

# *Insulating Glass*

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**Oldcastle Glass®**

*Where glass becomes architecture™*



**Jacobson Building at Iowa State University**

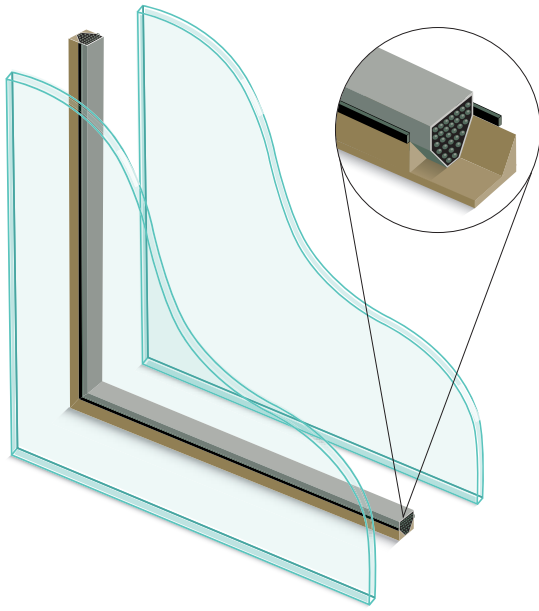
Ames, Iowa  
Architect: Herbert Lewis  
Kruse Blunck Architecture

Insulating Glass (IG Units)



**Oldcastle Glass®**

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**O**ur IG units are hermetically sealed combinations of two or more lites of glass separated by a dry airspace. IG units improve the thermal performance of windows, thus significantly reducing heating and air-conditioning costs. IG units also reduce interior condensation in cold climates, and increase comfort near windows, thus maximizing the usable interior space.

## Insulating Glass Applications

*Insulating glass (IG) units are used in a wide range of applications including:*

- Commercial/Residential Fixed and Operable windows
- Curtain Walls
- Storefronts
- Sloped/Overhead Glazing
- Nonvision (Spandrel) Locations



**Calgary Zoo  
Destination Africa**  
Calgary, Alberta  
Architect: BKDI Architects

# Insulating Glass

## Introduction

Insulating glass use in residential and commercial construction has risen steadily over the years to where the majority of all new and renovation construction today includes IG units. IG units not only save on monthly heating and cooling costs, but they also reduce the initial size and cost of the heating and cooling equipment required on a project.

By combining Low-E coatings, tinted glasses, reflective coatings, silk-screened patterns, laminated glass products and more, a wide variety of insulating glass configurations are available to satisfy a wide range of performance and aesthetic

requirements. IG units can be fabricated to meet state energy codes, sound control requirements, seismic requirements, impact resistance, bullet resistance, and hurricane and blast resistance requirements. IG units can be designed to reduce heat loss and solar heat gain entering the building, with a minimal reduction of visible light transmittance.

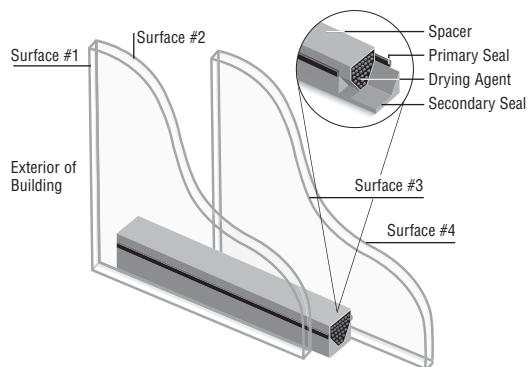
IG units will have a warmer room-side glass surface temperature than single glazing, thus reducing condensation and moisture-related problems.

## Description

IG units are hermetically sealed combinations of two or more lites of glass separated by a dehydrated airspace. Desiccated spacers are dual sealed with polyisobutylene primary sealant and an organic or silicone secondary sealant, depending on the project specifications and the application. (See the diagrams below.) Argon gas-filled IG units are available to further improve the insulating properties (reduce the U-Value) of a standard air-filled IG unit.

The glass lites of an IG unit can be annealed, heat-strengthened, tempered or laminated, as needed, to meet building code requirements, safety glazing standards and design requirements. The lites of an IG unit can be of equal or unequal thickness.

### Insulating Glass Unit



### Glass Types Available

Outboard Lite	Inboard Lite
<b>Clear</b>	Clear & Low-E
<b>Tints</b>	Clear & Low-E
<b>Low-E</b>	Clear
<b>Spectrally Selective Tints</b>	Clear & Low-E
<b>Patterned</b>	Clear & Low-E
<b>Reflectives #1 or #2</b>	Clear & Low-E

Others include: Laminated Glass, Spandrel Glass, Wired Glass, Silk-screened Glass and Other Decorative Glass.

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## Insulating Glass

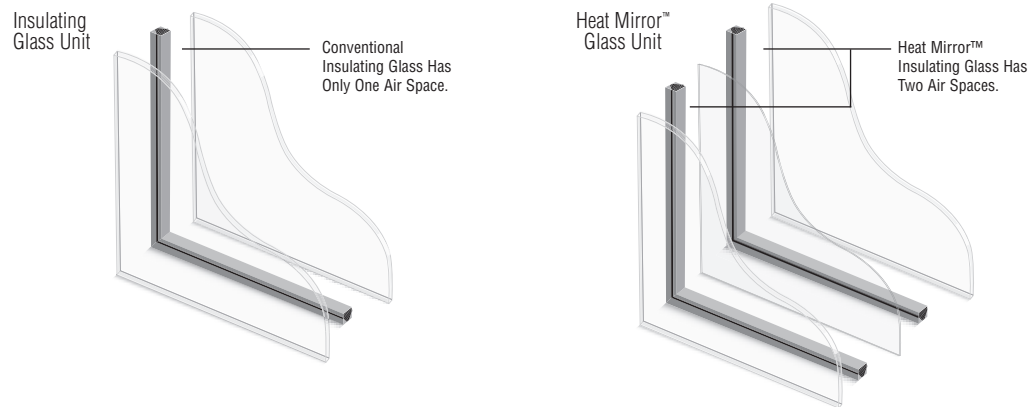
### Description (continued)

#### Heat Mirror™ Insulating Glass

Heat Mirror™ insulating glass has a specially coated Low-E film, suspended midway between the lites of glass in the IG unit, to create two dead airspaces, resulting in improved thermal

performance and solar control. In addition, tinted or reflective glasses can be used in the makeup to further enhance aesthetics and solar control.

#### Heat Mirror™ Offers More Than Twice the Insulation Value of Conventional Glass:



#### Glass Options

Insulating glass units are fabricated according to project specifications. IG units can be constructed using a large variety of glass products—including clear, low iron, Low-E's, standard or high performance (spectrally selective) tints; and reflective, silk-screened, spandrel, laminated, decorative, and wired glass—to achieve desired aesthetics, meet design criteria and/or to improve solar control and thermal performance.

*For a list of available glass products/colors, go to the White Glass Options Tab.*

*For more information on silk-screened, spandrel and laminated glass products, go to their respective Green Product Information Tabs.*

*For optical and thermal performance data on IG units, go to the Black Performance Data Tab.*

### Capabilities

The standard 1" commercial IG unit is made up of two lites of 1/4" glass and a nominal 1/2" airspace. Custom IG unit designs can be fabricated with glass thicknesses ranging from 1/8" to 3/4" and with airspace thicknesses ranging from 3/16" to 7/8".

Maximum sizes for IG units are determined by a number of considerations. Size, thickness, weight, aspect ratio, application and load requirements are the factors utilized to make this determination.

*(continued on next page)*



# Insulating Glass

## Capabilities (continued)

### Heat Mirror™ Product

<b>Minimum:</b>	5 sq. ft.
<b>Maximum:</b>	71"–One dimension (Film width)
<b>Minimum Size:</b>	12" x 12"
<b>Maximum Size:</b>	71" x 120"
<b>Minimum Unit Thickness:</b>	3/4"

The following Heat Mirror™ films are available with various light transmittance and solar properties: HM TC 88, HM SC 75, HM 77, HM 66, HM 55 and HM 44.

*See the Black Product Performance Data Tab for glass performance values with these films and various glass substrates.*

## Applications

Insulating glass units are used in essentially all exterior building applications, including vertical glazing, sloped glazing, overhead glazing and skylights, in both vision and spandrel (nonvision) areas. Depending on the glass type used, IG units can be designed for light and solar control; sound control; ultraviolet screening (to reduce fading); hurricane, earthquake and blast resistance; security; bullet resistance; and decorative applications.

IG units are also used for interior applications such as sound control and to reduce energy usage for climate-controlled (hot or cold) rooms.

*See the White Glass Selector Tab for some typical applications.*

### Residential Applications

Insulating glass has become the standard for both new and replacement residential windows. Most residential IG units are made with one outboard lite of clear glass and an inboard lite of clear glass, often with a Low-E coating to further reduce heat loss.

When the short-wave infrared (IR) energy of the sun strikes an object in the house, some of the energy is absorbed and reradiated as long-wave IR (heat) energy. The Low-E coating acts to reflect this heat energy back into the residence. In cold climates, the Low-E coating is normally

placed on the #3 surface of the unit. This is done to maximize passive solar heat gain from the sun, while still improving (reducing) the winter nighttime heat loss (winter U-Value). In warm climates, the Low-E coating is positioned on the #2 surface of an IG unit to minimize solar heat gain. The U-Value remains unchanged for the second or third surface application.

### Commercial Applications

Most commercial buildings spend the majority of their energy dollars on cooling loads, even in cold climates, due to the internal heat generated by lights, people, copiers, computers and other office equipment. Also, there has been an increase in the number and size of windows to maximize the use of natural daylight to reduce energy usage and lighting costs, as well as the positive effect on employee productivity. Therefore, the major emphasis in commercial buildings is to reduce heat gain (minimize the shading coefficient/the solar heat gain coefficient). Of lesser importance, but still quite significant in cold climates, is the need to minimize nighttime heat loss (winter U-Value).

There are now a large number of high performance/spectrally selective tints, with and without high and low reflective coatings, that do an excellent job of reducing heat gain. And there are a number of Low-E glasses that not only improve (reduce) the winter U-Value, but also reduce heat gain.

## Insulating Glass

### Characteristics

#### Certification

Oldcastle Glass® insulating glass units are independently tested and certified according to North American standards for quality and performance. Our IG unit constructions pass the highest level (class CBA) of the ASTM E773/E774 specifications for seal durability. The tests are performed by third-party labs and validated by the Insulating Glass Certification Council (IGCC), which sponsors the certification program and conducts in-plant inspections in the USA. In Canada, insulating glass units are certified through the IGMAC (Insulating Glass Manufacturers Association of Canada), certification program, in accordance with the CGSB 12.8 Standard. Additionally, Canada and the USA are actively promoting member participation in a harmonized insulating glass standard test method that is administered by IGMA (Insulating Glass Manufacturers Alliance) in Canada and through IGCC in the USA. The new standard has been labeled ASTM E2188, E2189 and E2190. Oldcastle Glass® is an active member of IGMA, a unification of the former IG associations of the USA (Sealed Insulating Glass Manufacturers Association) and of Canada (IGMAC). Oldcastle Glass® insulating glass products are listed in the latest version of the *IGCC Certified Products Directory*.

#### Condensation on Interior Glass Surfaces

Condensation on building interior glass surfaces (the #4 surface of an IG unit) is a common wintertime complaint in much of North America. Condensation not only reduces visibility; it also leads to severe damage of the surrounding construction from this moisture. Condensation occurs on interior glass surfaces when the surface temperatures fall below the dew-point temperature of the room. The relative humidity in a room at which condensation will occur on the glass surface depends on the interior glass

surface temperature, which in turn depends on all the factors affecting heat flow through the glass. These factors include the inside and outside air temperatures and airflows adjacent to the glass surfaces, and the IG unit thermal transmittance (U-Value). Because Low-E glass improves (lowers) the IG unit U-Value, using Low-E glass will increase the unit's interior glass surface temperature. Thus an additional benefit of using Low-E glass is that it permits a higher relative humidity in a room before condensation will occur. This can improve occupant comfort and performance in the winter months.

#### Vision-Spandrel Color Match

Spandrel glass can be designed to contrast or harmonize with the vision glass. *A wide range of colors and glass products are available to do this, as discussed in the Green Spandrel Tab section of this binder.* The best match for a vision IG unit is a spandrel IG unit using the same exterior glass (normally a tinted or reflective glass) and a spandrel glass as the interior lite, with the coating on the #4 surface on an IG unit.

It should be understood that the degree of color and visual similarity of a building's vision and spandrel glass will vary greatly, depending on the time of day, sky conditions, the vision area lighting and interior shading conditions (drapes, miniblinds, etc.), as well as on the color, reflectance and light transmittance of the glass.

Assuming the vision and spandrel IG units have the same exterior lite, the visual difference between them will be less noticeable under the following conditions:

- the more reflective the exterior lite is
- the lower the light transmittance of the exterior lite is
- the brighter the sky conditions



## Insulating Glass

### Additional Important Information

#### Design Criteria

*Details on the following important topics can be found in the Black Design Criteria Tab: Glazing Instructions, Thermal Stress, Deflection, Glass Design Loads, Glass Thickness Selection, Spontaneous Breakage of Tempered Glass, Roller Wave Distortion in Heat-treated Glass, Mock-ups and Warranties.*

#### Specifications

*A sample Section 08800 Specification for North America can be found in the Black Specifications Tab. Information specific to insulating glass can be found in Part 2 Products, 2.02 Materials.*

#### Contact Us

For any additional information, including details, technical data, specifications, technical assistance and samples, or to speak with an architectural specialist, call 1-866-OLDCASTLE(653-2278).

#### Visit Us on the Web

Log on to [www.oldcastleglass.com](http://www.oldcastleglass.com) for project photos, product colors, general inquiries and project assistance.

To view performance data on a wide range of glass makeups, or to build your own product specification, log on to [www.oldcastleglass.com](http://www.oldcastleglass.com) and choose GlasSelect™ 