



**GUARDIAN**  
**ECOGUARD® Mo**  
MOLYBDENUM CONDUCTIVE GLASS

*Power Through Glass™*



## Your Energy Investment Optimized

### Global Solar Solutions

Standing behind excellence in your solar energy solutions is a company committed to providing you with glass innovation. Guardian has been manufacturing high-quality glass solutions for more than 75 years, with a comprehensive product line that includes glass, mirrors and coatings for solar energy applications. EcoGuard Mo is another high performance product in a long list of Guardian glass coatings.

Guardian operates state of the art manufacturing centers around the world, so we are well positioned to provide your solar glass, mirror and coating needs on a regional basis.

### Description & Features

Guardian's EcoGuard Mo is a Molybdenum coated glass that is designed to optimize the conductive characteristics of photovoltaic systems that use copper indium sulfide (CIS) and copper indium gallium diselenide (CIGS) solar cells and is available in several different glass thicknesses and levels of conductivity.

### Product Optimization

Guardian's EcoGuard Mo can be optimized for thin film solar manufacturers in a variety of ways - sheet resistance, Na (sodium) diffusion, thin film stress, laser-scribing and glass protection layers ( $\text{SiO}_2$ ,  $\text{SiNx}$  or  $\text{SiOxNy}$ ).

### Applications

EcoGuard Mo was specifically developed to be a high performing conductive coating for CIS and CIGS photovoltaic modules.

Combined with EcoGuard Float, a solar glass with high transmission properties, Guardian offers a complete solution for the exterior components of CIS and CIGS thin film photovoltaic modules.

# ECOGUARD<sup>®</sup> Mo

## MOLYBDENUM CONDUCTIVE GLASS

### Common Product Configurations

	Product No.	Glass Thickness (mm)	Sheet Resistance ( $\Omega / \square$ )	Resistivity ( $\mu\Omega \cdot \text{cm}$ )
EcoGuard Mo 1	ECO-Mo-1-3.0	3.0	0.55	15 - 22
EcoGuard Mo 2	ECO-Mo-2-3.0	3.0	0.65	15 - 22
EcoGuard Mo 3	ECO-Mo-3-3.0	3.0	0.90	15 - 22
EcoGuard Mo 1	ECO-Mo-1-4.0	4.0	0.55	15 - 22
EcoGuard Mo 2	ECO-Mo-2-4.0	4.0	0.65	15 - 22
EcoGuard Mo 3	ECO-Mo-3-4.0	4.0	0.90	15 - 22



### Product Information

**Glass Thickness:** Numerous glass thickness are available: 2.1 mm, 3.0 mm, 3.2 mm and 4.0 mm. Thickness tolerance is +/- 0.2 mm. For other glass thicknesses and layer stack design options, please contact Guardian Industries via the published company information.

**Glass Size:** Custom sizes are available with length and the width tolerance of +/- 1 mm.

**Edge Work:** Both seaming or grinding available (C-shape or K-Shape).

### Advantages: Manufacturing

- Extensive experience of producing consistent, high quality glass coatings
- Tight cut size and thickness tolerance control
- Variety of edge treatments
- Inline, continuous metrology for all coated glass production
- Quality control systems and personnel designed and trained for electronics grade products.

### Advantages: Performance

- Multiple grades of sheet resistance to match performance needs
- Designed to withstand process temperatures up to 600°C for extended periods of time
- Superior corrosion resistance
- Optimized design to minimize the electrical barrier between the Mo and semiconductor layer
- Customization of the sodium permeability: stop migration or optimize the permeability for enhanced CIS and CIGS grain size
- Optimized design for improved laser-scribing

### Advantages: Guardian

- Track record of optimizing customers' energy costs
- Global solar asset base
- Stable, privately held company with clear focus
- Tradition of glass innovation backed by broad solar R&D
- Advanced and proprietary manufacturing capabilities
- Rich, diverse product and technology pipelines

#### Guardian Industries Corp.

EcoGuard Solar Glass  
14511 Romine Road  
Carleton, MI 48117  
+1.800.521.9439  
solarglass@guardian.com

#### Guardian Europe S.à r.l.

Zone Industrielle Wolser  
L-3452 Dudelange  
Grande-Duche de Luxembourg  
+352.52.11.15.01  
solarglass.europe@guardian.com

[www.guardian.com/solarenergy](http://www.guardian.com/solarenergy)



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