guide to warm-edge thermal barrier technology

Fundamental facts about warm-edge for use in commercial insulated glass applications

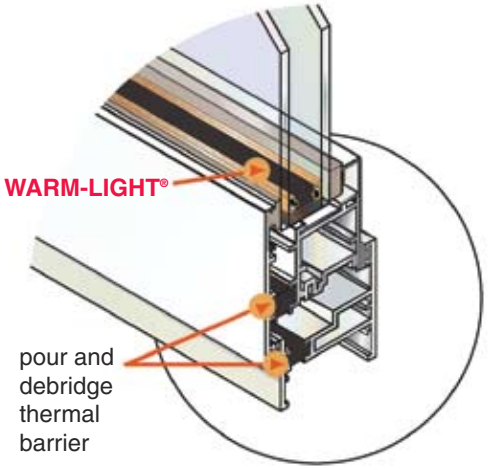
WARM-LIGHT®

Welcome to the new standard

AZON

Technology
Chemicals
Machinery

Compelling reasons why **Azon's WARM-LIGHT®** technology is the winning performer:



Flexible

Whether contemporary designs or a timeless look is desired, Warm-Light allows for a wide array of options with colors and shapes–a designers dream.

Q - Why use warm-edge technology in commercial glass applications?

A - To save energy, lower utility costs, experience less condensation and to provide a more comfortable environment. The combination of thermally improved frames and high performance glass have made the air space material the weak link in the overall glazing system. Adding a thermal barrier in the air space material dramatically reduces the transfer of outside climatic conditions (figure 1, figure 2) resulting in improved overall thermal performance.

Q - Is Warm-Light as strong as conventional spacer material?

A-Yes, as a matter of fact, with the cantilever bending method, Warm-Light will exhibit 20% less deflection than a conventional spacer. In addition Warm-Light will withstand more than twice the Lbf (pounds-force) in compression tests than conventional spacer. Today's architectural design's call for larger glass openings, thicker glass for security and increased use of structural glazing. The use of a stronger air space material is an added benefit to the thermal improvements.

Q - Is there a track record for warm-edge technology?

A- Pour and debridge technology has been in use since 1962. Incorporating thermal barrier is a natural progression of the technology from aluminum extrusions to air space material.

Q - Can I still specify a dual seal 10-year class CBA insulating glass unit?

A - The answer is a resounding yes!! The most important part of an insulating glass unit is the perimeter seal that is warranted by the IG manufacturer. Warm-Light by Azon has been designed and tested to various ASTM, IGMA, and IGCC tests and standards that are applicable to commercial glass fabricators and the production of the highest quality insulating glass units.

Q - Will I be able to meet the new energy codes with Warm-Light and warm-edge technology?

A - While satisfying various code requirements with glazing options is a function of window design and glass performance, adding Warm-Light to insulated glass has been shown to provide an improvement in the windows overall U factor in excess of .02 (.12 W/m2*K) as represented in figure 4. This provides a significant thermal improvement in the overall opening.

Q - How does Warm-Light work so well?

A - Thermal conductivity is the key. The thermal conductivity of conventional spacer (the lower the number the better) is 1,109. Stainless steel spacer material has a thermal conductivity of 99 and thus is 11 times better than aluminum in terms of thermal conductivity. Warm-Light has a thermal conductivity of .84 and is more than 100 times better than stainless steel. The polyurethane core creates a true thermal barrier (see figure 3).

Q - What does warm-edge technology add to the cost of insulating glass?

A - In today's use of high performance insulated glass, the additional cost can be calculated to a very small percentage (as little as 0.25 percent of the overall opening costs).

Q - Is manufacturing and processing an issue?

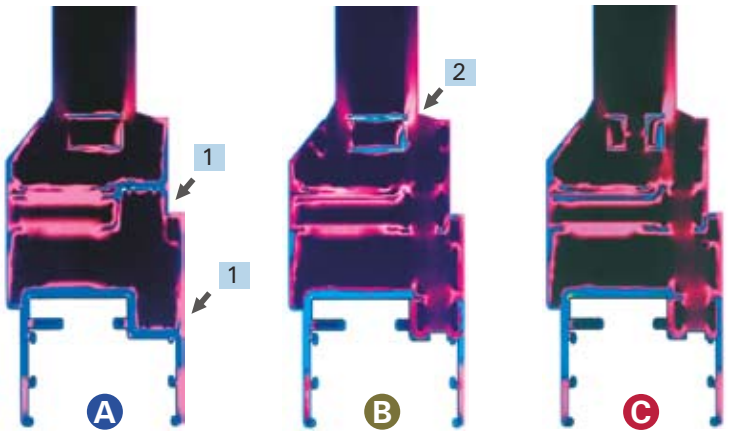
A - Warm-Light by Azon has been designed to work on virtually all insulating glass manufacturer's equipment. The product is designed to incorporate traditional desiccant filling around the entire perimeter. Warm-Light is bendable for the corners and for shapes that may be used in the building design.

Q - Are there any design limitations to the product?

A - There are standard and custom colors available. The product can be used with argon gas and internal muntins if desired.

Spacer Perfomance Data

Figure 1. Thermodynamic imaging



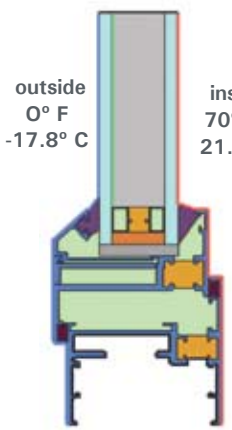
A Insulated glass unit with low E, aluminum spacer and aluminum frame. The heat flow is through the frame as shown in blue at mid-point 1

B The same low E unit with an aluminum spacer and thermal barrier frame. The heat flow is now through the spacer as depicted by the blue through the spacer 2

C Total performance package: A low E unit with Warm-Light spacer and thermal barrier frame There is no direct heat-flow path

based on temperature outside: O° F / -17.8° C ambient temperature inside: 70° F / 21.1° C

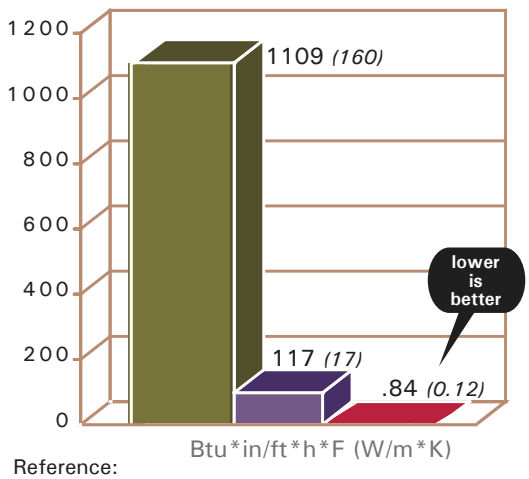
Figure 2. Sightline CRF



	double silver low E aluminum spacer	double silver low E Warm-Light spacer
sightline temp	31.2° F -0.4° C	38.7° F 3.7° C
sightline CRF	44.5	55.3

CRF or Condensation Resistance Factor is a value that measures the efficiency of a window. The higher the calculated number, the less likely condensation will form.

Figure 3. Thermal conductivity

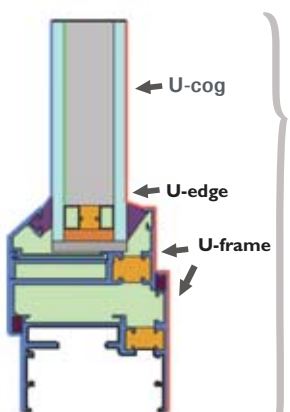


Btu*in/ft*h*F (W/m*K)

Reference:
NFRC 101: Procedure for Determining Thermo-Physical Propertiesfor Materials for Use in NFRC (National Fenestration Ratings Council) -approved software

Spacer comparisons
- conventional aluminum
- stainless steel
- Warm-Light by Azon

Figure 4. U-factors



Total U-factor is measured by overall performance of glass and frame:
- U-cog = U-factor center of glass
- U-edge = weighted average of U-cog and sight line properties (spacer)
- U-frame = heat transfer below sightline (spacer)
- U-factor = weighted average of U-cog + U-edge + U-frame

	double silver low E aluminum spacer	double silver low E Warm-Light spacer
U-cog = U-factor center of glass	.30 *(1.73)*	.30 *(1.73)*
U-edge = center of glass and sightline	.47 *(2.71)*	.42 *(2.42)*
U-frame = includes the spacer	.62 *(3.58)*	.58 *(3.35)*
U-factor = overall window performance	.45 *(2.60)*	.43 *(2.48)*

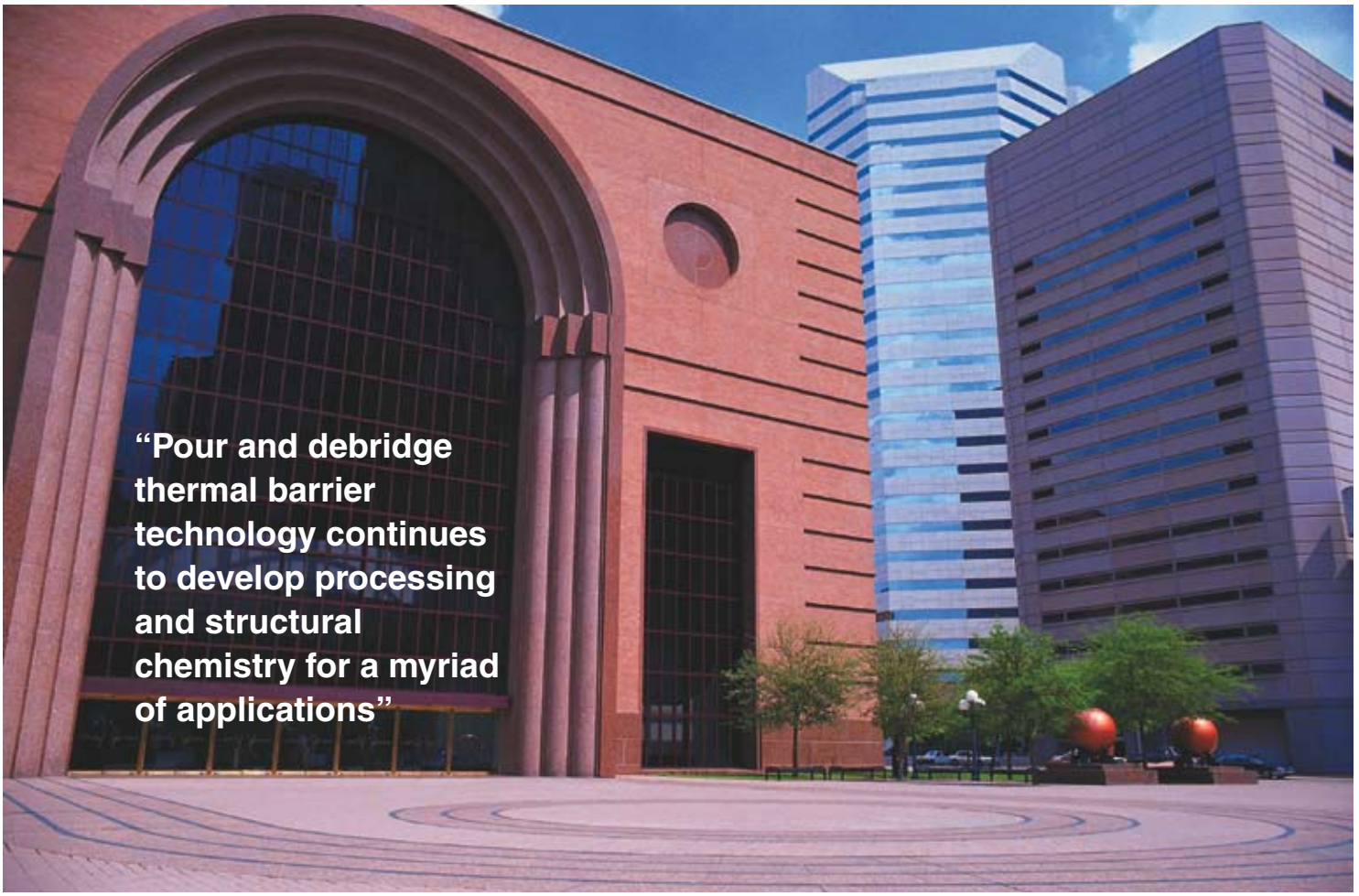
Btu/ft^2*h*F (W/m^2*K)

All calculations and thermal graphics created with Therm 5 and Window 5.1
Therm 5 and Window 5.1 are tradenames of Lawrence Berkeley Laboratory

The Azon story

During the latter part of the twentieth century enough aluminum thermal barrier extrusions have been produced to encircle the globe nine times—making Azon's *pour and debridge* for aluminum fenestration framing a world leader.

At Azon we understand the specialized needs of the commercial construction industry—particularly for commercial glazing. We adapted the process and technology of pour and debridge to the air space material. The combination of aluminum and polyurethane is what gives Warm-Light its strength and energy savings—both characteristics that are important to meet today's requirements for commercial windows and doors.



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