation view of a secondary glazing system according to the present invention.

Figure 3 is an exploded view of a corner section of a secondary glazing system according to the present invention.

Figure 4 depicts front and cross section views of one example embodiment, herein referred to as a Bronze embodiment.

Figure 5 depicts side, isometric and detailed views of a Bronze embodiment.

Figure 6 depicts an exploded view of a Bronze embodiment.

Figure 7 depicts front and cross section views of one example embodiment, herein referred to as a Silver embodiment.

Figure 8 depicts side, isometric and detailed views of a Silver embodiment.

Figure 9 depicts an exploded view of a Silver embodiment.

Figure 10 depicts front and cross section views of one example embodiment, herein referred to as a Gold embodiment.

Figure 11 depicts side, isometric and detailed views of a Gold embodiment.
Improvements relating to overlays

Figure 12 depicts front and rear section views of an example embodiment, herein referred to as an iron embodiment.

Figure 13 depicts side, isometric and detailed views of an iron embodiment.

Figures 15 and 16 depict various views of an air thermal break mounting system according to certain embodiments of the invention.

Figures 17 and 18 depict various views of a recessed mounting system according to certain embodiments of the invention.

Figures 19 and 20 depict various views of a Hash mount magnet mounting system according to certain embodiments of the invention.

Figures 21 and 22 depict various views of a rebate mount magnet mounting system according to certain embodiments of the invention.

Figures 23 and 24 depict various views of a flush mount steel strip mounting system according to certain embodiments of the invention.

Figures 25 and 26 depict various views of a rebate mount steel strip mounting system according to certain embodiments of the invention.

Figures 27 and 28 depict various views of a flush mount rare earth magnet mounting system according to certain embodiments of the invention.

Figures 29 and 30 depict various views of a rebate mount rare earth magnet mounting system according to certain embodiments of the invention.

Detailed description of the exemplary embodiments:

It is convenient to describe the invention herein in relation to particularly preferred embodiments. However, the invention is applicable to a wide range of situations and it is to be appreciated that other constructions and arrangements are also considered as falling within the scope of the invention. Various modifications, alterations, variations and or additions to the construction and arrangements described herein are also considered as falling within the ambit and scope of the present invention.

In some embodiments, the invention provides a secondary glazing system allowing builders/users the ability to achieve a desired level of acoustics and/or thermal insulation by tailoring the number and type of overlay and gap layers.
Improvements relating to overlays

In some embodiments, the invention provides a secondary glazing system allowing for dark tinging effect on laminated glass windows, in particular large thick and body-tinted panels, which was previously at risk of thermal stress fracturing with the direct application of tint due to the high level of heat being absorbed back into the inner layer of glass by dark tints (for example 2% VLT or lower).

In some embodiments, the invention provides a secondary glazing system allowing for dark and highly reflective tinging effect on IGU (double glazing) in situations where otherwise the seals would be blown due to excessive pressure resulting from raised temperatures within the air gap caused by the film, applied directly to the internal glass surface, reflecting and absorbing additional heat back into the scaled air gap.

In some embodiments, the invention provides a system which can also be used to better seal and restrict the entry of dust and general movement of air currents through air conditioning or heating vents, particularly in ceilings, or poorly sealed doors and windows.

In some preferred embodiments, there is provided a window film that has been laminated with a window tint film. Preferred examples of this comprise two layers of standard film (such as security film) and preferably on either side of the tint film. Some embodiments comprise two layers of polyester security film (100-350 micron each) on either side of a conventional window tint film. Particularly preferred examples comprise metallised Silver 20 (reflective) and/or non-metallised dyed NightSky 10 (non-reflective).

In some preferred embodiments, there is provided a removal and replaceable tint layer for a window overlay which is preferably of high strength and rigidity. Such embodiments allow users to seasonally adapt the level of visible light transmission through the secondary glazing by changing the overlay as required (for example by removing a tint overlay component). As an example, some embodiments provide a greater energy-saving benefit in Winter when otherwise with permanently tinted windows greater amounts of energy would be consumed by lighting.

Some embodiments provide laminated PMMA cast acrylic sheets with a Sim Responsive Thermochromic (SRT) interlayer. Such sheets are preferably sintered to provide a substantially oxygen impermeable seal.

Figure 1 depicts an existing window or section of door glass (1) with insulating material such as heading or silicon (8) and overlay (12) which comprises polycarbonate sheet with a body tint or a tint film applied. The overlay may comprise any suitable material, for example a security film, such as a heavy duty film, for example of thickness in the range 300 to 600 micron, preferably 350 to 700 micron.
Inventions relating to overlays

Overlay (2) is attached to window frame (3) via sub frame (1) which in this embodiment comprises extruded plastic and is held to frame (3) by screw (7). Magnetic strips (5) serve to attach overlay (2), via edging (or profile) (4) to sub frame (1). Edging or profile (4) may partially surround overlay (2) provided that this is sufficient to enable engagement with window frame (4) in such a way to hold overlay (a) in place. In some preferred embodiments, overlay (b) is substantially surrounded at the perimeter by profile (4) which provides added strength.

An overlay according to the present invention may be applied to either the inside or the outside of a window. Attachment means suitable to an outside attachment may be used in such embodiments. In some of these, a simple magnetic snap system as described above will be sufficient. In others, an alternative system, such as a set of guides and/or channels with which the overlay slideably engages may be required (for example to avoid the overlay being blown away by wind).

Figure 1 depicts overlay (y) with corner pieces (1.0) in this embodiment comprising plastic / ABS and piolite (12) completely surrounding the perimeter of overlay (g). Also depicted is finger grip (11) which is in this embodiment placed in a corner and enables ready application and removal of overlay (y).

In some embodiments there is no finger grip. In these embodiments, another suitable means of removal may be used. This may for example comprise an external device, such as a suction cap.

Figure 3 depicts an exploded view of one corner of an overlay system according to the present invention. Overlay (14) is attached to magnetic strip (13) via extended profile (15) and corner piece (15) is attached around profile (16).

A wide variety of optional features may be comprised in an overlay according to the invention, for example:

- Optical Grade polycarbonate or cast PivMA (Terspex or any other brand) - of varying thicknesses, for example 3.0mm, 4.5mm, 6.0mm, 7.5mm or 10.0mm utilised at individual sheets or edge-welded and Inmained together with an SRT interlayer.
- Trim in a wide variety of colours to match existing frame colours.
- Trim made out of extruded ABS or any other UV-stable plastic, fibreglass compound or any other suitable construction material.
- Corner trim on overlays made from ABS or any other UV-stable plastic, libreglass or any other suitable construction material or separate suction cap grip.
Improvements relating to overlays

5 Magnetic strip or individual rare earth magnets affixed to rear side of secondary glazing.

• Matchpull magnetic strip or thin, powder coated steel strapping and/or steel strips affixed to existing window frame or directly onto window glass.

• A self managed system allowing removal of tint layer in winter or automatically adapting SRT system requiring no electric current and providing addition VLT (Visible Light Transmission) in Winter.

Any suitable specifications may be used in relation to the tint of an overlay according to the present invention. Tinting has many beneficial effects, for example, fade protection for furniture, drapes, carpets and flooring. In addition it results in glare, UV and further excessive heat gain reduction. A useful benefit is the lowering of overall energy costs, particularly in relation to air conditioning and heating.

Suitable Visible Light Transmission levels may for example range from approx 8% at darkest when exposed to maximum climatic heat (Summer) to approx 55% in minimum climatic heat conditions (Winter). The amount of solar heat rejected may for example range from approx 65% at its lowest VLT to 40% at its highest VLT level.

Thermal Insulation

In some embodiments, there are a range of possible methods of installing an overlay according to the invention. In such embodiments, it is often beneficial to consider the optimum air gap widths for various requirements, such as thermal insulation (summer heat gain / winter heat loss) or acoustic insulation (reduction in level of incoming noise).

For example, in some embodiments, for thermal insulation, the optimum air gap width is in the range of 8 – 25 mm to minimise air movement within an air pocket between the existing glass and the irisedal overlay. Any movement of air increases the rule of heat loss/gain across the air gap as a greater surface of the air is exposed to the inner and culler barrier surfaces of the air gap.

Another consideration in determining insulation is the effectiveness of the seal around the existing glazing. If not currently well sealed, this will result in heat leakage.

The construction material for the existing windows will also play a minor role in thermal insulation. Thus for example, aluminium window frames are better heat conductors than timber window frames and therefore less effective at insulating against heat gain and loss.

Example Performance Data

<table>
<thead>
<tr>
<th></th>
<th>Incoming</th>
<th>Glare</th>
<th>Fade</th>
<th>UV</th>
<th>Winter heat loss</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Improvements relating to overlays

<table>
<thead>
<tr>
<th></th>
<th>Heat reduction</th>
<th>Reduction</th>
<th>Reduction</th>
<th>Reduction</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Nightsky' Example</td>
<td>62%</td>
<td>89%</td>
<td>70%</td>
<td>99%</td>
<td>60-70% depending on width of air gap and thickness of overlay</td>
</tr>
<tr>
<td>'Silver' Example</td>
<td>78%</td>
<td>82%</td>
<td>80%</td>
<td>99%</td>
<td>60-70% depending on width of air gap and thickness of overlay</td>
</tr>
</tbody>
</table>

Acoustic Insulation

For acoustic insulation, the optimum air gap width is as wide as possible. In general, this means not less than 50mm and preferably more than 100mm. The wider the gap and the thicker the material of which the barriers are constructed, the greater level of sound insulation can be achieved.

Example Performance Data

Noise reduction may be as great as 60% or more dependent on the width of the air gap and the thickness of the overlay (for example, 3, 4.5 or 6mm).

Figure 4 depicts front and cross section views of one example embodiment, herein referred to as a Bronze embodiment. Figure 5 depicts side, isometric and detailed views of a Bronze embodiment and Figure 6 depicts an exploded view of a Bronze embodiment. The Bronze embodiment comprises a basic single layer overlay. It can be in any suitable form, in this example it is either in clear polycarbonate or Lamitint (showing three laminations with the two external layers of 350 micron polyester security film encapsulating the third conventional window tint film).

Figure 7 depicts front and cross section views of one example embodiment, herein referred to as a Silver embodiment. Figure 8 depicts side, isometric and detailed views of a Silver embodiment and Figure 9 depicts an exploded view of a Silver embodiment. The Silver embodiment comprises a standard single polycarbonate/acrylic overlay bill with added removable/replaceable Lamitint overlay. (Lamitint refers to a laminate with tinted and win-tinted materials.)

Figure 10 depicts front and cross section views of one example embodiment, herein referred to as a Gold embodiment. Figure 11 depicts side, isometric and detailed views of a Gold embodiment.
Improvements relating to overlays

In this example embodiment, the embodiment comprises premium tailored multiple layers system. In this example, it comprises 2 layers of polycarbonate or acrylic sheet with a scaled air gap (vacuum, air or argon-filled). The third layer is Lamitint which slides into a slot in the surrounding edge frame and can be easily removed and replaced. Can be manufactured with multiple layers and air gaps, with polycarbonate/acrylic of any thickness and include Lamitint and SRT layers to meet the prescribed acoustic and/or thermal insulation requirements.

Figure 12 depicts front and cross section views of one example embodiment, at time herein referred to as an Iron embodiment. Figure 13 depicts side, isometric and detailed views and Figure 14 depicts an exploded view of an Iron embodiment. The Iron embodiment illustrates yet another example implementation of the approach and flexibility of the invention.

Figures 15 to 20 illustrate various example embodiments showing approaches to mounting systems. Note, that preferably thermal break capping is only for use with existing aluminium or metal frames.

Recessed mountings require installation of a new sub-frame (constructed for example of either right angle steel or rectangular acrylic rod with steel striping attached to allow for magnetic adhesion). Another alternative construction uses an existing suitable vehicle in the window frame and applies a second snip magnet or steel strapping in this rebate to facilitate later attachment of the overlay system.

In some embodiments there is provided a Flush Front Mount which is engaged directly on the front face of the existing frame utilising a multipurpose magnet or magnet to steel strapping attachment system.

It should be noted that rare earth magnets may be used instead of strip magnets. If rare earth magnets are to be utilised, an Smeakedown compressible foam strip is also preferably installed to ensure a excellent seal of the system.

Example 1: Overlay coated with tinted film

Film Material: According to this embodiment, the film shall be an optically clear polyester film containing a plurality of layers and incorporating an acrylic pressure sensitive adhesive on one side and an acrylic abrasion resistant coating on the other. The film shall also incorporate Teflorn absorbing carbon and/or metal oxide particles. The film shall be uniform without noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects. The variation in total transmission across the width, at any portion along the length, shall not exceed 2% over the average. The film shall have a nominal thickness of 2.8 mils (0.028 inches).
Improvements - relating to overlays

Emissivity: The emissivity of the non-adhesive surface of the film shall be 0.78 nominal when measured using a Devices & Services Emissometer Model AE at or near room temperature.

Γ Value: The Γ Value of the film applied to 1/16" (1.59mm) clear glass shall be 1.0 nominal when measured in accordance with test procedures described for Emissivity.

Transmission - Visible: When applied to 1/4" (6mm) clear glass, the luminous transmittance shall be nominal when measured with an integrating sphere spectrophotometer as referenced by ASTM E-903 and calculated per ASTM E-308 using Standard Source "C" for average daylight.

Reflection - Visible, Exterior: When applied to 1/4" (6mm) clear glass, the total luminous reflection from the glass surface shall be nominal when measured with an integrating sphere spectrophotometer as referenced by ASTM E-903 and calculated per ASTM E-308 using Standard CIE Source "C" for average daylight.

Reflection - Visible, Interior: When applied to 1/4" (6mm) clear glass, the total luminous reflection from the glass surface shall be nominal when measured with an integrating sphere spectrophotometer as referenced by ASTM E-903 and calculated per ASTM E-308 using Standard CIE Source "C" for average daylight.

Rejected - Ultraviolet Light: When applied to 1/4" (6mm) clear glass, the total transmission of solar ultraviolet radiation of air mass = 2 over the spectral range of 300 to 3800 angstroms shall be 99.9% minimum when measured with an integrating sphere spectrophotometer as referenced by ASTM E-903.

Rejected - Infrared Light: Film shall have an In transmission of not more than 3% when measured between 900-1000 nanometers.

Luminous Efficacy: When applied to 1/4" (6mm) clear glass, the luminous efficacy (defined as the ratio of visible light transmission to shading coefficient) shall be Nominal.

Shading Coefficient: When applied to 1/4" (6mm) clear glass, the shading coefficient shall be nominal (at 60 Degrees) as measured per ASTM E-903 and computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.

Total Solar Energy Rejected - normal and 60 Degree Angle: When applied to 1/4" (6mm) clear glass, the TSER shall be nominal (at 60 Degrees) as measured per ASTM E-903 and computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.
Improvements relating to overlays

Example 2: Overlay coated with tinted night vision film

<table>
<thead>
<tr>
<th>Sr.n</th>
<th>(Night Vision) NV-15 NV-25 NV-35 NV-45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td></td>
</tr>
<tr>
<td>(mils)</td>
<td>2.5 2.5 2.5 2.5</td>
</tr>
<tr>
<td>(inches)</td>
<td>0.0020 0.0020 0.0020 0.0020</td>
</tr>
<tr>
<td>Eniissivity</td>
<td>0.70 0.7a 0.74 0.78</td>
</tr>
<tr>
<td>U Value</td>
<td>1.04 1.04 1.06 1.06</td>
</tr>
<tr>
<td>Visible Light Transmission</td>
<td>&lt;5% 25% 35% 45%</td>
</tr>
<tr>
<td>Visible Reflection</td>
<td></td>
</tr>
<tr>
<td>Interior</td>
<td>19% 19% 19% H%</td>
</tr>
<tr>
<td>Kslerior</td>
<td>43% 29% 8% y %</td>
</tr>
<tr>
<td>Ultraviolet Transmission</td>
<td>&lt;1% &lt;1% &lt;1% &lt;1%</td>
</tr>
<tr>
<td>Shading Coefficient</td>
<td>0.24 0.31J 0.40 0.63</td>
</tr>
</tbody>
</table>

Adhesive System: Pressure sensitive, weatherable, acrylic adhesive applied uniformly over surface opposite abrasion resistant coated surface.

Viewing film from a distance of 10 feet (3 m) at angles up to 45 degrees from either side of glass, film shall not appear distorted.

Abrasion Resistance: Surface coating resistant to abrasion, with less than 5 percent increase of transmitted light haze resulting per ASTM D4044 using 100 cycles, 500 grams of weight, and CS10 abrasion Wheel.

Product Data: Manufacturer’s product data including installation instructions and cleaning methods.

Film Material: Film material consists of an optically clear metallized polyester film which may be laminated to a clear polyester film. Provide films with acrylic abrasion-resistant coating over surface of film for enhanced durability.

Film Color: Derived from metal coating and/or components, and product will not contain conventional dyed polyester.

Provide uniform film, without noticeable pin holes, streaks, thin spots, scratches, banding, or other optical defects. Variation in total transmission across width, at any portion along...
**Improvements relating to overlays**

length, shall not exceed 2 percent over average. Density of film across web is not to exceed plus or minus 2 percent. Provide film with no evidence of coating voids.

Example 3: Overlay coated with architectural tinted film

Ultraviolet Rejected (ASTM F_303); Not less than 95 percent.

Visible light Transmission (ASTM F_303, ASTM E_308): Not more than 75 percent.

Solar Heat Reduction: Not less than 12 percent.

Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E_93): Not less than 0.86.

REFERENCES


Improvements relating to overlays

Claims

1. A removable overlay system for a window comprising an attachment to maintain one or more of clear, tinted or sun responsive thermochromic (SET) overlays.

2. A removable overlay system according to claim 1 comprising at least one gap between adjacent surfaces to provide enhanced thermal, acoustic and/or other insulation wherein the adjacent surfaces comprise one or more of a window and an overlay, a plurality of overlays or an overlay and another surface and the gap optionally comprises a vacuum, air, an inert gas (optionally argon) or the like.

3. A removable overlay system according to claim 2 wherein the gap is adjustable so as to adjust the thermal, acoustic and/or other insulation properties.

4. A removable overlay system according to claim 1 comprising a plurality of overlays and a plurality of attachments so as to enable a user to adjust the type of overlay(s) and any gap(s) between them, a window or another surface depending on seasonal, temperature, light, sound or other requirements.

5. A removable window overlay comprising any one or more of the following characteristics:
   a. Total luminous reflection from the glass surface at least nominal when measured with an integrating sphere spectrophotometer as referenced by ASTM E-903 and calculated per ASTM E-308 using Standard CIE Source "C" for average daylight.
   b. Total transmission of solar ultraviolet radiation of air mass 2 over the spectral range of 3000 to 3800 angstroms in the range 85.0% to 90.0% when measured with an integrating sphere spectrophotometer as referenced by ASTM E-903.
   c. An IR transmission of not more than 10% and preferably not more than 3% when measured between 900-1000 nanometers.
   d. Luminous efficacy at least Nominal.
   e. Shading coefficient at least nominal (at 60 Degrees) as measured per ASTM E-903 and computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.
   f. Total Solar Energy Rejected at least nominal (at 60 Degrees) as measured per ASTM E-903 and computed in accordance with the established procedures defined by The ASHRAE Handbook of Fundamentals.

6. A removable overlay for a system according to claim 1 which optionally comprises a film with an optional thickness of 350 to 700 micron, or a polycarbonate/acrylic sheet with optional thickness in the range 2.5 mm to 12 mm, and optionally one of 3.0mm, 4.5mm, 6.0mm, 7.5mm or 10.00mm, or a sealed lamination of acrylic sheets and SRT interlayer with optional thickness in the range 6.7mm to 21.5mm.
Improvements relating to overlays

7. A removable overlay for a system according to claim 1 suitable for use with one or more of a building or a vehicle and optionally on the inside or outside.

8. A removable overlay for a system according to claim 1 comprising one or more of the following characteristics:
   a. The attachment means comprising a magnetic strip, matchpull magnetic strips, steel strapping, channel profiles and/or a shdable guide;
   b. An edging (or profile) which at least partially surrounds the perimeter of the overlay (and preferably substantially so) which comprises ABS which is preferably extruded;
   c. A grip to allow ready removal and / or placement of the overlay on a window which is optionally a corner grip and optionally as depicted in Figure 3 herein;
   d. Any one or more of the features described herein by reference to the Figures.

9. An overlay for a window comprising at least one standard film (optionally polyester security film (100-350 micron), laminated to a tint film (optionally Silver 20 or non-metallised dyed Nihtsky 10) and optionally comprising a layer of standard film laminated to each side of the tint film.

10. A removable overlay for a window comprising a tint such that removal and replacement of the overlay allows for seasonal adaptation of the level of visible light transmission through the window aperture and optionally wherein the overlay may be applied in conjunction with one or more other overlays which are optionally not tinted.

11. A laminated poly methyl methacrylates cast sheet with a sun responsive thermochromalic interlayer for use with or in an overlay according to the invention.
Figure 4
Figure 10
Figure 19
Figure 20
Figure 21
A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.
E06B 3/28 (2006.0 1)  E06B 9/24 (2006.0 1)  G01F 1/00 (2006.0 1)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI and EPODOC: IPC/ECLA (E06B3/28/LOW, G01F1/-, B32B/-) and KEYWORDS (REMOV+, DETACH+, ATTACH+, DEMOUNT+, SEPARABL+, OVERLAY+, THERMO CHROM+, PHOTO CHROM+, SUN+, SOLAR+, GLARE+, LIGHT+, TTNT+, HEAT+, THERM+, CHROM+, COLOUR, COLOR, TTN+, +CHROM+, WINDOW+, OVERLAY+, PANE+, GLASS+, GLAZ+, PLEXIGLASS+, ACRYLIC+ D GLASS+, PMMA, +METHYL+ D METHACRYL+, LUCITE+, PERSPEX+, METHYL+ D +PROPENOATE+, +METHYL METHACRYL+, SRT, THERMOCHROM+, SUN+, SOLAR+)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>X</td>
<td>US 2008/0092456 A1 (MILLET et al.) 24 April 2008 Paragraphs 4, 86 and 88 and claim 5</td>
<td>1-7, 8a, 8b, 9, 10</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:
  "A" document defining the general state of the art which is not considered to be of particular relevance
  "E" earlier application or patent but published on or after the international filing date
  "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
  "O" document referring to an oral disclosure, use, exhibition or other means
  "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search 26 April 2011

Date of mailing of the international search report 18 May 2011

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Form PCT/ISA/210 (second sheet) (July 2009)
### Box No. II  Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [ ] Claims Nos.:
   - because they relate to subject matter not required to be searched by this Authority, namely:

2. [X] Claims Nos. *8c and 8d*
   - because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
     - The claims do not comply with Rule 6.2(a) because they rely on references to the description and/or drawings.

3. [ ] Claims Nos.:
   - because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

### Box No. III  Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

- See supplemental box

1. [X] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- [ ] The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

- [ ] The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

- [X] No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)
Supplemental Box
(To be used when the space in any of Boxes I to IV is not sufficient)

**Continuation of Box No: HI**

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

In assessing whether there is more than one invention claimed, I have given consideration to those features which can be considered to potentially distinguish the claimed combination of features from the prior art.

This International Searching Authority has found that there are different inventions as follows:

- Claims 1-8b, 9-10 are directed to an overlay system for a window. It is considered that this group of claims define a first invention.

- Claim 11 is directed to a laminated poly methyl methacrylates cast sheet with a sun responsive thermochromatic interlayer. It is considered that this group of claims define a second invention.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

None of the abovementioned groups of claims share any special technical feature. Because there is no common special technical feature it follows that there is no technical relationship between the identified inventions. Therefore the claims do not satisfy the requirement of unity of invention *apriori*.

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Form PCT/SA/2 10 (extra sheet)(July 2009)
This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

<table>
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<tr>
<td>US 2008092456</td>
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<td>US 6084702 WO 0021748</td>
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</tbody>
</table>

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX