What are Conductive Carbon Blacks?
And how might I use them in my products?

One of the more innovative uses for carbon black pigments in the plastics industry is in the electronics field. Products in this industry are called electrically conductive compounds. Since few plastic resins are inherently conductive, it is necessary to add special fillers to the plastic matrix to give them the desired conductive characteristics.

Over the years, carbon blacks have proven to be one of the most versatile functional fillers for plastics. In addition to providing electrical conductivity to the plastic compound, they also provide lasting protection against ultraviolet light degradation. Carbon blacks function as a moderately low cost pigment producing various shades of black in the final product. In many product formulations the plastics compounder can achieve several property combinations in one product.

The selection of the proper carbon black to use in the production of conductive compounds is based not only on the final properties of the particular compound desired, but also on the specific properties of the carbon black. The key carbon black properties are particle size, structure, and purity. These critical elements of the carbon black are then combined with various polymer carrier resins in the compounding process to produce the finished compound.

- Excellent dispersion
- Integrity of the carbon black structure or network
- Consistent particle size
- Specific resistance
  High: <10 ohm-cm
  General: 10-100 ohm-cm
  Antistatic >1000 ohm-cm

**Conductivity**

Conductivity is measured by the surface resistivity (SR) of the conductive film. A better conductivity performance for a particular conductive black compound will permit the design engineer to use the appropriate loading of carbon black to achieve the minimum required surface resistivity for the application.
Conductivity is dependent on:

- The polymer matrix
- The type of conductive black
- The concentration of the conductive black
- The dispersion quality of the compound
- The distribution of the conductive black during extrusion

**Volume Conductivity**

Increased volume conductivity generally means decreased surface resistance. The graph below illustrates the internal resistance of various substances. To reduce internal resistance of a polymer it is quite common to add a conductive substance such as carbon black. The necessary amount varies depending on the desired end properties of the polymer film or molded article.
Ampacet Corporation produces a family of high quality, performance oriented conductive carbon black compounds and masterbatches. The following table provides a quick reference to the commercial offerings. Ampacet Corporation also will custom engineer products to meet the specific needs of most applications.

<table>
<thead>
<tr>
<th>Product</th>
<th>% Carbon</th>
<th>Carrier Resin</th>
<th>Applications</th>
<th>Special Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>7992749</td>
<td>25</td>
<td>EVA</td>
<td>Blown Film</td>
<td>Excellent balance of performance and cost</td>
</tr>
<tr>
<td>490698</td>
<td>25</td>
<td>EMA</td>
<td>BF, CF</td>
<td>Super-conductive</td>
</tr>
<tr>
<td>190802</td>
<td>25</td>
<td>mLLD</td>
<td>Blown Film</td>
<td>Metalocene base resin</td>
</tr>
<tr>
<td>199946</td>
<td>20</td>
<td>HDPE</td>
<td>BF, IM</td>
<td>High Density PE base resin</td>
</tr>
<tr>
<td>7992989</td>
<td>20</td>
<td>HDPE</td>
<td>BF, IM</td>
<td>Super-conductive</td>
</tr>
<tr>
<td>19492</td>
<td>35</td>
<td>LLDPE</td>
<td>BF, CF, IM, BM</td>
<td>Higher loading, multipurpose design</td>
</tr>
<tr>
<td>19873</td>
<td>35</td>
<td>PP</td>
<td>IM, BM, Sheet</td>
<td>Polypropylene base resin</td>
</tr>
</tbody>
</table>
For more information, please contact Ampacet’s technical support team at 888-822-7546 or 812-466-9828.

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