Applications

- Micro-optics and substrates
- Refractive and diffractive optical elements (ROEs & DOEs)
- 3D sensors, optics, spacers, heat sinks, and camera optics
- Beam shaping elements
- Homogenizers and optical sensors
- RF components
- Nanoimprint lithography substrates
- Hard disk masters and molds
- Blazed-wavelength and sub-wavelength diffraction gratings

Benefits of Corning Wafer-Level Optic Solutions

- Various melting and forming methods enable significant volume supply of high-precision wafers with lowest thickness variation: part to part and batch to batch
- Compatible with wafer-level optic and semicon manufacturing processes and legacy equipment and tools
- Supporting capabilities include ceramics, automated laser glass-cutting, photostructuring, bonding, dicing, and coatings
- Best-in-class metrology minimizes reliability risks and enables fine resolution data across the full wafer
- Fracture mechanics glass strength experts available to train and consult on many applications

Material Properties and Attributes

- Diameters: 100/150/200/300 mm
- Diameter tolerance*: +/- 0.200 mm
- Thickness range: 0.10-5.0 mm
- Thickness tolerance*: +/- 0.020 mm
- Available upon request: Various sizes/shapes/features, semi notch/flat specifications, laser serialization, laser processing, structuring, holes, bonding, coatings
- Large volume capacity: up to 60k WPM
- Typical lead-time: 2-12 weeks
- Polish scratch/dig: 20/10 to 80/50 per military spec
- World-class Tropl® FlatMaster® MSP metrology
*Other tighter tolerances available upon request

Typical Properties and Attributes

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>TTV</td>
<td>≤ 1 µm to ≤ 5µm</td>
</tr>
<tr>
<td>Bow</td>
<td>≤ 5µm to ≤ 30µm</td>
</tr>
<tr>
<td>Warp</td>
<td>+/- 20µm to ± 40µm</td>
</tr>
<tr>
<td>Surface roughness (Ra)</td>
<td>≤ 10Å</td>
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<tr>
<td>SORI</td>
<td>≤ 0.5µm to ≤ 1.5µm</td>
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</tbody>
</table>

Low-loss, High-frequency Electrical Performance

<table>
<thead>
<tr>
<th>Composition</th>
<th>Loss tangent</th>
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<tbody>
<tr>
<td>SG 3.2</td>
<td>0.0001</td>
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<tr>
<td>SG 3.4</td>
<td>0.0001</td>
</tr>
<tr>
<td>Alumina</td>
<td>0.0001</td>
</tr>
<tr>
<td>HPFS</td>
<td>0.0001</td>
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</tbody>
</table>

Multiple Compositions* for Diverse Applications

<table>
<thead>
<tr>
<th>Composition</th>
<th>Abbe Value ( v_b )</th>
<th>Refractive Index ( n_D )</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG 0.5</td>
<td>67.8</td>
<td>1.459</td>
</tr>
<tr>
<td>SG 5.1</td>
<td>65.0</td>
<td>1.487</td>
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<tr>
<td>SG 7.1</td>
<td>60.7</td>
<td>1.492</td>
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<td>SG 7.8</td>
<td>61.7</td>
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<td>62.7</td>
<td>1.510</td>
</tr>
<tr>
<td>SG 3.6</td>
<td>62.7</td>
<td>1.510</td>
</tr>
<tr>
<td>SG 8.2</td>
<td>64.2</td>
<td>1.517</td>
</tr>
<tr>
<td>SG 9.3</td>
<td>58.9</td>
<td>1.523</td>
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<td>57.1</td>
<td>1.523</td>
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<td>1.527</td>
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<tr>
<td>SG 9.0</td>
<td>55.6</td>
<td>1.530</td>
</tr>
<tr>
<td>SG 10.0</td>
<td>41.6</td>
<td>1.601</td>
</tr>
</tbody>
</table>

*Active glasses shown here; Others available upon request
Corning's unique combination of capabilities enable customizable solutions for emerging 3D sensing applications.

Corning works closely with customers to identify the ideal set of solutions for wafer-level optics applications. We offer multiple glass and ceramic compositions, various coatings, bonding and structuring techniques, and world-class measurements to provide our customers with optimized solutions for wafer-level optic applications.

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