CERANOVUS® A Series polyethylene (PE) and polypropylene (PP) additives have low viscosity and penetration hardness but also exhibit amorphous polymer characteristics and greater polarity due to higher molecular weights and short chain branching.

<table>
<thead>
<tr>
<th>CERANOVUS® Additive</th>
<th>Product Type</th>
<th>Density (g/cm³) ASTM D1298</th>
<th>Drop Point (°C) ASTM D3954</th>
<th>Penetration @ 25°C in dmm ASTM D1321</th>
<th>Viscosity cps @ 140°C BROOKFIELD</th>
<th>Viscosity cps @ 190°C BROOKFIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A115 Polyethylene</td>
<td>0.92</td>
<td>116</td>
<td>2</td>
<td>225</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A120 Polyethylene</td>
<td>0.93</td>
<td>122</td>
<td>2</td>
<td>700</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A125 Polyethylene</td>
<td>0.94</td>
<td>126</td>
<td>1</td>
<td>2025</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A155 Polypropylene</td>
<td>0.90</td>
<td>155</td>
<td>2</td>
<td>-</td>
<td>75</td>
<td>-</td>
</tr>
</tbody>
</table>

CERANOVUS® A Series additives were evaluated at 2% by weight in PG 64-22 asphalt by the University of Massachusetts per AASHTO protocols. Test results confirm that CERANOVUS® additives enhance asphalt performance by delivering the following benefits:

- Increases penetration hardness
- Lowers viscosity during production
- Improves resistance to rutting and deformation
- Enables grade bumping while maintaining low temperature properties

**Chart 1**
Continuous Performance Grade AASHTO M320*

- A155 PP additive bumps high temperature performance by +2 grades above 76°C and maintains low temperature below -22°C
- A115 and A120 PE additives bump performance by +1 grade above 70°C and maintain low temperature below -22°C

*AASHTO M320 includes T 313, T 315 and T 240
CERANOVUS® A Series polymer additives are made from 100% post consumer and post industrial recycled plastics as certified by SCS Global Services. Products containing CERANOVUS® A Series polymer additives contribute towards LEED certification and credits programs.

- CERANOVUS® PE additives show slight improvement in the elastic recovery
- A120 and A125 PE additives meet the Jnr Diff guideline of > 0.75 for PMA asphalt
- A155 PP additive performance is shear dependent and can deliver significant improvement to a Very Heavy Traffic Grade

- All CERANOVUS® polymer additives show improvement of the complex shear modulus of the base asphalt indicating improved resistance to rutting and deformation
- A155 PP additive delivers the most significant improvement in stiffness and would still pass test at 76°C

- A155 PP additive maintains low temperature creep and stiffness
- A125 PE additive reduces the low temperature PG grade by 1 level to -16°C