DYNAVIS® technology
Resource-efficient hydraulic fluid additives for diverse applications
Advanced solutions for hydraulic systems worldwide

Evonik Oil Additives sees the big picture – promoting Resource Efficiency, enhancing fuel economy, conserving energy and advancing innovation.

Evonik Oil Additives is a global leader in the development, manufacture and supply of products for the lubricant, fuel and refinery process markets. Evonik technologies, products and technical services advance the work of oil blenders, marketers and OEMs in extending fuel efficiency, enhancing equipment performance and raising productivity. Evonik offers a broad line of products developed from proprietary polyalkyl methacrylate (PAMA) technology, complemented with customized formulations to meet customer needs and specifications.

Customers confidently rely on Evonik Oil Additives for global supply security, fast delivery and worldwide technical expertise. Evonik’s commitment to innovation means formulators can count on Evonik to keep them ahead of the curve in offering the most advanced solutions to their customers.
Custom solutions for every hydraulic application

Evonik Oil Additives offers advanced technologies for hydraulic fluids. Evonik product lines include VISCOPLEX® Viscosity Index Improvers (VIIs), Pour Point Depressants (PPDs), Defoamers and environmentally-friendly lubricant additives. Evonik Oil Additives has decades-long experience in efficiency testing in all types of hydraulic systems and pumps, including piston, vane and gear.

Applications and examples:
- Automotive – shock absorbers, brake fluids and power steering fluids
- Aviation – fire-resistance fluids
- Industrial – injection molding
- Marine – transfer pumps
- Mobile – agriculture, construction and heavy machinery

Superior benefits for hydraulic fluids

The Evonik Oil Additives difference

- Proven PAMA technology
- Local service and technical support
- Business continuity from a highly reliable supply chain
- Performance that meets major OEM requirements
- Sustainable increases in productivity and reductions in fuel consumption

About Evonik’s DYNAVIS® technology

Hydraulic fluids formulated to Evonik’s DYNAVIS® performance standard improve hydraulic pump operation in several substantial and measurable ways. Based on years of intensive R&D and meticulously-designed field tests, hydraulic equipment operating with DYNAVIS®-formulated fluids have credibly demonstrated their potential to achieve:

- Up to 30% more hydraulic power under full-load conditions
- Up to 30% lower fuel consumption to complete the same amount of work
- Faster response to operator control
- Higher flow rate at peak operating temperatures

1Typical savings achieved using a DYNAVIS®-formulated hydraulic fluid will range from 5%-10% when compared to a conventional monograde fluid of the same ISO viscosity class; however, field tests have recorded gains of as high as 30%.
Unsurpassed research and development capabilities
Testing in the lab and in the field

Evonik Oil Additives offers a wide range of hydraulic fluid additive technologies and products to meet formulation challenges worldwide, all supported by one of the industry’s most knowledgeable and experienced staffs. Evonik is recognized for its skills in evaluating customers’ specific formulations and performing rigorous laboratory testing with a variety of advanced equipment. With Evonik’s ongoing discovery of next-generation technologies, the team develops customized viscometric solutions, creating additional value and offering new opportunities for hydraulic oils.

Test capabilities include:
- State-of-the-art laboratory testing
  - Shear stability testing
  - Pump testing (piston, vane, gear)
  - Efficiency testing
  - Denison HF-0 tests
- OEM equipment field testing

Tribology measurement capabilities include:
- Mini Traction Machine (MTM)
- Tribometer
- Rheometer

Evonik’s hydraulic fluid technologies and products demonstrate outstanding performance in laboratory and Denison hybrid pump tests. In field tests they also outperform, even under the most severe conditions encountered in challenging operating environments.
DYNAVIS® technology boosts efficiency and performance

Modern hydraulic systems must perform in difficult environments – from continuously operating industrial machinery to mobile equipment working on massive infrastructure or redevelopment projects. Rigorous testing throughout the entire development process ensures that Evonik technologies and products perform reliably, even under the most severe conditions.

Beginning with detailed thermodynamic modeling in Evonik labs, development continues with a regimen of pump tests, followed by a series of realistic field tests. These tests, combined with Evonik’s close partnerships with leading formulators and OEMs, ensure that the Evonik innovation pipeline is filled with the resource-efficient solutions that respond to today’s changing global performance requirements.

Monograde hydraulic fluids vs multigrade hydraulic fluids with DYNAVIS® technology

<table>
<thead>
<tr>
<th>Productivity</th>
<th>Fuel economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full buckets of earth moved over a 20-minute work cycle</td>
<td>Fuel consumption per 100 buckets of earth moved</td>
</tr>
</tbody>
</table>

- **Monograde hydraulic fluids**
  - 5-30% productivity gain
- **Multigrade hydraulic fluids with DYNAVIS® technology**
  - Savings of 5-30%

Active digging cycle with a mid-sized excavator.
Results vary depending on the equipment, the hydraulic oil and test conditions.
Powering global progress
Evonik Oil Additives for hydraulic fluids

### Viscosity modifiers for hydraulic fluids meeting the DYNAVIS® performance standard

<table>
<thead>
<tr>
<th>PSSI</th>
<th>PSSI</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>VISCOPLEX® 8-100</td>
<td>9</td>
<td>19 For Grp I base stocks; with PPD activity</td>
</tr>
<tr>
<td>VISCOPLEX® 8-112</td>
<td>8</td>
<td>16 For Grp II/III base stocks</td>
</tr>
<tr>
<td>VISCOPLEX® 8-200</td>
<td>19</td>
<td>39 For Grp I base stocks; with PPD activity</td>
</tr>
<tr>
<td>VISCOPLEX® 8-219</td>
<td>16</td>
<td>39 For Grp II/III base stocks</td>
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</table>

### Viscosity modifiers for specialty hydraulic fluids

<table>
<thead>
<tr>
<th>PSSI</th>
<th>PSSI</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>VISCOPLEX® 7-302</td>
<td>36</td>
<td>51 For superior pour point and excellent low-temperature viscosity</td>
</tr>
<tr>
<td>VISCOPLEX® 7-305</td>
<td>36</td>
<td>50 For naphthenic, paraffinic, and synthetic aircraft &amp; shock absorber fluids</td>
</tr>
<tr>
<td>VISCOPLEX® 7-510</td>
<td>42</td>
<td>66 For naphthenic, paraffinic, and synthetic fluids</td>
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### Viscosity modifiers for industrial hydraulic fluids

<table>
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<tr>
<th>PSSI</th>
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<th>Comments</th>
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<tr>
<td>VISCOPLEX® 8-220</td>
<td>18</td>
<td>47 High shear stability, for demanding filterability and demulsification requirements</td>
</tr>
<tr>
<td>VISCOPLEX® 8-251</td>
<td>36</td>
<td>47 With PPD activity</td>
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<tr>
<td>VISCOPLEX® 8-310</td>
<td>32</td>
<td>47 For superior pour point and very good low-temperature viscosity</td>
</tr>
<tr>
<td>VISCOPLEX® 8-400</td>
<td>43</td>
<td>63 For SS 155434 fluids; with PPD activity</td>
</tr>
<tr>
<td>VISCOPLEX® 8-407</td>
<td>43</td>
<td>55 High VI improvement, with PPD activity</td>
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<tr>
<td>VISCOPLEX® 8-450</td>
<td>51</td>
<td>62 High thickening efficiency; with PPD activity</td>
</tr>
<tr>
<td>VISCOPLEX® 8-944</td>
<td>75</td>
<td>89 Dispersant VI improver for use in hydraulic/transmission tractor fluids</td>
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<tr>
<td>VISCOPLEX® 8-954</td>
<td>75</td>
<td>89</td>
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### Viscosity modifiers for biodegradable hydraulic fluids

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<th>PSSI</th>
<th>PSSI</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>VISCOPLEX® 10-250</td>
<td>33</td>
<td>44 Very high shear stability</td>
</tr>
<tr>
<td>VISCOPLEX® 10-930</td>
<td>-</td>
<td>- Good shear stability</td>
</tr>
<tr>
<td>VISCOPLEX® 10-950</td>
<td>-</td>
<td>- High thickening efficiency</td>
</tr>
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</table>

PSSI KRL = Shear stability index according to CEC L-45-A-99 (tapered roller bearing, 20 hrs)
PSSI US = Shear stability index according to ASTM D 5621 (sonic shear, 40 min)
Values may vary depending on the formulation
Evonik Oil Additives experts, available worldwide

Evonik Oil Additives promises timely and personalized support from local experts around the world. With more than 70 years of industry experience, Evonik Oil Additives offers customers a unique combination of lubrication expertise, formulation assistance and customized solutions.

Creating Resource Efficiency for hydraulics

Resource Efficiency is enhancing the value of partners’ formulations. Resource Efficiency reflects Evonik’s commitment to continually seek opportunities to enable the adoption of sustainable methods of energy production and consumption.

Resource Efficiency represents Evonik’s drive to research and develop next-generation technologies and to make those technologies available worldwide. It reflects Evonik’s goal to advance the role of additives as an integral part of tomorrow’s energy solutions.
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