NAUGALUBE® PANA
Phenyl-α-Naphthylamine Antioxidant

NAUGALUBE® PANA is an excellent antioxidant for synthetic fluids and mineral oils. It is particularly effective in high temperature applications, such as aviation turbine engine oils, and in the formulation of high performance industrial oils and greases. NAUGALUBE® PANA is a solid antioxidant in flake form typically used at treat levels between 0.05% and 1.0%.

NAUGALUBE® PANA is used in the manufacture of aviation turbine engine oils meeting MIL-1-23699 and MIL-L-7808 specifications. These specifications use the FTMS 791C 5308.7 procedure as a measure of oxidation and corrosion protection.

For enhanced performance, NAUGALUBE® PANA can also be used in combination with other alkylated diphenylamines, hindered phenolics and/or secondary peroxide decomposer antioxidants, as well as appropriate metal deactivators.

### Applications

<table>
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<tr>
<th></th>
<th>Primary Recommendation</th>
<th>Alternative Recommendation</th>
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</thead>
<tbody>
<tr>
<td><strong>Industrial</strong></td>
<td>Gear Oil</td>
<td>Turbine Oil</td>
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<td></td>
<td>Hydraulic Oil</td>
<td>Heat Transfer Oil</td>
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<td></td>
<td>Chain Oil</td>
<td>Compressor Oil</td>
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<td></td>
<td>Trunk Piston Engine Oil</td>
<td>System Oil</td>
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<tr>
<td><strong>Marine</strong></td>
<td>Turbine Oil</td>
<td>Hydraulic Oil</td>
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<td><strong>Aviation</strong></td>
<td>Gasoline Engine Oil</td>
<td>Diesel Engine Oil</td>
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<tr>
<td><strong>Automotive</strong></td>
<td>Auto Transmission Fluid (ATF)</td>
<td>Differential Fluid</td>
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<td>Automotive Grease</td>
<td>Industrial Grease</td>
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<tr>
<td><strong>Grease</strong></td>
<td>Aviation Grease</td>
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RPVOT (Rotating Pressure Vessel Oxidation Test) performance testing was run at 150ºC in a series of fully formulated turbine oils additized with 0.25 %wt. antioxidant. Results of the testing demonstrate that NAUGALUBE® PANA provides superior antioxidant performance to Nonylated ADPA and hindered phenolics in API Group I, Group II and Group IV base oils.

RPVOT (Rotating Pressure Vessel Oxidation Test) performance testing was run at 150ºC in a Group II based turbine oil at both equal nitrogen content and at equal wt%. On an equal nitrogen basis, the data shows NAUGALUBE® PANA and APAN have superior performance over the nonylated DPA and thereby demonstrates the higher antioxidant activity of NAUGALUBE® PANA and APAN.

Shipping Information: 20kg bags

Benefits

Can be used in a broad range of lubricant formulations

Reduced oil oxidation and prolonged lubricant life

NSF HX-1 approval for use in lubricants subject to incidental food contact at a maximum level of 0.5%

Maximizes antioxidant efficiency and provides added alkalinity

Features

Ashless antioxidant

Excellent high temperature performance providing effective control against viscosity increase

US FDA 21 CFR 178.3750 approved and Kosher certified

High active Nitrogen content

<table>
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<tr>
<th>Turbine Oil Oxidation Stability by RPVOT</th>
<th>Antioxidant Performance in a Group II Turbine Oil by RPVOT (Equal Nitrogen Content vs. Equal Weight %)</th>
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<tbody>
<tr>
<td><img src="chart1.png" alt="Graph" /></td>
<td><img src="chart2.png" alt="Graph" /></td>
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Please visit our website [www.chemtura.com](http://www.chemtura.com) for more information on this product and to locate the Product Data Sheet (PDS) and Safety Data Sheet (SDS).