

IGMA -Gram

Newsletter from the Insulating Glass Manufacturers Alliance

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THE LANGUAGE OF FAILURE ANALYSIS

All industries have their own terms and phrases. Sometimes these terms have a totally different meaning from one industry to another, even though they are spelled alike and sound alike. For instance, glazing to a baker is quite different from glazing to a construction worker. Even within an industry, new products, new usages and improved technology can bring on new meaning or create new terminology.

CAUSE DEFINITIONS:

Definitive Cause – The exact mechanism that describes how a failure occurred.

Primary Cause – The condition that causes a majority of failures when there are two or more conditions associated with the failures.

Adhesion Failure – The pulling away of a sealant / compound from the surface it is applied to resulting in water penetration.

Secondary Cause – A condition that causes fewer failures than the Primary Cause of failures when there are two or more conditions associated with the failures.

Root Cause – Similar to Definitive Cause but usually used when the change of a single condition will prevent future failures.

Probable Cause – A statistical description only. Must be suffixed by Primary, Secondary, Contributing.

Candidate Cause – A hypothesis that a particular circumstance provides a feasible explanation for the failure. It is necessary to test all candidate causes in order to determine whether they are Definitive, Primary, Secondary

or Contributing Causes or alternatively not related to the failures.

Design Failure or Cause – Failure of a designer to consider any of the Service Environments or Product Specifications. One of the two broad categories of failure – see Implementation Failure.

Implementation Failure or Cause – Failure of a supplier, manufacturer, shipper, etc. to meet the Product Specifications. One of the two broad categories of failures.

MORE DEFINITIONS:

Baseline Failure – The failure rate that occurs in units that are manufactured and installed in accordance with the Design Specifications. It is usually well less than 1% during the warranty period.

Cohesive Failure – The splitting and opening of a sealant / compound within its body, resulting in water penetration.

Condition – An item or circumstance that may or may not relate to failures.

Data Mining – The practice of searching for correlations in data with the purpose of generating a failure hypothesis.

Demonstration Test – A test that demonstrates particular physical phenomena but does not establish a cause of failure.

Design Environment or Service Environment – The conditions that the designer specifies and assumes that an IG unit will exist during its service life.

Design Sensitivity – A design specification condition when a small change in a specification causes a significant change in the performance.

Dew Point – The temperature above 0°C (32°F) at which visible water vapour or other liquid vapour begins to deposit on the air-space glass surface of a sealed insulating glass unit in contact with the measuring surface of the dew point apparatus.

Effect – An observation related to the failures such as loss of sealant adhesion. Not to be confused with a cause of failure.

Facing Elevation Angle – The angle, in degrees, starting from North and measure in a clockwise direction that the unit faces. A south facing unit has a facing elevation angle of 180 degrees. Magnetic compass measurements must be adjusted by the magnetic declination for the particular location of the building.

Failed I.G. Unit – An installed unit failure exhibits permanent material obstruction of vision through the unit due to accumulation of dust, moisture or film on the internal surface of the glass. Surface numbers 2 or 3 in dual pane units; surface numbers 2, 3, 4 or 5 on triple pane units.

Failure Database – A database that contains as much information as possible regarding the conditions relating to the failures as well as the manufacturing process and service conditions of the entire production population.

Failure Database Analysis – An analytical system of a Failure Database using various database and statistical methods that typically

compares failure rates (see Failure Rate) against condition variables. For example: What is the comparative failure rate for units glazed in different types of windows?

Failure Rate (K-rate) – The number of failures during a specified period of time for product manufactured during a specified time period. For IG units it is usually expressed as the number of failures per year for each 100,000 units manufactured in one year.

Fogged Unit – A permanent deposit of contaminates on the interior glass surfaces of an insulating glass unit.

Fogging – A deposit of contamination left on the inside surface of a sealed insulating glass unit due to extremes of temperatures or failed seals.

Frost Point – The temperature below 0°C (32°F) at which visible frost begins to deposit on the air-space surface of a sealed insulating glass unit in contact with the measuring surface of the frost point apparatus.

Premature Failure – The condition when unit failures significantly exceed the base failure rate within approximately the first ten years of life. Anytime the annual K-rate exceeds 100, Premature Failure can be suspected.

Product Specification – The features of the materials or the design that describes the minimum required dimensions or physical, mechanical or chemical properties.

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