



Oil Additives

Innovative additives using the latest technologies in chemicals, providing unsurpassed levels of performance.

- True Nano Technology
- Patented Additives
- Colorless Nano Particles
- No Solubility Issues



Diesel Fuel Additives

Innovative additives using the latest technologies in chemicals, providing unsurpassed levels of performance.

- Innovative Technology
- Improved Winter Operability
- Formulated For Your Fuel



Where Innovation Lives

In a quest to engineer the best products, we:

- Brought in chemicals from around the world
 - Including Nano Technology, Group V Esters, base oils
- Litany of tests were performed
- Perfect synergy found to deliver unsurpassed performance

Leadership

LSI Chemical CEO Chris Gabrelcik:

- Certified Lubrication Specialist (CLS)
- Oil Management Analyst (OMA)
- Leads world-class R&D department

Vice President of Research & Development, Kevin Adams



What is Nano Technology?

- The branch of technology that deals with dimensions and tolerances less than 100 nanometers (nm)
- Nanometer is 1-billionth of a meter, 1,000X smaller than a micron
- Types of nano particles include carbon, molybdenum disulfide and more
- Commonly used in lubrication but often comes with issues



Red blood cell is 7,500 nm
(3,000x larger)

Industry Problems with Nano Technology

- Particles do not stay in suspension
- Dark in color
- Changes final product appearance
- Problems lead to limited uses across industries

We have solved these problems with our innovative processes and have claims that are supported by data.





NanoClear304 is a turnkey oil additive solution engineered to extend the performance of oil in:

- Shear & oxidation stability
- Performance
- Anti-wear & anti-friction properties

Properties

- Contains a true synthetic, colorless nano-carbon lubricant, 3-10nm
- Undergoes patented surface treatment to ensure suspension
- Does not change product appearance
- Conventional oils can now be marketed & sold as semi-synthetic





Benefits

- Improves shear stability & oxidation stability
- Increases horsepower and fuel economy from 1-5%
- Reduces operating temperatures
- Reduces friction, noise & vibration
- Cleans engine components

Applications

- R&D will work with you to find the perfect treat ratio
- Add to market-ready product or used as an add-on to market-ready products



Typical Properties

PROPERTY OR TEST	ASTM	RESULT
Kinematic Viscosity @ 40°C, mm ² /2	D-445	53.70 cSt
Kinematic Viscosity @ 100°C, mm ² /2	D-445	11.03 cSt
Viscosity Index	D-2270	203
Specific Gravity	D-4052	0.8873
Acid Number, mg KOH/g	D-974	0.03
Flash Point (open cup), °F	D-92	496
Pour Point, °C	D-97	-36
Dielectric Breakdown Voltage, Kilovolts	D-877	36.23
Water Mass %	D-6304	0.01
Color	D-1500	L0.5

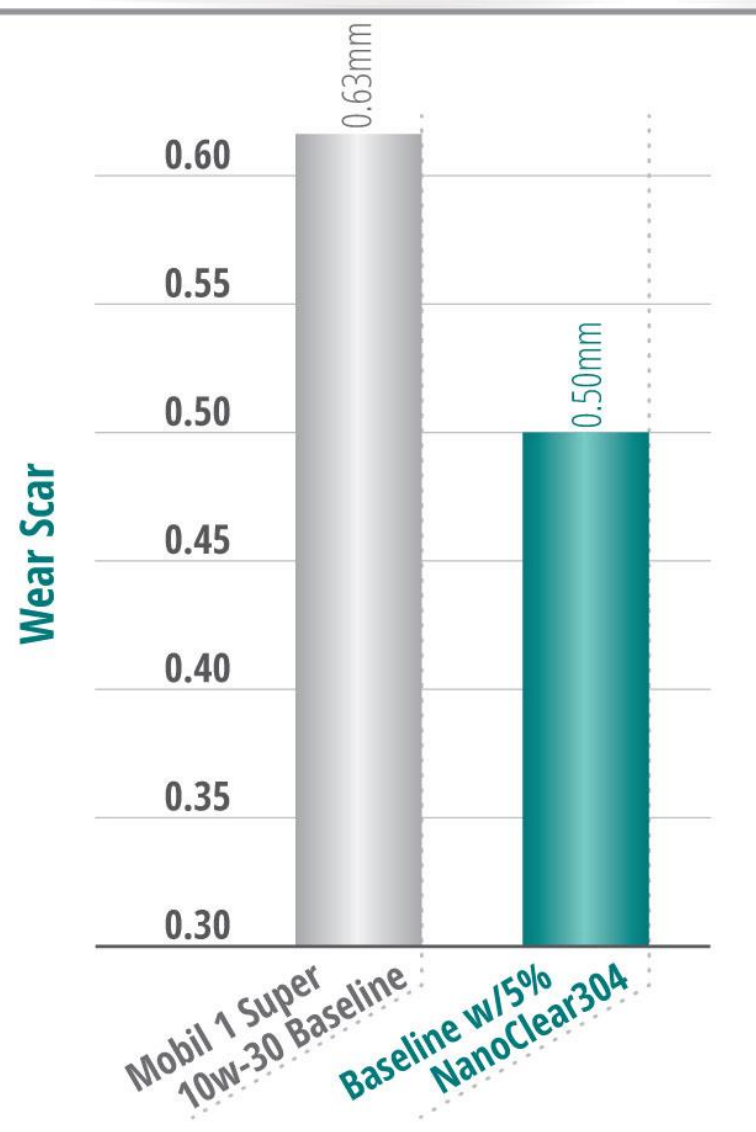
NanoClear 304

Where Innovation Lives

ASTM D-4172 Four Ball Wear Test Results

Wear Reduction

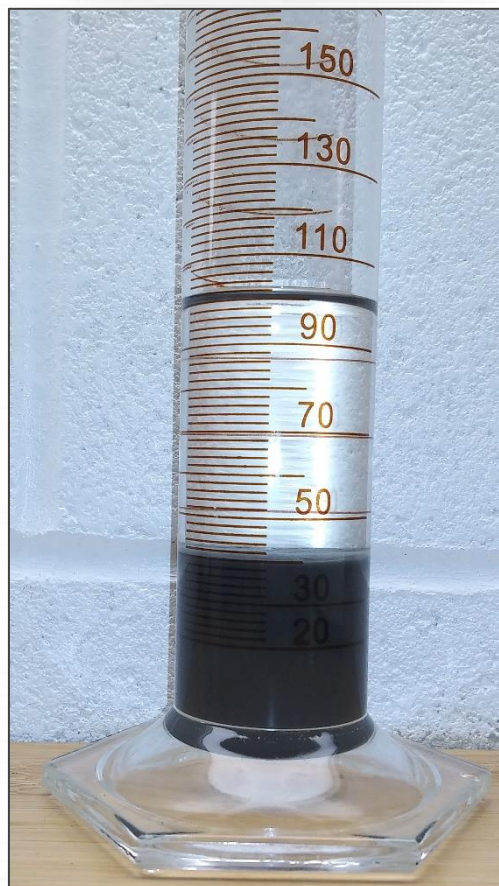
When tested in ASTM D-4172 (Four Ball Method) using Mobil1 Super 10W-30 baseline, **NanoClear304** showed a 20.6% reduction in wear.



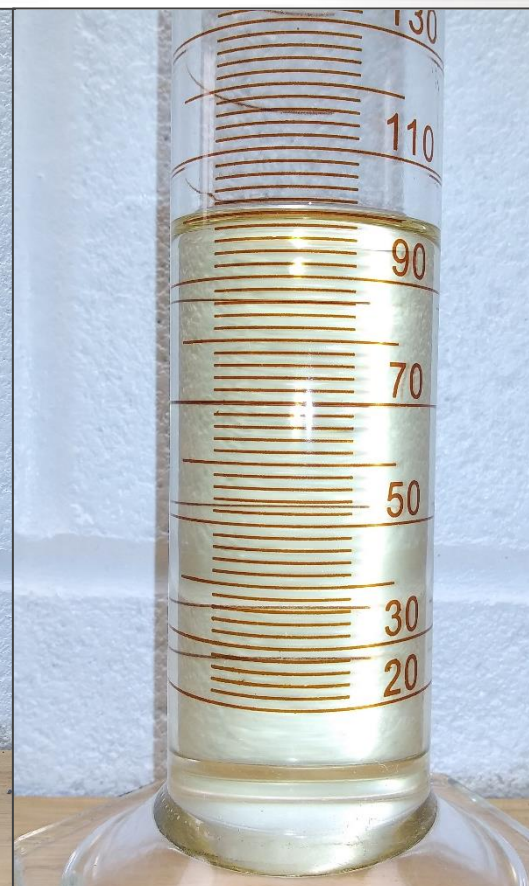
Stays In Suspension

Our nano particles are treated with a patented surface treatment to ensure stability. No precipitation issues like other nano particles.

Competitor Nano
Ceramic after 4-hours



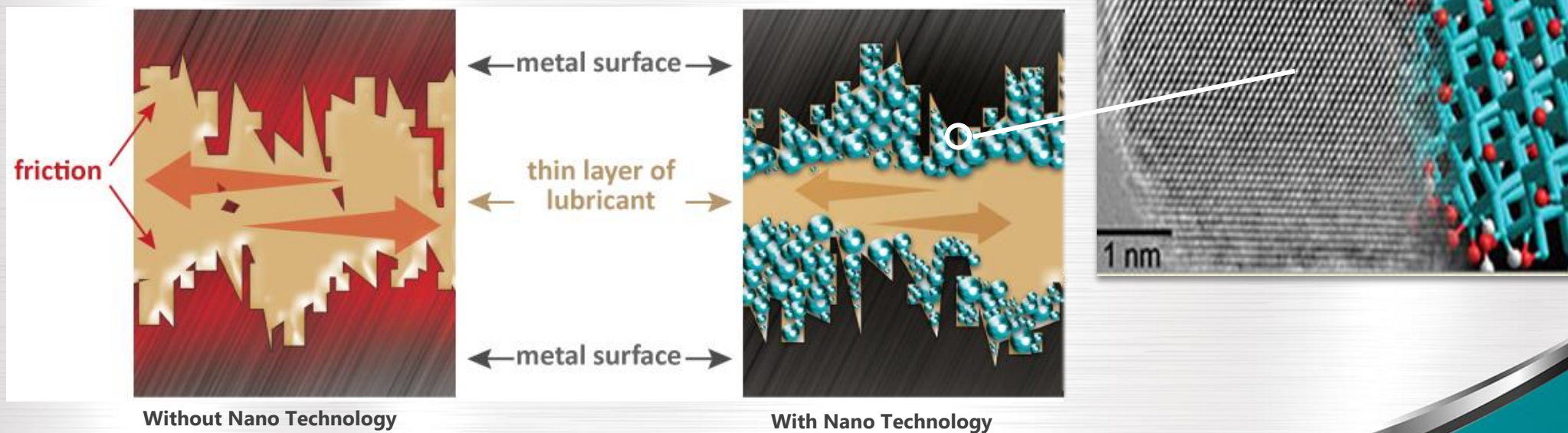
NanoClear304 after 6-months





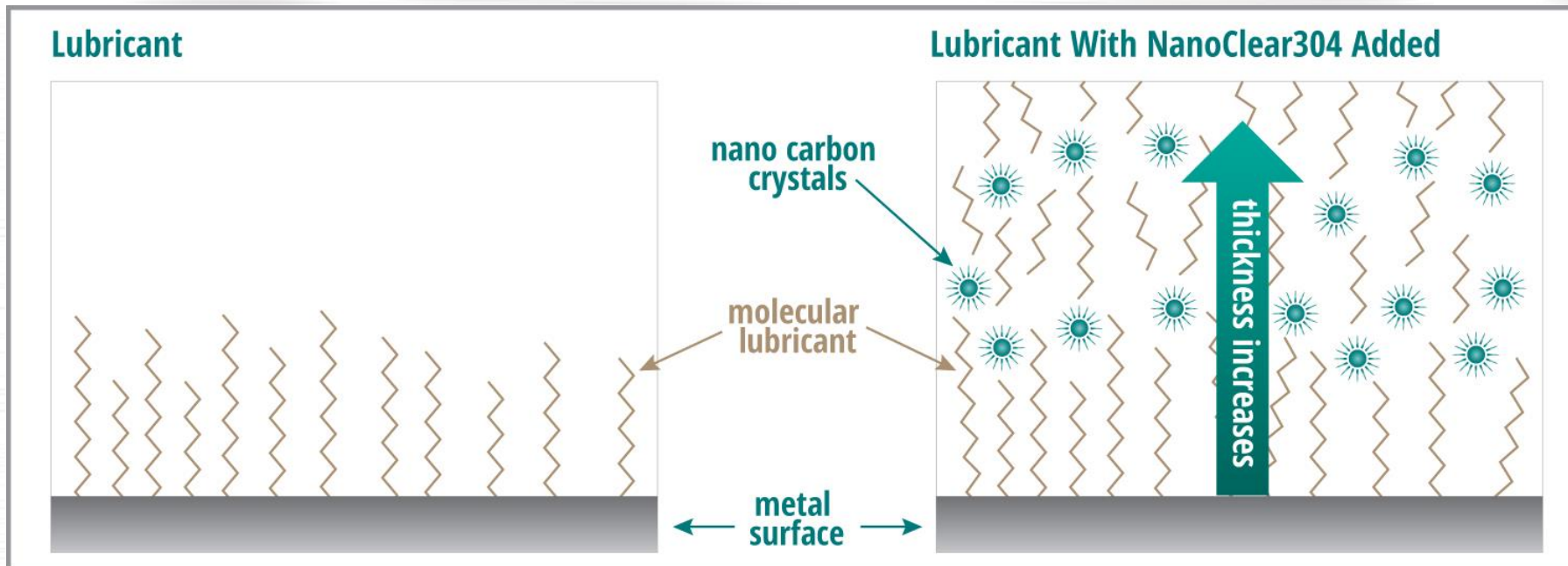
Smoother Surface

Submicron particle size and polarity allows particles to fill in asperities on machined surface.



Increased Film Strength

Nano particles form chain-like links that increase the molecular structure of the oil which behaves like higher viscosity oils.



Extends Engine Oil Life

Acid Number

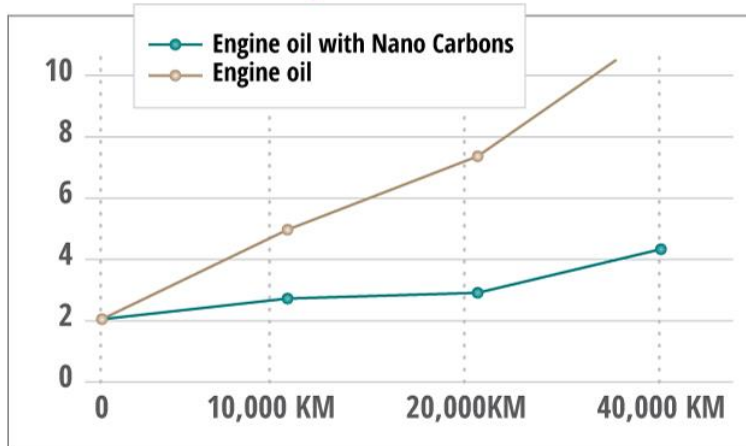
Purpose

An engine oil to be oxidized by oxygen and heat of high temperature through driving distance and times.
An acid number represents an indicator of oil oxidation.

Test

Measuring acid number in oil every 10,000km of driving.

Total Acid Number, MG KOH/G



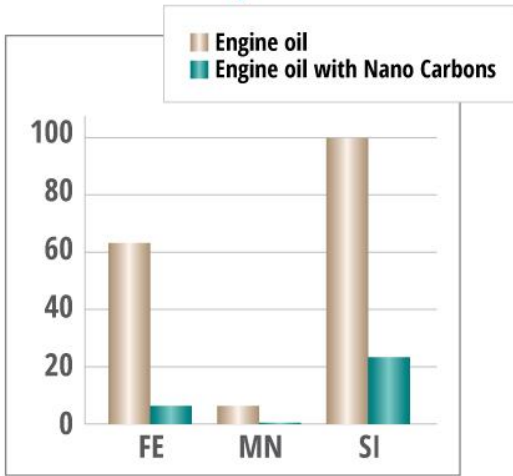
Description	Driving (KM)	TAN-Acid Number (mgKOH/g)	Remark
Engine oil	0	2.397	107%
	10,000	4.965	
Engine oil with Nano Carbons added	0	2.373	22%
	10,000	2.895	

Results

Acid number decreased ~85% compared to untreated engine oil.

Extends Engine Oil Life

Metal Abrasion & Particle Count

Purpose	The engine is composed mostly of metal materials (Fe, Mn, Si) through a casting process and metal abrasion is increased by friction during normal operation. Metals can be found in the oil through particle count on an oil analysis.																																							
Test	Measurement of metal contents in oil after 10,000km driving Metal Abrasion, MG/KG																																							
Results	Metal abrasion decreases in Nano Carbon treated engine oil.	<table border="1"> <thead> <tr> <th>Description</th><th>Driving (KM)</th><th colspan="3">Detected Substances (mg/kg)</th></tr> <tr> <th></th><th></th><th>FE (Iron)</th><th>MN (Manganese)</th><th>SI (Silicon)</th></tr> </thead> <tbody> <tr> <td rowspan="2">Engine oil</td><td>0</td><td>0</td><td>0</td><td>19.9</td></tr> <tr> <td>10,000</td><td>69.1</td><td>7.83</td><td>103</td></tr> <tr> <td rowspan="4">Engine oil with Nano Carbons added</td><td>0</td><td>0</td><td>0</td><td>21.3</td></tr> <tr> <td>10,000</td><td>7.58</td><td>0</td><td>30.5</td></tr> <tr> <td>20,000</td><td>23.5</td><td>0</td><td>49.5</td></tr> <tr> <td>40,000</td><td>51.6</td><td>5.78</td><td>58.7</td></tr> </tbody> </table>			Description	Driving (KM)	Detected Substances (mg/kg)					FE (Iron)	MN (Manganese)	SI (Silicon)	Engine oil	0	0	0	19.9	10,000	69.1	7.83	103	Engine oil with Nano Carbons added	0	0	0	21.3	10,000	7.58	0	30.5	20,000	23.5	0	49.5	40,000	51.6	5.78	58.7
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NanoClear504 is a synthetic additive featuring nano particles for higher viscosity oils and lubricants. It is engineered to:

- Lower oil operating temperatures
- Increase film strength
- Improve anti-wear and anti-friction properties

Properties

- Contains true synthetic nano-carbon particles, 3-10nm
- Undergoes patented surface treatment to ensure suspension
- Does not change product appearance



Benefits

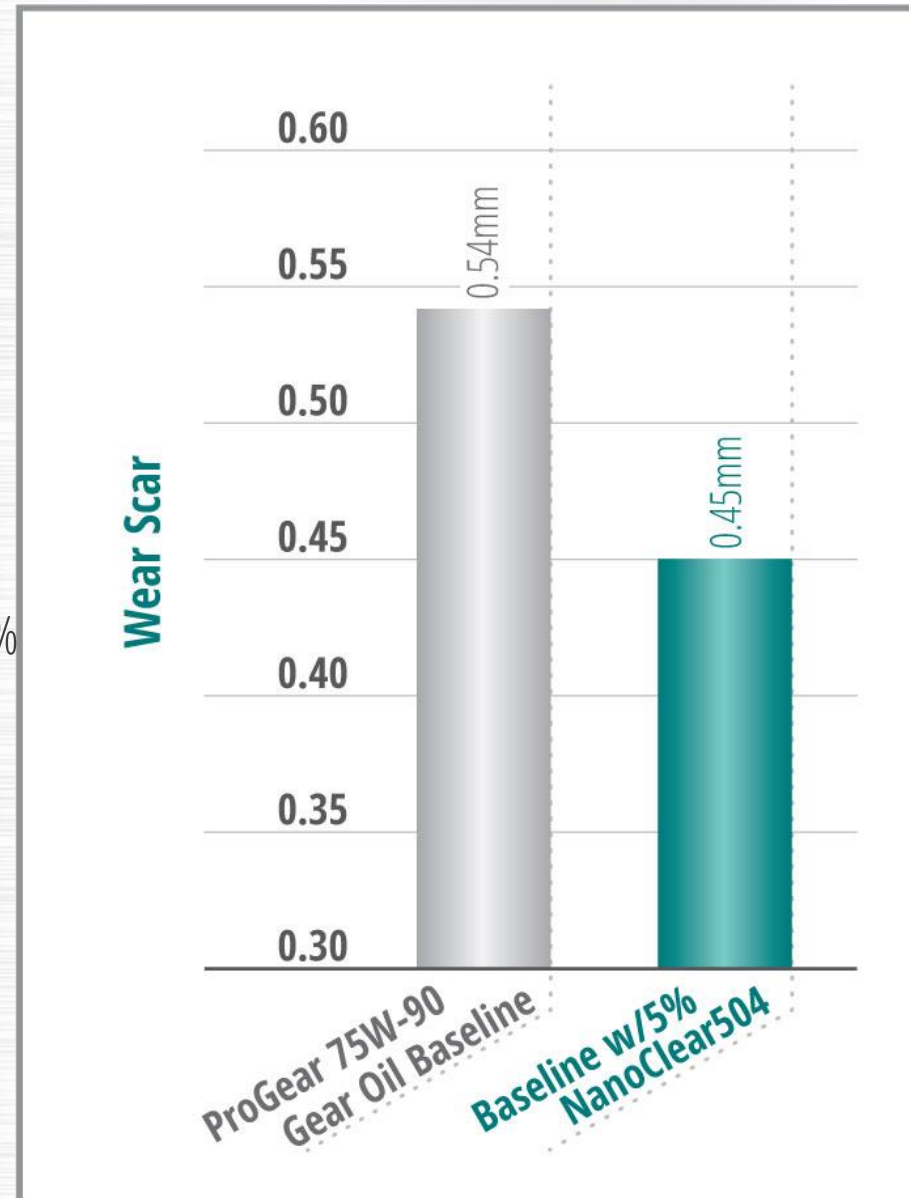
- Improves shear stability & oxidation stability
- Increases film strength
- Reduces wear, noise & vibration
- Allows for high load carrying capacity

Applications

- Compatible with gear oil, greases, etc.
- R&D will work with you to find the perfect treat ratio
- May be used as part of an additive package or as an add-on to market-ready products

Wear Reduction

When tested in ASTM D-2266 (Four Ball Method) using ProGear™ 75W-90 Gear Oil, **NanoClear504** showed a 16.6% reduction in wear.







EsterAd232 is an innovative oil additive engineered with three proprietary synthetic chemicals, including a Group V Ester, that improves oil in:

- Stability
- Performance
- Anti-wear properties

Properties

- Contains proprietary Group V Ester & Group IV PAO
- Negatively charged particles fills in asperities
 - Allows for a true smooth surface for lubricating film to form





Benefits

- Improves shear & oxidation stability, anti-wear properties
- Improves oil film strength & boundary lubrication
- Reduces friction, noise & vibration
- Cleans engine deposits
- Improves efficiency, resulting in improved power
- Recertification of lubricant is not necessary (e.g. API)
- Great replacement of for Ester in formula(s)

Applications

- R&D will work with you to find the perfect treat ratio
- Compatible with all groups of oils of all viscosities
- Add to market-ready product or used as an add-on to market-ready products



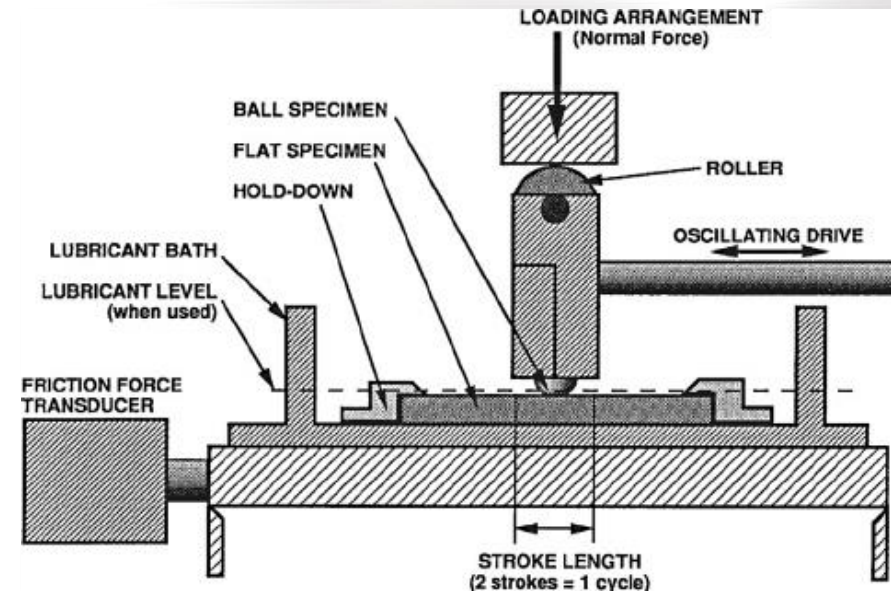
Typical Properties

PROPERTY OR TEST	ASTM	RESULT
Kinematic Viscosity @ 40°C, mm ² /2	D-445	53.70 cSt
Kinematic Viscosity @ 100°C, mm ² /2	D-445	11.03 cSt
Viscosity Index	D-2270	203
Specific Gravity	D-4052	0.8873
Acid Number, mg KOH/g	D-947	0.03
Flash Point (open cup), °F	D-92	496
Pour Point, °C	D-97	-36
Dielectric Breakdown Voltage, Kilovolts	D-877	36.23
Water Mass %	D-6304	0.01
Color	D-1500	L0.5

ASTM G-133 Test

“Test method designed to simulate the geometry and motions that are experienced in many types of rubbing components whose normal operation results in periodic reversals in the direction of relative sliding.”

- Best represents engine conditions versus other test methods
 - Start & stop test compared to other tests which are continuous (e.g. four-ball)
- Uses a sliding pin on flat plate immersed in the target oil
- Sliding action produces a wear scar that can be measured
- Test is 40,000 cycles



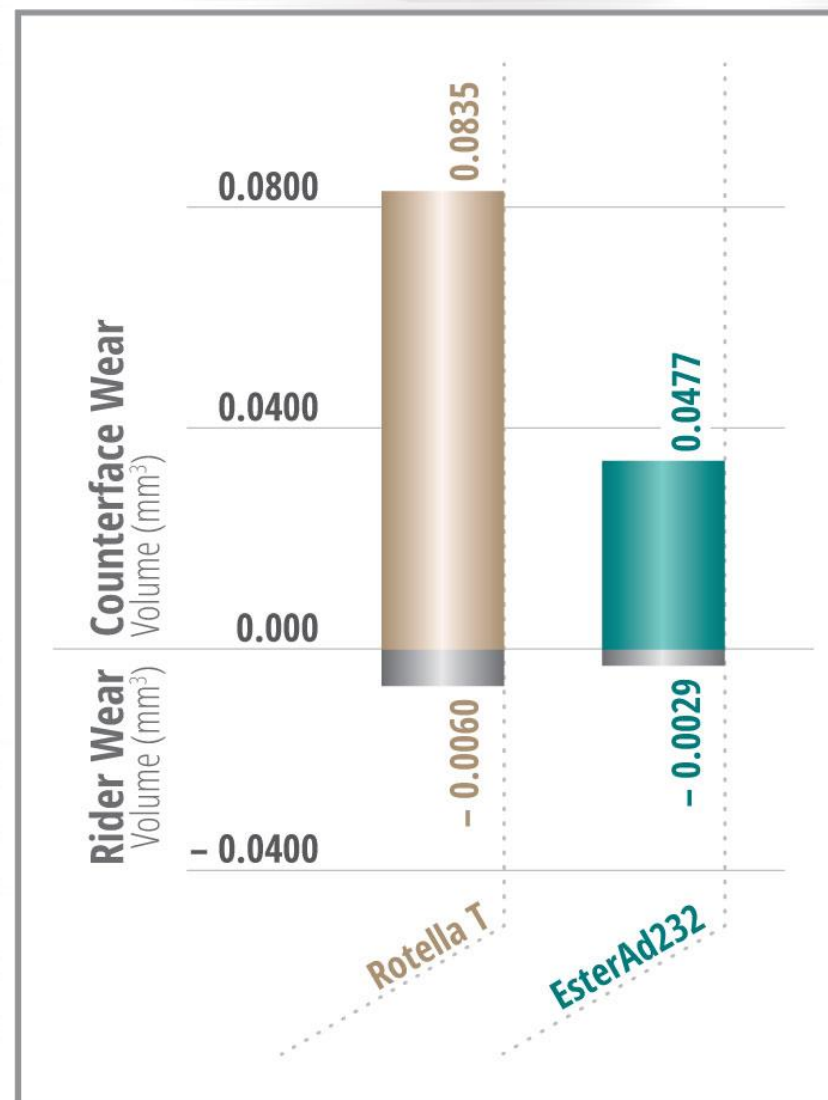
ASTM G-133 Test Apparatus



ASTM G-133 Test Results

Wear Reduction

When tested in ASTM G-133 using Shell™ Rotella T baseline, **EsterAd232** showed a 43% reduction in wear.



NanoRestore **736**

Where Innovation Lives



NanoRestore736 is an oil additive that restores power and compression in vehicles and equipment by safely and effectively removing deposits. It is formulated using our proprietary nano additive.

NanoRestore736 keeps oil-wetted components and passageways clean and lubricated, allowing for improved power and a longer life span for components.

Properties

- Formulated with a Group V Ester, nano additive and conventional/mineral oil
- Unique ability to clean & lubricate
- Contains zero harmful solvents





Benefits

- Resulted in a 98% clean rating in the ASTM D-4828 scrub test
- Cleans & lubricates
- Restores power & compression
- Reduces wear & coefficient of friction

Applications

- Compatible with mineral, semi-synthetic & synthetic oils
- Add to market-ready product or used as an add-on to market-ready products

NanoRestore 736

Where Innovation Lives

Typical Properties

PROPERTY OR TEST	ASTM	RESULT
API Gravity @ 60°F	D-287	15.32
Viscosity @ 100°F, SUS	D-2161	13,000
Viscosity @ 210°F, SUS	D-2162	1,100
Flash Point (COC), °F	D-93	122
Pour Point, °F	D-97	-40
1-H (M2C101B)	n/a	Pass
Acid	n/a	Excellent
Color	n/a	Light Gold
Copper Strip Corrosion	D-130	Pass - Class 1
Humidity Cabinet	D-1748	Pass
Gum and Varnish	D-7320	Excellent
Moisture	n/a	Excellent

NanoRestore 736

Where Innovation Lives

Cleaning Properties

When tested in ASTM D-4828 for practical washability, **NanoRestore736** showed a 98% clean rating.



BEFORE

Scrub Test Plates
With Burnt Oil (Varnish)

98% 98% cleaned!



AFTER

'Cleaned' Scrub Test Plates
@ 30 Cycles

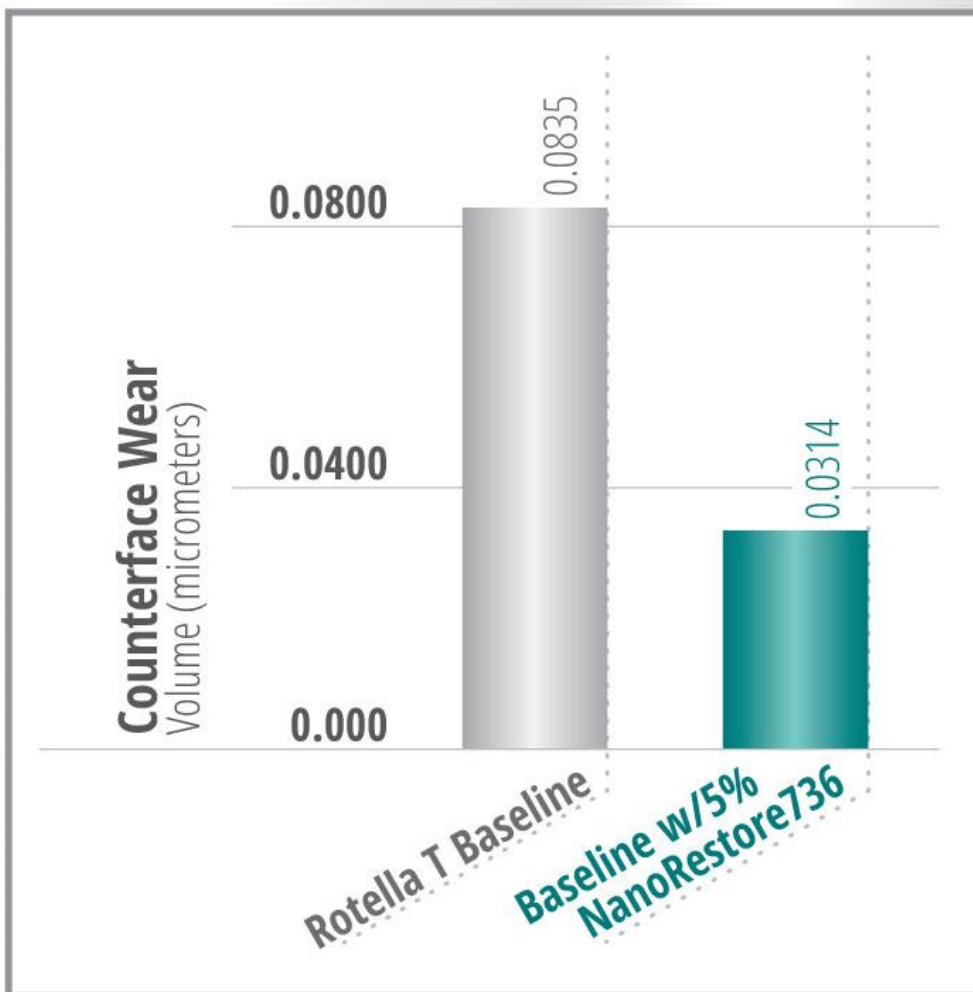
NanoRestore 736

Where Innovation Lives

Wear Reduction

When tested in ASTM G-133 using Shell™ Rotella T baseline, **NanoRestore736** showed a 64.4% reduction in wear.

ASTM G-133 Wear Test Results



Fuel Additives







ArcticArmor523 is a cold flow improver for diesel fuels to improve the low temperature performance and greatly increase winter operability. It is engineered to advance multiple characteristics of diesel, including Cold Filter Plugging Point (CFPP), Pour Point and Cloud Point.

Properties

- Solubilizes paraffin nuclei as they begin to crystallize
- Modifies paraffin crystal's growth as they precipitate
- Ensures the production of smaller crystals to keep fuel lines and filters clear and maintain operability





Benefits

- Prevents gelling & icing
- Reduces Cold Filter Plugging Point
- Reduces Pour Point & Cloud Point
- Lowers cloud point by solubilizing paraffin nuclei as they begin to crystalize

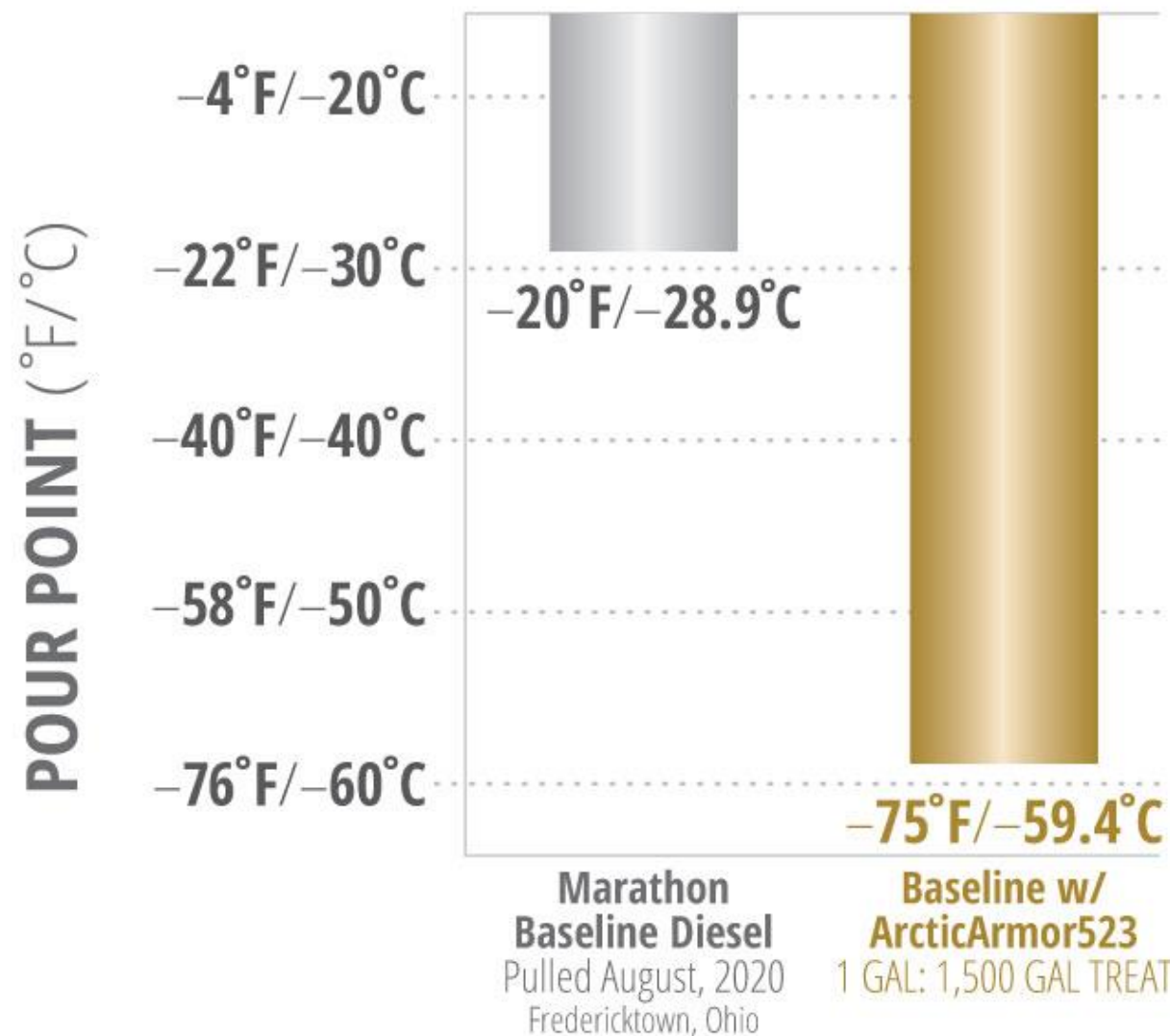
Applications

- Is formulated for today's diesel fuels & typical biodiesel blends
- Recommended for use in all diesel engines

ArcticArmor 523

Where Innovation Lives

Pour Point Test

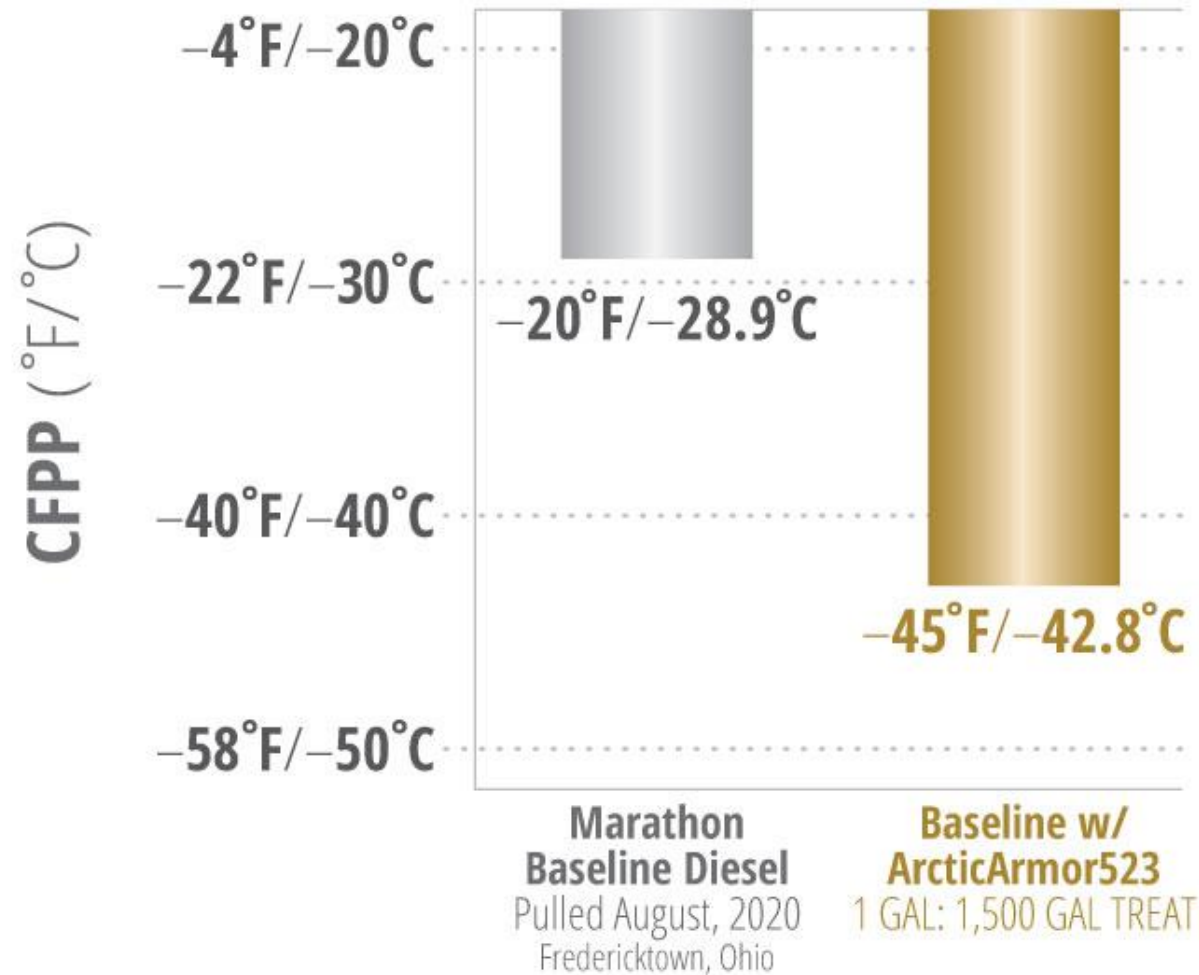


ArcticArmor 523

Where Innovation Lives

LSI  **CHEMICAL**
Where Innovation Lives

Cold Filter Plugging Point Test







TotalArmor607 is a multi-functional aftermarket additive for diesel fuel that is engineered to:

- Reduce wear
- Increase power & performance
- Control moisture & corrosion

Properties

- Utilizes special nitrates, which are pro-oxidants
- Includes the most advanced lubricity chemical available
- Meets top-tier detergency requirements
- Received an “A” rating in the NACE corrosion test
- Demulsifies moisture





Benefits

- Boosts cetane for better fuel combustibility
- Increases lubricity by up to 28%
- Reduces hydrocarbon & particulate matter output
- Cleans fuel injectors & removes deposits
- Neutralizes harmful acids

Applications

- Is formulated for today's diesel fuels and typical biodiesel blends
- Completely ashless and sulfur content does not exceed 15 ppm
- Complies with the federal low sulfur content requirements for use in diesel motor vehicles and non-road engines.



Typical Properties

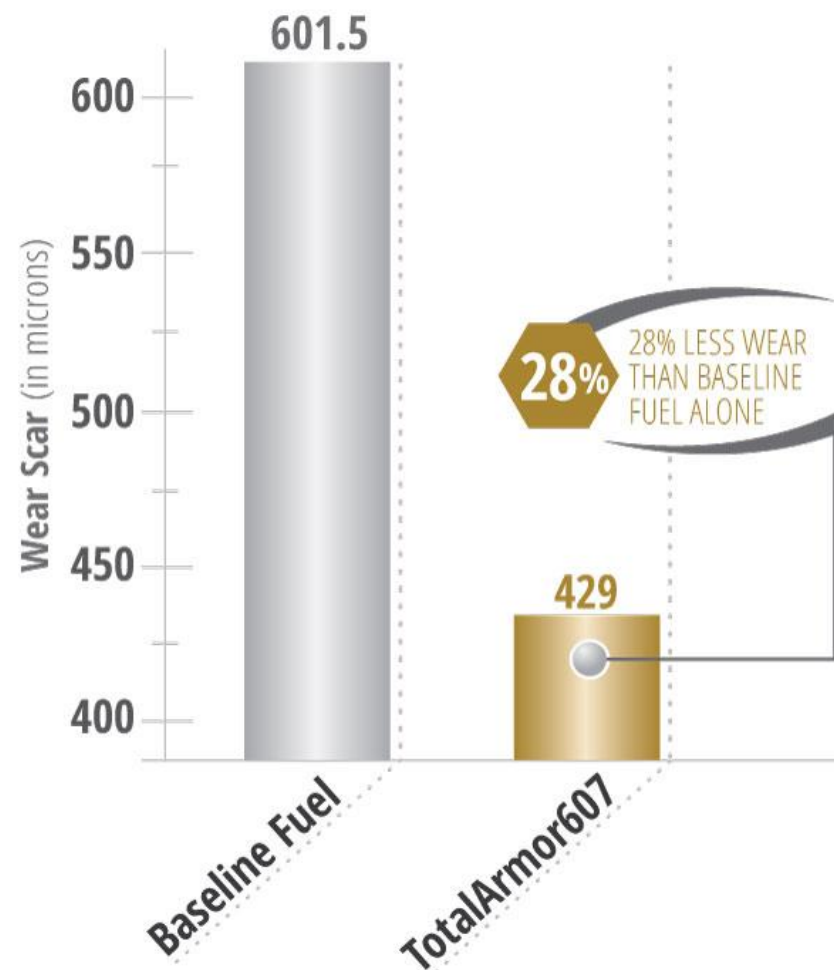
PROPERTY OR TEST	ASTM	RESULT
API Gravity @ 60°F	D-287	20.1
Flash Point, °F	D-92	155
Pour Point, °F	D-97	-60
Ash Content	n/a	None
Color	n/a	Amber
Copper Strip Corrosion	D-130	Pass
Filter Blocking	D-2068	Pass
Wear Scar	D-6079	Reduction of 121µm



ASTM D-6079 Test Results

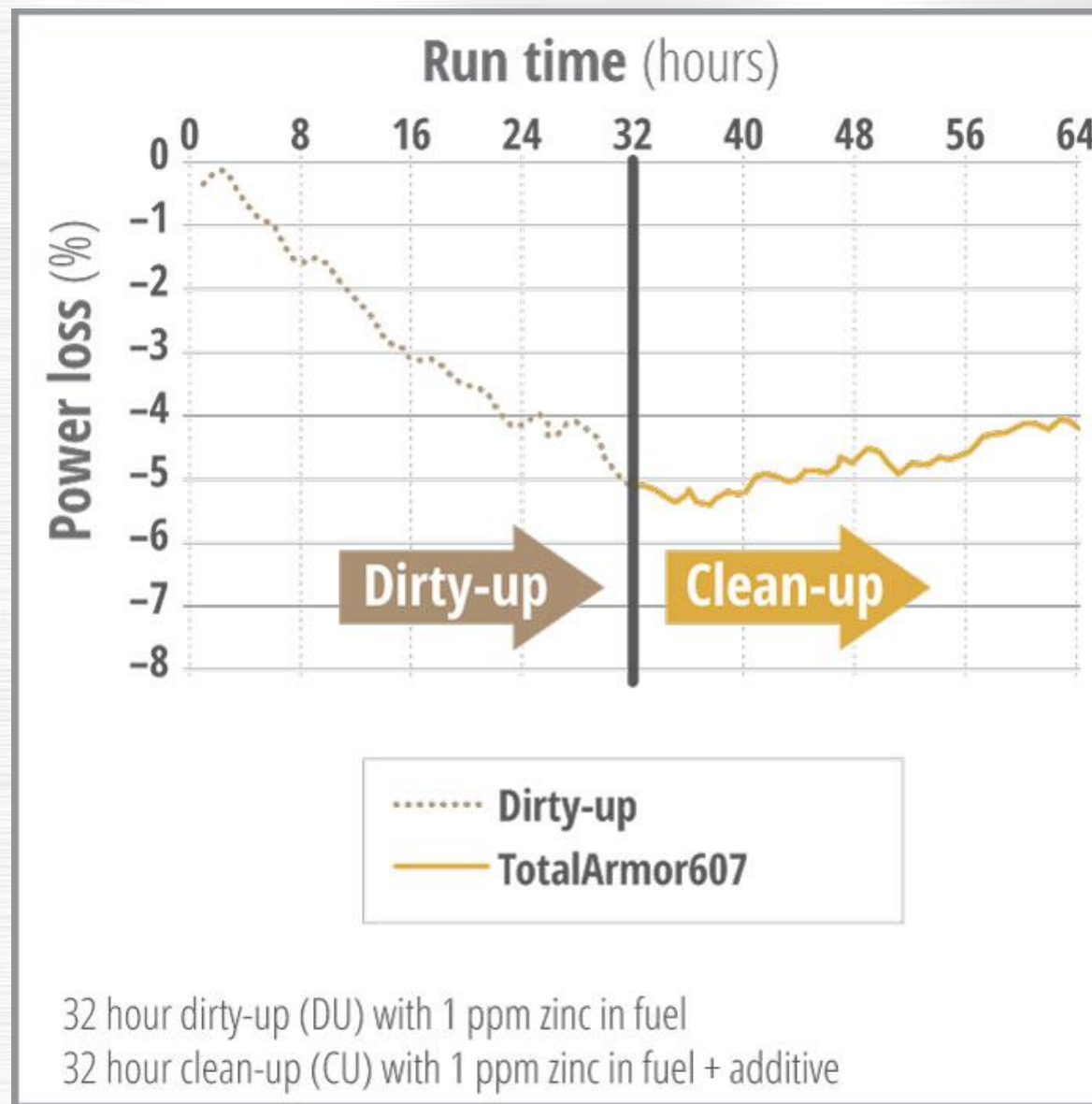
Wear Reduction

When tested in ASTM D-6079, **TotalArmor607** reduced wear by 28% compared to the baseline fuel.





Peugeot CEC F98-08 DW-10 Dirty-up/Clean-up Test







TotalArmorW7 is a multi-functional additive for winter blend diesel fuels that is engineered to:

- Improve winter operability
- Improve detergency & stability
- Increase lubricity & cetane number

Properties

- Contains:
 - Cloud point & pour point depressants
 - Anti-settling agents
- Prevents paraffin wax precipitation





Benefits

- Prevents gelling & icing.
- Minimizes the size of wax crystals & prevents paraffin wax precipitation.
- Enables the fuel to travel through the filter at temperatures 20°F/–6.6 °C below the cloud point of the diesel fuel.
- Lowers cloud point by solubilizing paraffin nuclei as they begin to crystalize.

Applications

- Is formulated for today's diesel fuels and typical biodiesel blends.
- Sulfur content does not exceed 15 ppm.
- Complies with the federal low sulfur content requirements for use in diesel motor vehicles and non-road engines.

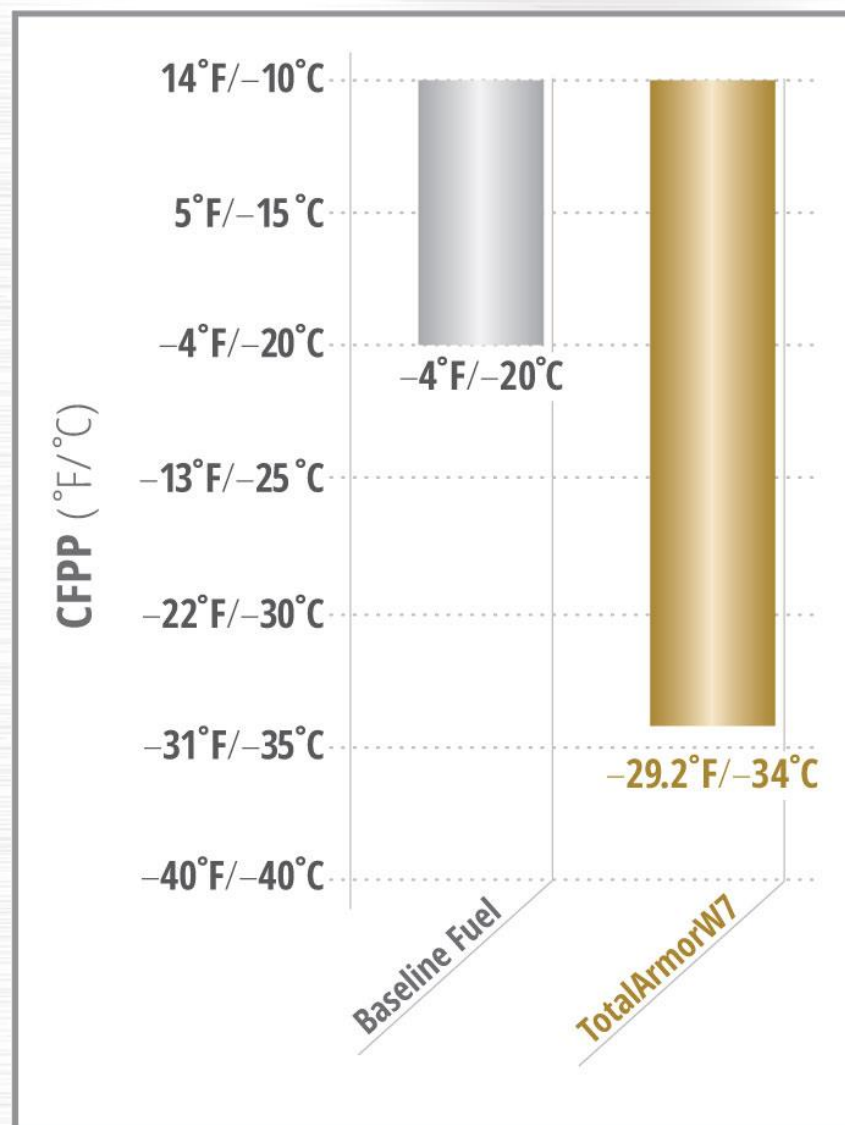


Typical Properties

PROPERTY OR TEST	ASTM	RESULT
API Gravity @ 60°F	D-287	24.3
Viscosity @ 40°F, CS	D-445	3.6
Flash Point, °F	D-92	125
Pour Point, °F	D-97	-45
Appearance	n/a	Hazy Amber



Cold Filter Plugging Point Test



***TotalArmor Clean** 450*

Where Innovation Lives

TotalArmor Clean 450

Where Innovation Lives

TotalArmor Clean450 is a multi-functional additive for diesel fuel that is engineered to:

- Remove “sticky” injector deposits
- Increase power & performance
- Control moisture & corrosion

Properties

- Exceeds top-tier detergency requirements
- Utilizes special nitrates, which are pro-oxidants
- Demulsifies moisture





Benefits

- 87% power restore in modified DW-10 test
- Contains 2X detergency requirements for premium diesel
- Removes both External Diesel Injector Deposits (EDIDs) and Internal Diesel Injector Deposits (IDIDs), including waxy and polymeric deposits
- Boosts cetane for better fuel combustibility
- Reduces hydrocarbon & particulate matter output

Applications

- Is formulated for today's diesel fuels and typical biodiesel blends
- Is recommended for use in all diesel engines

TotalArmor Clean 450

Where Innovation Lives

Typical Properties

PROPERTY OR TEST	ASTM	RESULT
API Gravity @ 60°F	D-287	27.9
Viscosity @ 100°F, SUS	D-2161	43
Viscosity @ 210°F, CS	D-2161	5.2
Flash Point (COC), °F	D-93	158
Pour Point, °F	D-97	-60
Acid Test	n/a	Excellent
Ash Content	n/a	None
Copper Strip Corrosion	D-130	Pass
Gum and Varnish	D-7320	Excellent
Storage Stability	n/a	Excellent
Filter Blocking	D-2068	Pass
Wear Scar	D-6079	Reduction of 60µm

TotalArmor Clean 450

Where Innovation Lives

Peugeot CEC F98-08 DW-10 Dirty-up/Clean-up Test



Hand Sanitizer

- Gel & Liquid available
- Pharmaceutical grade
- Manufactured in FDA approved facility
- 80% Ethyl Alcohol formula
- Formulation recommended by the World Health Organization
- Made in USA



Sampling & Testing Program

LSI Chemical will utilize our state-of-the-art laboratory in Mt. Gilead, Ohio to test our additives in your existing formula(s).

- Find the perfect balance of **performance & function**
- Provide results to **sell & market** an improved product with greater **benefits**
- Lab of scientists **easily accessible & available** to help develop products that meet your needs
- Easy, hassle-free process

**Aaron Darnell, Technical Director of
Research & Development**

Private Label Capabilities

Whether creating products from scratch or reformulating existing products, we can help you.

- Experience private labeling for large companies within the industry
- State-of-the-art blending and bottling facility
- Excellent formulation and shipping times
- Minimal turn-around time
- Low minimum orders



Private Label Capabilities

Products we can create & label for you:

- Oil Additives
- Fuel additives
- Engine oil
- Gear Oil
- Transmission Fluid
- Greases
- Spray lubricants
- And more





HOT SHOT'S SECRET

One of the fastest growing automotive aftermarket chemical brands.

With great brand awareness and product reputation, boost sales by carrying an already reputable brand with a rapidly expanding customer base.



What Can We Do Next To Help You?

Cutting Edge Nano Technology to Bring Your Products to the Next Level



Thank you!

Contact: Todd Cawley, President
801.541.6050
Todd@LSIchemical.com
LSIChemical.com