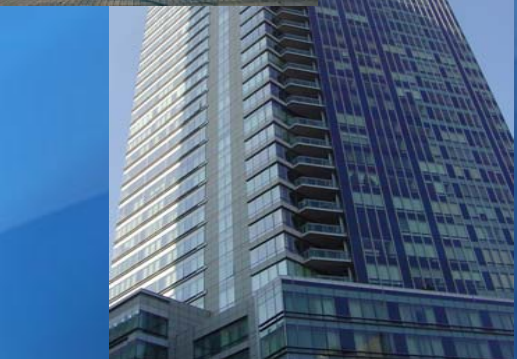




VIRACON

YOUR
GLASS
PERFORMANCE





**Glazing Trends
for Sustainable
Design**

Appearance - Color Options

Float Glass – over 15 basic colors

Coatings - currently more than 40 options

Lamination - wide array of colored interlayers

Silk-screen – over 10 colors and the option
for custom paint colors

Glass Colors

Tinted glass is the first step toward high performance glazing

The Relative Heat Gain for monolithic tinted glass, is about 25% less than clear glass



Relative Heat Gain

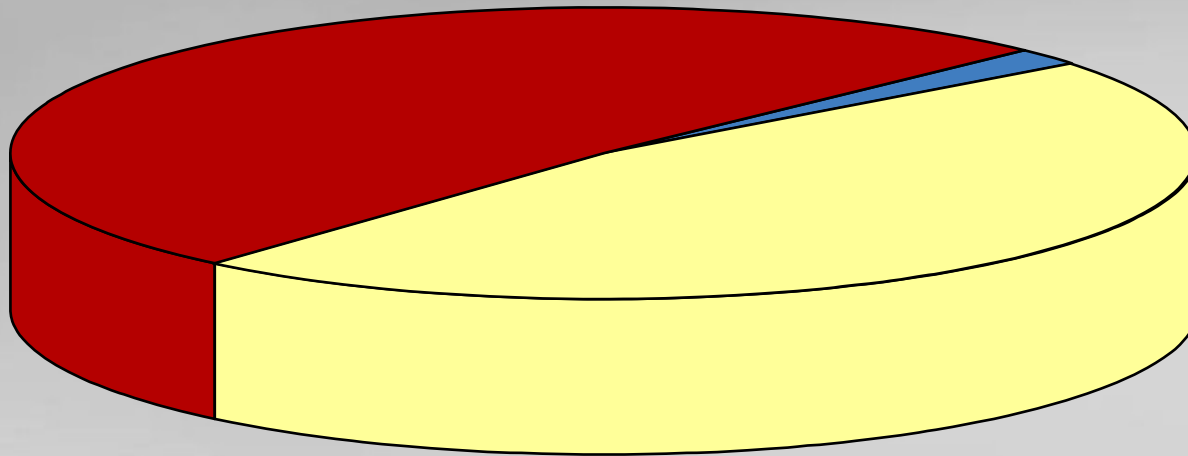


Relative Heat Gain

Solar Spectrum

Infrared 51%

Ultraviolet 2%



Visible Light 47%

Energy Conservation & Comfort

Achieved using one or a combination of:

Colored Float Glass

Insulating Glass

Coatings

Laminates

Silk-screens

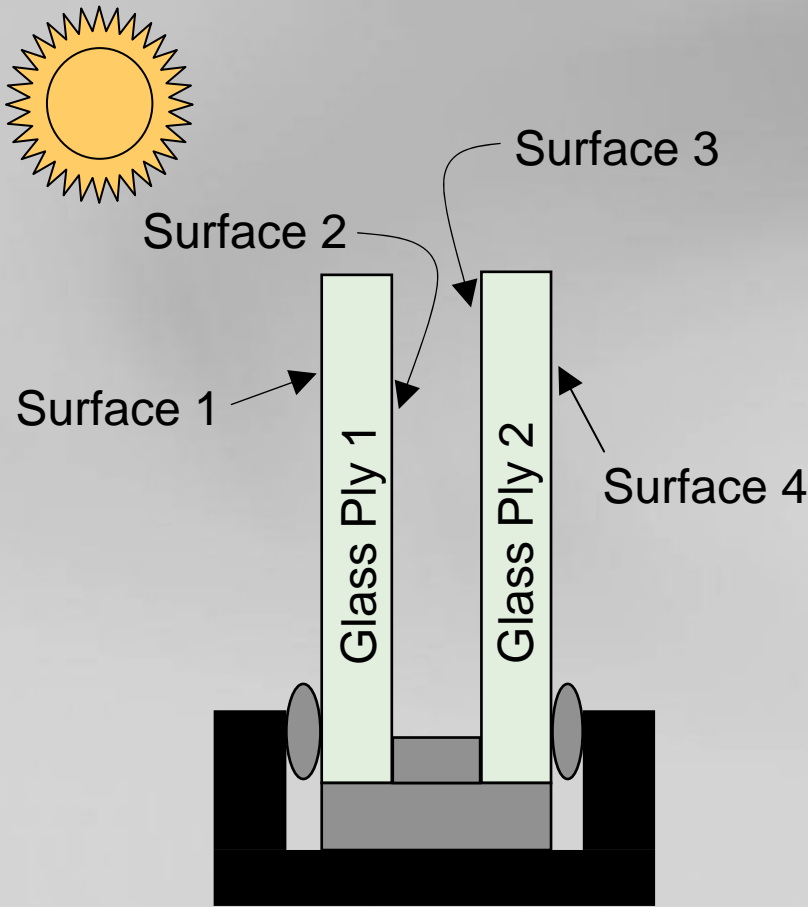
40-50% of the total energy consumed by buildings is for electric light and to remove the heat it produces.



**Phoenix Central Library
Phoenix, Arizona**

Architect: DWL Architects and Planners
Glazing Contract: B & B Glass
Glass Makeup: VE2-85

Insulating Glass



Increases thermal performance

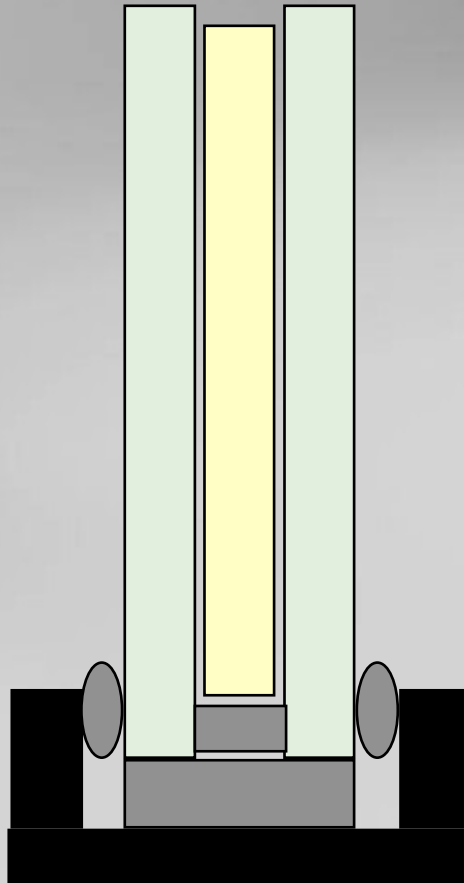
Fabricated with two glass plies spaced apart and sealed to form a single-glazed unit

Each ply has two surfaces, for a total of four surfaces in an insulated unit

Insulating Glass w/Gas Filling

Argon

SF6

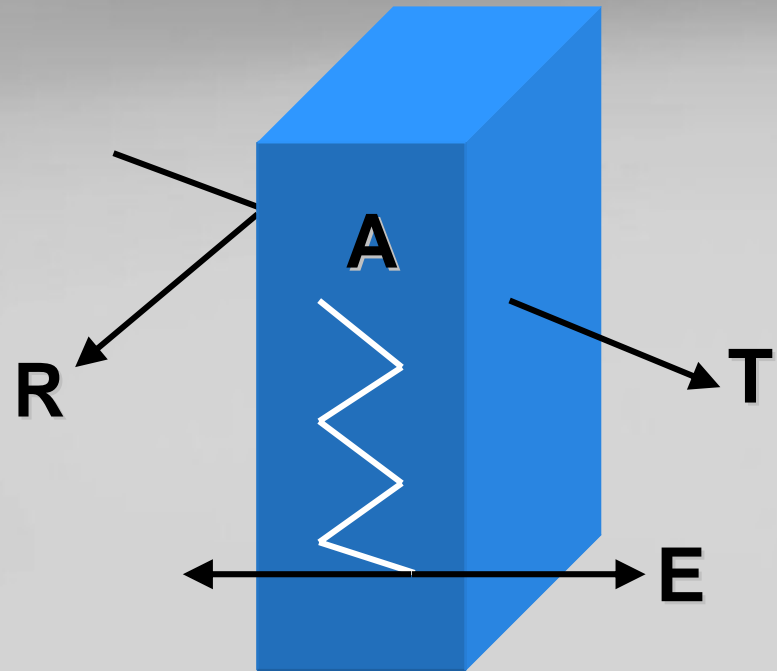
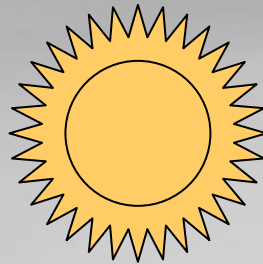


Krypton

Does it work ?

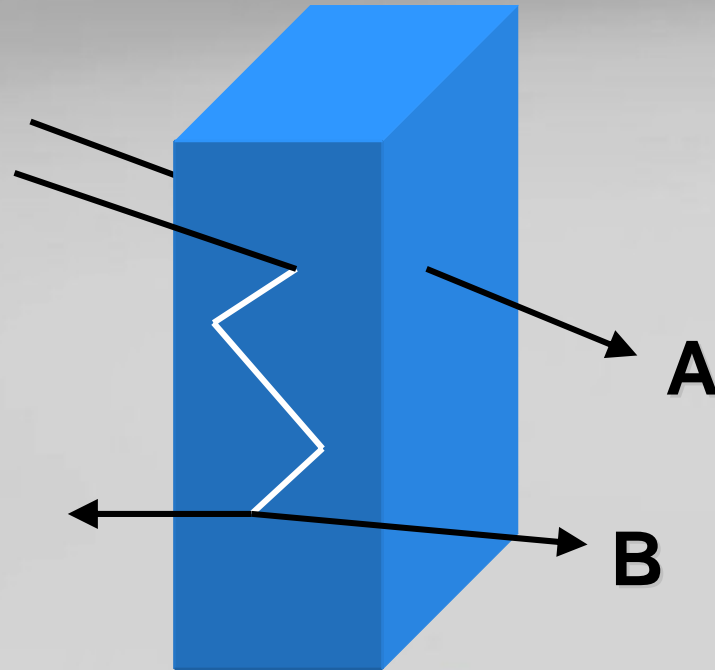
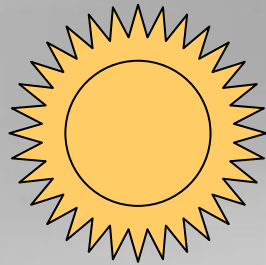
RAT Equation

Accounts for 100%
of solar energy



R = Reflection
A = Absorption
T = Transmission
E = Emission

Shading Coefficient



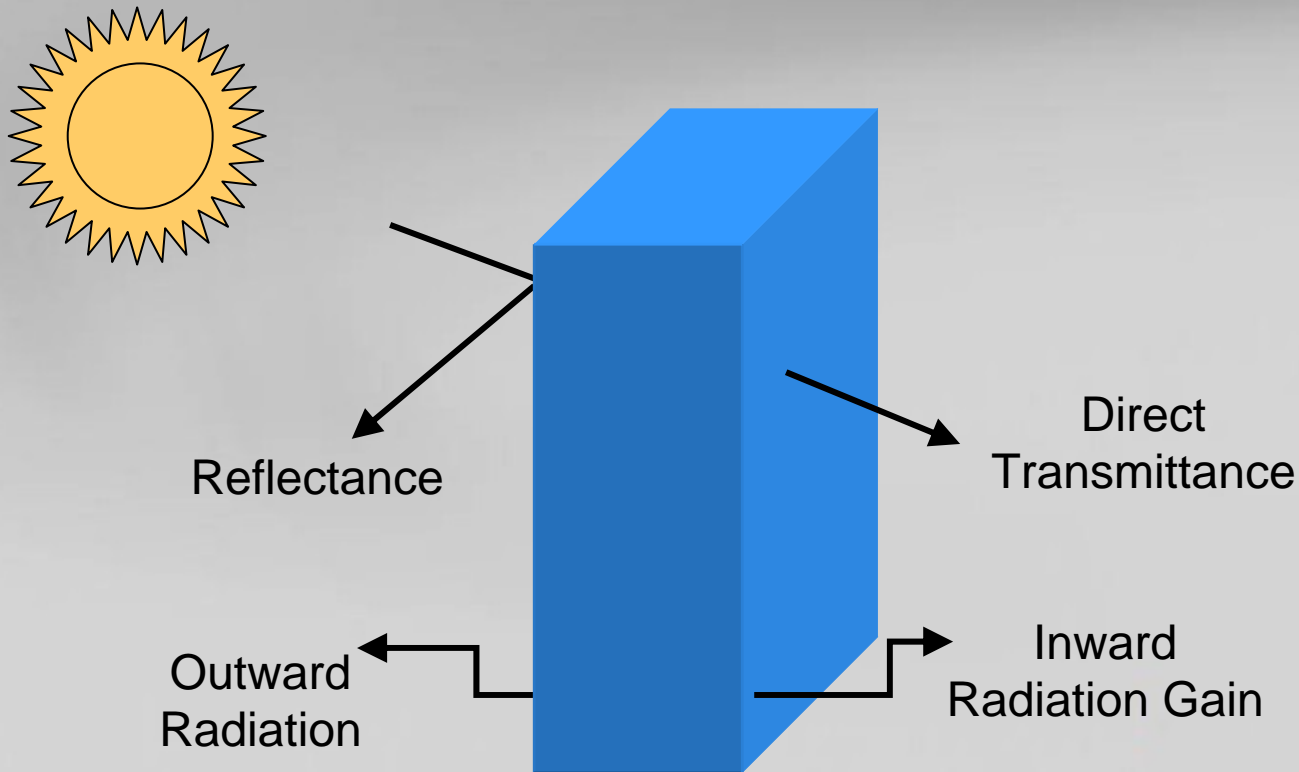
Solar Heat Gain (SHG)

$$\text{SHG} = A + B$$

$$\text{SC} = \frac{\text{SHG of X}}{\text{SHG of } 1/8'' \text{ (3 mm) CL}}$$

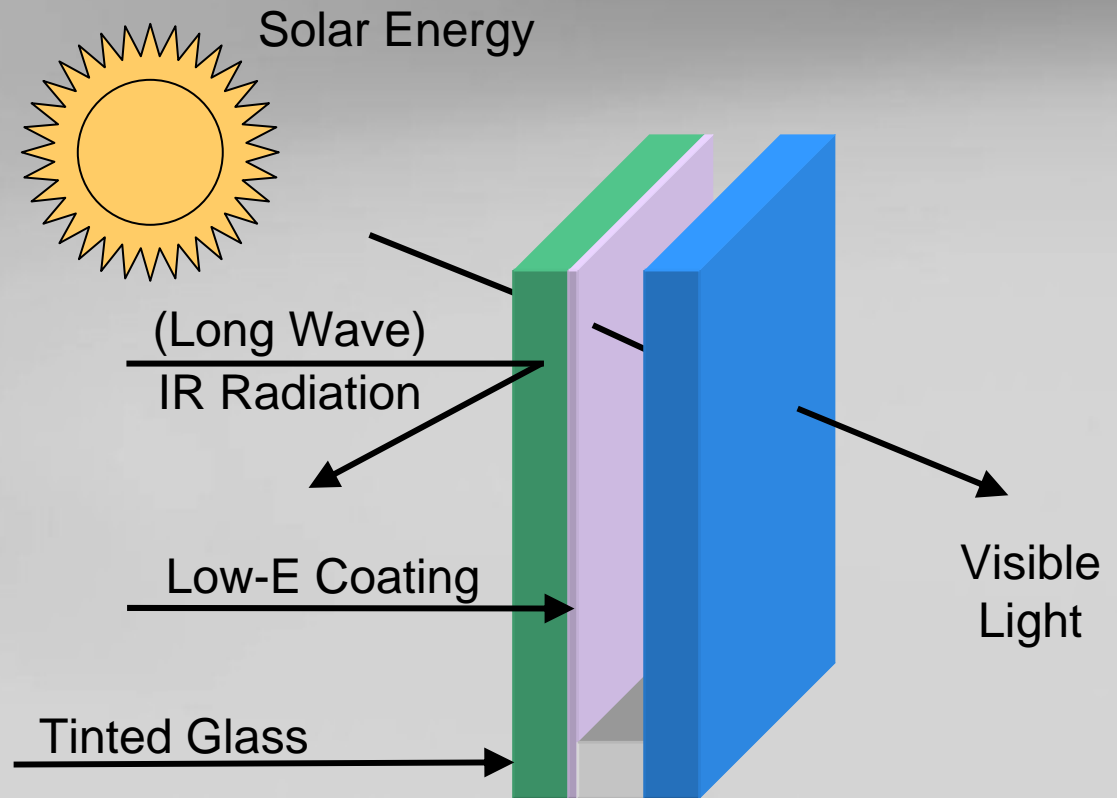
Emissivity

The ability of a material to reradiate heat



Reducing Heat Gain

Tinted exterior
glass with
Low-E coating on
#2 = Comfort



Coatings

Change glass performance and appearance

Generally composed of multiple layers of thin metallic films

May be required to be insulated to the inside of an IG unit

Generally result in significant energy cost savings for both heating and air conditioning

Coating Make-Ups

Either pyrolytic or vacuum deposited thin films

All coatings are metals

Coating types include: Low-E, Hybrid Low-E and Reflective



Dr. Pepper

Dallas, Texas

Architect: HKS, Inc.

Glazing Contract: Southwest Glass, Inc.

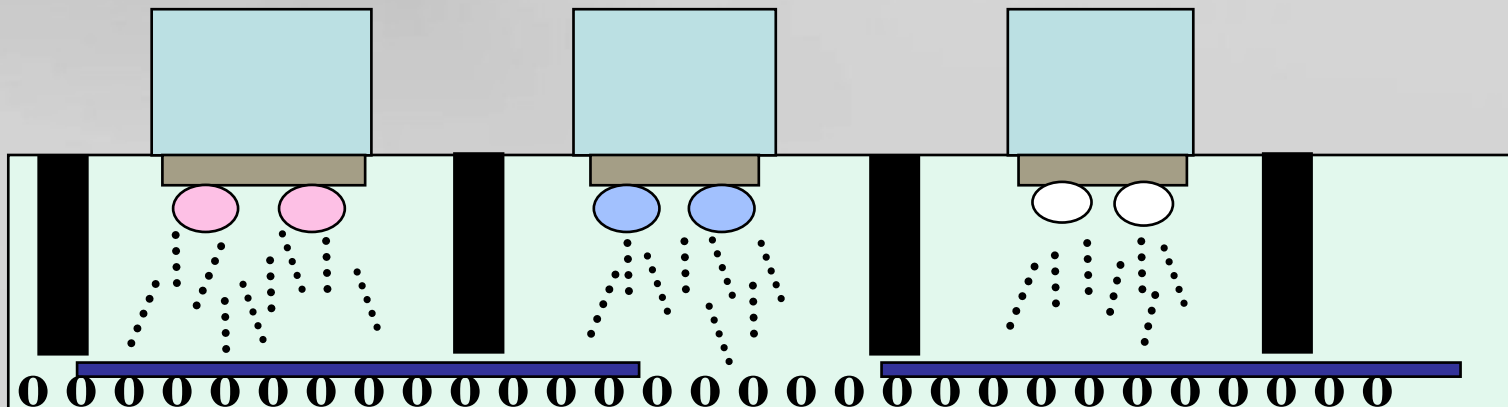
Glass Makeup: VE3-2M

Photographer: Wes Thompson

Pyrolytic vs. Vacuum Coatings

Pyrolytic - Applied during the glass manufacturing process, the coating can be applied in either the tin bath or in the lehr

Vacuum – Applied after the glass is manufactured, metal is sputtered from targets to glass in vacuum chambers. There are many different types of coatings and they can be applied to colored glass



Reflective Coatings

Available in many color options including:

Antique

Crystal Chrome

Stainless Steel

Titanium



BLUE REFLECTIVE COATING

**Oficentro Bioquim
San Jose, Costa Rica**
Glass Makeup: VT1-40 3/8" Heat Soak

Low-E Coatings

Many different Low-E Coatings exist, each with different performance and appearance

Clear

Clear VE-85

Clear VE-2M

Clear VE-55

Clear VE-52

Clear VE-42

Clear VE-40



Insulating units shown use **clear** glass – the only color seen is from the coating



**Wyeth Pharmaceuticals Worldwide Headquarters
Collegeville, PA**

Architect: Kling

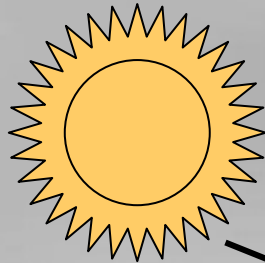
Glazing Contractor: APG-America, Inc.

Glass Make-up: VE1-2M, VE3-2M

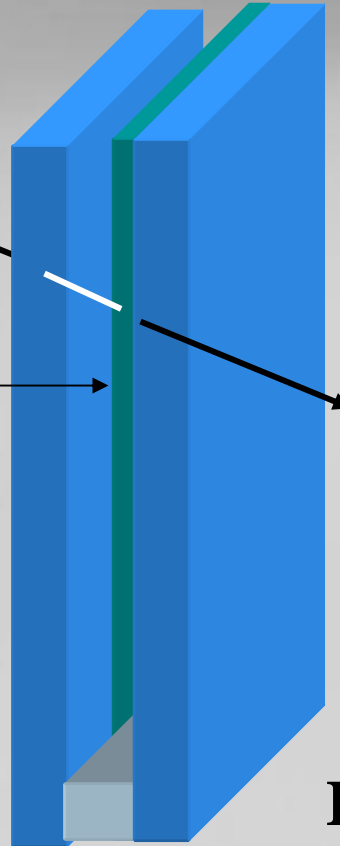
Photographer: Warchol Photography

Low-E #3 Surface Insulating Glass

“Heat Trap For Commercial Buildings”



Low-E Coating #3 Surface



Exterior

Interior

Shading Coefficient

	#2	#3*
CLEAR-2M	0.44	0.53
GREEN-2M	0.36	0.41
GRAY-2M	0.28	0.33
AZURE-2M	0.33	0.36

*Room-Side Glass
Temperature Increases
By as much as 13° F

Hybrid Low-e

Coating which combines the high visible light transmittance of a low-e coating with the low u-values and shading coefficients of a reflective coating

Available in varying light transmission

Appearance is a shiny silver color



**World Trade Center 7
New York, New York**

Architect: Skidmore, Owings & Merrill LLP

Glazing Contractor: Permasteelisa

Glass Makeup: VRE15-59 w/silkscreen



**Seneca Niagara Casino & Hotel
Niagara Falls, NY**

Architect: SOSH Architects

Glazing Contractor: CBO Glass

Glass Make-up: VRE1-38, VS5-14, VS10-14, VRE2-38, VS2-40

Photographer: Greg West Photography

Hybrid Low-e

Visible Light Transmittance

Low-e coatings range from 76% – 36%

Hybrid low-e coatings 60% – 36%

Reflective coatings 36% – 8%

Shading Coefficient

Low-e coatings range from 0.63 – 0.32

Hybrid low-e coatings 0.43 – 0.27

Reflective Coatings 0.44 – 0.15

Quinnipiac University New Residence Hall Hamden, Connecticut

Architect: Centerbrook Architects

Glazing Contractor: Advanced Performance Glass

Glass Makeup: VRE1-46, VRE1-46 with white silk-screen and VRE1-46 with green frit

SouthTrust Tower Atlanta, Georgia

Architect: SRSS and Associates

Glazing Contractor: Jamco

Glass Makeup: VRE1-59 and VE1-2M

High-performance Glass

Tinted

Insulating

Solar reflective

Low-emissivity

Laminated

Silk-screened

The background features a blue-tinted image of a building with a grid of windows in the upper left corner, transitioning into a smooth grey gradient that covers the rest of the slide. A thin, light grey scribble is visible behind the text.

Questions ???

Additional Resources

Viraconsulting™

Website

Product Specification Guides,
Brochures, Tech Talks

SweetSource CD and Sweet's
Website (<http://sweets.com>)

