Apec® for Automotive Lighting

Apec is a high heat Polycarbonate with excellent properties at elevated operating temperatures, making it the best option for automotive lighting assemblies such as metalized reflectors, bezels, and inner lenses.

Heat Distortion Temperature Under Load (HDTUL)
- Apec high-heat polycarbonate is well-suited for applications requiring greater heat resistance than standard polycarbonate grades can deliver.
- Apec grades are available to meet HTDUL requirements from 138°C to 175°C @ 1.8 MPa.

Operating Temperatures
Typical continuous use temperature for Apec grades is 15°C below the Vicat softening temperature, for parts subjected to low levels of mechanical stress.

Specific Gravity
Apec products have lower specific gravity compared to other high temperature thermoplastics, such as PET, PBT, PES, PSU, PEI and some high heat copolymers. This translates to less usage of Apec, representing true weight, material and cost savings.

### Apec Grades for Automotive Lighting

![Apec Grades Diagram]

**Apec 1695 or 1895**
- Inner Bezel

**Apec 1895 or 2095**
- Primary Reflector

**Apec 1897**
- Custom Color Trim Ring

**Apec 1695**
- Daytime Running Lamp Reflector

**Apec 1795**
- Park - Turn Reflector

**Apec 1803**
- Clear Projector Lens

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**KEY PROPERTIES**

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<tbody>
<tr>
<td>Minimum Draft Angle</td>
<td>Degrees</td>
<td>2-3</td>
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<td>4</td>
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<tr>
<td>Mold Shrinkage</td>
<td>%</td>
<td>0.5-0.7</td>
<td>0.5-0.7</td>
<td>0.75</td>
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<tr>
<td>Annealed</td>
<td>°C/°F</td>
<td>126/259</td>
<td>130/266</td>
<td>–</td>
<td>144/291</td>
<td>156/313</td>
<td>–</td>
<td>165/329</td>
<td>180/356</td>
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<tr>
<td>Un-annealed</td>
<td>°C/°F</td>
<td>122/252</td>
<td>126/259</td>
<td>–</td>
<td>140/284</td>
<td>152/306</td>
<td>–</td>
<td>161/322</td>
<td>176/349</td>
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<tr>
<td>Equilibrium</td>
<td>%</td>
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<td>0.3</td>
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<td>24 Hours</td>
<td>%</td>
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**Melt Volume Rate @ 330°C, 2.16 kg (ISO 1183)**

<table>
<thead>
<tr>
<th>cm³/10 min</th>
<th>Apec 1695 or 1895</th>
<th>Apec 1895 or 2095</th>
<th>Apec 1897</th>
<th>Apec 1695 or 1895</th>
<th>Apec 1895 or 2095</th>
<th>Apec 1897</th>
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<tr>
<td>19</td>
<td>12</td>
<td>25</td>
<td>45</td>
<td>30</td>
<td>10</td>
<td>18</td>
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<tr>
<td>HDTUL @ 1.8 MPa (ISO 75)</td>
<td>°C/°F</td>
<td>125/257</td>
<td>124/253</td>
<td>128/262</td>
<td>128/260</td>
<td>148/298</td>
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<tr>
<td>HDTUL @ 0.45 MPa (ISO 75)</td>
<td>°C/°F</td>
<td>134/273</td>
<td>137/279</td>
<td>151/304</td>
<td>150/302</td>
<td>160/320</td>
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<td>Specific Gravity (ISO 1183)</td>
<td>g/cm³</td>
<td>1.2</td>
<td>1.2</td>
<td>1.18</td>
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Apec high-heat polycarbonate provides extended temperature performance, while retaining excellent transmission, good flow properties and impact strength.

**Draft Angle**
- Apec typically requires more draft than standard PC. The minimum suggested draft for Apec is 4° per side. If the part has texture, an additional draft of 1° per 0.001" depth of texture is necessary. This is an advantage over competitive materials which require higher draft angles, making Apec ideal for styling and design.

**Viscosity**
- Flow characteristics for most Apec grades are available in each product’s data sheets. http://www.plastics.covestro.com/en/Products/Apec.aspx
- Rheological data for Apec have been generated and are included in the material databases of commonly used mold filling simulation software. This useful tool should be used to design the molding system to optimize the processability of Apec in your particular application.

**Mold Shrinkage**
- Apec is an amorphous polymer with inherent low mold shrinkage values.

**Snap Fit**
- Apec has wide design capabilities for snap fits in automotive assemblies stemming from its excellent elongation properties.
  - The maximum allowable deformation strain is 4.0% for a one time snap fit.
  - The allowable strain for a multiuse snap fit is 2.4%.

**Moisture Absorption**
- Unlike Polyamide and Polyesters, Apec absorbs and retains lower levels of moisture during the lifecycle of the lighting assembly.

**Iridescence Point**
- Apec materials have a narrow and consistent irisation temperature, thus minimizing the complexity of mitigation techniques.