LoĒ²-270 Glass

Who says you can't do anything about the weather? Cardinal LoĒ²-270® glass delivers year-round comfort in all types of weather. In summer, it rejects the sun's heat and damaging UV rays. In winter, it reflects heat back into the room.

Cardinal LoĒ²-270 is very similar to our LoĒ²-272® glass, only with slightly more solar control, while LoĒ²-272 offers a little more light transmittance.

Regardless of where your home is located, choosing windows that provide you with the highest level of comfort and energy savings year-round is extremely important. And choosing the right glass for your windows is the most important factor in that decision. Go beyond ordinary low-e glass. Let LoĒ²-270 help you handle the weather – any weather.

Solar control for just about the coolest windows under the sun.

When the temperature is heading to the top of the thermometer, ordinary window glass simply welcomes in the heat. Cardinal LoĒ²-270, however, has been specially formulated to reject the sun's heat and damaging rays and keep your home cool and comfortable. The patented LoĒ²-270 coating provides high performance solar control and visual clarity. The end result of all this engineering is that Cardinal LoĒ²-270 provides the ultimate in comfort because it reduces window heat gain by 50% or more when compared to ordinary glass.

Frigid outside, cozy inside.

During cold weather, the insulating effect of your windows has a direct impact on how your rooms feel. Typically, 75% of the exposed surface of a window is glass, and the temperature of the room-side of the glass directly affects the air temperature in the room. The better insulated the window glass, the warmer your room will be.

In fact, the Efficient Windows Collaborative (**www.efficientwindows.org**) suggests that when glass surface temperatures fall below 52°F, there is a risk of thermal discomfort. To maintain the best comfort during the winter, select a glass product that produces surface temperatures that will stay above this point during the coldest outdoor conditions.

Inside glass and outside temperatures.

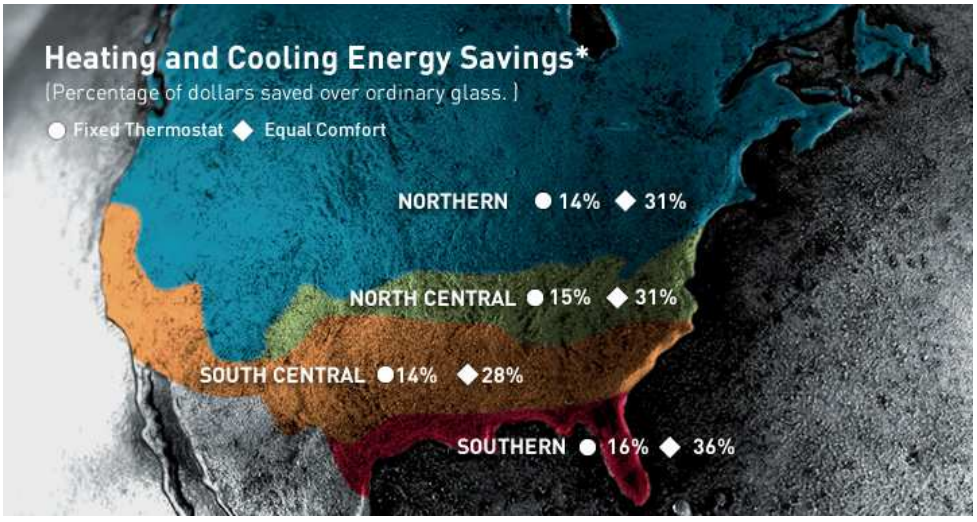
The table below compares the room-side center of glass temperatures of different glass types against two different winter conditions.

	OUTSIDE TEMP -20°F (-30°C)	OUTSIDE TEMP +20°F (-10°C)
Single-pane, clear	0°F (-19°C)	31°F (-3°C)
Double-pane, clear	37°F (2°C)	51°F (9°C)
Ordinary low-e (air fill)	46°F (7°C)	57°F (13°C)
LoĒ² – 270 (air fill)	49°F (9°C)	58°F (14°C)
LoĒ² – 270 (argon fill)	52°F (10°C)	60°F (15°C)

The superior insulating capability of Cardinal LoĒ²-270 is a key factor in the construction of comfortable windows for cold climates. The dramatic comfort improvement from windows with warm glass surfaces also means the relative humidity of the indoor air can be controlled and maintained properly. Proper humidity levels (not too much, not too little) will improve comfort and promote a healthier living environment.

Save energy with glass so smart, it can control your comfort.

Although windows provide beautiful views and wonderful natural light, they can also account for up to 50% of the heating and cooling energy consumed in a home. In the summer Cardinal LoĒ²-270 keeps your home cool and comfortable by rejecting the sun's heat and damaging rays. In the winter it helps your home stay warm and cozy by blocking heat loss to the cold weather outside. In short, it can save energy year around.



* Thermostat settings are the largest variable in establishing the heating and cooling energy savings potential with window replacements. If you tolerate the discomfort from your current windows and don't change thermostat settings with the weather, consider the savings suggested from the "Fixed Thermostat" column. If on the other hand you frequently adjust the thermostat, add space heaters to compensate for cold rooms, or close drapes/blinds to block the sun consider the additional savings suggested in the "Equal Comfort" column.

Modeling Conditions

Heat/Cool portion of your energy bill: DOE estimates that in 2005 the average house spent $2,003 on utilities and that 43% of this total ($886) is for heating and cooling energy. (http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=2.3.10).

Savings values are average of multiple locations within climate zone.

"Average" house as described in the Buildings Data Book at http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=2.2.7 The model house is described as a mid-1970's single-story dwelling with natural gas furnace, central air-conditioning, adequate insulation, and double-pane windows.

Window orientation set as uniformly distributed on all sides to represent a neighborhood average and the total window area set to 15% of the floor area.

Interior shading devices are presumed to be closed 50% of the time throughout the year.

"Fixed Thermostat" conditions are 70°F for heating and 75°F for cooling.

"Equal Comfort" thermostat settings determined using window thermal comfort research from the University of California at Berkeley (http://www.cbe.berkeley.edu/research/pdf_files/SR_NFRC2006_FinalReport.pdf). The existing double-pane windows used heat/cool thermostat setpoints of 72°F/74°F to match the comfort of **LoĒ²-270** glass at 70°F/78°F.

House heat/cool energy simulations used the Resfen program from Lawrence Berkeley National Lab (http://windows.lbl.gov/software/resfen/resfen.html).

GLASS PERFORMANCE

	VISIBLE LIGHT TRANSMITTANCE	SOLAR HEAT GAIN COEFFICIENT	WINTER U-FACTOR (AIR / ARGON)	UV	FADING TRANSMISSION
Single-pane, clear	90%	0.86	1.04 / –	0.71	0.84
Double-pane, clear	82%	0.78	0.48 / –	0.58	0.75
Ordinary low-e	76%	0.72	0.34 / 0.30	0.50	0.68
LoĒ² – 270	70%	0.37	0.30 / 0.25	0.14	0.53

Definitions

Note: All values calculated using Window 6.3. (See **http://windows.lbl.gov/software/default.htm** and **http://windows.lbl.gov/materials/optical_data/default.htm** for more information on glass optical data and the Windows 6.3 program.) Emittance of ordinary (pyrolitic) low-E is 0.16.

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 600 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·ft²·°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 LoĒ²-270 that are rated and certified by the NFRC can comply with Energy Star™ requirements for the northern and central regions of the country. Northern zone will likely require the addition of **LoĒ-i89** on the 4th surface to comply with U-Factor requirements. (See **https://www.energystar.gov/products/certified-products/detail/residential-windows-doors-and-skylights** for more information on the Energy Star windows program.)

The difference is clearly **comfort.**

The difference is clear.

Cardinal LoĒ²-270 is ideal for all weather conditions in most climates. In summer, its patented coating blocks 86% of the sun's harmful ultraviolet rays and 63% of the sun's heat. It even outperforms the tinted glass often used in warm climates. You can see out and the light shines in, with no heavy bronze or smoke colored tints to darken the personality of your home. In winter, it reflects heat back into rooms.

LoĒ²-270 can be purchased in hurricane-resistant laminated glass in a variety of shapes and sizes.