# SunGuard SuperNeutral™ 68

## JUST WHAT THE DOCTOR ORDERED FOR A MEDICAL COMPLEX IN THE SOUTH

### New Low-E Glass Reduces Heat, Increases Comfort for Occupants and Patients

*In designing two new medical office buildings in Tennessee, the architects knew they wanted a transparent glass that allowed natural light inside without causing increases in energy consumption and excessive heat gain. Clearly, the answer was to specify a low-E insulating glass. What the architects learned was that not all low-E commercial glass products offer the desired results.*

For many years, architects and designers have sought to utilize glass as an attractive yet functional element of commercial building design. The ideal glass would be neutral in appearance and fill interior spaces with natural light, while reducing solar heat gain in warm weather and preventing heat loss in cold weather.

To meet this need, glass industry innovators brought low-E (for "low emissivity") product options to the marketplace. Emissivity is the measure of the glass' ability to radiate energy. The lower the emissivity, the less heat is transferred in or out. Low-E glass utilizes a super thin metallic coating to significantly reduce heat transfer as compared to uncoated glass.

Two low-E options are sputter-coated (also known as soft coat) glass, and pyrolytic coated (also known as hard coat) glass. To create sputter low-E coatings, optically transparent silver is deposited on the float glass off-line, after the base glass is manufactured. Sputter low-E includes one or more layers of silver between layers of metal oxide in a vacuum. Pyrolytic low-E is produced by applying metal oxides during the molten stage of float glass manufacturing.

What comes as a surprise to many is that not all low-E glass products are created equal. Sputter-coated glass provides high visible light transmission and optimal



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transparency, and dramatically lowers heat gain or loss. Pyrolytic low-E coatings typically allow more solar heat to be transmitted than the latest generation of sputter-coated glass. Unless the correct coated glass is installed, transparent glass that allows too much solar energy to penetrate inside the building can result in occupant discomfort, increased energy consumption and a costly strain on cooling systems.

The architects of a new medical office plaza in Tennessee recently faced this dilemma. Without full technical knowledge of the vast differences between glass options, they specified a low-E glass for use in the project, but not a sputter-coated low-E. Consequently, a pyrolytic coated glass was installed, but it soon became apparent that it was not the best choice.

## Too Warm for Comfort

Perhaps more than in any other commercial building, designers of healthcare facilities must endeavor to create a comfortable, pleasing atmosphere for patients and providers alike. This was the goal of the architect of a medical plaza located in a small city not far from Nashville. Construction plans called for two identical 45,000-square-foot, three-story commercial buildings to be built across the street from a new hospital in a high development area.

The owner planned construction in two phases. Building I was completed in 2005 to accommodate various outpatient medical practices, including a dermatology clinic, an oral and maxillofacial surgery facility and a foot treatment center. Building II opened in 2007.

Both buildings were to be constructed in a protected historical area near a Civil War battlefield, so they had to meet strict design codes. Only stone, brick and clear glass are permitted in new buildings in an effort to preserve the historic integrity of the area.

With an eye toward achieving a neutral appearance and taking into account the relatively warm location, the architects specified an insulating low-E glass for Building I. However, the double-paned pyrolytic low-E glass installed wasn't the ideal choice for the warm climate. In addition, the pyrolytic low-E was applied to the #3 surface instead of the #2 surface of the insulating glass unit, which is the norm for commercial buildings to reduce heat gain. Although it is neutral in appearance, the pyrolytic glass simply transmitted too much heat to the interior of the building.

Occupants in the western and southern elevations of Building I began to complain of discomfort during certain times of the year (especially spring through fall) as well as certain times of the day. Even though the air conditioning system was operating, the air temperature felt too warm for comfort. Office personnel and healthcare providers stated that performing daily tasks and treatment procedures was physically and mentally taxing for them in the overheated environment. Patients also complained about the heat inside the waiting room and treatment areas. In fact, occupants even reported that the window glass was warm to the touch on the western and southern sections of the building.

The heat load in Building I was also putting a burden on the cooling system. Tests were conducted to assess the heat load in different areas of the building during specific times of the day and throughout the year. Energy costs were higher than they should have been because the air conditioning system was overworking to maintain a comfortable temperature throughout all sections of the building.

The owners and architect were pleased with the visible light transmitting performance of the pyrolytic glass product, but not at the expense of the comfort of occupants or increased energy consumption.

### A Better Choice

Meanwhile, the architects were preparing specifications for Building II. Because they had been disappointed with the performance of the glass in Building I, they looked for another transparent glass option for the second phase that would more effectively reflect heat energy.

The architect learned that Guardian Industries, one of the top glass manufacturers in the world, had recently introduced SunGuard SuperNeutral 68 (SN 68), a coated glass product that addresses today's complex design challenges. SN 68, with a low-E coating applied to the #2 surface, has Guardian's highest visible light transmission percentage (68 percent) for a clear glass look combined with a very low solar heat gain coefficient (SHGC) of .38.

**Cross Section of Insulating Glass Unit - SuperNeutral 68 on #2**

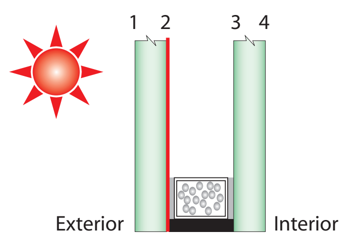


Figure 1
Source: Guardian Industries Corp.

This means SN 68 is highly efficient in transmitting light but still blocks 62 percent of solar heat. This relationship is often measured by the "light to solar gain factor" (LSG) which is the ratio of light transmission to solar heat gain and is a good measurement of the efficiency of a particular glazing. For SN 68, the LSG is 1.80, which offers an extraordinary combination of high light and low heat transmittance. Highly versatile, SN 68 also prevents heat loss from the interior of the building in cooler climates.

| Double-Glazing Technology | Glass Product | % Visible Light Transmittance | % Solar Heat Gain (SHGC) | Light to Solar Gain (LSG) | Indoor Glass Temperature for Sunlit Glass (F) |
|---|---|---|---|---|---|
| Sputter | SuperNeutral 68 Low-E on outboard #2 surface | 68 | 38 | 1.80 | 95 °F |
| Pyrolytic | Commercial Low-E on inboard #3 surface | 73 | 68 | 1.07 | 115 °F |

Figure 2
Source: Guardian Industries Corp.

Guardian provided product samples and performance data for the architect and glazier to consider for Building II. The architect appreciated the design advantages of the glass' clear, neutral appearance and wide availability of the product to meet the project's deadlines. And because SN 68 takes advantage of natural light, it is an environmentally sound choice, in line with current sustainable building trends that call for more use of natural light and less artificial light.

The architect, seeking a transparent product that let in light but minimized the unwanted side effects, not only specified SN 68 for the new building but recommended using it to replace the glass in the western and southern elevations of the original building.

The owner was initially leery of installing another high visible light transmitting glass in Building II, but agreed to the reglazing of the two elevations of the first building. Once the glazing of Building I was replaced and the tenants reported a significant improvement in their comfort level and less burden on the cooling system, the owner agreed SN 68 was the preferred option for Building II.

A comparison of the heat load before and after the installation of SN 68 in Building I was conducted by Guardian's engineers. Guardian's analysis showed a 43 percent reduction in the overall heat load (see chart, "Reduction in Solar Gain Due to SunGuard SuperNeutral 68").

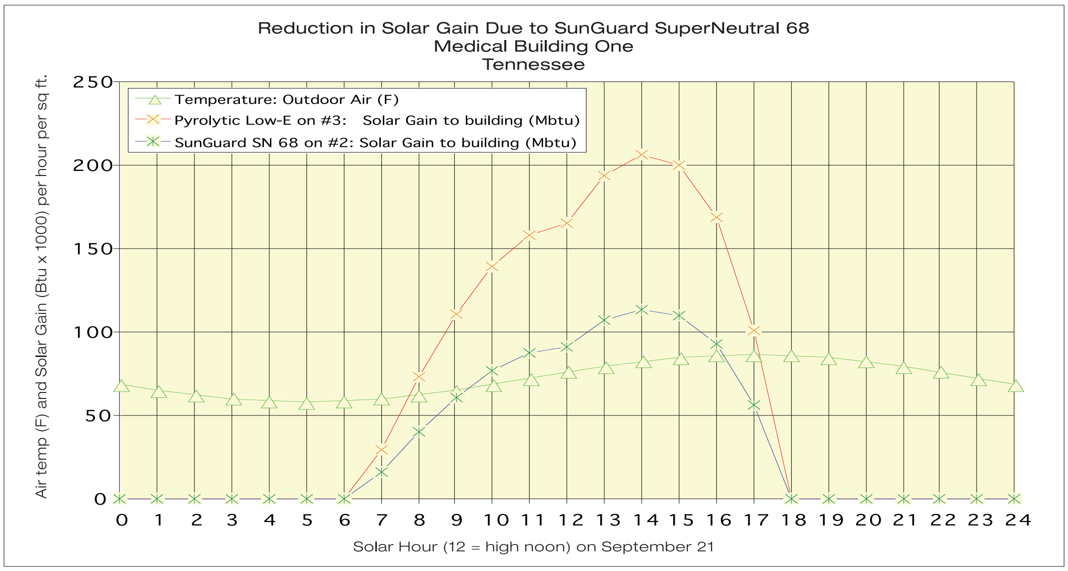


Figure 3
Source: Guardian Industries Corp.

Max Perilstein, vice president of marketing for Arch Aluminum & Glass Company, the Independent Guardian SunGuard Select™ Fabricator for the project, said, "We have been processing and supplying SN 68 throughout North America since it was introduced. It's the low-E glass of choice, and we recommend it to all our customers."

The cost savings gained as a result of improved energy efficiency would have more than compensated for any small premium the client might have paid for the superior product; however, the cost for SN 68 was competitive with the pyrolytic product used in Building I. SN 68 proved to be the optimum choice for the medical plaza buildings in Tennessee due to a substantial improvement in light-to-solar gain, greater occupant comfort and an impressive return on energy investment for the building owner.