

WHAT IS LUMIRA®?



SOLAR INNOVATIONS® ARCHITECTURAL GLAZING SYSTEMS

Lumira® aerogel, formerly Nanogel aerogel, is an insulating gel used to fill polycarbonate, for many architectural systems and applications. Lumira® aerogel's main purpose is to increase thermal ratings, but can also greatly reduce sound transmission difference. Lumira® aerogel consists of small clear hydrophobic particles, creating an R-Value of 6.5 for a 25mm, 3 wall unit compared to an R-Value of 3 for an unfilled unit. After Lumira® aerogel is added to the polycarbonate, the thermal transfer of heat and cold is greatly reduced, minimizing energy costs on installations.

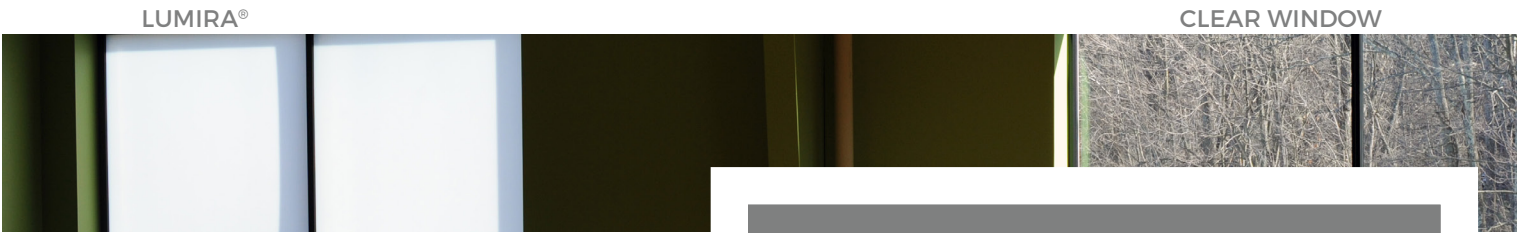
In certain applications, Lumira® aerogel can aid in LEED certifications. Lumira® can also assist in the achievement of sustainable purchasing, optimum energy efficiency, occupant comfort, low emissions, along with daylight and views.



LUMIRA® AEROGEL

What Lumira® is Made Of

The actual Lumira® aerogel product is translucent and made out of a dry silica particulate, with the ability to retain a large amount of light transmittance. Values range from 70% light transmittance for a 10mm sheet of polycarbonate to 50% with 25mm of polycarbonate when filled. Another benefit of incorporating Lumira® aerogel is glare reduction. If harsh glare is a problem, Lumira® aerogel infill can be used to diffuse light. When sunlight and heat gain are reduced in a space, energy savings will likely occur. Lumira® particles do not harbor mold, moisture, mildew, or fungus, are completely safe to be around, and do not emit any odors. The aerogel particles are UV-stable and will not deteriorate due to sunlight exposure. If a skylight is filled with Lumira® aerogel and requires replacement, the Lumira® aerogel particles can be reused and recycled under certain conditions in the replacement skylight.



Performance Features of Aerogel

Aerogel's unique combination of properties provide performance benefits unequaled in existing building materials:

- Heat Transfer Minimized
- Sound Transmission Reduced
- Light is Diffused
- Moisture Repelled

*Illustration depicts the highly porous structure of aerogel
• Average pore size is 20 nanometers

Thermal Benefits

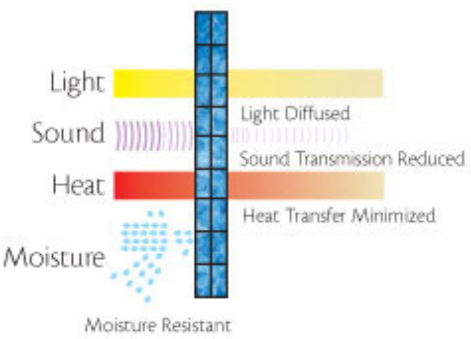
Aerogel is among the lightest and most effective insulating materials in the world. Lumira® aerogel is a solid which consists largely of air (>90%) contained in a structure with pore sizes that are smaller than the space required for air molecules to travel through. This severely inhibits heat transfer through the material, enabling world-class performance.

Acoustical Benefits

When acoustical ratings are required, Lumira® aerogel can be used to achieve specific levels. The beads not only block sound, they absorb it. The result is strong sound control by reducing outside noise transfer. With the assistance of Lumira® aerogel, interior spaces and rooms become quieter and user comfort levels increase.

The key feature of Lumira® aerogel in a sound control application is the low speed of sound waves (airborne) propagating through the porous medium, as well as poor solid vibration transmission. This is due to Lumira® aerogel's tenuous structure. Speed of sound in a medium is a fundamental material property with important implications in the attenuation of sound waves. To attenuate a sound wave of wavelength λ , it is necessary to use a layer of sound insulation at least $\lambda/2$ " thick. The wavelength of such sound wave is governed by the speed of sound: $C=\lambda \cdot f$ where

f is the frequency and C the speed of sound of the medium. Since the wavelength increases as the frequency decreases, the lower the frequency – the thicker the layer of sound control material needed.



Lower sound velocity in Lumira® aerogel makes the material particularly adapted to low frequency sound control where space is a concern.

The noise reduction coefficient is the average of the absorption at four frequencies (250, 500, 1000, and 2000 Hz). The NFRC however does not reflect material performance at specific frequencies of interest for the application. The sound absorption properties of Lumira® granules can be modified to match the needs of a particular application by changing both the mechanical properties of the material as well as the particle size distribution.

LUMIRA® AEROGEL



Though standard Lumira® is white in appearance, tinted and mirrored (metallic) finishes are available and can be incorporated for design reasons.



Daylighting Benefits

There are many applications for Lumira® aerogel such as curtain walls, interior walls, skylights, sloped sunrooms, pool enclosures, greenhouses, conservatories, walkways, and canopies. These applications all have the potential to benefit from Lumira® aerogel fill. Lumira® aerogel can also be placed inside bent and radius units.

LUMIRA® AEROGEL PERFORMANCE PROPERTIES*				
Thickness** (mm)	Light Transmission (%)	Direct Solar transmission (%)	U-value (W/m²K)	R-value (in)
10	80	80	1.38	3.2
16	70	70	1.00	4.3
20	62	62	0.78	7.2
25	55	55	0.64	8.0
32	47	47	0.51	11.1
40	39	39	0.42	12.0
50	31	31	0.34	16.0
70	19	19	0.25	20.0

*Values are for Lumira aerogel only
**Does not represent all available thickness options

Translucent Panels

The inclusion of Lumira® in daylighting systems virtually eliminates the historical trade-off of insulation vs. natural light by providing 3 to 6 times the thermal performance of traditional, insulated fenestration products while maintaining optimal light transmission.

Solid, non light-transmissive construction delivers an R-value of 25 (U-value 0.04), which allows daylighting products to deliver a range of R-values from 6 to 20 (U-0.05 to 0.16) while cultivating essential natural daylight.

- Increased daylighting designs are proven to have positive effects such as:
- Increase in productivity
 - Increase in sales
 - Increase in learning rates
 - Decrease in absenteeism
 - Promotes a healthier, happier work, and educational environment

Commercial hotels, restaurants, multi-family housing, schools, and health care buildings have the ability to incorporate Lumira® aerogel into their new glazing construction. Residential Lumira® aerogel applications include skylights, glazed structures used for entertaining or plants, or an outside canopy.

Please contact a Solar Innovations, Inc. representative with any questions at 800-618-0669.

LUMIRA® AEROGEL



* Trademark of SABIC Innovative Plastics IP BV

		Wt. (lbs/sqft)	Insulation		Clear		
			U Value	R Value	LT %	SHGC	ST
10 mm 2 wall	Standard	0.35	0.52	1.87	80	0.80	80
	w/ Lumira®	0.50	0.32	3.12	60	0.70	70
16 mm* 3 wall	Standard	0.57	0.39	2.56	74	0.65	78
	w/ Lumira®	0.80	0.26*	3.85	52*	0.57*	62
25mm* 3 wall	Standard	0.67	0.34	2.94	72	0.57	71
	w/ Lumira®	1.03	0.16*	6.25	49*	0.54*	61
40mm Thermoclear*	Standard	0.82	0.34	2.94	59	0.64	73
	w/ Lumira®	1.03	0.09	11.11	40	0.55	63

Sabic Innovative Plastics proprietary and confidential data. Typical properties based on Lexan* Thermoclear* products.

All material in this chart is Class A/CC1, per ASTM D635 and E84

% Light Transmission ISO 9050, EN410 D65 (380-780nm)

Shading Coefficient & SHGC ISO 9050, EN410

U-Value (Btu/h² F) ISO 1007, EN673

For more information on Lumira® aerogel, please visit our website at www.solarinnovations.com

REVISED 8/26/16