TR-Clad™ Metal Foil Clad Polyimide

Light weight copper clad polyimide

TR-Clad™ flexible laminates are both the lowest weight and lowest dielectric constant copper/polyimide laminates available. TR-Clad™ flexible laminates are made by direct coating CP1™ Polyimide onto copper or aluminum foils resulting in an adhesiveless material. TR-Clad™ can be made with polyimide layer thicknesses as low as 2 microns and using copper foil with thicknesses as low as 9 microns or aluminum foil as low as 4 microns. The low dielectric constant of the CP1™ Polyimide coating reduces cross talk between circuit traces and allows for the fabrication of finer features. Additionally, TR-Clad™ can be made with electrically conductive polyimide for ESD level conductive applications. TR-Clad™ is made to order and can be custom tailored with polyimide and metal foil thicknesses to meet your needs.

Characteristics

- Low thickness and weight
- Low dielectric constant polyimide
- Low moisture uptake
- High heat stability
- Etchable copper

Applications

- Antennas
- Flex circuits
- Advanced composites
# Typical Properties of TR-Clad™

## Physical and Mechanical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM Method</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength (12 µm CP1/9 µm copper foil, 23°C)</td>
<td>D882-02</td>
<td>136 (19.7)</td>
<td>MPa (ksi)</td>
</tr>
<tr>
<td>Young’s Modulus (12 µm CP1/9 µm copper foil, 23°C)</td>
<td>D882-02</td>
<td>10.8 (1566)</td>
<td>GPa (ksi)</td>
</tr>
<tr>
<td>Tensile Elongation at Break (12 µm CP1/9 µm copper foil, 23°C)</td>
<td>D882-02</td>
<td>1.5</td>
<td>%</td>
</tr>
</tbody>
</table>

## Optical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM Method</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Absorptance (12 µm CP1/9 µm copper foil)</td>
<td>E903-96¹</td>
<td>0.67</td>
<td>-</td>
</tr>
<tr>
<td>Solar Absorptance (ESD Grade, 12 µm CP1/9 µm copper foil)</td>
<td>E903-96¹</td>
<td>0.95</td>
<td>-</td>
</tr>
</tbody>
</table>

¹ Data weighted to air mass zero solar irradiance values in ASTM E490-00a

## Thermal Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM Method</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear CTE (-80°C—+225°C, 12 µm CP1/9 µm copper foil)</td>
<td>E831-06</td>
<td>20</td>
<td>ppm/°C</td>
</tr>
<tr>
<td>Linear CTE (-80°C—+225°C, ESD Grade, 12 µm CP1/9 µm copper foil)</td>
<td>E831-06</td>
<td>24</td>
<td>ppm/°C</td>
</tr>
</tbody>
</table>

## Material Availability

- Material available in continuous rolls of film up to 50 inches wide
- 9-70 micron copper foil thicknesses available
- 4-100 micron aluminum foil thicknesses available
- 4-15 micron polyimide thicknesses available. Other thicknesses available upon request
- TR-Clad™ is available with nonconductive or ESD conductive polyimide available
- TR-Clad™ can be delivered on removable protective liner for easier handling
- TR-Clad™ is a highly customizable material. Contact us with your specific needs today

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**Warranty.** The information contained herein is believed to be accurate and reliable. However, the user is responsible for determining the suitability and use of the final formulations/products. NeXolve warrants that its products will meet specifications, but not merchantability or fitness for use.

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For more information contact:

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