Glass Low E

Module #3B
Product Knowledge Training
Home Center
Temperature Control Solutions

Low Emissivity (Low-E) Solutions
Another type of important heat reflective glass is called Low-E or Low Emissivity glass. Milgard uses primarily Softcoat Low-E, however you may hear about Hardcoat Low-E in the field.

1. Hard coat Low-E
Hard coat Low-E, or pyro lytic coating, is a coating applied at high temperatures and is sprayed onto the glass surface during the float process. Pyro lytic coating contains one layer of tin oxide and one layer of silica on the glass. Hard coat low-e is usually applied to the #3 surface of an IG unit.

Advantages
- Can be tempered after coating application.
- Can be used in single glazing applications.
- Utilizes passive solar heat gain.

Disadvantages
- Higher U-values compared to Softcoat Low-E products.
- Slightly higher haze levels.
- Higher solar heat gain coefficient compared to Softcoat Low-E products.
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Low Emissivity (Low-E) Solutions
An advanced type of Low-e coating is “soft coat” low-e. We use the term “soft” due to the fact that this coating is more fragile than a pyrolytic coating. It is applied in a vacuum chamber.

2. Softcoat Low-E (Sputter coat Low-E)
Softcoat Low-E or sputter coating, is applied in multiple layers of optically transparent silver sandwiched between layers of metal oxide in a vacuum chamber, providing a nearly invisible coating. Softcoat low-e is usually applied to the #2 surface of an IG unit.

Advantages
- High visible light transmission.
- Low SHGC and shading coefficient.
- Ultra-low emissivity giving optimum winter U-values.
- Less UV transmission compared with standard clear glazing.

Disadvantages
- Must be used in an insulated unit: the soft coating is sensitive to handling.
- May require tempering the glass prior to coating.
- Edge deletion of the coating is required to ensure a proper seal in an IG.
**Milgard SunCoat® Low-E²**

**SunCoat® Low-E**
Milgard's standard soft-coat Low-E glass that is used on Milgard products is branded as **SunCoat®**. It is produced using the sputter coating process, by applying multiple layers of optically transparent silver sandwiched between layers of metal oxide in a vacuum chamber. This provides a nearly invisible coating.

**Advantages**
- a. High visible light transmission  
- b. Low winter U-Value  
- c. Low shading coefficient which reduces heat gain  
- d. Low solar heat gain coefficient  
- e. Reduces heating and cooling costs for both cold and warm climates compared to other glazing.  
- f. Lower visible light reflectance (indoor and outdoor) than clear glass  
- g. Consistent temperatures for year-round comfort  
- h. Reduces harmful Ultra-violet rays by up to 84%

**Disadvantages**
- a. SunCoat® Low-E² must be used in an insulated unit: the soft coating is sensitive to handling.  
- b. Edge deletion of the coating is required to ensure a proper seal in an IG.
Temperature Control Solutions

SunCoat® Low-E²

1. Allows maximum visible light while blocking heat from direct sunlight.
2. Blocks heat from entering during the summer.
3. Keeps heat in the building during the winter.

*Saves 18-31% in cooling costs versus clear glass by blocking radiant heat and UV rays.

* Cardinal Glass Industries.
Milgard's Low-E Glass

SunCoat® Low-E²

- Milgard's standard Low-E² glass for many locations
- 70% visible light transmittance
- Low winter U-Value of .30
- Low shading coefficient: .47
- Delivers maximum air-conditioning efficiency
- Reduces solar heat gain by 50%.
- Rejects harmful UV rays which fade home furnishings
- Contains layers of: scratch resister, chemical protector, silver oxide, silver protector, iron oxide, and glass
- Low SHGC of 0.41
- Low relative heat gains: 98 btu/hr/sq. ft.
- Reduces heating and cooling costs for both warm and cold climates compared to other glazing
- Lower visible light reflectance (indoor and outdoor) than clear glass

NOTE: These values are for Center of Glass in an IG. The will differ in a complete window depending on product and configuration options.
Milgard SunCoatMAX®

Milgard always uses the most current in Low-E Technology – SunCoatMAX® Low-E insulating glass is Milgard’s high performing Low-E. It is an upgrade option from our SunCoat® product.

SunCoatMAX® is the ultimate balance of solar control and high visibility, giving us maximum energy efficiency, optimal protection against harmful UV rays, maximization of overall light entering a building, and year round comfort whether heating or cooling a building interior.

SunCoatMAX® provides an incredible 95% UV blockage. This helps reduce damaging ultra-violet rays that contribute to the fading of fabrics and furnishings, which in turn will aid in the longevity of the furnishings.

SunCoatMAX®, allows you to keep a clear view outside your home. There's no need for tinted glass to control solar heat gain. Visible Light Transmission is 66% so you can surpass tinted glass shading benefits without having to sacrifice natural light flowing into your home.
Performance Comparisons

Visible Light Transmittance:
Measure of visible light through a unit. The higher the number, the better.

Solar Heat Gain Coefficient:
Measure of near infrared and radiant heat through a unit. The lower the value, the better the performance.

U-Factor:
Heat flow rate through a window. The lower value, the better the performance.

- *Used as one pane in a double-pane glass unit.
- † Hard-coat Low-E with 0.20 emittance.

<table>
<thead>
<tr>
<th>Glass Product</th>
<th>Visible Light Transmittance (higher is better)</th>
<th>Solar Heat Gain Coefficient (lower is better)</th>
<th>Winter Heat Loss – U-Factor (Air / Argon) (lower is better)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear single pane</td>
<td>90%</td>
<td>.86</td>
<td>1.04 / -</td>
</tr>
<tr>
<td>Clear double pane</td>
<td>82%</td>
<td>.76</td>
<td>.48 / -</td>
</tr>
<tr>
<td>Hard coat Low-E *†</td>
<td>76%</td>
<td>.72</td>
<td>.35/.30</td>
</tr>
<tr>
<td>Gray tinted *</td>
<td>55%</td>
<td>.58</td>
<td>.48</td>
</tr>
<tr>
<td>SunCoat® *</td>
<td>70%</td>
<td>.37 -.41</td>
<td>.30</td>
</tr>
<tr>
<td>SunCoatMAX® *</td>
<td>66%</td>
<td>.27</td>
<td>.29/.24</td>
</tr>
</tbody>
</table>
**SunCoatMax® Comfort**

This chart shows the glass surface temperatures at two different outside temperatures. Milgard’s SunCoatMAX® maintains a higher interior surface glass temperature, even in the coldest temperatures.

This is important because The Efficient Windows collaborative suggests that when glass surface temperatures fall below 52 degrees Fahrenheit, the occupants of a home may feel thermal discomfort.

<table>
<thead>
<tr>
<th>Glass Product</th>
<th>Temp at Center of Interior Glass when -20°F outside</th>
<th>Temp at Center of Interior Glass when +20°F outside</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear single pane</td>
<td>0°</td>
<td>31°</td>
</tr>
<tr>
<td>Clear double pane</td>
<td>37°</td>
<td>51°</td>
</tr>
<tr>
<td>Hard coat Low-E</td>
<td>47°</td>
<td>58°</td>
</tr>
<tr>
<td>SunCoat®</td>
<td>52°</td>
<td>61°</td>
</tr>
<tr>
<td>SunCoatMAX®</td>
<td>52°</td>
<td>61°</td>
</tr>
</tbody>
</table>
Milgard 4th Surface High Energy Performance Package

4th Surface is a durable TCO (Transparent Conductive Oxide) coating that enhances the u-factor of the window by reflecting heat back into the home. This package provides energy performance levels in a Dual Glazed insulated unit (IG). It also offers more light transmittance and less reflectance than triple glazing.

**Energy Package includes:**
- Milgard SunCoat® Low-E glass
- Foam spacer system
- Argon gas
- An additional 4th surface coating on the interior glass

This allows our products to achieve u-factor performance that exceeds a standard dual glaze product. Prior to this package, common alternative selections in the market included the use of triple glazed combinations that limit size availability and can reduce visible light transmittance.

**Care and Maintenance**
Standard cleaning solutions, such as a soap solution with clean water or standard commercial glass cleaning products, can be used to clean the 4th Surface coating.