Visgard® Fog-Free PET Film

Visgard 200 (Pressure Sensitive Adhesive on Reverse)
Visgard 275 (No Adhesive)

**Features**
- Excellent Abrasion, Scratch, and Mar Resistance
- Extremely Hydrophilic
- Exceptional Anti-Fog and Water Sheetig Performance
- Anti-Fog Coating Absorbs Moisture, and Cannot be Dissolve in Water
- Will not Discolor from Sunlight or Heat
- Wet and Dry Application compatible

**Benefits**
- High quality anti-fog surface improves product durability and visual clarity
- Optically clear, pressure sensitive backside adhesive surface protected by a release liner.
- Easy to install and maintain anti-fog surface with clear masking protects the coated surface during installation.

**Premium Anti-Fog, Abrasion, Scratch and Mar Resistance**

**Product Application**
- Medical, Military, Safety & Sports Eyewear
- Face Shields, Goggles, Masks & Visors
- Electronic Displays & Devices
- Custom Appliqué Shapes

Visgard 200 and 275 Anti-Fog coated polyester (PET) film is extremely hydrophilic, delivering best-in-class abrasion, scratch, and mar resistance, exceptional product stability and optical clarity. Sold in both 2 mil and 4 mil thickness with or without adhesive. Coating will not scratch under standard usage. The film can be installed using either dry laminating machinery, or by hand, using a wet application technique.

**Physical Characteristics**

<table>
<thead>
<tr>
<th>Physical Characteristics</th>
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<tbody>
<tr>
<td>Appearance</td>
<td>Crystal clear and colorless. The removable masking is also clear and must be removed.</td>
</tr>
<tr>
<td>Visible Light Transmission</td>
<td>90%</td>
</tr>
<tr>
<td>Tear Strength (Initial)</td>
<td>2 mil—4.2 lbs. (1.9 kg)</td>
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<tr>
<td></td>
<td>4 mil—8.4 lbs. (3.8 kg)</td>
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<tr>
<td>Heat Tolerance</td>
<td>300°F (149.4°C)</td>
</tr>
</tbody>
</table>

Available in 2 mil and 4 mil (50 and 100 micron) thickness. The adhesive, release liner, and masking thickness are additional to the thickness of the base film.
Visgard® Fog-Free PET Film
Anti-Fog, Abrasion, Scratch and Mar Resistance

Testing and Use

Anti-Fog Coating
The anti-fog treatment is a patented polymer coating which prevents or reduces fogging under normal temperature-humidity conditions, even after repeated cleanings. The Visgard treatment is extremely hydrophilic which causes condensation to spread as a clear layer, rather than form droplets which appear as fog. Although it absorbs moisture, the coating does not dissolve in water, so it will not smudge when wet. Visgard Film is not adversely affected by commercial glass cleaners and detergents. It will not discolor from exposure to sunlight or heat.

Scratch Resistance
Rubbing lightly with #0000 steel wool will leave only a few scratches on the Visgard surface. Occasionally, fine scratches will appear but will heal when moistened, or after simply standing at room temperature for 15 to 20 minutes.

The following data were obtained using a Taber abrader with a CS10F wheel and 500g load, according to ASTM D1044:

<table>
<thead>
<tr>
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<th>100 Cycles</th>
<th>500 Cycles</th>
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</thead>
<tbody>
<tr>
<td>Uncoated Polyester</td>
<td>20% (approx.) Δ haze</td>
<td>66% (approx.) Δ haze</td>
</tr>
<tr>
<td>Visgard Film</td>
<td>5.6% Δ haze</td>
<td>25.5% Δ haze</td>
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</tbody>
</table>

Falling sand abrasion was performed according to ASTM D968 using 3 kg standard Ottawa sand.

Anti-Fog Tests

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<thead>
<tr>
<th></th>
<th>30% (approx.) Δ haze</th>
<th>1.49% Δ haze</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncoated Polyester</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visgard Film</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Test #1** - The test surface is immersed in distilled or deionized water for 1 hr. and allowed to dry for at least 1 hr. It is then placed face down over a container of warm water (112°F/50°C) so as to completely cover the opening. Visgard coatings may exhibit a ring of condensation as the coating hydrates, but will remain clear thereafter. The test is complete when sufficient moisture has condensed to form large water drops.

**Anti-Fog Tests (cont.)**

**Test #2** - The test surface is immersed in distilled or deionized water for 24 hours, removed and allowed to dry for at least 1 hr. The sample is then cooled in a refrigerator to approximately 40°F (4°C) and withdrawn to a test chamber containing ambient air at 70°F (21°C) and 70 to 80% relative humidity. Material coated with Visgard will remain free of fog indefinitely.

Untreated plastics or glass will fog within seconds. Inferior anti-fog coatings may fog immediately, or remain clear for a short time until they become saturated. Visgard exceeds ASTM and European tests for resistance to fogging.

Pressure Sensitive Adhesive (PSA)

Visgard 200
FSI Coating Technologies uses an optically clear adhesive recommended for use with pressure roll laminating machinery or by professional installers familiar with the handling of adhesive films. The adhesive bonds immediately to glass and plastics. Peel strength increases slightly after 5 to 10 days. The adhesive bond strength will be reduced after extended immersion in water, but bond will re-strengthen on drying.

The adhesive was chosen because it remains a self-cross linking acrylic polymer that cures at moderate temperatures. The adhesive was specifically designed for low temperature bonding applications. This particular adhesive remains tacky and bondable to temperatures as low as -20°F. Additionally, the adhesive has been chosen:

- as it contains no surface additives which could whiten or haze in the presence of moisture and
- the initial peel strength ensures permanent adhesion.

<table>
<thead>
<tr>
<th>Adhesive Bond Strength</th>
<th>Approx. 15 oz./in.</th>
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<tbody>
<tr>
<td>Acrylic/Polycarbonate</td>
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<tr>
<td>Glass</td>
<td>Approx. 6 oz./in.</td>
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<tr>
<td>Tack</td>
<td>Approx. 0.20 lbs./ft²</td>
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<tr>
<td>Sheer Strength</td>
<td>Approx. 200 hours</td>
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<tr>
<td>Minimum Application Temperature</td>
<td>30°F (-1°C)</td>
</tr>
</tbody>
</table>
Installation, Care & Removal

Installation with Laminating Machinery
A clean room environment and proper laminating equipment is recommended when applying Visgard Fog-Free Film. Please contact FSICl for a list of appropriate laminating equipment companies at technicalsupport@fsicti.com.

Installation by Hand
Where laminating machinery is not available or not practical, Visgard 200 Fog-Free Film may be installed by hand using a wet application technique. To prevent premature "grab" which will trap pockets of air or water, a preferred wetting solution for pressure sensitive adhesives is DI water with up to 0.01% of non-abrasive liquid hand soap. To begin the application, spray the wetting agent on the substrate, then on the exposed adhesive backing and put in place, but without pressure. Then spray the film surface with the same application solution so a squeegee can glide over during application.

Care and Instructions
Treated surfaces may be cleaned with household glass cleaner (such as ammonia-free Windex®) and a sponge, tissue or paper towel. Cleaners containing alcohol may be used but the alcohol content should be no greater than 30% of the solution. Do not use cleaners which contain moisturizers, abrasives, strong acids, or caustic substances.

Remove any oily contamination with a grease cutting cleaner, such as Fantastik® or Mr. Clean®.

Apply pressure with a urethane squeegee to evacuate liquid from beneath the film. Use overlapping strokes to prevent trapping pockets of water or air. If milky blotches appear, excess water remained after squeegeeing. The water will dry in time, and blotches and distortion will disappear.