Advanced Polyalphaolefins
SpectraSyn Plus™
## Modern Basestock Quality Drivers

<table>
<thead>
<tr>
<th>Performance Parameter</th>
<th>Desired Basestock Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Economy</td>
<td>Low Viscosity</td>
</tr>
<tr>
<td>Low Emissions</td>
<td>Low Volatility</td>
</tr>
<tr>
<td>Drain Interval</td>
<td>Good Stability</td>
</tr>
<tr>
<td>Low Temperature</td>
<td>Low MRV, Brookfield, CCS</td>
</tr>
</tbody>
</table>
What is SpectraSyn™ Plus PAO?

A low viscosity PAO that combines improved volatility and low temperature fluidity to offer:

- Expanded formulation and blending options to meet increasingly stringent specifications
- Reduced volatility to help lower emissions
- Better low temperature properties to help improve fuel economy and start-up wear protection
## SpectraSyn Plus™ Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Units</th>
<th>SpectraSyn Plus™ 3.6</th>
<th>SpectraSyn Plus™ 4</th>
<th>Conventional PAO 4</th>
<th>SpectraSyn Plus™ 6</th>
<th>Conventional PAO 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>KV@100°C</td>
<td>cSt</td>
<td>3.6</td>
<td>3.9</td>
<td>4.1</td>
<td>5.9</td>
<td>5.8</td>
</tr>
<tr>
<td>KV@40°C</td>
<td>cSt</td>
<td>15.4</td>
<td>17.2</td>
<td>19.0</td>
<td>30.3</td>
<td>31</td>
</tr>
<tr>
<td>KV@-40°C</td>
<td>cSt</td>
<td>2000</td>
<td>2430</td>
<td>2900</td>
<td>7400</td>
<td>7800</td>
</tr>
<tr>
<td>Viscosity Index</td>
<td></td>
<td>120</td>
<td>126</td>
<td>120</td>
<td>143</td>
<td>138</td>
</tr>
<tr>
<td>Noack Volatility %</td>
<td></td>
<td>15.2</td>
<td>11.2</td>
<td>14 max</td>
<td>6.5 max</td>
<td>8 max</td>
</tr>
<tr>
<td>Pour Point °C</td>
<td></td>
<td>-65 max</td>
<td>-60 max</td>
<td>-66</td>
<td>-54 max</td>
<td>-57</td>
</tr>
<tr>
<td>CCS@-35°C</td>
<td>cP</td>
<td>1050</td>
<td>1290</td>
<td>1424</td>
<td>3600</td>
<td>4000</td>
</tr>
</tbody>
</table>
SpectraSyn Plus™ Volatility versus CCS Viscosity

SpectraSyn Plus™ PAO is a Leader in Volatility, Pour Point & Low-Temperature Fluidity

SpectraSyn Plus™ PAO Sets a New Volatility Standard for Low Viscosity Hydrocarbon Basestocks
Can Group III base oils be used in 0W-30 oils?

0W grade engine oils made with Group III basestocks typically need blending with some PAO in order to meet CCS/volatility requirements.
Blends of SpectraSyn Plus™ and conventional Group III base oil meet 0W-30 CCS and volatility targets.
SpectraSyn Plus™ Blending Flexibility

**Group III**
- KV @ 100 ºC, cSt: 5
- Noack, wt%: 12
- CCS @ - 35 ºC, cP: 4490

**PAO**
- KV @ 100 ºC, cSt: 5
- Noack, wt%: 9
- CCS @ - 35 ºC, cP: 2590

**Group III & SpectraSyn Plus™ PAO**
- KV @ 100 ºC, cSt: 5
- Noack, wt%: 9
- CCS @ - 35 ºC, cP: 2590

Blending flexibility and basestock value extended with SpectraSyn Plus™ PAO
SpectraSyn Plus™ - Summary of Benefits

Low Viscosity Available
- 3.6, 4, 6 cSt

Low Pour Points
- -66 °C to -54 °C

Low Volatility
- 6 – 15 % Noack Volatility

Improved Viscosity Index
- 5 VI unit higher than conventional PAO

Excellent Low Temperature Fluidity
- 8 - 10% reduction in CCS @ -35 °C
- May help to offset poorer low temperature viscosities of other components

SpectraSyn Plus™ PAO - a superior combination of low volatility, pour point, and low temperature fluidity
©2009 ExxonMobil. To the extent the user is entitled to disclose and distribute this document, the user may forward, distribute, and/or photocopy this copyrighted document only if unaltered and complete, including all of its headers, footers, disclaimers, and other information. You may not copy this document to a Web site. ExxonMobil does not guarantee the typical (or other) values. Analysis may be performed on representative samples and not the actual product shipped. The information in this document relates only to the named product or materials when not in combination with any other product or materials. We based the information on data believed to be reliable on the date compiled, but we do not represent, warrant, or otherwise guarantee, expressly or impliedly, the merchantability, fitness for a particular purpose, suitability, accuracy, reliability, or completeness of this information or the products, materials, or processes described. The user is solely responsible for all determinations regarding any use of material or product and any process in its territories of interest. We expressly disclaim liability for any loss, damage, or injury directly or indirectly suffered or incurred as a result of or related to anyone using or relying on any of the information in this document. There is no endorsement of any product or process, and we expressly disclaim any contrary implication. The terms, “we”, “our”, "ExxonMobil Chemical", or "ExxonMobil" are used for convenience, and may include any one or more of ExxonMobil Chemical Company, Exxon Mobil Corporation, or any affiliates they directly or indirectly steward. ExxonMobil, The ExxonMobil Emblem, the “Interlocking X” Device, Synesstic, SpectraSyn, SpectraSyn Ultra and SpectraSyn Plus are trademarks of ExxonMobil.