

# Argon Gas Filling

Since 1988, Cardinal IG Company has been gas filling their IG units. Gas filling, and more particularly argon gas filling, is used to lower the U-Factor of the IG unit.

## Initial Argon Fill Level

It is well understood that insulating glass units cannot be 100% filled with any particular gas. Cardinal designs their units to have initial average argon fills of 90% or above (unless otherwise specified).

Insulating glass unit size, geometry and addition of internal grilles, etc. can negatively influence the effectiveness of the argon filling process and the resulting percentage of argon in the air space. For example, grilles inside the airspace contain ambient air and the air in the grille likely will reduce the overall initial argon fill percentage by several percentage points.

Cardinal IG is a licensee of IGCC (Insulating Glass Certification Council) and IGMA (Insulating Glass Manufacturers Alliance) under their argon fill certification programs. Cardinal IG has submitted the required IG units to IGCC and IGMA for testing against their requirements. Such test units must be found to meet a minimum average initial argon gas content of 90%, and after final weathering of ASTM E2190 weathering cycle have a minimum average gas content of 80%. See [www.igcc.org](http://www.igcc.org) and [www.igmaonline.org](http://www.igmaonline.org) for more information.

At the time of manufacturing, Cardinal automatically measures argon fill levels of its IG units using various spectroscopy techniques. All of these techniques have inherent limitations and do not allow the measurement of gas fill levels of all IG units.

## Argon Permeation

Cardinal IG has also used the European *EN 1279-3 Long Term Test Method and Requirements for Gas Leakage Rate and For Gas Concentration* to determine the argon permeation rate of tested units.

These tests, conducted by an independent laboratory, found the Cardinal IG units had an argon initial permeation rate below 1% of argon per year.

Cardinal IG manages its manufacturing processes for the purpose of consistently constructing units in a manner similar to the units that were tested under the EN 1279-3 standard. However, Cardinal IG cannot certify or assure any particular IG unit will have an argon permeation rate of below 1% of argon per year.

## Argon Filling of IG Units Without LoE

Cardinal IG does not recommend the use of argon in units without a LoE coating. The addition of argon gas provides only a small improvement in U-Factor compared to the addition of LoE coating. In the absence of a LoE coating the argon gas will only provide a small incremental improvement in U-Factor and virtually no effect on the unit's other performance properties. This is illustrated in Fig IG02-02 below.

Outboard Lite	Clear	Clear
Gas Fill	Argon	Air
Inboard Lite	Clear	Clear
U-Factor	0.46	0.48
Tvis	0.82	0.82
SHGC	0.78	0.78

Fig IG02-02 Center of glass performance with 0.522" (13mm) airspace, 3mm glass, and argon fill assumed to be 90% with remainder air. U-Factor units of BTU / hr-ft<sup>2</sup>-F. Calculations done with LBNL Window software.

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