

# Fuel Additive Technologies

Maintain fuel quality and improve end-use characteristics



Maximizing profitability while making fuels has always been tough and today's increasingly stringent regulations make it harder than ever. As markets continue to become more competitive and regulations more complex, you need all the advantages on your side.

As a long-time technology leader in the industry, Baker Hughes, a GE company (BHGE) has a comprehensive suite of technologies to help combat your fuel problems, including **SULFIX™** hydrogen sulfide (H<sub>2</sub>S) and mercaptan scavengers and **TOLAD™** fuel additives. Our technology experts have extensive application knowledge and field training; they can accurately diagnose your hydrocarbon needs and apply the appropriate program in a safe and economical manner to help confirm your fuels meet the highest quality specifications. We also offer **PREPARED TO RESPOND™ (P2R™)** services that help you maximize profits by

meeting fuel and crude oil specifications, increasing their value and marketability. Our P2R services team is available 24 hours a day, 365 days a year to respond to your fuel needs and challenges.

Whether you are importing or exporting, in a refinery or a distribution system, there are defined fuel quality specifications that have to be met. Our fuel additives can help achieve these requirements by reducing fuel injector deposits, enhancing lubricity, improving stability, mitigating corrosion, and eliminating water entrainment. From an economic perspective, our fuel additives can also increase the profitability of cargos that have a high pour point or high H<sub>2</sub>S levels and effectively maintain refinery throughput during a shut down.

Contact your BHGE representative to learn how our fuel additives can help you meet specification and increase the value of your fuels.

## Applications

- Refineries and terminals
- Biofuels and finished fuels
- Pipelines
- Aftermarket fuel packages

## Features and benefits

- SULFIX H<sub>2</sub>S and mercaptan scavengers
  - Address safety concerns and government regulations
  - Reduce product rejections and shipping delays
- TOLAD corrosion inhibitors
  - Maintain asset integrity of fuel transportation and storage equipment
  - Meet corrosion specifications for both ferrous and non-ferrous metals
- TOLAD cold flow additives
  - Minimize handling and storage costs
  - Improve low-temperature operability
  - Decrease filter plugging caused by wax buildup
- TOLAD dehazers and demulsifiers
  - Eliminate water haze from fuels
  - Reduce amount of off-spec product
  - Reduce corrosion in distribution systems
- TOLAD lubricity improvers
  - Restore lubricating properties of hydrotreated diesel fuels
  - Reduce failure of fuel pumps and injectors

Challenges	BHGE Solutions				Benefits Gained
	Crude Oil	Marine Fuel	Intermediates	Refined Products	
<ul style="list-style-type: none"> <li>Fouling in fuel distribution system</li> <li>Fouling in burners</li> <li>Fouling of combustion chamber and exhaust chamber</li> </ul>					<ul style="list-style-type: none"> <li>Ash reduction additives and dispersants</li> </ul> <ul style="list-style-type: none"> <li>More efficient combustion</li> <li>Less maintenance of fuel system</li> <li>Increase reliability of equipment</li> </ul>
<ul style="list-style-type: none"> <li>Slime and solids in fuel storage</li> <li>Plugged filters and fouled instrumentation</li> <li>Emulsion problems</li> <li>Corrosion</li> <li>Elastomer breakdown</li> </ul>					<ul style="list-style-type: none"> <li>X-CIDE™ biocides (water-soluble or fuel-soluble)</li> </ul> <ul style="list-style-type: none"> <li>Decrease plugging of filters and injection equipment</li> <li>Improve water shedding characteristics</li> <li>Reduce storage tank corrosion</li> </ul>
<ul style="list-style-type: none"> <li>Poor ignition quality in diesel</li> <li>White smoke</li> <li>Difficult starting</li> <li>Rough idle</li> </ul>					<ul style="list-style-type: none"> <li>Cetane improvers</li> </ul> <ul style="list-style-type: none"> <li>Improve combustion efficiency</li> <li>Better starting characteristics in cold weather</li> <li>Reduce emissions</li> <li>Permits increased blending of lower cetane stocks</li> </ul>
<ul style="list-style-type: none"> <li>Gelled fuel</li> <li>Reduced flow</li> <li>Filter plugging</li> <li>Blocked lines</li> </ul>					<ul style="list-style-type: none"> <li>TOLAD™ operability additives (CFPP, LTFT)</li> <li>TOLAD™ pour point depressants</li> <li>TOLAD™ cloud point depressants</li> </ul> <ul style="list-style-type: none"> <li>Improve flow characteristics in cold weather</li> <li>Permits blending of higher pour materials</li> <li>Improve low temperature vehicle operability</li> <li>Lower cloud point and pour point</li> </ul>
<ul style="list-style-type: none"> <li>Poor fuel economy</li> <li>Highly visible emissions</li> <li>Fouling of combustion chamber and exhaust chamber</li> <li>Vanadium-based corrosion at the 'hot-side' of a boiler, engine, or gas turbine</li> <li>Cold-end corrosion due to hydrolyzed SO<sub>2</sub></li> </ul>					<ul style="list-style-type: none"> <li>MariQuest™ marine fuel additives</li> </ul> <ul style="list-style-type: none"> <li>Overall improvement in performance, efficiency, and emissions standards</li> <li>Reduce corrosion</li> <li>Extend maintenance cycles</li> <li>Reduce slag</li> </ul>
<ul style="list-style-type: none"> <li>Electrical charge build-up in fuel due to movement and pumping with the potential for static discharge and explosion</li> </ul>					<ul style="list-style-type: none"> <li>TOLAD™ conductivity improvers</li> </ul> <ul style="list-style-type: none"> <li>Increase electrical conductivity of hydrocarbon liquid</li> <li>Enhance safety during handling, loading, and transport of fuels</li> <li>Meet industry conductivity specification for diesel fuel</li> </ul>
<ul style="list-style-type: none"> <li>Hazy fuel caused by finely dispersed water droplets or an emulsion</li> <li>Diminished water shedding properties of a fuel resulting from surfactants present in an additive package</li> </ul>					<ul style="list-style-type: none"> <li>TOLAD™ dehazers</li> <li>TOLAD™ demulsifiers</li> </ul> <ul style="list-style-type: none"> <li>Clear, marketable fuel</li> <li>Reduced microbiological growth</li> <li>Reduced potential for corrosion</li> </ul>
<ul style="list-style-type: none"> <li>Presence of toxic H<sub>2</sub>S</li> <li>Corrosion</li> <li>Emissions control</li> </ul>					<ul style="list-style-type: none"> <li>SULFIX™ H<sub>2</sub>S scavengers</li> </ul> <ul style="list-style-type: none"> <li>Improve safety, minimizing employee exposure to H<sub>2</sub>S</li> <li>Reduce toxic emissions</li> <li>Minimize the number of product rejections</li> <li>Decrease demurrage</li> <li>Reduce storage corrosion</li> </ul>
<ul style="list-style-type: none"> <li>Poor fuel lubricity</li> </ul>					<ul style="list-style-type: none"> <li>TOLAD™ lubricity additives</li> </ul> <ul style="list-style-type: none"> <li>Reduce wear within engine and fuel injection system</li> <li>Meet industry specification</li> </ul>
<ul style="list-style-type: none"> <li>Presence of mercaptans</li> <li>Corrosion</li> <li>Failed doctor test</li> <li>Odor problems</li> </ul>					<ul style="list-style-type: none"> <li>SULFIX™ mercaptan scavengers</li> </ul> <ul style="list-style-type: none"> <li>Improve product quality</li> <li>Reduce odor complaints</li> <li>Improve corrosion characteristics</li> </ul>
<ul style="list-style-type: none"> <li>Increased instability due to the presence of metals such as copper, vanadium, and iron</li> </ul>					<ul style="list-style-type: none"> <li>Metal deactivators</li> </ul> <ul style="list-style-type: none"> <li>Catalytic metals are chemically deactivated</li> <li>Improve stability</li> </ul>
<ul style="list-style-type: none"> <li>Premium or exported diesel fuel</li> </ul>					<ul style="list-style-type: none"> <li>TOLAD multi-purpose additive packages</li> </ul> <ul style="list-style-type: none"> <li>Exceed standard fuel specifications</li> <li>Premium fuel marketability claims</li> </ul>
<ul style="list-style-type: none"> <li>Failing copper and/or silver strip corrosion tests</li> </ul>					<ul style="list-style-type: none"> <li>TOLAD™ non-ferrous corrosion inhibitors</li> </ul> <ul style="list-style-type: none"> <li>Meet fuel specifications</li> <li>Inhibit corrosion to non-ferrous metal</li> </ul>
<ul style="list-style-type: none"> <li>Hydrocarbon has an objectionable odor</li> </ul>					<ul style="list-style-type: none"> <li>SULFIX™ hydrogen sulfide and mercaptan scavengers</li> <li>Odor abatement chemicals</li> </ul> <ul style="list-style-type: none"> <li>Mitigation of H<sub>2</sub>S and mercaptans</li> <li>Acceptable fuel odor</li> </ul>
<ul style="list-style-type: none"> <li>Rusting of pipelines or fuel systems resulting in corrosion-based failures</li> <li>Increased particulates</li> <li>Plugged filters</li> <li>Rough pipe walls</li> </ul>					<ul style="list-style-type: none"> <li>Corrosion inhibitors</li> </ul> <ul style="list-style-type: none"> <li>Improve pipeline integrity</li> <li>Decrease corrosion of carbon steel equipment</li> <li>Reduce filter plugging</li> <li>Decrease pumping costs</li> </ul>
<ul style="list-style-type: none"> <li>Hydrocarbons which cannot be moved due to: <ul style="list-style-type: none"> <li>high pour point</li> <li>solidification</li> <li>wax deposition</li> </ul> </li> <li>Reduced pumping rate</li> </ul>					<ul style="list-style-type: none"> <li>TOLAD™ heavy oil pour point depressants</li> <li>Paraffin control additives</li> </ul> <ul style="list-style-type: none"> <li>Enable transportation of waxy crudes and fuels</li> <li>Reduce the need for system heating</li> <li>Reduce the need for higher value cutter stock</li> <li>Enhance the value of heavy fuels</li> <li>Better handling of opportunity crudes</li> </ul>

■ Crude Oil
■ Fuel Oil and Bunkers (Marine Fuel)
■ Intermediate Products
■ Refined Products

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