HFX

A Multi-Purpose Residual Fuel Additive with a Combustion Catalyst.

HFX is a balanced compound of an organic dispersant, detergent, and a surfactant that are blended with a highly effective, combustion improving catalyst in a pure hydrocarbon base. Each additive within this compound is designed to improve particular performance characteristics found in residual fuel.

The flowability of residual oil stocks is improved by the organic dispersant in HFX.

The formation of viscous emulsions and the stratification that often occurs in residual fuels is greatly reduced. Dispersing long chain, heavy hydrocarbons prevents them settling into sludge. Tanks, lines, nozzles and pre-ignition components remain free of sludge and deposits.

The varnishes, gums and carbon deposits are reduced by the detergents in HFX.

Both pre-ignition and post-ignition deposits are reduced. Cleaner fuel system components and burner surfaces mean improved performance.

The water in residual fuels passes through delivery and ignition systems because of the surfactant in HFX.

The surface tension of condensation and free-standing water is reduced (proven through scientific tests), allowing it to pass through the system with atomization of the fuel at the burner nozzles. This inhibits corrosion in the fuel system and aids the combustion process.

The formation of slag, SO_3 and the reduction of excess air results in significant savings in fuel consumption. All are improved by the combustion improving organic catalyst in HFX.

The combustion catalyst is a solution of organic compounds which are dissolved in a pure hydrocarbon solvent, making

them miscible with oils. These organic ions dissolved in solution cause more rapid and complete burning of the fuel and provide significant reductions in the corrosive effects of high sulfur, high vanadium and sodium content of the residual fuel.

Control of deposits during the combustion process is effected by the organic catalyst. This catalyst changes the nature of the vanadium oxides formed during the combustion process. The vanadium pentoxide, which has a relatively low melting point is the primary cause of slag formation in combustion chambers. In liquid or molten form it acts as a binder and a powerful corrosive agent. The organic catalyst in HFX reacts with the vanadium to form high melting point vanadates that deposit in dry friable form thus inhibiting the formation of molten vanadium slag.

Furthermore, existing deposits containing vanadium will usually be reached by the action of the HFX catalyst's vapors and drop off in pieces over a period of a few weeks.

How does the organic catalyst in HFX effect a reduction of SO_3 emissions, the primary cause of acid rain? When molten vanadium pentoxide is present, it acts as a catalyst to change the SO_2 in the presence of excess air to the more objectionable sulfur trioxide *(*SO_3), which then combines with moisture to form sulfuric acid. This, of course, has a very serious corrosive effect on metal surfaces and the environment. The dry friable form of vanadates are deposited far less on combustion chamber surfaces thus reducing substantially the conversion of SO_2 to SO_3.

Additional improvement in the SO_2/SO_3 ratio can be made by the reduction of excess air. The combustion improving capability of HFX will allow air requirements to be reduced. Less air and therefore less unused oxygen in the ignition process causes reduced SO_3 formation.

The combination of dispersants, detergents, surfactants and the combustion improving catalyst in HFX all add up to lower hazardous emissions and improved fuel consumption.

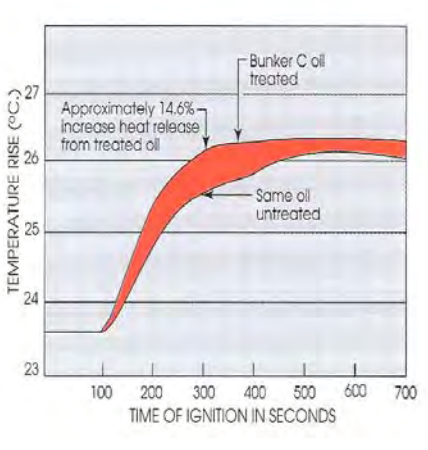
Lower air requirements and more efficient burning of fuel stocks add up to significant savings. The combustion improvement capability of HFX will allow excess air to be reduced. This helps to overcome loss of heat up the stack by reducing its velocity past the heating surfaces.

Laboratory tests confirm the value of HFX as an additive to residual fuel stocks.

Combustion tests conducted and verified in a laboratory setting resulted in a significant reduction of unburned residues and increased heat release.

Evaluation of the effects of the combustion catalyst on ash and residues.

To evaluate the effects of the organic combustion catalyst on ash and residues, measured samples of untreated oils were burned in a combustion chamber with air introduced at atmospheric pressure. The unburned residues were then collected and weighed. The melting point of the residues were determined. The percentage of unburned residue was 10.1 % for untreated Bunker C versus 6.5% for samples treated with HFX. The ash melting point was 700°-760° C for the untreated fuel and 1040°-1200° C for the treated fuel. This resulted in an increase of nearly 50% of the melting point of residues and indicates that the residue will be dryer and will not stick to heating surfaces.



Evaluation of the combustion catalyst on heat release.

A typical test to illustrate increased heat release is the Parr Oxygen Bomb Calorimeter Test. The purpose of this test is to compare the rate of combustion and the amount of heat release for treated and untreated Bunker C oil. Oxygen has been adjusted to approximate the available oxygen in a typical efficient oil burner. A measured sample of untreated Bunker C was burned and the rate of heat rise recorded. The same oil was treated with a measured dosage of the combustion catalyst used in our product and the test was repeated.

During the test when untreated oil was burned, it left sticky, gummv residues. When treated oil was burned, the sticky, gummy residue was not found and the amount of carbon was greatly reduced.

From the accompanying illustration, one can see the increase in heat release for the treated oil during the first period shown may be calculated by integrating to determine the difference in the areas of the two curves. This calculation indicates that approxlmately 14.6% more heat was obtained from the oil treated with our combustion catalyst.

The slope of the temperature rise curves indicates the rate of combustion. The rate of heat rise in the data below is 0.15°/second for the untreated fuel, and combustion .025°/second for the treated fuel, an increase of about 60% in the rate of combustion.

The overall conclusion from this data illustrates the effectiveness of HFX Residual Fuel Additive for use in all grades of fuel.

Specifications of HFX

Specific Gravity @25° C…… 0.815
Density (Lbs/Gallon) @ 60° F…. 6.85
Viscosity (Svs) @ 100° F…..... 30 Sec.
Flash Point (PM) ……..112° F.
Fire Point ……...……..135° F.
Pour Point…… Below minus 50° F.
BTU per Pound……. 18,300
BTU per Gallon……125,355
Color ASTM-D-1500……. 6.5
Neutralization # (MG KDH/GM)..0.25

The mixing and dosage of HFX with residual oil stocks.

HFX should be added to the storage tank at the time the tank is being filled to insure good mixing. It immediately mixes with the oil, with which it is chemically homogeneous. As it mixes, it penetrates and breaks down sludge and sludge forming compounds into very fine particles. Regular use of HFX will stabilize waste oil and prevent its deterioration due to microorganism growth.

Add HFX to storage tank prior to filling. The additive can be added to the storage tank during fuel delivery, or it may be fed directly into the oil feed line by means of a proportioning pump.

Add 1 gallon of HFX to 4000 gallons of residual fuel stock. This equals 1 oz. to 23 gallons. Dosage may be increased to obtain optimum results. Double dosage is suggested for initial treatment to break up previous accumulations with the fuel and combustion systems.

HFX can be used in all types of heating oil with proper ventilation.

Benefits resulting from the use of HFX as a residual fuel additive.

Pre-ignition Benefits

- Prevents buildup of tank bottom sludge.
- Ensures cleaner tanks, lines, strainers, preheating
- Provides more uniform flow of oil to the burner for the best possible combustion.
- Inhibits corrosion in fuel systems.
- Converts sludge already present to burnable fuel.
- Recovers tank capacity lost by sludge accumulation with no interruption of service.

Fireside Benefits

- Improves combustion In burners.
- Reduces air pollution by minimizing the discharge unburned hydrocarbons and SO_3.
- Prevents slag formation.
- Removes old built-up formations.
- Lowers stack temperatures.
- Eliminates tube plugging.
- Prevents corrosion of metal surfaces when using fuels with vanadium and sulfur content.
- Keeps combustion chambers cleaner for longer periods reducing the need for cleaning shutdowns and the labor entailed in these operations.

Find out how HFX can help solve your oil problems.

The varied uses of the many grades of oil stocks throughout the world make it impossible for a single formulation, such as HFX, to be able to solve every need.

Energy Additives, Inc. is ready with the technical advice and formulating capability to respond to your particular performance problems. Please call us regarding any questions about HFX or our other additives.

ENERGY ADDITIVES, INC.
www.energyadditives.com
P.O. Box 1694
Battle Creek, Michigan 49016-1694
(269) 965-8085 Fax: (269) 965-3157
TOLL FREE (888) 965-6374