

Superior Performance.

VISCOPLEX® ADDITIVES FOR
MOBILE HYDRAULIC EQUIPMENT





AGRICULTURE

In the field of agriculture, equipment can be a cost driver and the lifeblood for operation. By properly maintaining equipment, it will ensure performance reliability, giving the owner optimal field time.



CONSTRUCTION

When high-productivity is your business, top performing equipment is needed. With the right additives, you'll experience a faster and smoother response of the hydraulic system, allowing equipment to run without issue.



MINING

Ensuring your hydraulic fluid is working at maximum efficiency is a safeguard to continuously running reliable equipment, ultimately lowering your total cost of ownership.



FORESTRY

Operating equipment within an ideal viscosity range is critical to maintaining high performance. Using the right biodegradable additives will help you improve production, enhance fuel economy and reduce equipment noise levels.



In today's business environment, hydraulic equipment is constantly being pushed to its limits. Operators expect more uptime and greater productivity, even in harsh environments and under higher operating pressures. They are also increasingly aware of environmental concerns and noise levels, as well as total cost of ownership, which has led to a push for increased fuel economy, higher power density, extended oil drain intervals and longer service intervals.

On the manufacturer side, smaller oil reservoirs and smaller cooling systems make it more difficult to cool the fluid down, further increasing the stress on hydraulic fluids.

The Oil Additives specialists at Evonik created advanced hydraulic fluid additives for a wide range of hydraulic applications, including forestry, construction, mining, agriculture, automotive, aviation, and marine. They bring many years of experience in hydraulic system and pump testing, and support with OEM approvals. With a considerable level of experience and knowledge, Evonik is able to contribute additives that improve productivity while reducing fuel consumption, providing the components to achieve both efficiency and sustainability for hydraulic fluid formulators and marketers.

LET IT FLOW.

Hydraulic fluid transmits power, making it one of the key components of a hydraulic system. The use of a “low performance” fluid results in poor heat transfer, power transmission losses, and reduced responsiveness to controls and oxidative stress in the hydraulic system.

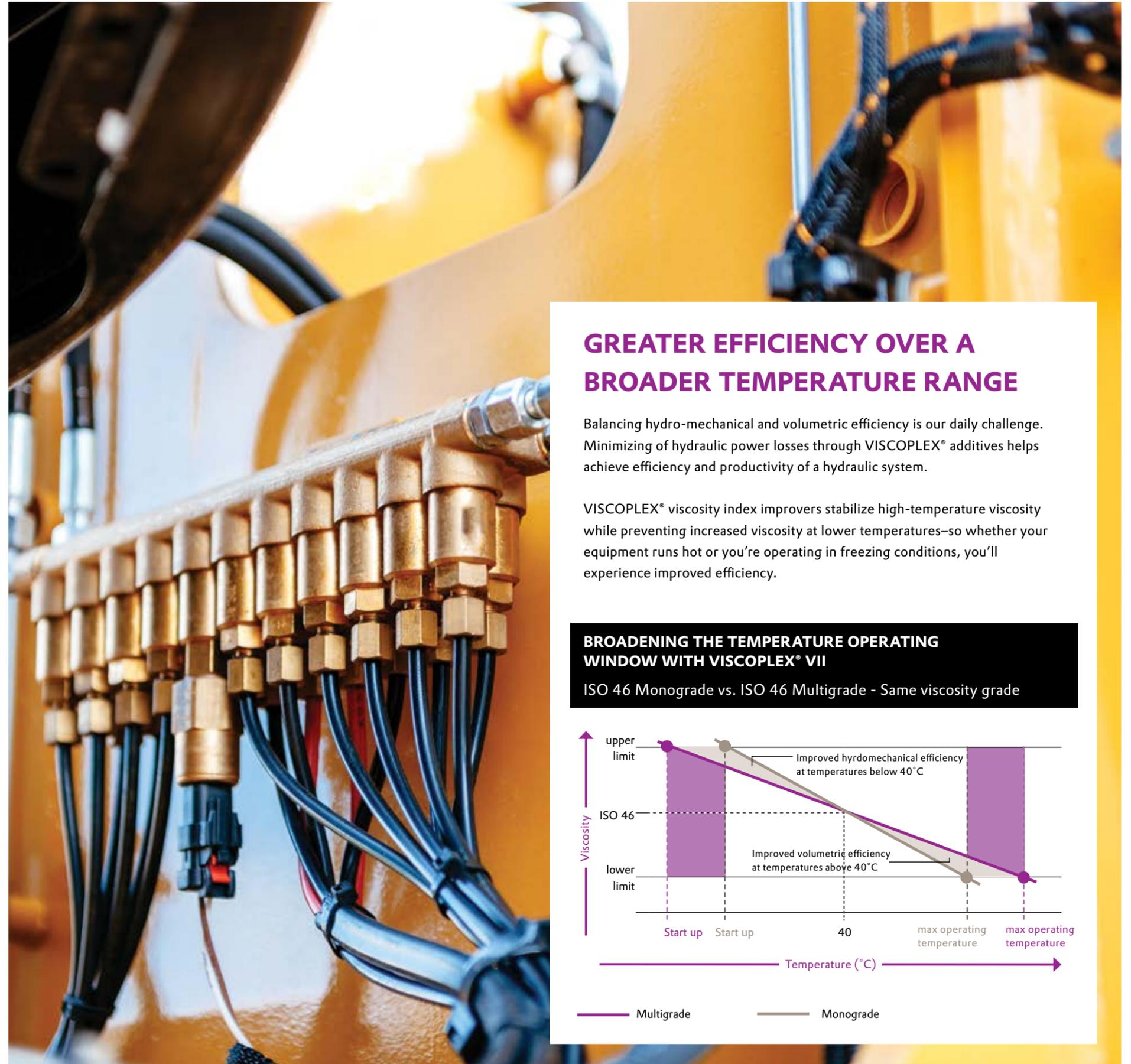
When hydraulic fluid is too cold, the increased viscosity creates high levels of friction. And when the fluid is too hot, decreased viscosity can lead to increased leakage flow. In either case, performance suffers.

To ensure proper flow, formulators strive to create a fluid capable of maintaining an optimal level of viscosity over a wide temperature range. To accomplish this, Evonik has developed specially designed additives that contribute to higher viscosity at high temperatures and offer minimal viscosity contribution at lower temperatures, an effect commonly referred to as high viscosity index.

High temperatures are the enemy of stable viscosity. As temperatures rise, the fluids thin, creating metal-to-metal contact in extreme cases. Poor viscosity due to high temperatures will cause increased wear and internal leakage, resulting in poor performance and costly repairs, or machine down-time.

When working with equipment where fluid viscosity remains within an optimal range, it allows the hydraulic system to work at maximum efficiency. The Oil Additives specialists at Evonik solve these challenges with additives that focus on the specific needs of hydraulic fluids used in mobile equipment.

Trust the Oil Additive specialists at Evonik to help you –
Let it flow.



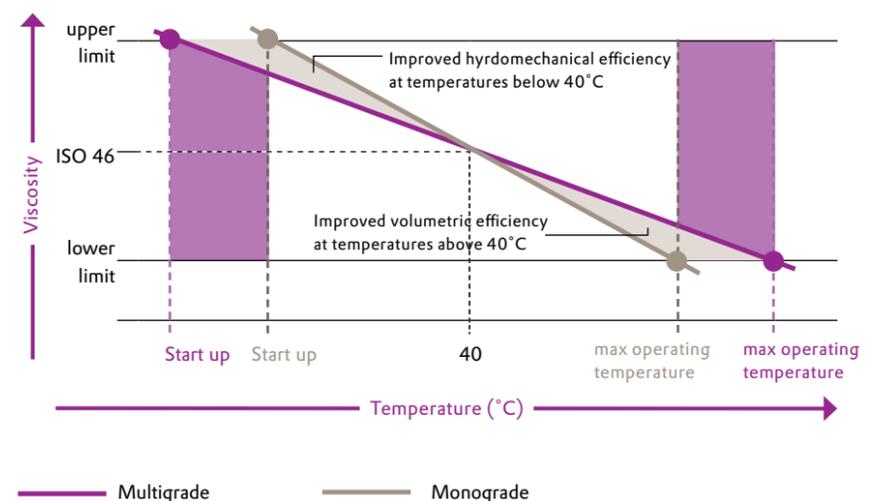
GREATER EFFICIENCY OVER A BROADER TEMPERATURE RANGE

Balancing hydro-mechanical and volumetric efficiency is our daily challenge. Minimizing of hydraulic power losses through VISCOPLEX® additives helps achieve efficiency and productivity of a hydraulic system.

VISCOPLEX® viscosity index improvers stabilize high-temperature viscosity while preventing increased viscosity at lower temperatures—so whether your equipment runs hot or you’re operating in freezing conditions, you’ll experience improved efficiency.

BROADENING THE TEMPERATURE OPERATING WINDOW WITH VISCOPLEX® VII

ISO 46 Monograde vs. ISO 46 Multigrade - Same viscosity grade



VISCOPLEX® FORMULATION EXAMPLES

The Oil Additives specialists at Evonik have developed an entire line of VISCOPLEX® Viscosity Index Improvers, along with formulation guidelines that help deliver maximum efficiency and performance for all types of mobile hydraulic equipment in all types of conditions.

Hydraulic fluids are typically composed of 85 to 99 percent base fluid by weight. Polymer-based additives such as viscosity index improvers and pour point depressants make up most of the rest, and other additives such as antioxidants, rust- and corrosion inhibitors, anti-wear agents, demulsifiers, metal inhibitors and anti-foam agents account for less than 1 percent.



ISO 32, VI 160

	Unit	8-200	8-219	8-310	8-360	8-610	
VISCOPLEX® VII	wt%	6	6.4	4.3	3.8	3	
Additive Package	wt%	0.85	0.85	0.85	0.85	0.85	
VISCOPLEX® PPD	wt%		0.2	0.2	0.2	0.2	
Base Oils							
Gr. II 4 cSt at 100°C	wt%	67	68.75	63.5	52	58.45	
Gr. II 6 cSt at 100°C	wt%	26.15	23.8	31.15	43.15	37.5	
Data	Method	Unit					
KV40	ASTM D 445	mm ² /s	32.34	32.78	32.4	32.2	32.25
KV100	ASTM D 445	mm ² /s	6.5	6.59	6.525	6.47	6.48
VI	ASTM D 2270		159	161	161	159	159
Pour Point	ASTM D 5949	°C	-42	-51	-54	-48	-54
Brookfield (-26°C)	ASTM D 2983	mPa·s	2,400	2,400	2,400	2,600	2,700
Shear Stability, Viscosity Loss at 100°C:							
Bosch 250 Cycles	DIN 51382	%	0	0	2	3	6
Sonic Shear 40 min	ASTM D 5621	%	6	5	9	10	14
KRL 20h	ISO 26422	%	12	12	15	15	18

ISO 46, VI 160

	Unit	8-200	8-219	8-310	8-360	8-610	
VISCOPLEX® VII	wt%	7.6	8	5.5	5	3.9	
Additive Package	wt%	0.85	0.85	0.85	0.85	0.85	
VISCOPLEX® PPD	wt%		0.2	0.2	0.2	0.2	
Base Oils							
Gr. II 4 cSt at 100°C	wt%	29	31.3	25.5	10.75	17	
Gr. II 6 cSt at 100°C	wt%	62.55	59.65	67.95	83.2	78.05	
Data	Method	Unit					
KV40	ASTM D 445	mm ² /s	46.32	46.82	46.06	46.24	46.48
KV100	ASTM D 445	mm ² /s	8.44	8.52	8.43	8.45	8.45
VI	ASTM D 2270		161	161	161	161	160
Pour Point	ASTM D 5949	°C	-39	-51	-51	-48	-51
Brookfield (-26°C)	ASTM D 2983	mPa·s	4,500	4,300	4,600	5,000	5,100
Shear Stability, Viscosity Loss at 100°C:							
Bosch 250 Cycles	DIN 51382	%	0	0	3	4	7
Sonic Shear 40 min	ASTM D 5621	%	7	6	11	12	17
KRL 20h	ISO 26422	%	15	14	18	18	21



Evonik provides its customers with a number of OEM approvals and performs efficiency testing to ensure superior performance of hydraulic fluids formulated with VISCOPLEX® additives.

Hydraulic fluids formulated with VISCOPLEX® additives meet the requirements for leading industry approvals such as:

- Bosch Rexroth RD 90235
- Denison HF-0
- DYNAVIS® Performance Standard

The DYNAVIS® Performance Standard defines a set of fluid parameters that guarantee maximum efficiency. These parameters include a viscosity index of >160, a maximum shear loss of 15% and a limit to low temperature viscosity for hydraulic fluids of ISO grades 32, 46, 68. In addition it requires that efficiency gains of >3.5% are demonstrated in a hydraulic pump test.

LONG-TERM PERFORMANCE DEMONSTRATION

More than 1,500 runs and 18 different formulations were evaluated in a long-term performance demonstration at our test site in Germany. The test proved the superiority of DYNAVIS® formulated fluids vs. monograde fluids, as well as conventional (i.e. non shear stable) high VI fluids.



CASE STUDY

INCREASED PRODUCTIVITY AND IMPROVED FUEL EFFICIENCY

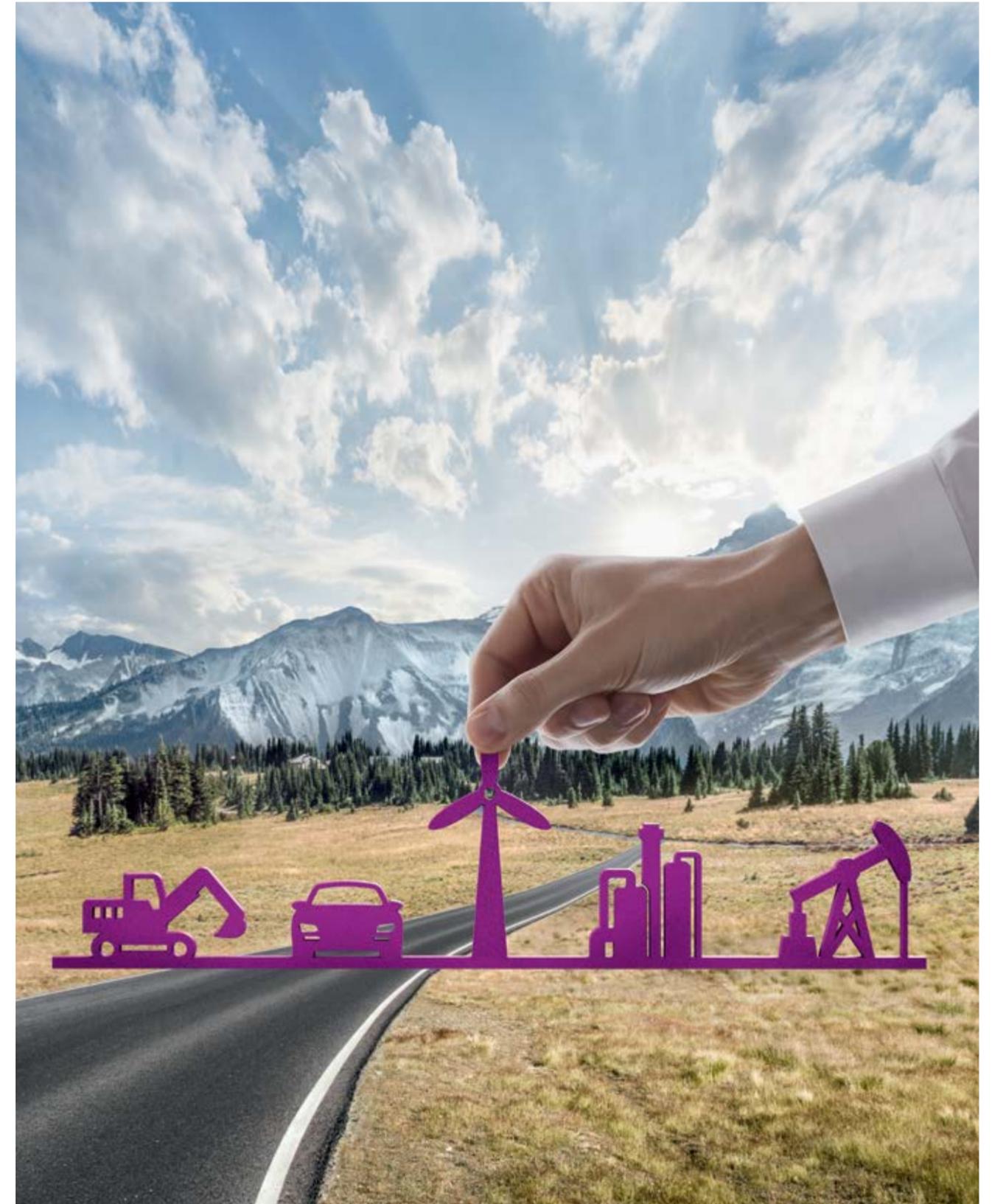
Equipment used	Test phases	Results
<ul style="list-style-type: none"> • Hydraulic excavator • Two dump trucks • On-site truck scale • Wheel loader 	<ul style="list-style-type: none"> • Truck loading • Traveling • Digging • Idling 	<ul style="list-style-type: none"> • 5-17 percent higher fuel efficiency • 6-23 percent more productivity

A FOCUS ON RESOURCE EFFICIENCY

With a constant focus on enhancing the value of our partners' formulations, Evonik is continuously striving to develop next-generation technologies that improve efficiency and sustainability. As part of our goal to advance the role of additives as an integral part of tomorrow's energy solutions, we seek opportunities to enable the adoption of sustainable methods of energy production and consumption. With custom solutions, continuous product development and a reliable, robust supply chain, Evonik keeps its customers one step ahead of industry challenges.

GLOBAL AVAILABILITY AND SUPPLY SECURITY

With five ISO 9001 and ISO 14001-certified production plants across the globe, our partners can be sure they always have the access they need to Evonik's specialized VISCOPLEX® products and other viscosity index improvers. And with more than 70 years of industry experience and timely, personalized support from local Evonik Oil Additives experts around the world, we offer a unique combination of lubrication expertise, formulation assistance and customized solutions.



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