EFT

Pollution Solutions

SHIPPING INDUSTRY

Company Background

E.F.T. is a company that owns the intellectual property to and manufactures a range of hydrocarbon based fuel conditioners and equipment that:

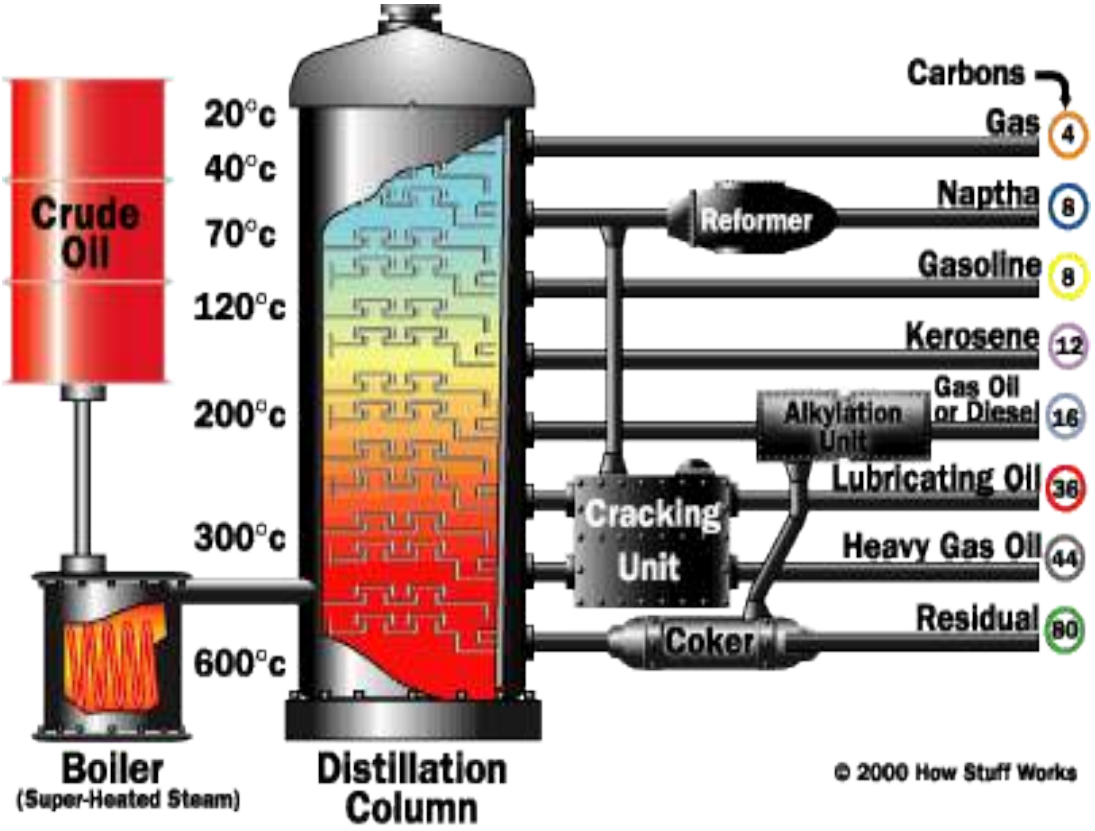
- **Enhances engine or boiler performance for petrol, diesel and heavy fuel oil users**
- **Significantly reduces harmful emissions**
- **Reduces maintenance costs and increase equipment life**

All E.F.T. products are manufactured in various strategic locations including Germany, Great Britain, New Zealand, Australia and Romania and are made to ISO9001 standards. All products have been comprehensively tested by leading independent testing institutes and major companies.

Increasing performance and economy while reducing harmful emissions for 25 years.


It is our aim to provide technology that increases performance and economy, while reducing harmful exhaust emissions that are polluting our planet and poisoning the air we breathe

Refinery Fuel Oil Grades produced



Bunker 6
Bunker 5
Bunker 4
Bunker 2

Figure 1

Fuel oil is any liquid petroleum product that is burned in an engine for the generation of power, except for oils having a flash point below 100°F (38°C).

Because of differences in equipment, types of operation and economics, different fuels are used in different plants.

Basically, there are several different grades of industrial & shipping fuel oil available.

The most common heavy fuel oil is No.6, which is a viscous residual oil. A higher quality residual oil is No. 5 fuel oil, which is lighter and, under some climatic conditions, can be burned without preheating. Diesel oil and/or No. 2 fuel oils are relatively light oils, which can be distilled or vaporized at normal temperatures and pressures.

They are used as a general-purpose domestic or commercial fuel. Number 4 fuel oil is used in commercial or industrial furnace installations that are not equipped with preheating equipment. It is a blend of No.5, No.6 , and No.2 oils. Number 4 oil tends to be unstable and separates into its components.

Fuel Oil Impurities

Classifications

Fuel Oil	Ash%	Sulphur%	Bottom Sediment & Water %
No.6	0.3005 - 0.300	0.5 - 6.0	0.2 - 2.0
No.5	0 - 0.075	0.5 - 5.0	0.2 - 1.0
No.4	0 - 0.005	0.3 - 1.0	0.1 - 0.5
No.2	0	0.0 - 0.5	0.0 - 0.2

BS&W is a measure of the water and sediment found in the fuel.

The major ash constituents of fuel are silica, vanadium, sodium and nickel

The forms of sulphur in fuel oil are elemental sulphur, hydrogen sulfide and organosulphur compounds.

The Main Problems

When burning heavy diesel, the problems include :

1. Water Control
2. Acid Formation and Corrosion
3. Incomplete Combustion

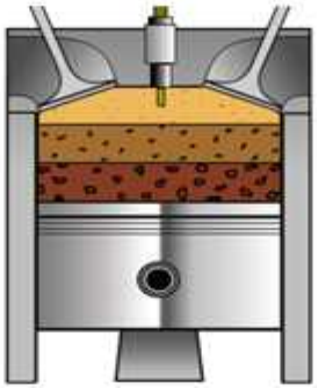
The Chemistry of Burning Fuels

However, the burning of fuel is NEVER a perfect reaction !

Fuel + Air = CO_2 + H_2O + CO + SOx + HC + NOx + Others

Many of these other by-products of incomplete combustion are controlled by Environmental authorities

The Problems With Burning Fuel



The common problems associated with burning fuels may be summarised as follows:

- Incomplete Combustion
- Contamination & Deposit Formation
- Acid Formation and Corrosion
- Water Contamination and Bacterial Growth

Fuel produced by the major oil companies has failed to keep pace with the requirements of modern engines and boilers, or the expectations of society in relation to emissions such as Kyoto and Marpol. Oil companies will continue to produce fuel to the minimum specification required by the relevant authorities.

Combustion is an exothermic (heat releasing) reaction between fuel and the oxygen in the air. _Incomplete combustion_ occurs when the fuel is not sufficiently atomized prior to ignition or when the oxygen supply is insufficient to allow full combustion.

Incomplete combustion increases the release of carbon monoxide, sulfur dioxide and nitrous oxide emissions. Soot and ash buildup will occur with incomplete combustion, causing problems with _pre ignition, oil system contamination and exhaust system fouling_.

Brief Scientific Considerations

Combustion is a reaction in which heat is evolved because of the internal molecular energy (potential energy) of the reaction products which is less than the internal energy of reactants.

The overall theoretical reaction for fuel oil combustion is illustrated as follows:

1. Oil + Air $\longrightarrow$ CO + H_2 + N_2O + Heat

However, this reaction takes place in two intermediate stages. The first stage has the complex hydrocarbon molecules, "R", broken down into smaller electronically charged molecules that are called free radicals R.

This can be represented as:

$$2.\ \text{Oil} + \text{Air} \xrightarrow{\text{Heat}} R_1 - \underset{H}{\overset{H}{C}} + \left[R_2 - \underset{H}{\overset{H}{C}} \right]_N + \text{Air}$$

Where: N designates the number of different hydrocarbons

The breakdown of the complex hydrocarbons occurs in a symmetrical manner with a cleavage of the carbon to carbon bonds. Each carbon atom retains one electron of the molecular bonding pair. The odd electron associated with each radical is therefore not paired. An atom or group of atoms possessing an odd (unpaired) electron is called a "free radical". These radicals are extremely reactive since they have the tendency to gain an additional electron. This also causes the release of energy with the formation of these new bonds. The final stage of combustion occurs with the reaction of these free radicals with oxygen, which can be represented as:

$$3.\ \text{Air} + R_1 - \underset{H}{\overset{H}{C}} + \left[R_2 - \underset{H}{\overset{H}{C}} \right] \xrightarrow{\text{Heat}} CO_2 + H_2 + N_2$$

The energy for these reactions must be supplied to the reactants to maintain combustion throughout the various stages. This supplied energy, the energy of activation, is defined as "the minimum amount of energy that must be provided by a molecular collision for the reaction to occur". The kinetic energy of moving particles is the source of the energy of activation [EACT].

The combustion process can therefore be illustrated by the following potential energy diagram (Figure 2). Combustion begins in a "potential energy valley" with free radical hydrocarbons and oxygen molecules. The molecules collide, and kinetic energy is converted to potential energy. The energy for the activation of the reaction is, as a consequence, generated. The reaction continues and the top of the hill is reached. Now, the potential energy begins to be converted back to kinetic energy until the systems reaches the potential energy level of the reaction products (e.g., flue gas).

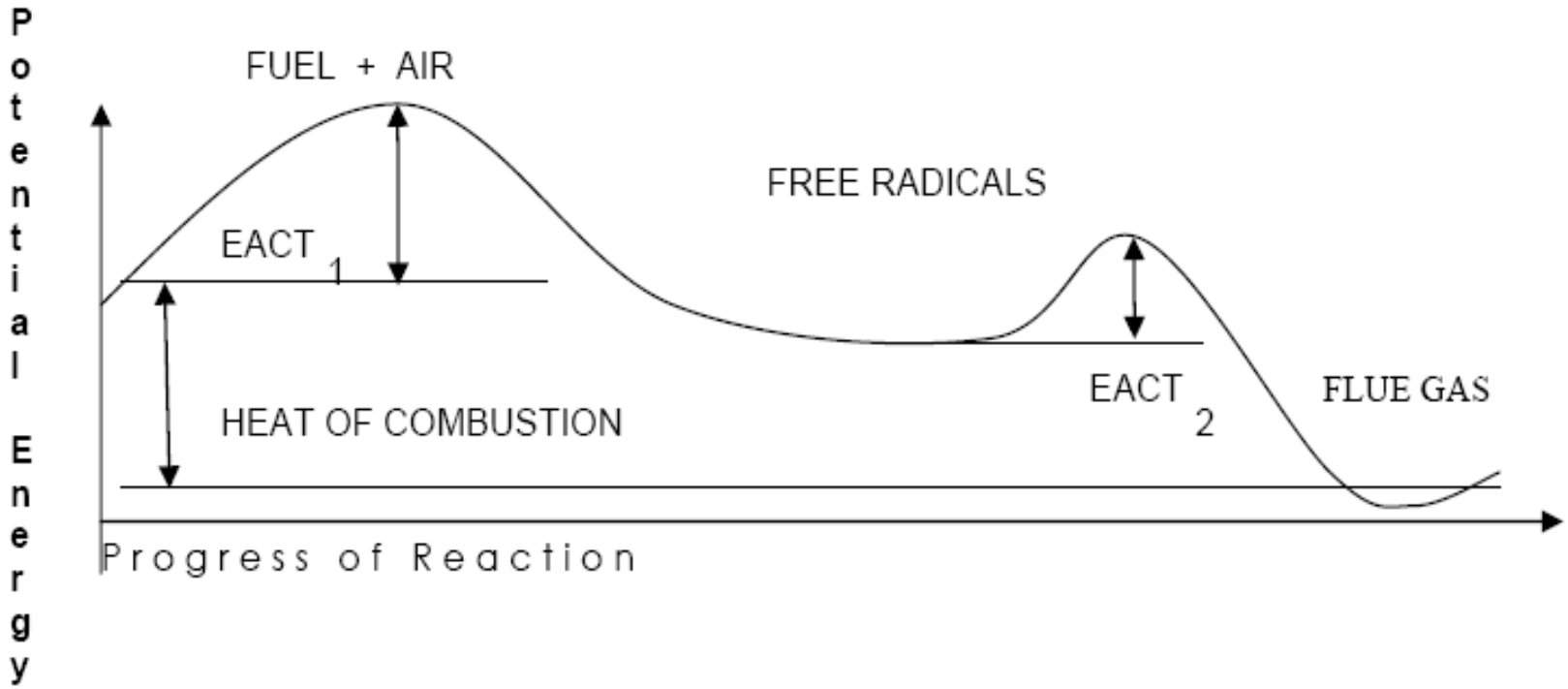


Figure 2.

Potential energy diagram for fuel oil combustion reactions

Combustion, as a result, will become more difficult as the level of activation energy increases. Higher levels of excess air are then required to maintain combustion.

A combustion catalyst functions by reducing the level of activation energy that is required for the latter stage of the reaction. This in turn reduces the amount of excess air required to drive the reaction to completion, which saves fuel oil.

A combustion catalyst also increases efficiency if the excess air level is held constant, because of better combustion of unburned carbon, hydrocarbons and carbon monoxide.

Generally the heavier the fuel, the larger the proportion of impurities and contaminants. With reserves of poorer quality crude oils being used as world oil reserves are depleted, the proportion of these impurities in the fuel we use is increasing. The existence of these impurities cause the fouling of fuel lines and filters, resulting in poor fuel supply.

Slugging of fuel injectors will cause poor atomisation and incomplete combustion.

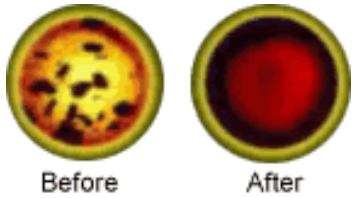
These contaminants will find their way into the oil system, degrading oil quality and reducing engine life.

Water Contamination in Fuel

An engine running on fuel contaminated with water and bacteria will experience the following:

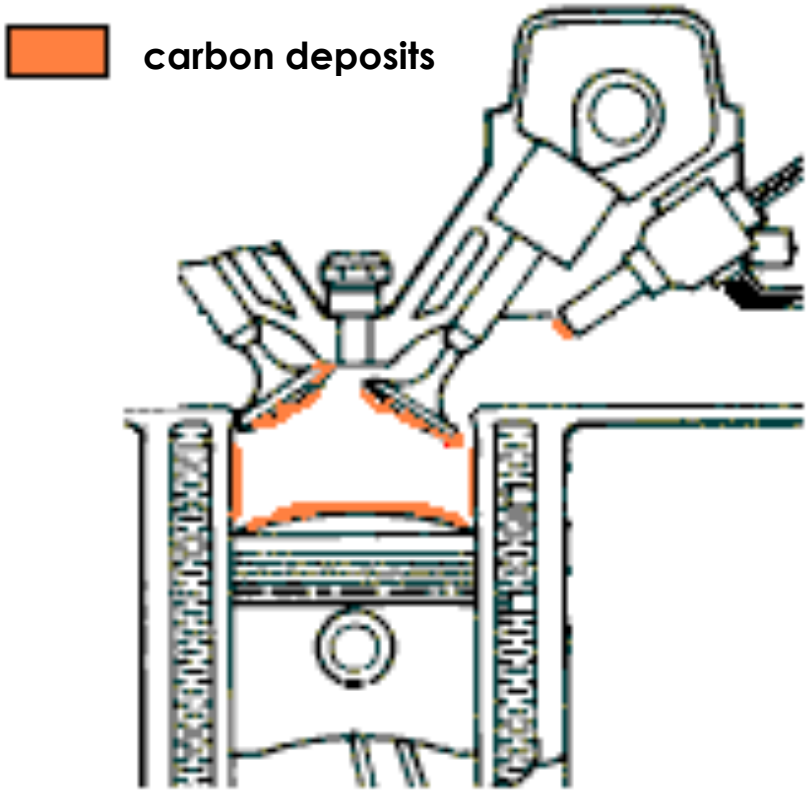
Poor performance

- **Poor fuel economy**
- **Hard Starting**
- **Rough Idling**
- **Excessive Smoke Pollution**



E.F.T. products work by emulsifying the water, starving the bacteria of its environment in which it grows. This water is passed harmlessly through the combustion chamber. E.F.T. also stops bacteria from reforming, and increases fuel storage life.

How the engine is affected



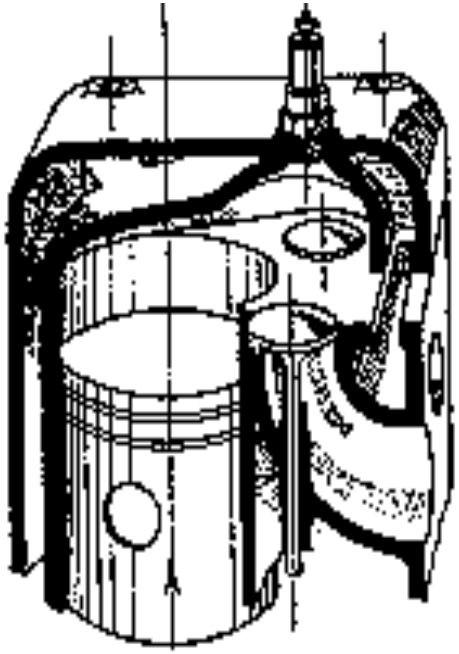
Contamination of the fuel will cause incomplete combustion, leading to carbon deposits. These deposits accumulate on:

- **Valves**
- **Piston Crown**
- **Piston Ring**
- **Piston Land**
- **Cylinder Bore**
- **Fuel Injector**

resulting in:

- **Poor fuel spray pattern**
- **Reduced valve sealing**
- **Loss of engine power**
- **Reduced fuel efficiency**
- **Increased emissions**
- **Pre-ignition (Knocking)**

A leading engine manufacturer Caterpillar say 90% of engine wear is caused by acid action, not friction. For every 16,000 kilometers of usage, engine performance is reduced by 1%.



Independent tests show that for every 400 litres of fuel burned in a combustion engine the following are produced:

- 1.6 kilograms of Sulphur compounds
- 1 kilogram of soot
- 1 kilogram of gums, lacquers and varnishes

Solutions

E.F.T. contains specially formulated detergents and dispersants which counteract the problems associated with slugging

Detergents dissolve sludge build up in fuel lines and on injectors. This improves the fuel flow and the atomisation of the fuel in the combustion chamber. Dispersants keep the sludge forming contaminants in suspension with the fuel, thus preventing the accumulation of future build up.

Before treatment with FP conditioner

See the improvement after treatment with FP conditioner.

The application of a combustion catalyst allows for more complete burning of combustibles (hydrocarbons, carbon, and carbon monoxide) for any constant level of air.

The fuel savings resulting from more complete combustion can be substantial, even without lowering the level of air. More complete combustion will result in reductions in smoking and furnace soot deposits; also, there will be an increase in the level of carbon dioxide in the flue gas.

All E.F.T. fuel conditioning products contain an effective combustion catalyst. Independent internationally recognized scientific tests have proven that our products speed up the fuel burn by 25-30%, and can provide combustion efficiency of up to 90%.

The Effect on the Environment

The key harmful emissions from poor combustion are:

• **Sulphur Dioxide**	**Produced through the combustion of sulphur compounds in the fuel. A major cause of acid rain**
• **Nitrous Oxides**	**Produced by the reaction of nitrogen in the air with free oxygen in the combustion environment**
• **Carbon Monoxide**	**Probably the most poisonous gas. Produced at the expense of CO_2 due to incomplete combustion**
• **Unburned Hydrocarbons**	**Simply unburned fuel. Major cause of smog pollution and breathing related illnesses. Usually measured by smoke opacity test.**

Sulphur dioxide

Fuel oil normally contains sulphur either in the elemental form or as hydrogen sulphide, mercaptan, sulphides, disulphides, thiosulphides, or polysulphides. This sulphur reacts with oxygen during fuel oil combustion to form sulphur dioxide:

$$S + O_2 \longrightarrow SO_2$$

About 1% to 5% of the sulphur dioxide then reacts with more oxygen to form sulphur trioxide:

$$SO_2 + \tfrac{1}{2}\, O_2 \longrightarrow SO_3$$

In the presence of moisture (water) a portion of this sulphur trioxide may condense as sulphuric acide:

$$SO_3 + H_2O \longrightarrow H_2SO_4$$

The conversion of SO_2 to SO_3 is catalyzed by V_2O_5 and by iron oxide present on metal surfaces.

(Vanadium is present in fuel oil in the form of soluble organic complex and is the most troublesome constituent in the fuel oil ash.

Nitrous oxides

$$O + N_2 \rightleftharpoons NO + N$$

$$N + O_2 \rightleftharpoons NO + O$$

$$N + OH \rightleftharpoons NO + H$$

$$NO + OHO \longrightarrow NO_2 + HO$$

The amount of NO_x emissions in diesel engines rises with the load & speed, when the combustion temperature & pressure rise too.

In addition, complete combustion of fuel oil require oxygen greater than the theoretically calculated amount. An excess of oxygen is required to drive the reactions. Less excess oxygen is needed as a driving force when conditions for combustion are more favorable.

The conditions of interest include good fuel quality, good fuel atomization, and a good design of combustion chamber of the diesel engine.

The use of a combustion catalyst to lower the activation energy levels also reduces the level of excess oxygen required.

Fuel treatment ratios

E.F.T. manufactures a range of fuel conditioning products for a variety of applications. Each product is specifically designed with the end user in mind.

FP4000 1 litre treats 4000 litres . For use in all diesel engines.

FP10000 1 litre treats 10,000 litres. For use in all bunker fuel oil applications, including ships, industrial power plants and power stations.

These products are similar, in that they address similar problems common to all fuels, However, FP10000 is designed with the higher viscosity fuel oils in mind, and contains additional components to improve the combustion of these fuels.

The Solution for Diesel

E.F.T. FP4000

E.F.T. FP4000 is designed specifically to treat problems that are inherent in diesel fuel and fuel storage. These problems include water contamination in fuel tanks and the formation of deposits in the fuel system of an engine.

Diesel fuel is unique in that it is hydroscopic, meaning it forms water through condensation in storage. This combination of water and diesel provides an ideal environment for bacteria to form. This bacterial algae contaminates the fuel and clogs filters, injectors and causes poor performance and black smoke during combustion.

Cleaning the Fuel Delivery System

E.F.T. products contain active ingredients that remove harmful deposits from the fuel delivery system. E.F.T. neutralizes acid, cleans varnish/sludge from fuel tanks and lines. E.F.T. will also extend fuel filter life as shown below.

E.F.T. are hydrocarbon based, and contains no harmful chemical ingredients or toxic additives.

Specific chemical reactions for reducing NO & HC

$$2\,NO + 2\,CO \longrightarrow N_2 + 2\,CO_2$$

$$2\,NO + 5\,CO + 3\,H_2O \longrightarrow 2\,NH_3 + 5\,CO_2$$

$$2\,NO + 2\,H_2 \longrightarrow 2\,N_2 + 2\,H_2O$$

$$2\,NO + 5\,H_2 \longrightarrow 2\,NH_3 + 2\,H_2$$

$$(2m + n/2)\,NO + C_mH_n \longrightarrow m\,CO_2 + n/2\,H_2O + (m + n)\,N_2$$

FP4000 - Summary of Benefits

The benefits of using E.F.T. FP4000 can be summarised as follows:

- **Improved fuel economy due to better fuel atomisation and combustion catalyst**
- **Reduced maintenance and equipment downtime**
- **Water controlled in fuel, preventing bacterial growth**
- **Reduced harmful exhaust emissions**

Note: FP4000 is registered with NATO. (NSN 9150 66 14 16311)

The Problems with Bunker fuel

Heavy fuel oil (bunker fuel) exhibits some very unique characteristics as it is a lesser refined product than diesel. Generally it is high in sulphur, contains paraffin, abrasive impurities such as corrosive ash and abrasive salts and other insoluble residues. A high percentage of water is present with the fuel in storage and thus acid formation occurs quite readily.

An engine or boiler running on low grade heavy fuel oil will experience the following:

- **Poor Fuel Economy**
- **Excessive Pollution**
- **Excessive Engine Wear**
- **Increased Maintenance Costs**

The Solution for Bunker Fuel

E.F.T. FP10000

E.F.T. FP10000 has been formulated for optimum water and bacteria control. E.F.T. FP10000 disperses this water into the fuel slowly, removing the environment for the bacteria to live in, and allows the water to be burned off.

When this is accomplished bacteria cannot reproduce and the associated problems are eliminated. Acid formation is dramatically reduced as are the other various poisonous gases resulting in reduced harmful exhaust emissions.

FP 10000

Product Description

E.F.T. FP10000 is an effective conditioner concentrate for use in heavy fuel oils (sometimes called residual fuels or bunker fuels). When added to fuel in proper concentration, it greatly improves performance and reliability.

It is a carefully balanced blend of petroleum additives formulated to improve fuel efficiency and stability, reduce emissions, clean and maintain the entire fuel system, control corrosion and deposits and provide lubrication for moving parts in the fuel system.

What properties does it consist of?

It is a carefully balanced blend of petroleum additives formulated to improve fuel stability, clean and maintain the entire fuel system, control corrosion and deposits and provide lubrication for moving parts in the fuel system.

1.STABILITY : FP 10000 contains inhibitors to improve oxidation and color stability, thus preventing the formation of deposits in the fuel and in the storage system. By minimizing deposits the life of the fuel filters in the system is extended. The growth of bacteria may occasionally lead to fuel problems. This occurs as a result of water accumulating in the fuel, which provides an ideal place for bacterial growth.
FP 10000 disperses the water into the fuel slowly causing the water to be burned off. When this is accomplished bacteria cannot reproduce and the bacteria problem is eliminated.

2.CORROSION INHIBITION FP 10000 contains an effective rust inhibitor to control corrosion in storage tanks and fuel systems. Fuel containing 0.015% (150 ppm) or 1 part E.F.T. TYPE, BF to 6667 parts fuel passes the requirements of the following rust tests:

- Dynamic Test Method ASTM D-665
- The Static Immersion Rust Test
- The Machined Cup Rust Test

3.WATER CONTROL

FP 10000 has been carefully formulated for optimum water control. The following water contents were obtained with a fuel after shaking with 1% water, allowing complete separation, and then analyzing the upper fuel layer for water by ASTM Method D-1744.

Fuel, No Treatment	50 ppm Water
Fuel with 0.030% FP 10000	79 ppm Water.

This demonstrates that FP 10000 will solubilize small amounts of water in fuel.

4.DISPERSANCY

FP 10000 contains an extremely effective dispersant system.

It will clean and control deposits in storage tanks and distribution systems and eliminates problems associated with fuel incompatibility. Insoluble residues that precipitate and cause filter clogging will be eliminated.

Problems Associated With Sulphur Content Fuel Oils

In naturally occurring low sulphur fuels, there usually is a paraffin wax present, which can cause waxy deposits. In blended low sulphur fuels, the mixture of fuels can undergo separation, thereby causing potential sludge buildup.

Sludge dispersants may be used to minimize the problems associated with low sulphur fuel oils. A combustion catalyst can be used to improve combustion of fuel oil mixtures that contain paraffin wax or sludge.

High sulphur fuel oil may cause the formation of high levels of sulphuric acid. Sulphuric acid attack can then occur and cause corrosion in the cold-end section of the boiler. The sulphuric acid can also form sulphate deposits.

Combustion catalysts and/or specific slag modifiers can be used to minimize these problems.

FP10000 - Summary of Benefits

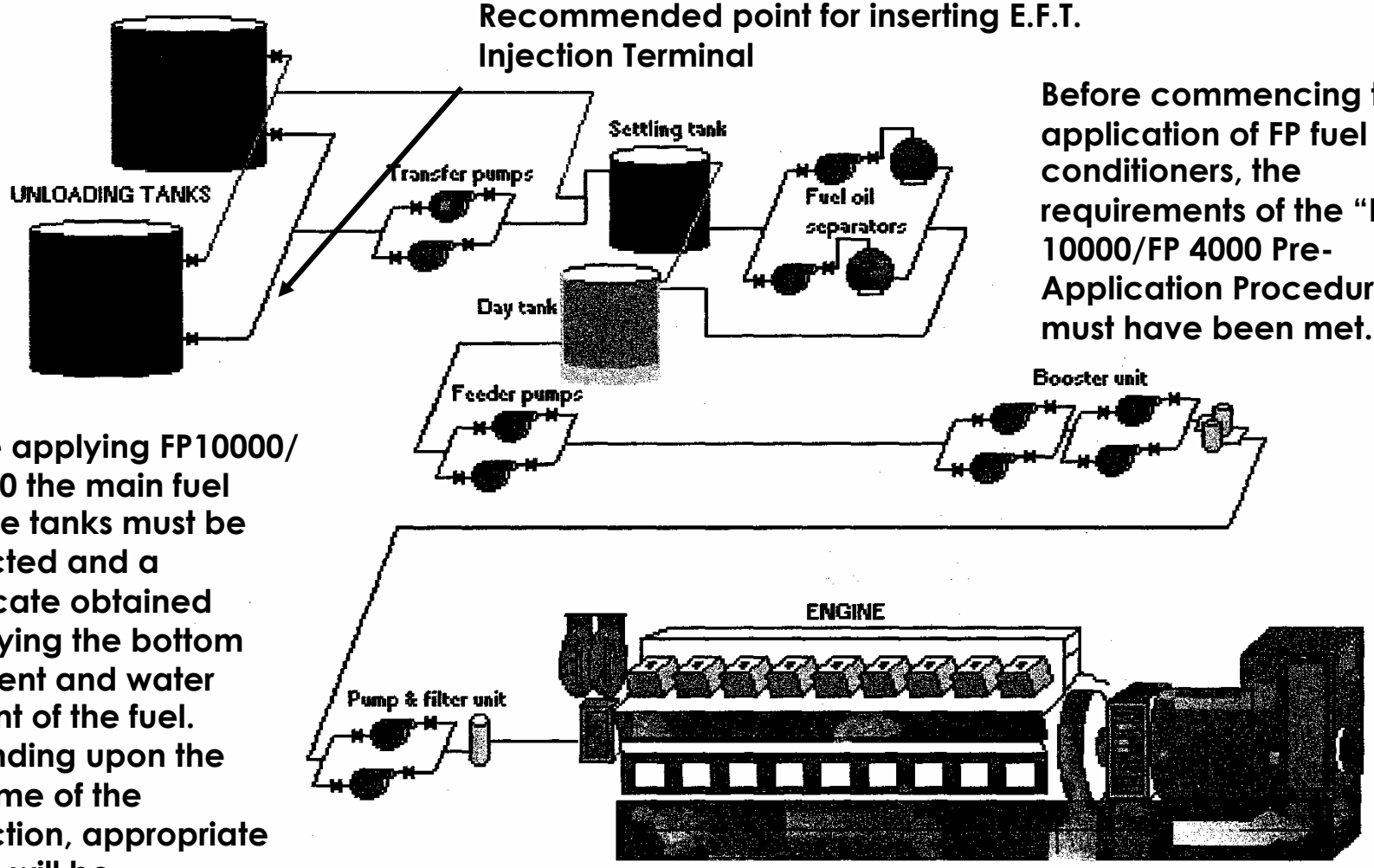
FP10000 will:

- **Improve fuel economy by average of 6-10%**
- **Clean and maintain the fuel system**
- **Control corrosion and deposits**
- **Provide lubrication for the moving parts in the fuel system**
- **Reduce maintenance costs by up to 50%**
- **Reduce harmful emissions in line with the new MARPOL requirement**

E.F.T. Products FP 4000 & FP 1000 for the shipping industry: How do we use them?

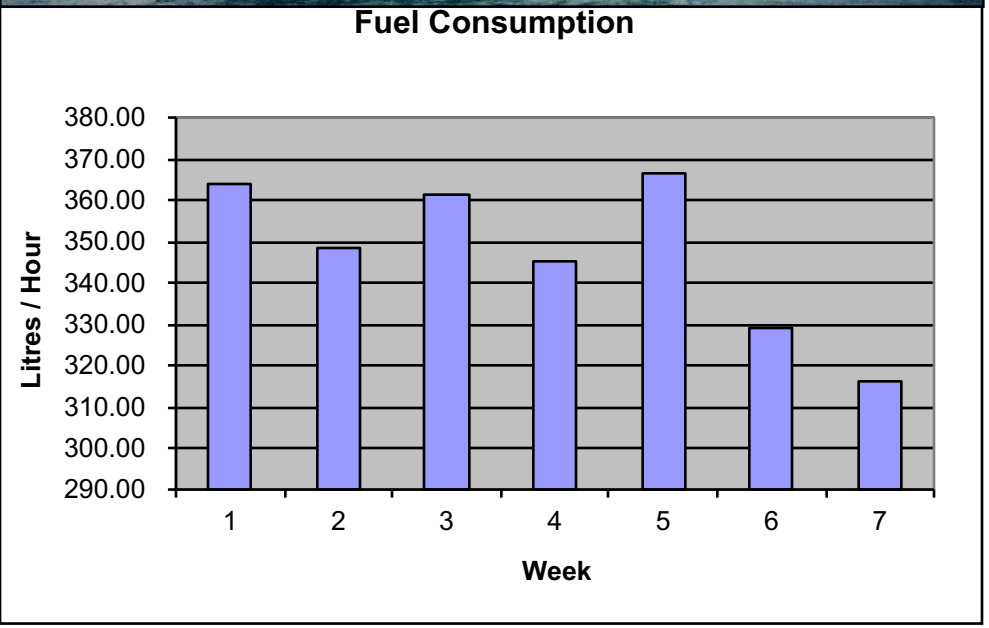
1. For diesel engines & boilers fueled with diesel fuel, use FP 4000 Application Procedure.
2. For engines & boilers fueled with bunker fuel use FP 10000 Application Procedure

Recommended point for inserting E.F.T. Injection Terminal



Before commencing the application of FP fuel conditioners, the requirements of the "FP 10000/FP 4000 Pre-Application Procedure" must have been met.

Before applying FP10000/ FP 4000 the main fuel storage tanks must be inspected and a certificate obtained specifying the bottom sediment and water content of the fuel. Depending upon the outcome of the inspection, appropriate action will be recommended prior to the application of FP10000/FP4000



Philippines

Lorenzo Shipping

Vessel:

LSC – Cagayan

11.12% fuel saving

Bremen Port Germany

Untermeyer Reederei GmbH

Emissions reductions

CO (Carbon Monoxide)

Reduced 7.18% and 16.07%

NO (Nitrogen Oxide)

Reduced 23.25% and 38.88%

The Main Engine Onboard

Indonesia/Singapore

Vessel PT MV. Ayer Mas

- Improve quality of fuel combustion
- Reduction of the hourly bunker fuel consumption by 7.3 % from 240 L/H into 223 L/H
- Carbon deposits dramatically reduced

MASCO Shipping
Murmansk
Russia

Fuel consumption average decreased by 7.7%;

Length of engine run increased by 2 hours 20 minutes;

Technical condition of engine injectors:

- **Coking decreased;**
- **Soot and oil deposits of injector sprays eliminated.**

Important points to note

1. The most important aspect of the application of FP10000/FP 4000 is to ensure that the FP10000/FP 4000 is properly mixed with the fuel before it enters the combustion chamber. If this is not achieved, it is not possible to ensure the best result. This can be achieved in a number of ways:

- **FP10000/FP 4000 added to fuel at the refinery**
- **FP10000/FP 4000 added to the bulk storage tank as it is filled**
- **FP10000/FP 4000 added to the day tank as it is filled**

Which ever method is chosen, we strongly recommend the use of a E.F.T. Injection Terminal (FIT) which will ensure that the FP10000/FP 4000 is applied to the fuel at the correct dosage. The FIT has been developed by E.F.T. to work specifically with E.F.T. fuel conditioners and is inexpensive and simple to install and maintain.

2. During usage of FP10000/FP 4000, any fuel filters should be regularly checked to ensure that they do not become blocked. This is particularly important in the early stages of usage when the bottom sediment and water is being removed from the fuel delivery system.

3. Prior to application, the engine should be inspected and certified by a qualified engineer to ensure that it is in a good operating condition. If an engine has pre-existing mechanical faults, the application of FP10000/FP 4000 may not give the desired result (although the application of FP10000/FP 4000 can in no way harm the engine or worsen any mechanical fault).

Sea Bulk Offshore Dubai U.A.E.

The products reduced our fuel consumption by **10% to 12%.** Port emissions appear to have been reduced from 18% to 7%, and starboard readings appear to show reduced opacity from **28% to 9%.**

Quote:(I'm also recommending it to colleagues on behalf of sound environmental policy!)

Shipping Tests

In the harsh marine environment, equipment reliability and low maintenance costs are critical. Also, with many world ports demanding low emission levels from visiting vessels, fuel efficiency is also of the utmost importance:

Far East Marine Shipping Company, Vladivostok, Russia

After treating the fuel with E.F.T. Bunker Fuel Conditioner for a period of 4 weeks, the following results were noted: 1)Lower deposits in piston walls, smaller and softer deposits that were easy to remove. 2) Piston deposits very small, and removed with a rag. Previously removed with a hammer and chisel. 3) Exhaust temperatures reduced by 35 degrees centigrade. - V.A. Barishev, Chief or Maintenance Department.

PT Timah, Bangka, Indonesia

PT Timah uses Bunker Fuel in several dredge platforms. During the trial of FP 10000 Conditioner we achieved a fuel saving of 11.8%, which is very impressive considering the volume of Bunker Fuel we use. We have also measured an increase in productivity, where we used E.F.T. Bunker Fuel Conditioner to get 65-70% efficiency, we are now operating in the 80-85% range. Our overheating problems have also stopped since using your products. - Greg Smith, Technical Manager, PT Tambang TImah

Russian Railways

Long term comparative test of an operational locomotive carried out by the Research Institute of the Russian Railways in 2000/01, under the supervision of Professor Evgeny Kossov. After six months and 152,000 kilometres, the following results were achieved:

Engine wear reduced by 50%

- **Oil Consumption reduced by 32.1%**
- **Fuel Saving of 5.1 % with a total fuel saving in excess of US100,000,000**
- **Increased life of bearings, turbo compressors, cylinder piston groups and doubled fuel filter life**

NGATI TUMATAUENGA

NEW ZEALAND ARMY

Army General Staff, (Logistic Executive), Messines Army Centre, Private Bag 901, UPPER HUTT

13810-01/2/SQ&EA

Telephone: (04) 5275227
Cellphone: (025) 456663
Facsimile: (04) 5275637

Mr Bruce Bellve
International Sales Manager
TLC Manufacturing and Development Ltd
P.O. Box 15300
WELLINGTON

Dear Bruce,

Thank you very much for your efforts in assisting the New Zealand Army with preparing the M113 Armoured Personnel Carrier fleet for deployment to East Timor. Your Propower Auto Tune (Engine Flushing and Fuel System Flushing) service made a marked improvement in performance by improving the Engines power output and reducing the running temperature. Reduced exhaust emissions also resulted from the Propower Auto Tune.

I am interested in pursuing the possibility of introducing this equipment into Army as part of the operational vehicle servicing programme in the future.

K.M. BARCLAY
Lieutenant Colonel
Standards, Quality and Engineering Authority

5 November 1999

Russian Ministry of Defence

Test conducted on T72 Main Battle Tank

"УТВЕРЖДАЮ"
Врио заместителя начальника 38 НИМИ МО РФ
по научной работе
И. Бекбулатов
2004г.

(*Stamped above-* **"APPROVE"- Defense Ministry of Russian Federation 38 NII (SRI- Science Research Institute) Chief Assistant for Science research- I. Becboulatov-** *30.09.2004*)

Table 1- Experimental data results from conditioner FP 4000 test on summer diesel fuel

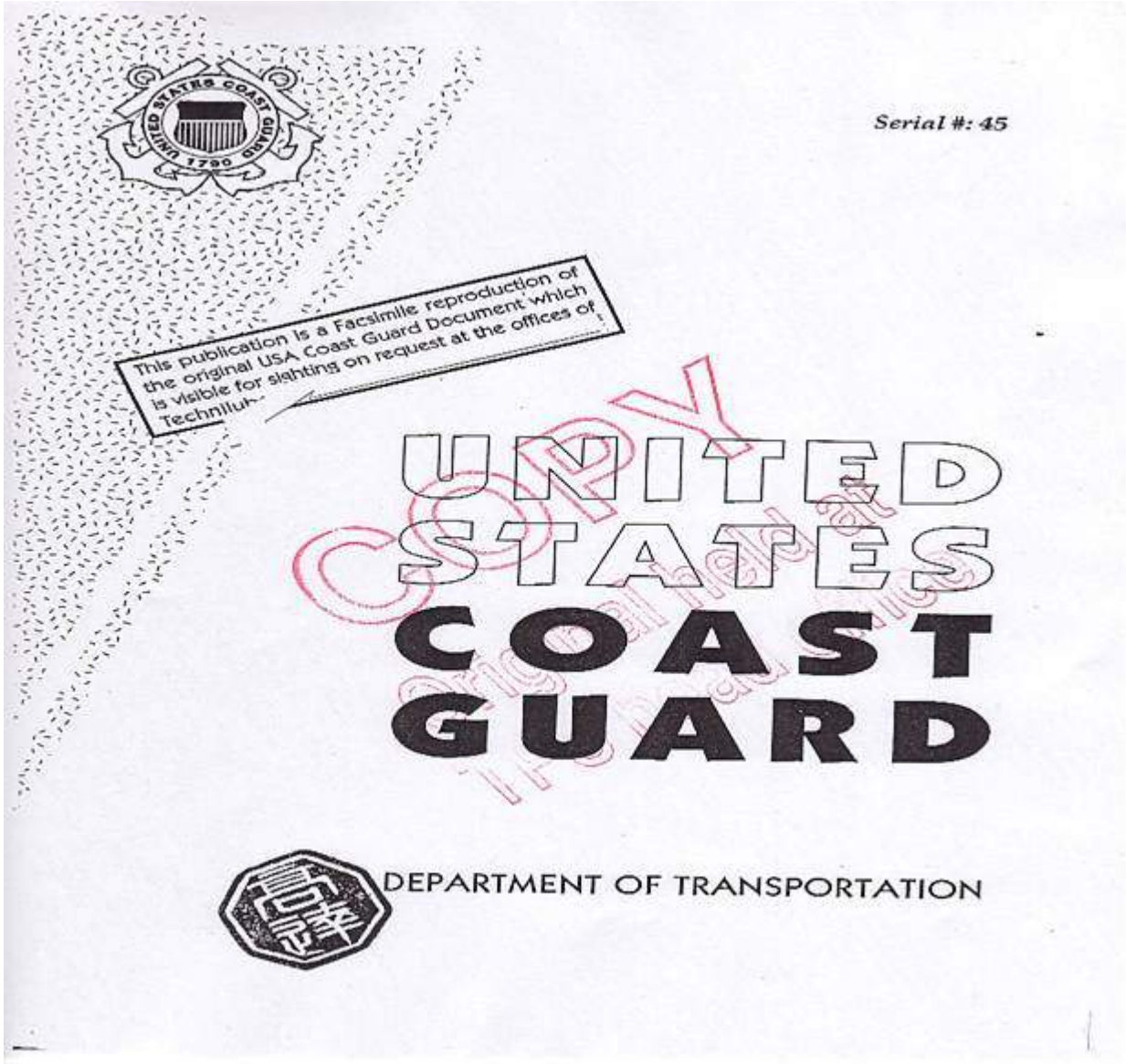
Crankshaft turns speed	Fuel consumption, kg/h		Fuel with conditioner
Turns per minute	Without conditioner	With conditioner	Consumption reduction %
	On Idle		
1000	6,1	5,45	10,65
1200	7,2	6,1	15,20
1400	8,6	7,5	12.79
1600	11,8	10,2	13,60
	Loading 20%		
1600	29,3	25,8	9,80
1500	28,1	25,4	10,20
1400	26,71	23,7	11,20
1300	25,7	22,6	11,60

Testing of FP4000 at engine stand No. 10 GUP (State Utilitarial Enterprise) 38 NII (SRI - Science Research Institute) according to program and methods (supplement No 1) on engine B-92C2 the test of conditioner FP4000 effect on fuel economy had been conducted.

The testing was conducted on serial engine B-92C2 No 2M11AT2841, 12 cylinders V-type 4-tact diesel with 1000hp boost pressure, p-2000 turns per minute.

Data from the table shows that on idle the FP4000 conditioner - fuel savings averaged 13.06%.

As 20% loading was applied fuel savings averaged 10.7%


Serial #: 45
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UNITED
STATES
COAST
GUARD
DEPARTMENT OF TRANSPORTATION

Extracts from USA Coast Guard Report on the use of Technilube Fuel Conditioners under controlled conditions.

"...

❖ Areas of Benefit Through Use of TLC

IMMEDIATE

- Higher available horsepower from the engine; because the fuel is preforming more efficiently.
- Reduced fuel consumption; from the fuel performing more efficiently and from cleaning and maintaining in a clean condition all fuel delivery system components and combustion areas.
- Exhaust temperatures reduction.
- Improved lubrication in lube systems.
- Increase in manifold pressure.
- ncreased equipment availability.

MAINTENANCE BENEFITS : Immediate & deferred

- Reduction of hard carbon deposits in the combustion areas, or chambers, ring lands, exhaust ports, manifold and/or stacks.
- Reduction of smoke opacity.
- Clean fuel delivery systems and injectors. Reduced wear rates and sticking injectors.
- Clean tanks and lines.
- Fuel filter life greatly extended.
- Bacteria and water control, dramatically lost injectors due to seizing.
- Oil and oil filter life extended.
- Reduced metal wear rates in oil.
- Reduced oil consumption.
- Reduced man hours required to maintain fuel systems and engines.
- Off sets the accelerated tank contamination problems generated by use of salt water ballast in the diesel fuel tank. Salt water tends to accelerate bacteria growth while the additive cleans and keeps tanks clean.

MARPOL CONVENTION – annex IV

In addition to setting a global cap on sulphur in bunker fuel, annex IV will also establish SOx emission controls limiting marine fuel to 1.5%. These emission controls have been now been ratified by most countries including the EU, Norway, Singapore, and Liberia.

Most environmental technologies have an associated cost. E.F.T. is unique in that it meets the most stringent demands of the new protocols such as MARPOL whilst at the same time delivering fuel and maintenance savings that more than off-set the cost associated with implementation.

Product Safety

E.F.T. products have been safely used for many years. The products do not contain any harsh chemicals that can damage an engine or expensive piece of equipment. The base materials for our fuel conditioning products are hydrocarbons which are fully compatible with the fuel, and full training is provided to ensure the correct application of the products in the field.

Insurance

E.F.T. carries a $10 million insurance policy in the unlikely event that any damage is caused to equipment by the use of E.F.T. products. To date, we have not had a claim.