

When The Going Gets Tough

The Tough **Go Further**

**FREEZE UP?**

**BOIL  
OVER?**

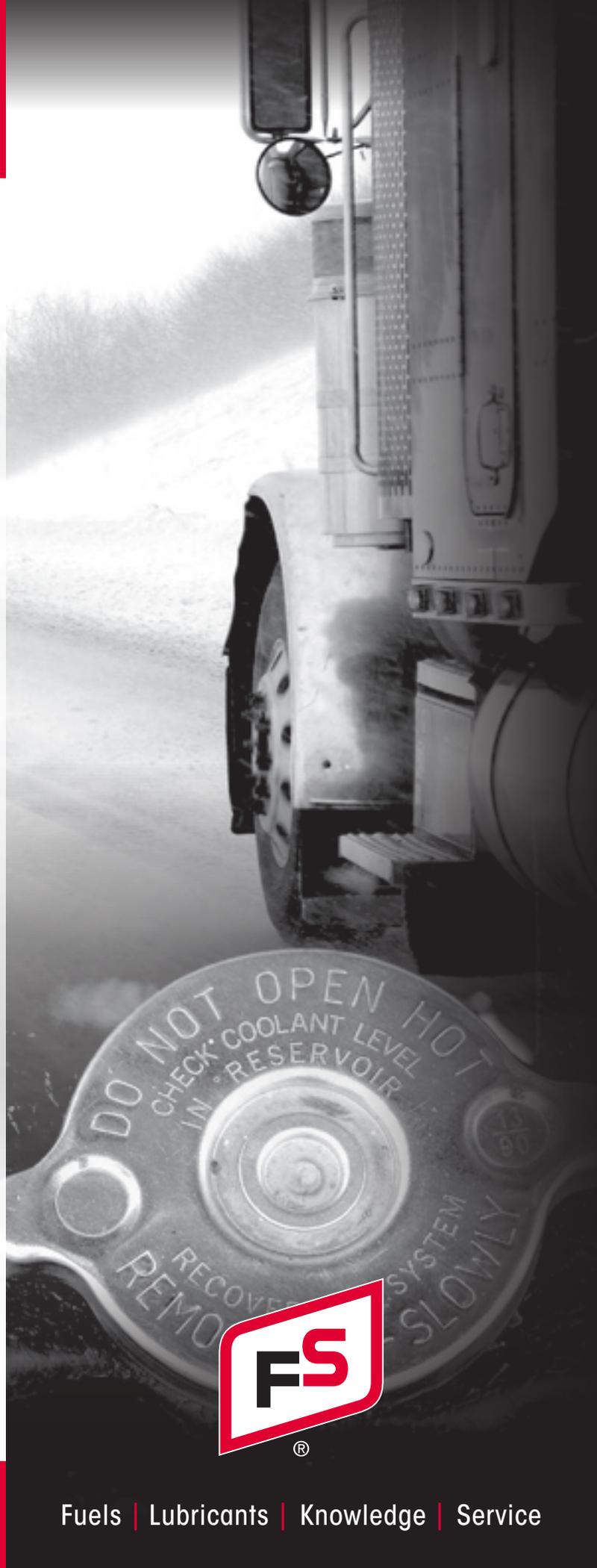
**CAVITATION  
ISSUES?**

Your Challenges. **Our Solutions.**

**BETTER PROTECTION AND  
IMPROVED PERFORMANCE**

**WITH**

**FS COOLANT/  
ANTIFREEZE**



# WHAT ROLE DOES COOLANT/ANTIFREEZE PLAY?

- Provides freeze-up and boil-over protection
- Provides engine material protection
- Facilitates effective heat exchange



## WHAT IS COOLANT/ANTIFREEZE COMPOSED OF?

WATER	+	GLYCOL	+	ADDITIVES
Transfers heat to radiator		Lowers the freezing point		Corrosion protection
		Raises the boiling point		Liner cavitation protection
		Reduces water surface tension		Scaling and deposit protection
		Transfers heat to the radiator		

## COOLANT/ANTIFREEZE EXPLAINED:

A typical antifreeze/coolant formulation is 96% water and glycol. However, the remaining 4% is important and can have a lasting impact on a heavy-duty diesel engine.

In heavy-duty diesel engine applications, coolant/antifreeze is formulated to prevent liner cavitation in wet sleeve liners, and also protect against scale and hard water deposits.

### Wet-Sleeve Liner Cavitation:

Cavitation occurs in wet-sleeve liners from rapid formation and collapse of vapor bubbles caused by vibrations occurring as the piston moves up and down. High pressures generated in very small areas cause the collapsing bubbles to hammer the liner and effectively drill small holes into the liner wall. If allowed to progress, the holes eventually penetrate through the liner wall and allow oil and coolants to mix.

Coolant additives, referred to as inhibitors, prevent this catastrophic occurrence. They form a hard surface on the liner wall that shields the metal from the effects of the vapor bubble implosion and subsequent pitting.



*Cylinder with liner cavitation*

### Inhibitors:

There are two general categories of inhibitors, inorganic and organic.

Organic acid technology (OAT) inhibitors are preferred by the majority of today's original equipment manufacturers (OEMs) and eliminate the need to add supplemental coolant additives (SCAs) or hassle with SCA maintenance. Instead of covering the entire system equally, OAT inhibitors move to trouble spots as needed and selectively protect the cooling system, resulting in longer-lasting protection.

Conventional inhibitors are typically comprised of inorganic molecules that create a strong plating film on the liner surface. They act quickly and cover all components throughout the cooling system equally. Unfortunately, they also deplete quickly and result in short-lived protection unless SCAs are added periodically.

# FS COOLANT/ANTIFREEZE SELECTION GUIDE

Selecting the right antifreeze for your application shouldn't be confusing. Contact your local FS Energy Specialist to determine which OAT, NOAT, or conventional coolant best meets your needs.

	FS Extended Life Organic Acid Technology (OAT)	FS Extended Life Nitrited Organic Acid Technology (NOAT)	FS Fully Formulated
<b>Features and Benefits</b>	<p>Premium organic acid technology</p> <p>Heavy-duty and light-duty diesel and gasoline applications</p> <p>Eliminates the need for supplemental coolant additives (SCAs) and coolant filters</p> <p>Provides superior long-term elastomer compatibility</p> <p>Prevents pitting caused by cavitation and corrosion of brass, copper, solder, steel, cast iron, and aluminum</p> <p>Extended service life – up to 1,000,000 miles   8 years or 20,000 hours protection*</p> <p>Free of phosphates, silicate, nitrites, amines, and borates</p> <p>Compatible with most major OEM brands of extended life coolant</p> <p>Provides maximum freeze-up and boil-over protection</p> <p>Available as pre-diluted (50/50) or as concentrate</p>	<p>Premium organic acid technology containing nitrite</p> <p>Contains better heat transfer properties than conventional coolants requiring SCAs</p> <p>Prevents pitting caused by cavitation and corrosion of brass, copper, solder, steel, cast iron, and aluminum</p> <p>Extended service life – up to 1,000,000 miles   8 years or 20,000 hours of off-road protection*</p> <p>Free of phosphates, silicates, and amines</p> <p>Compatible with most major brands of extended life OAT-type coolant/antifreeze</p> <p>Available as pre-diluted (50/50) or as concentrate</p> <p>Extender may be needed based on test results</p>	<p>Conventional technology; SCA precharged</p> <p>Protects against winter freezing and summer boil over</p> <p>Prevents pitting caused by cavitation and corrosion of brass, copper, solder, steel, cast iron, and aluminum</p> <p>No initial SCA precharge required, but will require SCA maintenance</p> <p>Phosphate-free, low-silicate formula</p> <p>Compatible with most major brands of conventional coolants, with and without the addition of SCAs</p> <p>Available as pre-diluted (50/50) or as concentrate</p>
<b>Package Offerings</b>	<p>6 x 1 gallon</p> <p>5-gallon pail</p> <p>30-gallon drum</p> <p>55-gallon drum</p> <p>265-gallon tote</p>	<p>6 x 1 gallon</p> <p>5-gallon pail</p> <p>30-gallon drum</p> <p>55-gallon drum</p> <p>265-gallon tote</p>	<p>6 x 1 gallon</p> <p>5-gallon pail</p> <p>30-gallon drum</p> <p>55-gallon drum</p> <p>265-gallon tote</p>
<b>Aluminum Compatibility</b>	Yes	Yes	Yes
<b>Contains Bitterant</b>	Yes	Yes	Yes
<b>Base Fluid</b>	100% Virgin Ethylene Glycol	100% Virgin Ethylene Glycol	100% Virgin Ethylene Glycol
<b>pH, 50% Volume Solution</b>	8.2-9.0	8.2-8.8	10.2-10.8
<b>Product Color</b>	Yellow	Red	Pink
<b>Specifications, Approvals &amp; Recommendations</b>	<p>ASTM D3306</p> <p>ASTM 6210</p> <p>CAT EC-1</p> <p>SAE J1941</p> <p>TMC RP329</p> <p>To view a complete listing of product specifications, visit <a href="http://GoFurtherGoFS.com">GoFurtherGoFS.com</a>.</p> <p>Meets most performance requirements but may or may not meet certain chemical requirements.</p>	<p>ASTM D3306</p> <p>ASTM 6210</p> <p>CAT EC-1</p> <p>SAE J1941</p> <p>TMC RP329</p> <p>To view a complete listing of product specifications, visit <a href="http://GoFurtherGoFS.com">GoFurtherGoFS.com</a>.</p> <p>Meets most performance requirements but may or may not meet certain chemical requirements.</p>	<p>ASTM D3306</p> <p>ASTM 6210</p> <p>SAE J1941</p> <p>TMC RP329</p> <p>To view a complete listing of product specifications, visit <a href="http://GoFurtherGoFS.com">GoFurtherGoFS.com</a>.</p> <p>Meets most performance requirements but may or may not meet certain chemical requirements.</p>
<b>Recommended Change Interval</b>	Up to 1,000,000 miles   8 years or 20,000 hours*	Up to 1,000,000 miles   8 years or 20,000 hours*	Varies: Recommended to maintain conventional technology every 25,000 miles

\*HD Extender may be needed based on test results.



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