



XBEE

Enzyme Fuel Technology

**100% natural technology for
all fuels and all engines**

www.XBEE.com

XBEE® Enzyme Fuel Technology

All-natural enzymes in **XBEE®** Enzyme Fuel Technology modify the structure of hydrocarbon molecules, improving fuel atomization. This optimizes oxygenation and combustion in diesel oils, gasoline, E-10, light and heavy fuel oil blends, as well as biodiesels.

Five good reasons to use XBEE Enzyme Fuel Technology

- 1 XBEE is a natural fuel additive and is OEM recommended
- 2 XBEE solves performance problems related to fuel quality
- 3 XBEE is used by thousands of customers all around the world
- 4 XBEE reduces your carbon footprint and is eco-certified
- 5 XBEE is highly cost-effective and will save you money

Why use XBEE Enzyme Fuel Technology?

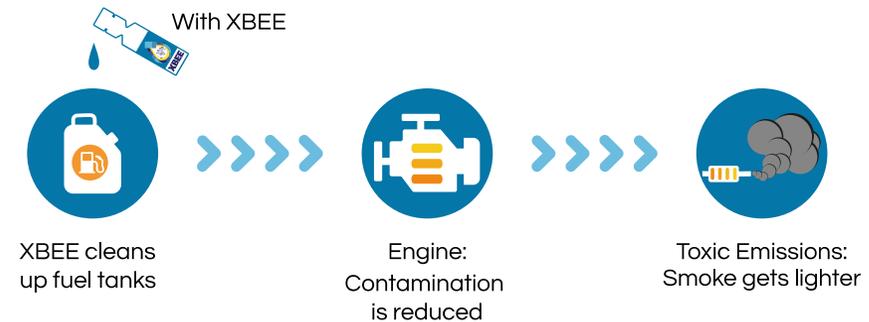
► Protects your fuel and engine

Standard fuel is often contaminated and does not burn correctly, building up soot and carbon deposits in engines.



► STAGE 1: Easy to use, natural and safe

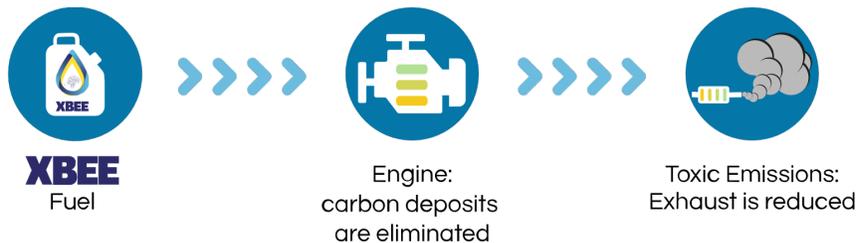
Adding XBEE to any type of fuel safely removes water, sludge, and the organic debris that contaminate fuel and damage fuel systems.



How does XBEE Enzyme Fuel Technology work?

▶ STAGE 2: Oxygenation and the Combustion Phase

XBEE hyper-oxygenates the fuel during combustion, reducing soot in the exhaust and gradually eliminating carbon deposits.

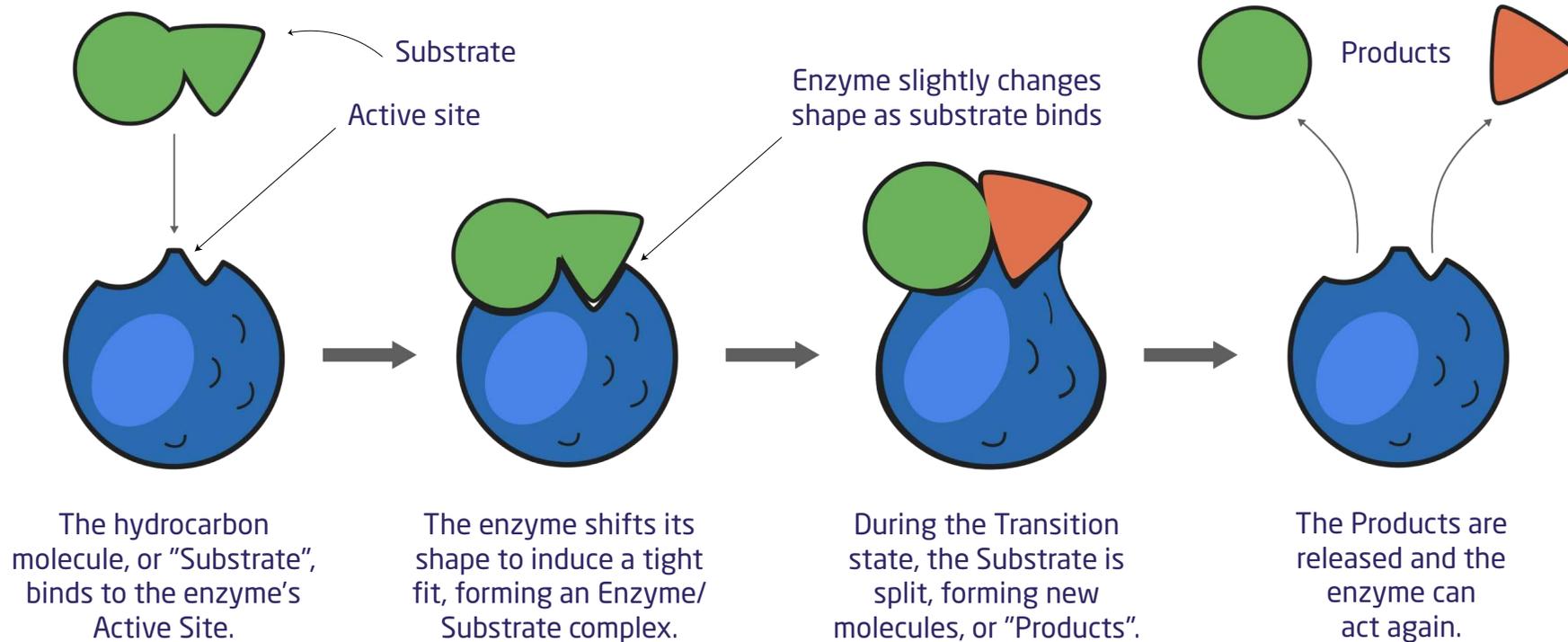


▶ STAGE 3: Reducing pollution

With regular use of XBEE, both the fuel system and engine are kept clean. This optimizes the combustion performance of the engine and lowers wasted fuel and exhaust pollution.



How does an enzyme work?



XBEE is fully approved for use in all engines



Marine vessels

Recognized and recommended by major OEMs such as Caterpillar and Wärtsilä for all engines burning Diesel oil, MDO and all grades of Heavy Fuel Oils.



Fishing vessels

Used by thousands of fishing vessel in all the oceans and seas to preserve the environment and improve workplace safety and conditions.



Public Transportation

Widely used in city buses, school buses, and coaches to eliminate problems due to organic contamination in the fuel.



Power plants ,boilers & Storage Tanks

Helps power plants and factories to clean up and maintain generators and boilers, and improve their performance. In addition Xbee helps stabilize Fuel in Storage Tanks and solve the fuel compatibility issue.



Railroad industry

Diesel locomotives reduce their fuel consumption by 6% to 9% and reduce soot, toxic emissions, and greenhouse gases.



Fuel & engine guarantees

XBEE is in compliance with all international fuel standards including EN590, EN 228, ISO8217, ASTM D975 and others, and is recognized safe in all engines and will not affect warranties.

XBEE is easy to use and cost-effective

▶ Easy to use

- > Simply pour the required dose of **XBEE** in the tank before filling with fuel.
- > Standard dosage ratio: 1 liter of **XBEE** for 4,000 liters of fuel.
- > Treat fuel at EACH and EVERY fill-up for optimum performance.
- > When treating bulk fuel for long-term storage, **XBEE** remains completely effective from -25°C to 43°C. Temperatures above that limit may reduce storage life.

▶ A complete range of packages



**250-ML BOTTLE -
INC. DOSING UNIT**
TREATS UP TO
1,000 LITERS
OF FUEL



**1-L BOTTLE -
INC. DOSING UNIT**
TREATS UP TO
4,000 LITERS
OF FUEL



5-L CAN
TREATS UP TO
20,000 LITERS
OF FUEL



20-L CAN
TREATS UP TO
80,000 LITERS
OF FUEL

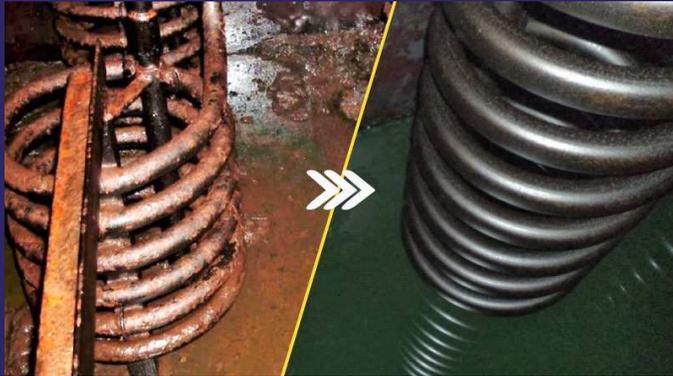


208-L DRUM
TREATS UP TO
832 M³
OF FUEL



Benefits

XBEE cleans fuel tanks and engines



Cleaning tanks

These fuel tanks belong to cargo sister ships powered by Heavy Fuel Oil 180 for years. They had to switch to Marine Diesel Oil (MDO) to remain in compliance with the European marine regulations. The ship on the right has been treated with XBEE enzymes for months before switching fuel. XBEE cleaned up the tanks and removed sludge and other organic fuel contaminants.



Cleaning Engine

XBEE Enzyme Fuel Technology is a powerful natural cleaner that helps to remove abrasive carbon deposits from engine's combustion chambers.

XBEE Enzyme Fuel Technology is detergent-free, yet cleans the entire fuel system, including tanks, piping, filters, and water separators, and by improving combustion, carbon deposits are eliminated, cleaning up the engine and exhaust system.



REMOVES WATER AND REDUCES CORROSION

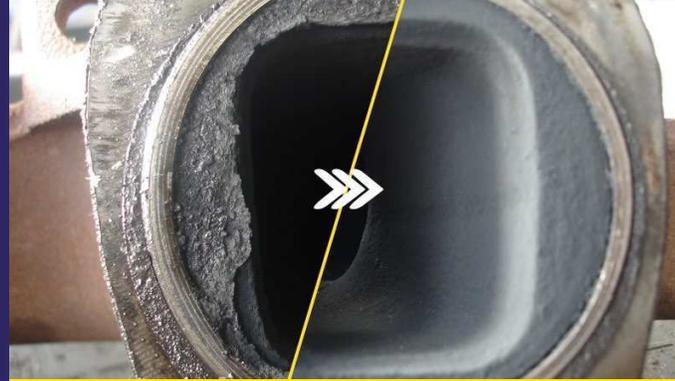
When fuel is in motion, XBEE acts as a mild surfactant, slowly dispersing water bottoms as microscopic drops without forming harmful emulsions or damaging fuel lubricity. Corrosion is reduced as fuel remains dry and free from water-related problems.

XBEE cleans fuel tanks and engines



Cleaning filters

Gas Stations pump filters were being replaced every two weeks due to plugging and slow pumping rates. After a few weeks using XBEE, the same pump filters are now cleaned or replaced if necessary at five week intervals with no plugging or slow down in pumping rates.



Cleaning Exhaust

Excessive soot forms thick, abrasive carbon deposits. With XBEE fuels, as soot is eliminated, thick, abrasive carbon deposits are naturally removed.



REMOVES SLUDGE AND STABILIZES FUEL

XBEE disperses fuel-derived organic debris, including oxidative gums and asphaltenes that precipitate from aged or contaminated fuel, which forms gums and corrosive sludge. Reducing asphaltenes also improves the compatibility of fuel oils from mixed-sources, stabilizing fuel oils with low aromatic reserves.



OPTIMIZES FUEL SYSTEM AND ENGINE PERFORMANCE

As XBEE breaks down organic contaminants into small, combustible particles, fuel filters last longer and water separators function more efficiently. The same catalytic function that cleans the fuel also breaks down large fuel molecules, particularly Polynuclear Aromatic Hydrocarbons (PAH). This reduces soot. Combustion chamber deposits are reduced, and less soot enters the lube oil through blow-by.

XBEE reduces maintenance costs and fuel consumption



REDUCES MAINTENANCE COSTS

XBEE's fuel purification benefits and the cleansing action of the entire fuel system, when coupled with XBEE'S improved combustion, prevents abrasive combustion chamber deposits and corrosive blow-by gases from contaminating the lubrication oil, and significantly reduces your fleet maintenance costs. Cleaner fuel and better combustion result in:

- › **Less frequent or even no need for tank cleaning**
- › **Less down time for engine maintenance and repairs**
- › **Extended life of fuel filters, injectors, pumps, exhaust valves, pistons, and rings**
- › **Lower oil and oil filter consumption**



REDUCES FUEL CONSUMPTION

As a combustion catalyst, XBEE's action of improving fuel atomization and hyper-oxygenation of the fuel charge during combustion improves engine efficiency. Less fuel is needed to accomplish the same work.

The savings from using less fuel pays for the cost of treatment with XBEE, and all the other benefits, including reducing CO₂ emissions along with reducing toxic soot, carbon monoxide, NO_x, and SO_x, are free.

With XBEE Enzyme Fuel Technology, you can reduce your carbon footprint and save money.

XBEE reduces toxic air pollution as well as Greenhouse Gases

REDUCES YOUR ENVIRONMENTAL FOOTPRINT

XBEE Enzyme Fuel Technology improves both fuel cleanliness and combustion, resulting in significant reductions of all exhaust gases and particles. The reduction of toxic soot, unburned hydrocarbons, and NOx helps fight diseases like asthma, lung cancer and emphysema. This decreases sick days and improves employee health.

Reducing fuel consumption is the only way to reduce the Greenhouse gas CO₂. When you use XBEE you are reducing CO₂ and your carbon footprint, and saving money at the same time.



CO₂ Carbon Dioxide (%)



HC - Hydrocarbons (ppm)



NOx - Nitrogen Dioxide (mg/Nm³)

GASOIL

Measurements made by certified laboratory ASCAL

	Without XBEE	With XBEE	Difference
Flow (Nm ³ /h)	151.60	104.80	-30.87 %
CO ₂ - Carbon Di oxide (%)	1.52	1.36	-10.53 %
CO - Carbon Monoxide (mg/Nm ³)	342.20	262.60	-23.26 %
NO - Nitrogen Oxide (mg/Nm ³)	415.60	380.60	-8.42 %
NOx - Nitrogen Dioxide (mg/Nm ³)	821.20	719.40	-12.40 %
VOC - Volatile Organic Compounds (mg/Nm ³)	113.00	105.40	-6.73 %

BIODIESEL FUEL

Measurements made by "Berkeley's Combustion Analysis Laboratory"

Aggregate used vegetable oils (B20)	Without XBEE	With XBEE	Difference
HC - Hydrocarbons (ppm)	12.80	5.30	-58.59 %
CO - Carbon Monoxide (ppm)	39.20	32.40	-17.35 %
PM - Particulate Matter (mg/Nm ³)	2.70	2.00	-25.93 %
NOx - Nitrogen Dioxide (mg/Nm ³)	646.00	554.00	-14.24* %

*The NOx emissions of this biodiesel compared to the CARB US Diesel oil increased by 1.6%

Virgin soy oil (B100)	Without XBEE	With XBEE	Difference
HC - Hydrocarbons (ppm)	10.00	5.20	-48.00 %
CO - Carbon Monoxide (ppm)	36.30	32.10	-11.57 %
PM - Particulate Matter (mg/Nm ³)	2.30	1.80	-21.74 %
NOx - Nitrogen Dioxide (mg/Nm ³)	720.00	559.00	-22.36* %

*The NOx emissions of this biodiesel compared to the CARB US Diesel oil increased by 13.2%

XBEE reduces toxic air pollution as well as Greenhouse Gases

 JOIN XBEE AND ITS PARTNERS TO IMPROVE HELP SAVING OUR PLANET

XBEE's all-natural enzyme formula and its unique ability to dramatically reduce fuel consumption and exhaust emissions in all types of fuels has lead us to partner up with global environmental certification programs, such as Lean & Green in 2018 and Green Marine in 2021.



Fuel consumption (g/kWh)



Particulates (mg/Nm₃)



CO₂ - Carbon Dioxide (%)

MARINE GASOIL -

Measurements made by certified laboratory Envirotech Consultancy WLL

	Without XBEE	With XBEE	Difference
Fuel consumption (g/kWh)	254.10	229.10	-9.83 %
CO ₂ - Carbon Di oxide (g/kWh)	788.00	716.00	-9.14 %
CO - Carbon Monoxide (g/kWh)	1.81	0.58	-67.96 %
NOx - Nitrogen Dioxide (g/kWh)	10.20	7.60	-25.49 %

HEAVY FUEL OIL HFO380

Measurements made by certified laboratory ASCAL

	Without XBEE	With XBEE	Difference
Flow (Nm ³ /h)	22 536.00	22 521.00	-0.07 %
CO ₂ - Carbon Di oxide (%)	6.10	4.70	-22.95 %
CO - Carbon Monoxide (mg/Nm ³)	98.40	56.20	-42.89 %
NO - Nitrogen Oxide (ppmv)	1 094.00	826.00	-24.50 %
NOx - Nitrogen Dioxide (ppmv)	1 125.00	851.00	-24.36 %
O ₂ - Ox ygene (%)	12.60	14.70	+16.7 %0
Particubtes (mg/Nm ³)	99.30	59.65	-39.93 %
SO ₂ - Sulfur di oxide (mg/Nm ³)	1 222.00	1 002.00	-18.00 %
VOC - Volatile Organic Compounds (mg/Nm ³)	76.90	45.60	-40.70 %

HEAVY FUEL OIL HFO380

Measurements made by certified laboratory DEKRA

	Without XBEE	With XBEE	Difference
Flow (Nm ³ /h)	73 525.00	68 197.00	-7.25 %
CO ₂ - Carbon Dioxide (%)	7.40	5.43	-26.62 %
CO - Carbon Monoxide (ppm)	70.33	40.00	-43.12 %
NOx - Nitrogen Dioxide (mg/Nm ³)	2 340.67	2 023.67	-13.54 %
O ₂ - Ox ygene (%)	13.03	11.77	-9.67 %
Particubtes (mg/Nm ³)	50.27	40.90	-18.64 %
SO ₂ - Sulfur di oxide (mg/Nm ³)	486.47	500.17	+2.82 %
VOC - Volatile Organic Compounds (mg/Nm ³)	18.03	14.27	-20.85 %

XBEE is Safe

IN COMPLIANCE WITH ALL FUEL STANDARDS

XBEE contains natural enzymes extracted from tree leaves, in a highly purified petroleum carrier. XBEE itself is a chemical-free, pure fuel. Fuels treated with XBEE remain in compliance with all liquid fuel standards, even if overdosed.

EN 228

Unleaded 95 &
98 gasolines,
Super E10

EN 590

Diesel oil,
MDO

CSR 441

Heating fuel,
Mazout

ISO 8217

Heavy fuel oils,
IFO 180, IFO 380

EN 14214 FAME

Bioheating oil,
biodiesel and
bioethanol

All analyses have been conducted by accredited laboratories such as Bureau Veritas, Intertek, SGS, Saybolt.

If your fuel is in compliance with the standard, using it is guaranteed by your OEM!

COMPATIBLE WITH ALL ENGINES

XBEE is an ashless product, containing no chemicals, no alcohols, no metals, etc. Thanks to its natural composition, it is harmless to all alloys in engines.

► **Det Norske Veritas (Norway) and Veritas Petroleum, (Netherlands)**

In 2008 and 2018 respectively, the laboratories analyzed pure XBEE and determined that XBEE Enzyme Fuel Technology was completely safe for all engines.

► **Wärtsilä Finland Oy**

Based on the aforementioned analysis, the engine manufacturer issued a letter of "No-Objection" to the use of the technology in their engines.

► **Mak/ Caterpillar (Germany)**

The famous OEM conducted diesel engine combustion tests with XBEE at their Department of Motor Development and Testing. Based on their very positive results, they issued a letter of recommendation noting XBEE's safety and efficacy in reducing maintenance costs, as well as XBEE's positive effects on the environment.



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