LOW-EMISSIVITY GLASS COATINGS EXPLAINED

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INTRODUCTION

Low-emissivity (low-E) glass comes in so many variations to suit different budgets and window performance requirements that it can be difficult to get your head around at times. Then there are different types of coatings with different glazing requirements and performance factors within the low-E space. Australian glass processor Glassworks (Aust.) provides a rundown of the main coatings and glazing options that best suit Australian conditions.

UNDERSTANDING THE TYPES OF COATINGS

Low-emissivity coatings essentially work by interacting with radiation in the two regions that windows are exposed to. The first being the solar region (short wavelength radiation emitted from sun) and the other being the room temperature region (long wavelength radiation).

The two main coating categories are Magnetron Sputtered Coating and Pyrolytic Coating. The main difference between the two is that the low-E Magnetron Sputtered Coating (also known as a Soft Coat or Sputter Coat) is designed to go inside the unit and therefore double-glazed in an Insulated Glass Unit (IGU). This type of coating cannot be exposed and generally performs better than Pyrolytic in terms of solar control and the reduction of heat transfer through the window (low U-Value).

Pyrolytic Coatings (also known as Hard Coat or Room Side Coat), on the other hand, are tough enough to be exposed and can be left monolithic (single glazed), although they perform better when double-glazed. These coatings generally offer less solar control as they are designed to reflect indoor heat from back inside the room, lowering the U-Value.
Questions:

1. How do different coating categories differ in terms of performance?

2. What are the main factors that influence the performance of low-E coatings?

3. How can the performance of low-E coatings be interpreted?

4. What are the implications of using super clear low-E magnetron coatings like Viridian Lightbridge™ or Pilkington Optitherm®?


6. How do the products of Glassworks differ in terms of performance?

7. What are the implications of using LoE®-340 for western elevations without blinds or overhangs?

8. How do low SHGC with high VLT coatings work in reducing heat from the sun at the same time?
2. LOW-E PYROLYTIC COATINGS

Pyrolytic Coatings (also known as Hard Coat or Room Side Coat) are a single layer vapour deposit that is fired on at high temperatures during the float glass process and is tough enough to be exposed internally and used on surface 2 of a monolithic window or surface 4 of a double glazed IGU. In spite of this, it is not a room-side only coating, as it too can be incorporated in an IGU on surface 2 or 3 – even performing far better this way. The best-known examples of Pyrolytic Coatings are Viridian EnergyTech™, Pilkington Energy Advantage™, and AGC Planibel G.

The advantages of a Pyrolytic Coating are that it is more durable, versatile, and easy to handle, with the disadvantages being that it offers less solar control on clear glass than many low-E Magnetron Coatings and has a higher comparative U-Value when in an IGU.

One exception of a low-E coating tough enough to be exposed is an Indium Tin Oxide Coating (ITO). An ITO is technically a magnetron sputtered coating but as it is not silver based like other low-E Magnetron Coatings, it too can go on the interior surface of a window (surface 2). This means that it does not necessarily have to be double-glazed, even though it performs better as a double glazed unit and better still when combined with other Low-E magnetron coatings on surface 2 of an IGU.

An example of this is Cardinal LoE-i89, which is processed locally by Glassworks. Michael states that because sputtered coatings are generally thinner and smoother they are often clearer. “We specifically introduced LoE-i89 to the Australian market to fulfill this need for a high performing single glazed clear product without the haze,” he says.
RECOMMENDED IGU COMBINATIONS

In essence, to ensure a building performs at its absolute peak, a monolithic option is not recommended, although it can be a good entry-level option if the client’s budget is limited.

However, to achieve superior window performance, a combination of a room side coating on surface 4 and the best sputtered Low-E coating on surface 2 of a double glazed IGU should be used. Combining LoE3-366 and LoE-i89 in such a makeup - 6mm LoE-366/12mm Argon/6mm LoE-i89 - results in a VLT of 63%, an SHGC of 0.27, and an unprecedented U Factor of 1.1, and is therefore highly recommended for western elevations or windows generally receiving the most sun.

A “good, better, ultimate” scenario could look something like this. The “good” would be a monolithic pyrolytic or ITO low-E, the “better” would be a double glazed IGU with a low-E magnetron sputter coating on surface 2 or 3, and the “ultimate” would be a double glazed IGU with a low-E magnetron sputter coating on surface 2 plus a low-E pyrolytic or ITO coating on surface 4.

Another option to lower the overall project cost without severely impacting performance is to pick and choose which windows warrant the added expense of the best IGU combination and which are protected by shade and less likely to need it.