Fall 2015

Dear No-Rosion Customer,

Hopefully you had fun enjoying your cars this summer… It sure when fast this year, didn't it!

This newsletter is arriving slightly later than it normally does – for good reason. We didn't want you to receive it until production was complete for our new and improved **No-Rosion Lubrication System Passivator!**

Our previous formula was created over 12 years ago. It was a great formula, and served you well for all these years. It actually took this long to improve upon it! We're happy to announce that we have indeed done just that. The new formula uses specialized chemistry sourced directly from our industrial chemical division, where it has been used with great results in stationary engines and generators that are laid-up for extended periods, and run infrequently. It outperforms our old formula in all pertinent categories.

Water is one of your engine's worst enemies! It accumulates in motor oil, where it can cause a number of issues. This occurs primarily in two ways. First, as a result of water vapor being one of the gaseous byproducts of the combustion process. That is precisely why you should always bring your engine up to full operating temperature anytime you start and run it. This generates sufficient heat to help remove water, and reduce its accumulation in motor oil. Conversely, short run cycles, during which the engine is NOT brought up to full temperature, can (and will!) result in accelerated rates of water accumulation in motor oil.

Water in engines also comes from humidity in the air. Through environmental temperature fluctuations, it condenses into water inside an engine, and accumulates in the oil. This is especially the case in engines that are not run for extended periods, and/or not stored in temperature-controlled environments.

Once water has had a chance to accumulate in motor oil, it gradually forms an **emulsion**. Yes, that's right, contrary to popular belief, **water and oil actually DO MIX!** Through repeated engine heating/cooling cycles, a corrosive oil-water emulsion is formed. As this continues, the emulsion eventually reaches saturation point, whereby it can't hold any more water. When this happens, the water separates back out and forms a corrosive layer in the bottom of the pan. We probably don't need to explain how/why this can be bad for engine bearings.

Condensation inside engine cylinders also forms a thin layer of rust on cylinder walls. Infrequently-run engines are particularly vulnerable, because motor oil sinks to the pan when an engine is not run for extended periods. So when the engine is eventually run, metal-on-metal start-up damage can occur during the critical period before 100% oil pressure is achieved. This can, of course, be prevented by installing a pre-lube system on your vehicle… But said installations are invasive, unsightly, and expensive.

These issues underscore the importance of tending to the special lubricity needs of your engine if you are unable to run it regularly. This is the basis for our **No-Rosion Lubrication System Passivator**. It contains a demulsifier that removes water from motor oil, and prevents emulsions. It also contains corrosion inhibitors that neutralize acidic combustion byproducts that accumulate in motor oil, and protect metals inside your engine from rust and corrosion. And it contains specialized ingredients that form passive, non-reactive surface films on cylinder walls that provide lubricity to protect against start-up damage and related wear that occur after all the oil has sunk to the pan, and the engine is dry-started after a lengthy idle period.

ASTM-certified tests are conducted as a means of validating a product's performance in these key areas. Having recently reformulated our **No-Rosion Lubrication System Passivator**, we have fresh new test results that we would like to share with you.

A few of the most important tests are:

1) ASTM D5001 Standard Test Method for Measurement of Lubricity by the Ball-on-Cylinder Lubricity Evaluator
2) ASTM D1401 Standard Test Method for Water Separability of Oil
3) ASTM D665 Standard Test Method for Rust-Prevention of Oil in the Presence of Water

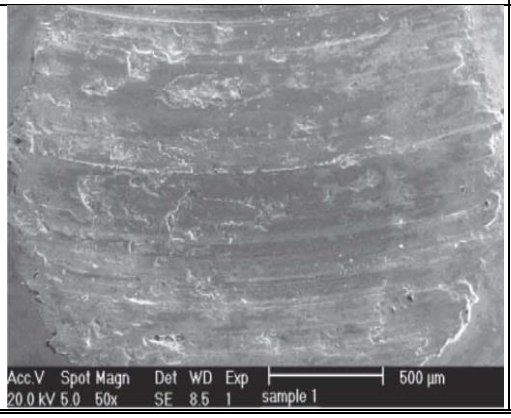
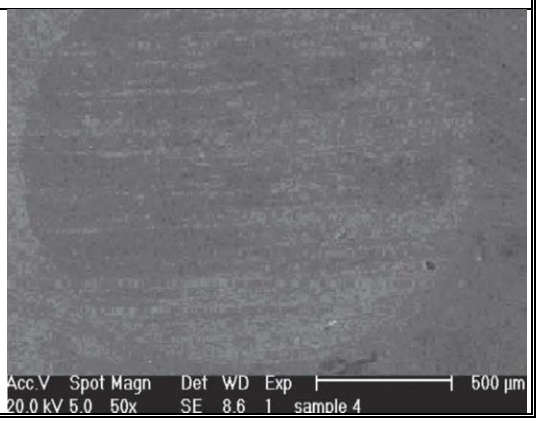
As a reminder, "ASTM" is the "American Society for Testing and Materials." It is composed of 141 technical committees that act as global leaders in the development and delivery of international test standards. Over 12,000 ASTM standards are used around the world to facilitate performance evaluations of products and materials ranging from metals, to construction products, to petroleum, to consumer products, and many more.

One of the ASTM's 141 technical committees is the D02 Committee on Petroleum Products, Liquid Fuels, and Lubricants. The D02 was formed in the year 1904, and plays a major role in motor oil development and innovations. It includes over 1,600 members from 52 countries, and has developed over 700 petroleum standards for materials that provide heat for homes, fuel for automobiles and airplanes, and lubricants for engines and machinery. Members of the D02 Committee include petroleum refineries, automobile and engine manufacturers, biodiesel producers, ethanol producers, equipment and apparatus vendors, governments, Department of Defense, academia, and others from around the world. Applied Chemical Specialties is an active, participating, voting member of the D02 Committee, and contributes to various D02 Subcommittees.

Without further ado, here are the test results:

1) ASTM D5001 Standard Test Method for Measurement of Lubricity by the Ball-on-Cylinder Lubricity Evaluator

This test method evaluates wear aspects and lubrication properties of rubbing steel surfaces. It is helpful in evaluating excessive friction, which results in shortened life of engine components. A prescribed amount of pressure is applied to a steel ball that is pressed against a rotating cylinder. The resultant wear scar is measured, and used as a means of assessing friction and lubricant characteristics. It is the best means of simulating metal-on-metal damage that results from dry engine start-ups.

	Motor oil <u>without</u> No-Rosion Lubrication System Passivator	Motor oil <u>with</u> No-Rosion Lubrication System Passivator
Wear Scar	257 microns	43 microns
Photos of Wear Scars		

2) ASTM D1401 Standard Test Method for Water Separability of Oil

This test method provides a guide for determining the water separation characteristics of oils subject to water contamination and emulsification. It is used for specification of new oils and monitoring of in-service oils. The procedure involves stirring 40 mL of oil and 40 mL of water in a graduated cylinder at 1500 rpm for 30 minutes, at a temperature of 130° F. Once complete, the oil and water levels are measured as a means of quantifying separability.

	Motor oil without No-Rosion Lubrication System Passivator	Motor oil with No-Rosion Lubrication System Passivator
Water Volume	40 mL	33 mL
Water Gain/Loss	0 mL	-7 mL

3) ASTM D665 Standard Test Method for Rust-Prevention of Oil in the Presence of Water

This test method evaluates the ability of oil to protect ferrous parts against rust and oxidation when emulsion occurs, and water becomes mixed with the oil. A steel pin is immersed in a mixture of oil and distilled water for 24 hours at a temperature of 100° F. After being removed, the percent of the pin that is covered in rust is used to determine a score, with a score of "B+" generally considered as a pass for the test. The scoring method is:

A – denotes 0% rust
B++ – denotes 0% to 1% rust
B+ – denotes 1% to 5% rust
B – denotes 5% to 25% rust
C – denotes 25% to 50% rust
D – denotes 50% to 75% rust
E – denotes 75% to 100% rust

	Motor oil without No-Rosion Lubrication System Passivator	Motor oil with No-Rosion Lubrication System Passivator
Rust Coverage	60%	0.5%
Score	D	B++
Pass/Fail	Fail	Pass
Photos of Pins		

It is true that some of these issues go away if you change your oil often enough. Similarly, if you store your vehicles in a climate-controlled garage, you further mitigate against issues. And you may even fog your engine before idle periods. But often it's not feasible to change oil as often as we would like (or should), and not all of us are fortunate enough to have a climate-controlled garage. Additionally, there are delivery issues with fog sprays. They can foul plugs, alter oil viscosity, and pool on piston crowns if not used properly. For these reasons and more, **Lubrication System Passivator** is a very practical, fail-safe, cost-effective solution.

Here's a question we often hear: "Why does my fuel economy drop when I use gasoline that contains ethanol?"

Ethanol contains about two-thirds as much energy as gasoline. Even though it is an effective octane booster, its lower energy content means vehicles will typically get 3% to 4% fewer miles per gallon on E10 (i.e. gasoline that contains 10% ethanol), and 4% to 5% fewer miles per gallon on E15.

A unit of measure called "Gasoline Gallon Equivalent," or GGE, represents the amount of alternative fuel it takes to equal the energy content of one gallon of pure unleaded gasoline. So GGE allows you to compare the energy content of various fuels to that of gasoline. As you will note below, alcohol-based fuels all contain less energy than gasoline. Thus, an engine will exhibit a loss in fuel economy that is commensurate with the energy density of the fuel being used.

Fuel Type	GGE %	BTU/gallon	kWh/gallon	HP-hr/gal	Calories/liter
Gasoline (regular unleaded)	100.00%	114,100	33.44	44.83	7594.0
E10 Gasoline (10% ethanol)	98.14%	111,836	32.78	43.94	7452.4
E85 (85% ethanol)	71.94%	81,800	24.04	32.23	5463.3
E100 (100% ethanol)	66.67%	76,100	22.27	29.85	5062.7
Methanol	49.75%	56,800	16.62	22.28	3778.1
Diesel	113.64%	129,500	37.95	50.87	8629.8

Which leads to another question: "Why do some racers run methanol if it has such little energy content?"

The answer relates to methanol's maximum power air/fuel ratio. Gasoline engines have an optimal air-to-fuel ratio of around 12.5:1 (12.5 parts air to 1 part fuel). But methanol burns optimally at a very rich ratio of 4:1! So even though gasoline contains twice as much energy, burning three times more methanol per stroke generates more power. All things being equal, this equates to almost 60% more energy output. Methanol also burns much cooler than gasoline and is high in octane, which offers distinct advantages for racing. But don't be tempted into thinking that you can, or should, consider methanol for your street-driven engines. It has serious drawbacks that make it entirely impractical. Because you have to run it so rich, you'll get horrible fuel economy, and have to completely retune your engine. It's also highly corrosive, and will eat through fuel lines very quickly.

Please find the enclosed order form that you can use to place your next order. Or, for quicker service, visit our web site and place your order using our secure, encrypted server at: www.NoRosion.com.

Thank you for being a customer. We appreciate your support, and look forward to continuing to be of service.

Applied Chemical Specialties, Inc.