

# LoE<sup>3</sup>-340 Glass

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# 0.18

The solar performance of our new LoE<sup>3</sup>-340 glass is unprecedented in a double-pane unit – no room-darkening tint required. With its SHGC of just 0.18, it greatly reduces oppressive solar heat gain. And wherever glare is a problem, LoE<sup>3</sup>-340 controls that as well. Then when cold weather rolls around, its low U-Factor reduces indoor heat loss.

Result? Year around comfort.

## The best solar control glass under the sun.



When it comes to reducing solar heat gain from the blazing sun, LoE<sup>3</sup>-340 simply has no equal. And because it's not tinted, you enjoy a number of other advantages as well. First, there's the cost savings of no tint. Then you avoid the disadvantages of tinting: the potential for thermal stress breakage and the potential need to heat treat the glass.

Tinted glass has several other glaring deficiencies. Regular tinted glass works by absorbing sunlight, so the glass becomes hot in the sun. The color of the glass also changes with its thickness. On the otherhand, LoE<sup>3</sup>-340's appearance and performance remain the same regardless of glass thickness.

What's more, LoE<sup>3</sup>-340 has a very high LSG (light to solar gain ratio) of 2.17. So even though solar gain is being controlled, plenty of visible light is still allowed inside. (NOTE: LSG based on 340/clear with 3mm glass thickness.)

## The invisible difference: LoE<sup>3</sup>, spectrally selective glass.

What makes multi-layer LoE<sup>3</sup>-340 different is its ability to handle each portion of the solar spectrum differently:

### LoE<sup>3</sup>-340.

#### Solar Control Glass

- **Ultraviolet (UV)**

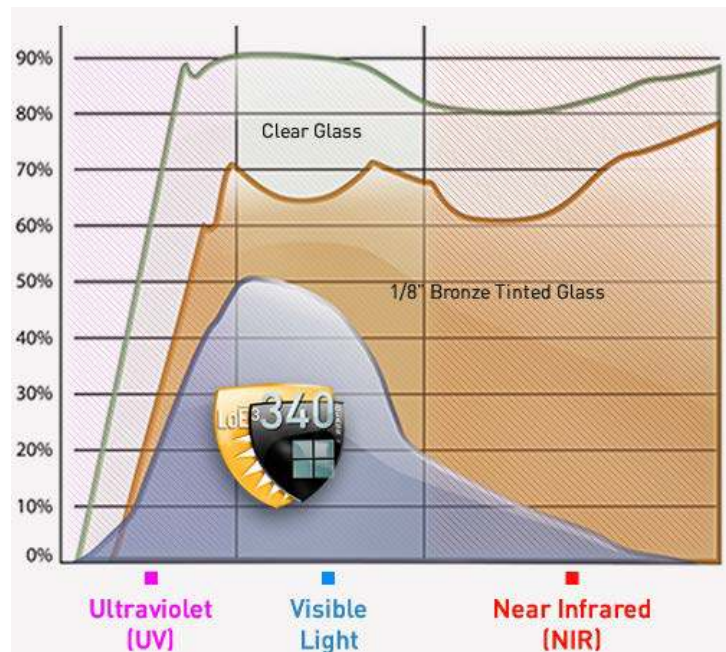
LoE<sup>3</sup>-340 blocks approximately 98% of the harmful UV radiation.

- **Visible Light**

LoE<sup>3</sup>-340 absorbs and reflects 60% of the visible light, which gives the coating glare control and its soft muted blue color.

- **Near Infrared (NIR)**

LoE<sup>3</sup>-340 reflects nearly all of the invisible solar infrared rays.



This graph compares the solar transmission of clear glass, bronze tinted glass and LoE<sup>3</sup>-340. Clear glass allows nearly all the solar energy through. Bronze glass reduces transmission by absorbing sunlight, but it's more effective at blocking light than heat. To match the glare control of LoE<sup>3</sup>-340, a tinted glass would have to be 1/4" thick.

Even at this heavy thickness, the solar blockage of tinted glass doesn't compare with LoE<sup>3</sup>-340. The LoE<sup>3</sup>-340 plot demonstrates the "selective" nature of the coating. Visible Light Transmittance is more than twice the Solar Heat Gain Coefficient. As a result, LoE<sup>3</sup>-340 provides effective glare control and maximum solar blockage in a softly tinted design – without the punishing discomfort of heat-absorbing glass or the visual disruption of highly reflective glass.

## Enjoy all season comfort



Year-round thermal comfort is mainly the result of two things:

1. Blocking oppressive solar heat gain in hot weather, thus maintaining cooler glass temperatures.
2. Reducing heat loss in cold weather, thus maintaining warmer glass temperatures.

Because LoE<sup>3</sup>-340 is more than a solar control glass, its advanced design provides a very low U-Factor of 0.25. This results in more comfort and energy savings in cold weather.

One of the best ways to compare comfort is to use the Mean Radiant Temperature (MRT). MRT can be thought of as a “feels like” temperature; the closer the MRT is to the thermostat setting, the better the comfort will be.



**INDOOR GLASS TEMPERATURES AND MEAN RADIANT TEMPERATURES**

INSULATING GLASS PRODUCT	WINTER: CENTER OF GLASS °F / °C	WINTER MRT °F / °C	SUMMER MRT °F / °C	SUMMER SHGC
Clear / Clear	44 / 07	60 / 16	81 / 27	0.78
Clear / LoE-180®	55 / 13	64 / 18	83 / 28	0.69
Gray Tint / LoE-180®	53 / 12	64 / 18	83 / 28	0.49
LoE <sup>2</sup> -272® / Clear	56 / 13	65 / 18	79 / 26	0.41
LoE <sup>2</sup> -270® / Clear	56 / 13	65 / 18	78 / 26	0.37
LoE <sup>3</sup> -366® / Clear	56 / 13	65 / 18	78 / 26	0.27
LoE <sup>3</sup> -340™ / Clear	56 / 13	65 / 18	79 / 26	0.18

GENERAL NOTES: [1] Data was calculated using the LBNL Window computer program per NFRC environmental conditions.

Double glazing improves the winter comfort, especially when a low-emittance LoE<sup>3</sup> coating is used. A double-pane window with a conventional tinted glass and low-e on the #3 surface (air-space side of indoor pane) improves the solar blockage, but exposes the building occupants to hot glass temperatures in the summer.

LoE<sup>3</sup>-340 is placed on the #2 surface (air-space side of outdoor pane) and provides the best comfort through all the seasons.



The clear choice for optimum solar control

**GLASS COMPARISONS**

	LIGHT TRANSMISSION	REFLECTANCE	COLOR	WINTER COMFORT	SUMMER COMFORT
Single-pane, tinted	Moderate	Low	Tinted	Poor	Poor
Double-pane, tinted	Moderate	Low	Tinted	Moderate	Moderate
Double pane, tinted & low-e	Moderate	Low	Tinted	Good	Moderate
<b>LoE<sup>3</sup> - 340</b>	<b>Moderate</b>	<b>Low</b>	<b>Tinted</b>	<b>Excellent</b>	<b>Excellent</b>

## GLASS PERFORMANCE

	VISIBLE LIGHT TRANSMITTANCE	SOLAR HEAT GAIN COEFFICIENT	WINTER U-FACTOR (AIR / ARGON)	UV LIGHT TRANSMISSION	FADING TRANSMISSION
1P, gray tint	60%	0.69	1.04 / -	37%	55%
2P, gray tint	55%	0.58	0.48 / 0.46	32%	49%
2P, gray tint/LoE-180[#3]	53%	0.49	0.31 / 0.26	17%	42%
LoE <sup>3</sup> -340 / Clear	39%	0.18	0.29 / 0.25	2%	27%

GENERAL NOTES: (1) Data was calculated using the LBNL Window computer program per NFRC environmental conditions. (2) 90% argon/10% air fill is used for IG's with LoE coated glass, otherwise 100% air fill is used for uncoated units. (3) The UV Transmittance is determined as an average for wavelengths 300 -380 nm. (4) UV Damage Weighted Transmittance (Td<sub>w</sub>) is the weighted average for wavelengths 300 – 700 nm (based on CIE 89/3).

## Definitions

**Note:** All values calculated using LBNL Window computer program. See <http://windows.lbl.gov/software/default.htm> for more information on glass optical data and the Window computer program.

**Solar Heat Gain Coefficient – (SHGC)** – The amount of solar radiation that enters a building as heat. The lower the number, the better the glazing is at preventing solar gain.

**Fading Transmission** – The portion of energy transmitted in a spectral region from 300 to 700 nanometers. This region includes all of the ultraviolet energy and part of the visible spectrum, and will give the best representation of relative fading rates. The lower the number, the better the glass is for reducing fading potential of carpets and interior furnishings.

**U-Factor** – This represents the heat flow rate through a window expressed in BTU/hr/ft<sup>2</sup>/°F, using winter night weather conditions of 0°F outside and 70°F inside. The smaller the number, the better the window system is at reducing heat loss.

Cardinal actively supports and participates in the National Fenestration Rating Council (NFRC). Windows with **LoE<sup>3</sup>-340** that are rated and certified by the NFRC can comply with Energy Star™ requirements in all regions of the country.

See <https://www.energystar.gov/products/certified-products/detail/residential-windows-doors-and-skylights> for more information on the Energy Star windows program.

Less heat gain when it's hot, less heat loss when it's cold, more comfort year-round, and the best glare control under the sun.

Finally, LoE<sup>3</sup>-340 delivers the lowest UV transmission of any LoE glass we offer. This greatly reduces fading on furniture, carpet, draperies and everything inside the home.

It can be purchased in hurricane-resistant laminated glass, in a variety of custom shapes and sizes. To learn more about LoE<sup>3</sup>-340 and other Cardinal glass products, ask your contractor or architect.