

# 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.

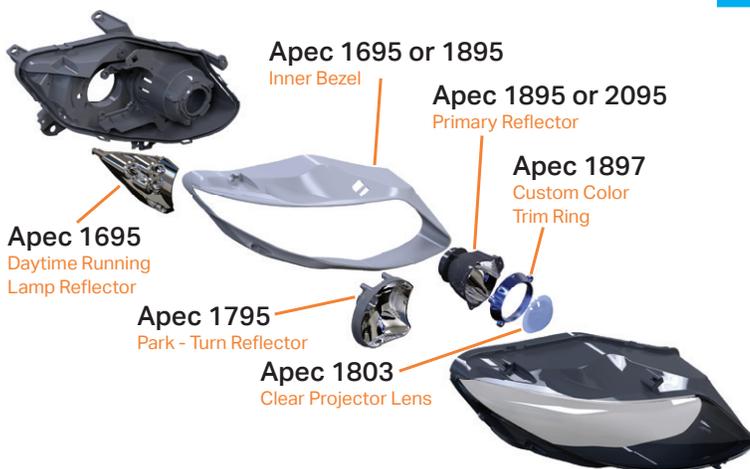
## KEY PROPERTIES

	Unit of Measure	Makrolon® 2405/2407	Makrolon® 2605/2607	Apec® 1603	Apec® 1695 / 1697	Apec® 1795 / 1797	Apec® 1803	Apec® 1895 / 1897	Apec® 2095 / 2097
Minimum Draft Angle	Degrees	2-3	2-3	4	4	4	4	4	4
Mold Shrinkage	%	0.5-0.7	0.5-0.7	0.75	0.75	0.80	0.85	0.85	0.90

Iridescence Point	Annealed	°C/°F	126/259	130/266	-	144/291	156/313	-	165/329	180/356
	Un-annealed	°C/°F	122/252	126/259	-	140/284	152/306	-	161/322	176/349

Moisture Absorption, Immersion @ 23°C/73°F (ISO62)	Equilibrium	%	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	24 Hours	%	0.12	0.12	0.12	0.12	0.12	0.12	0.12

## APEC GRADES FOR AUTOMOTIVE LIGHTING



Melt Volume Rate @ 330C, 2.16 kg (ISO 1183)	cm <sup>3</sup> /10 min	19	12	25	45	30	10	18	8
HDTUL @ 1.8 mPa (ISO 75)	°C/°F	125/257	124/255	139/282	138/280	148/298	160/320	158/316	175/347
HDTUL @ 0.45 MPa (ISO 75)	°C/°F	134/273	137/279	151/304	150/302	160/320	172/342	173/343	194/381
Specific Gravity (ISO 1133)	g/cm <sup>3</sup>	1.2	1.2	1.18	1.18	1.17	1.15	1.15	1.13
Vicat (ISO 306)	°C/°F	114/291	143/289	159/318	157/315	172/342	184/363	183/361	203/397

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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 iridescence temperature, thus minimizing the complexity of mitigation techniques.



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