



# The I-ENG-A Report

investigative engineering – property damage – cause and origin – biological growth analysis- fire and arson investigation  
accident reconstruction – subrogation – expert witness testimony – construction defects – products failure analysis

**Investigative Engineers Association, Inc.**

Nationwide investigative engineering expertise (800) 523-3680

## INSULATED GLASS (IG) SEAL FAILURE: SUDDEN AND ACCIDENTAL OR INEVITABLE?

Article by: James A. Skaret, PE; North Central Consultants, Ltd., I-ENG-A North Dakota

Most buildings that provide a temperature and/or humidity controlled environment are constructed using insulated glass (IG) panels in windows. The IG window consists of two (2) glass panels separated by a relatively thin air space. The exterior (windward) glass, and the interior (leeward) glass, are separated by a metal spacer. The air space between glass panels is normally filled with an inert gas. Glass panels are installed with a sealant that is intended to prevent the intrusion of outdoor or indoor air and moisture to the air space between glass panels. Manufacturers typically offer a 5 or 10 year warranty on the performance of the seals and visible evidence of the intrusion of air and moisture to the IG air space.

**Following a high wind event there will occasionally be claims that high wind pressure has caused IG window unit failure that is not characterized by broken glass, but by the presence of moisture within the IG air space.** Most of these claims occur following a high wind event where wind velocities have been less than 80-90 mph. To adjust such a claim, it is important to determine the age of the window

unit(s), the manufacturer of the windows and the spacer. Window dimensions are also important, not only to assess the monetary value of the IG panel, but to determine what is referred to as the “aspect ratio”. If a technical analysis of the window is needed, the “aspect ratio” or ratio of the width to the height of the window will be important data.

IG window experts concede that IG unit seals may be permeable to water from near the beginning of their in-service life. To understand the behavior of insulating glass units under stress from wind pressure or from thermal stress there have been research projects completed at the Wind Engineering Research Center and the Glass Research and Testing Laboratory at Texas Tech University. Research papers are available either through Texas Tech University or EMDOCS Document Delivery Service. Call 1-800-282-2720 or go to website: <http://emdocs.uncoverco.com>. The publisher of many of the research documents is Elsevier Science. The Sealed Insulated Glass Manufacturers Association (SIGMA) also is a valuable resource for information regarding the behavior of insulated glass units.



Example of IG Window Unit Failure: Note “streaking” on glass and “foggy” air space.

Insulated glass window manufacturers use metal spacers that contain a desiccant. The desiccant enables the IG unit to absorb a limited amount of moisture within the air space of the unit before there will be visible evidence of moisture intrusion. **The desiccant enables the window manufacturer to offer a warranty on the IG window unit.** When the desiccant capacity for moisture absorption is exceeded, (usually after the warranty period has elapsed) moisture will begin to appear within the air space. If there has been no surface damage to the windward side of an IG unit, and an

## INSULATED GLASS (IG) SEAL FAILURE:

insured claims that moisture within the IG unit air space was not present prior to the claimed high wind event, it should be understood that the appearance of moisture in the air space immediately after the high wind event is a very rare coincidence. It is more likely that the insured did not pay attention to the condition of the windows prior to the high wind event or is attempting to get the insurer to replace worn out IG window units.

The structural mechanics of IG panels under load is a complex issue. Architects and installers must be careful to specify to the manufacturer the location of the window installation to assure that the IG unit has the proper "ratios" that will assure the best possible performance and maximum service

life of the window units. The aspect ratio, thickness ratio of the glass panels, and the air space to thickness ratio are all factors that affect the portion of the applied pressure that is transferred from the windward glass to the leeward glass. These are factors that will affect the integrity of the glass sealant over the service life of the IG unit and are factors that will be analyzed if an expert is retained to investigate the loss.

**Premature failure of IG units is not uncommon when a builder/developer has not taken steps to assure that IG window units have been properly selected. However, a sudden and accidental failure of an IG unit without evidence of surface damage is very uncommon.**

**This article authored by James A. Skaret, P.E., North Dakota Affiliate of I-ENG-A.**

*Example of Multiple IG Window Unit Failure: Note "streaking" on glass and "foggy" air space.*



[www.ienga.net](http://www.ienga.net)

### COMPANY NAME

Address Line 1  
Address Line 2  
City, ST 11111

COMPANY NAME  
STREET ADDRESS  
CITY, STATE 00000