

Solar and Glare Control Glass



CARDINAL CG  ENGINEERING THE FUTURE OF COATED GLASS
A CARDINAL GLASS INDUSTRIES COMPANY





Wherever glare is a problem, Cardinal LoE²-240[®] glass is the ideal solution. It's a specially treated version of our finest LoE² glass. But LoE²-240 does much more than just control glare. It also maintains year-round comfort. In summertime, it blocks oppressive solar heat gain and maintains cool glass temperatures. Then when winter rolls around, it keeps inside glass temperatures warm. Control and year-round comfort – that's the advantage of LoE²-240.

TESTED AND PROVEN GLARE CONTROL.

Other tinted glass comes with glaring deficiencies. Regular tinted glass works by absorbing sunlight. The color of the glass changes with the thickness and becomes hot in the sunlight. However, LoE²-240 is a coating that is applied to clear glass, so that the appearance and performance are the same regardless of the glass thickness.

Clear glass transmits as much as 90% of the solar energy in all the regions and is ineffective at controlling glare or solar heat gain.

Bronze and gray-tinted glass absorb as much as 50% of all sunlight, but this varies with thickness. Large windows with thick glass will be dark, while small windows with thin glass will have little tint and minimal solar control. What's more, single-pane tinted glass temperatures can exceed 100°F, leading to serious discomfort near the window.

Reflective glass products are effective in rejecting solar gain, but their shiny appearance is undesirable in most homes and buildings.

To understand how LoE²-240 advances the science of glare control glass, let's review what sunlight is and how various glass products handle this energy. Within the spectrum of solar energy, there are three distinct regions:

- 1. Ultraviolet (UV).** UV is invisible and makes up about 3% of the total solar energy. This region of wave lengths is typically associated with fading of fabrics, paints, furniture and other household items.
- 2. Visible Light.** This portion of the solar spectrum makes up about 45% of total solar energy.
- 3. Near Infrared (NIR).** NIR is approximately 52% of the solar energy and invisible to the eye.



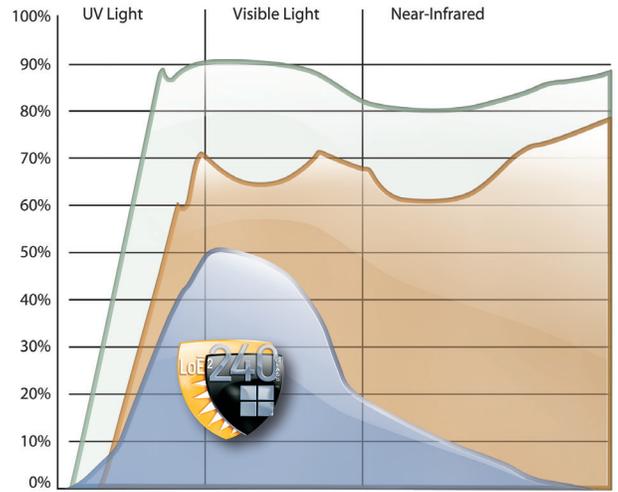
Spectrally selective: the invisible difference.

What makes multi-layer LoE²-240 different is its ability to handle each portion of the solar spectrum differently:

- Blocks over 84% of the harmful UV radiation.
- Absorbs 60% of the visible light, which gives the coating glare control and its soft muted blue color.
- Reflects nearly all of the heat-producing infrared rays.

This graph compares the solar transmission of clear glass, bronze tinted glass and LoE²-240. Clear glass allows nearly all the solar energy through. Bronze glass reduces transmission by absorbing sunlight, but is more effective at blocking light than heat. To match the glare control of LoE²-240, 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 LoE²-240. As a result, LoE²-240 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.



LoE²-240 permits visible light to shine while blocking UV and NIR light.

All-season comfort.

LoE²-240 controls more than the sun. During cold weather, its advanced coating design also provides an extremely low U-Factor to deliver comfort and energy savings.

Year-round thermal comfort is a result of warm glass temperatures in the winter, cool glass temperatures in the summer, and the blockage of oppressive solar heat gains. Comfort comparisons for various products are shown in the chart. Note that the solar blockage for single-pane tinted glass is marginal, and the extreme temperature fluctuations can lead to serious year-round comfort problems.



INSIDE GLASS TEMPERATURES

INSULATING GLASS PRODUCT	WINTER NIGHT (°F)	SUMMER DAY (°F)	SOLAR BLOCKAGE
Single-pane, Tinted	15°	100°	27%
Double-pane, Tinted	44°	95°	37%
Double-pane, tinted & low-e	53°	96°	42%
LoE² - 240 (argon fill)	55°	86°	75%

Double glazing improves the winter comfort, especially when a low emittance LoE² 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 leaves the building occupants exposed to hot glass temperatures in the summer.

LoE²-240 is placed on the #2 surface (air-space side of outdoor pane) and provides the best comfort through all the seasons.

A great choice for glare control.

If you envision your home's design benefiting from a tinted glass for glare control, LoE²-240 offers a great combination of aesthetic appeal along with energy performance and indoor comfort. The summary shown here gives you a comparative ranking based on a variety of glass selection criteria.

GLASS COMPARISONS

IG TYPE AND COATING	LIGHT TRANSMISSION	GLASS REFLECTANCE	COLOR OF GLASS	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
LoE ² -240 (argon fill)	Moderate	Low	Tinted	Good	Good

GLASS PERFORMANCE

IG TYPE AND COATING	VISIBLE LIGHT TRANSMITTANCE	SOLAR HEAT GAIN COEFFICIENT	WINTER U-FACTOR		UV LIGHT TRANSMISSION	FADE TRANSMISSION
			AIR FILL	ARGON FILL		
Single-pane, Gray Tint	60%	0.69	1.04	—	0.37	0.55
2 pane, Gray Tint	55%	0.58	0.48	0.46	0.32	0.49
2 pane, Gray Tint/LoE-180 (#3)	53%	0.49	0.31	0.26	0.17	0.42
LoE ² -240/Clear	40%	0.25	0.30	0.26	0.16	0.35

LoE²-240 can be purchased in heat-strengthened, tempered and laminated glass configurations, with a variety of shapes and sizes.



Controlling glare is only the beginning, and LoE²-240 does much more. It blocks heat in the summer and keeps rooms warm in the winter, all while maintaining comfort year-round.

To learn more about LoE²-240 and other Cardinal Glass products, ask your window manufacturer, contractor or architect.

CARDINAL CG
ENGINEERING THE FUTURE OF COATED GLASS

775 Prairie Center Drive,
Eden Prairie, MN 55344
cardinalcorp.com

