

Product Comparison Files: Dee-Zol vs. Other Diesel Fuel Additive Competitors

Bell Performance introduced its first diesel fuel treatment, Dee-Zol, in 1954. This was forty-five years after inventing the very first fuel additive in 1909, and twenty-seven years after company founder Robert J. Bell developed his revolutionary surfactant chemistry that allowed petroleum and water to mix. Dee-Zol is still the most effective and complete multi-treatment for diesel on the market. In this document, we'll compare the important functions of diesel fuel additives and see how some of the most popular options in the marketplace compare with Dee-Zol.

Introduction

Treatment of diesel fuel is one of the most competitive areas of the fuel additive market. Diesel fuel has changed substantially in the last 10 years, giving rise of a myriad of multi-function additives that claim a host of similar benefits. But so much noise in the market has inevitably led to consumer confusion, who do not know which treatments are best, which claims to believe, or even if any of them are worth anything at all.

Diesel Additives – What They're Used For

Diesel fuel users are looking for certain kinds of benefits. Some of their expectations flow from what they think their fuel should be doing. Still other expectations fall under the category of "*I didn't know I needed that, but now that you mention that, it's a good idea*".

Given the most common issues with today's diesel fuels, there are certain things that should be included in the benefits portfolio of a good diesel fuel additive. If they should be included, that necessarily implies that they can actually be accomplished through chemical treatment. *This is an important point*. The fuel additive industry has a reputation for "snake oil" because of bogus and exaggerated claims. This creates expectations in the consumer which then aren't fulfilled. The consumer is disappointed and feels stupid for having been fooled. The consumer then forms the opinion that fuel additives are all a waste of money.

You can't blame the consumer for feeling that way. But there are fuel additives out there that do deliver on their promises. So we are here to try and bring the good ones to light.

What To Look For In A Diesel Fuel Additive

The best multi-function diesel additives should be able to do the following:

Clean injectors and provide detergency

Injector cleaning is the single most important function a diesel fuel additive can offer. Injector deposits directly affect a number of important links in the internal combustion chain, including the proper atomization of the fuel into the combustion chamber. Keeping the injectors, combustion chamber and fuel system clean and free of deposits offers the greatest benefits toward improving vehicle/equipment performance and keeping them performing at a high level.



Improve mileage and power (within reason)

This is the one consumers pay the most attention to. There are legitimate ways to improve fuel efficiency and increase power in diesel engines. These ways typically center around a combination of active ingredients that improve combustion of the fuel and improve conditions within the engine such that it functions closer to the level it was functioning at while it was new. Most legitimate mileage increase claims for diesel engines will be on the order of 3%-5% or a little more. Additives guaranteeing significant mileage improvements well into the double-digits are not to be trusted.

Remove water

Removal of free water is essential to the life of stored diesel fuel. Water control helps extend the storage life of the fuel, reduce in-tank corrosion, and reduce favorable conditions for detrimental microbial growth in the fuel and storage tank. A good fuel treatment should control water, either by drawing free water up into the fuel or by dropping emulsified water out of the fuel, where it can be removed. The preferred method of water control will depend on whether the diesel fuel is stored for long periods of time or if it is turned over (used) quickly.

Increase cetane rating

Many diesel engines perform inadequately because they require a higher cetane diesel fuel than is available. A good diesel fuel additive should be able to increase cetane rating by 1-2 points or more. In most cases, this is enough to see a noticeable improvement in the power and operation of the diesel engine. However, multi-function diesel fuel additives claiming cetane increases of 6-8 points or more may not be the best choice. Most diesel engines do not need a cetane increase as high as 6-8 points. And in order to supply this level of improvement, these additives would need to have a treat ratio of less than 1:500. So it is a good idea to verify the treat ratio of such an additive before making a decision to spend money on them.

Provide top cylinder lubrication

A good diesel additive may contain a fuel-soluble lubricant, many times called a "top cylinder lubricant". This helps increase the lubricity rating of ultra-low sulfur diesel fuel, lubricating valves, injectors, fuel pumps and other critical parts.

Stabilize fuel

Fuel stability is commonly included in the benefits slate for diesel fuel multi-function additive. It's also one of the functions that is easy to accomplish with legitimate chemical treatment, as well as easily verified through lab testing like the ASTM Accelerated Stability test. The stability package offered by an additive should include anti-oxidants, metal deactivators and dispersants. Improved fuel stability means extended fuel storage life and decreased formation of harmful fuel sludge in the storage tank and fuel distribution system.

In addition to these functions, the following should also be true of a good diesel fuel additive.

Low Treat Rate (But Not Too Low)

Treat rate directly determines how much it costs to use a fuel additive. A single-treat additive might only cost \$5.00 a bottle, but if that bottle only treats one tank of fuel (15-20 gallons), the cost to use it would approach 30 cents per gallon. On the other hand, a concentrated multi-function additive might cost \$20.00 for a bottle treating 150 gallons or more. Its cost-to-treat is below 13 cents a gallon – less than half of the other one. Smart consumers will consider the cost-to-treat on a per-gallon of fuel basis, not the initial cost of the additive itself.



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EPA-Registered

By law, all on-road diesel additives must be registered with the Fuel Additives division of the United States EPA. This includes re-labels and re-names of existing additives (of which, there are many). There's no requirement to put a registration statement on the product label, so you can't tell, just by looking at that, if the diesel fuel additive is EPA-registered. The full list of registered fuel additives can be found simply by googling "list of registered diesel additives". If an additive is not EPA-registered, it's not legal to sell it in the United States.

That's to say nothing of whether it will actually work or not. An additive maker that hasn't taken the time to comply with the relatively-simple additive registration process (it's free) is not likely to be taking the time to formulate an additive that really works, whatever its claims.

It is also important to keep in mind that EPA-registration does not mean that the EPA or the United States government is endorsing an additive, or even that it works. EPA-registration is concerned with the contents of the formulation. They do not care what claims of greatness are made about it.

Dee-Zol vs. The Marketplace Competition

Now that we have a clearer picture of what separates good diesel additives from ones of lesser quality, let's see how Dee-Zol compares to some of the most popular additives names in the marketplace. The comparison formulations were selected based on consumer familiarity and market penetration of the brand names.

Of the thousands of diesel fuel additives out there, these are some of the more well-known selections in the market.



Sta-Bil Diesel Stabilizer (Gold Eagle) - Gold Eagle's Sta-Bil formulation is very well-known within the industry as a fuel stabilizer. The Gold Eagle company was started in 1932 and has significant market presence in the automotive aftermarket arena. They have a broad range of products including HEET for gasoline, starter fluid, washer fluid deicer and octane improvers (technically not street-legal). For the purposes for this comparison, Dee-Zol will be compared with the flagship Sta-Bil fuel stabilizer, their formulation with the greatest brand recognition.



Lucas Fuel Treatment (Lucas Oil Company) – Lucas Oil Company has tremendous brand recognition in the marketplace due to their extensive marketing sponsorships with NASCAR, off-road racing, bull riding, and since 2006, the home stadium of the Indianapolis Colts. Lucas Oil offers a full range of fuel treatments and automotive cleaning products, but are best known for their oil treatments, including a highlyeffective oil stabilizing product. For the purposes of this comparison, Dee-Zol will be compared to the Lucas Oil "Complete" Fuel Treatment formulation for diesel fuel.



Power Service Diesel Kleen (Power Service) - The Power Service company of Weatherford, Texas has specialized in diesel additives since its inception in 1956. Their original formulation was primarily a water dispersant. Today, Power Service offers a broad range of multi-function fuel additive formulations. For the purposes of this comparison, Dee-Zol will be compared to Power Service's Diesel Kleen fuel treatment.



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Marvel Mystery Oil (Marvel Oil Company) – One of the oldest fuel additive formulations on the market, its parent manufacturer, the Marvel Oil Company, was founded in 1923. It was purchased in 1999 by the Turtle Wax Company, which oversees production today. Marvel Mystery Oil is not approved for use in aircraft engines, yet has been implicated by the NTSB in at least one aircraft accident involving catastrophic engine damage after takeoff (the NTSB listed the probable cause of the accident as 'improper use of a fuel additive resulting in power loss').



PRI-D Diesel Treatment (Power Research Inc.) – Power Research Inc. of Houston, Texas was started in 1985 as a conduit for selling lubricity additives for low sulfur diesel, along with treatments for heavy fuel oil in the marine shipping industry. They launched a consumer products division in 1989, introducing a gasoline formulation (PRI-G). For the purposes of this comparison, Dee-Zol will be compared to Power Research's popular PRI-D multi-function diesel fuel treatment.



ILFC 1032 (R.W. Beckett Additives) – A white-label version of the UltraGuard formulation, manufactured by the R.W. Beckett Company, in business since 1937. UltraGuard's primary function is as a treatment for stored home heating oil. ILFC 1032 is marketed as a multi-function treatment for diesel fuel, allowing for a direct comparison to Dee-Zol.

In addition to these market competitors, we can also compare Dee-Zol with another diesel additive seeing increased market penetration over the past few years, Diesel Mate 2000.



Diesel Mate 2000 (Certified Labs) –Mmulti-function diesel treatment marketed by Certified Labs of Irving, Texas. Certified Labs is primarily a lubricant formulating company, but was started in 1948 as a cleaning supply business.

Comparative Infographic – Dee-Zol vs. The Marketplace / Dee-Zol vs. Diesel Mate 2000

The infographic below summarizes the legitimate claims made by each additive in qualitative form. This is followed by a summary description of how each type of diesel fuel additive performs in each desired trait. The goal is to provide a clearer picture of the effectiveness of each formulation vs. its product claims.

Immediately following the infographic, we've provided a comparison table highlighting the product claims for Dee-Zol vs. the Diesel Mate 2000 formulation.



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Dee-Zol vs. Diesel Mate 2000

| Dee-Zol | Functionality | Diesel Mate 2000 |
|---------|--------------------|------------------|
| Х | Cetane Improvement | Х |
| Х | Detergency | |
| Х | Controls water | Х |
| Х | Lubricity | Х |
| Х | Sludge dispersant | Х |
| Х | Fuel stabilization | Х |
| | | |



Now, let's examine how these diesel fuel additives compare with respect to their specific benefit claims.

Improves Mileage & Power – Dee-Zol, Lucas Fuel Treatment, Marvel Mystery Oil, Power Service and Pri-D all claim some kind of mileage improvement backed by testing.

The remaining three products – ILFC 1032, Diesel Mate 2000 and Sta-Bil – do not improve mileage or power.

| Improves/Claims T | To Improve Mileage & Power | | |
|-------------------------------|---|--------------|--|
| Dee-Zol | Contains a combination of multiple detergents and combustion improvers. Typical mileage improvement is about 5%, which is near the top of the industry. | | |
| Lucas Fuel Treatment | Contains injector detergents which can yield a mileage improvement. | | |
| Marvel Mystery Oil | If added to the fuel, claims to remove carbon deposits in important areas like injectors, which would give a mileage improvement in a vehicle with injector deposits. | \checkmark | |
| Pri-D | Claims a fuel efficiency improvement of "up to 1%", although there's no indication Pri-D contains any detergents or combustion improvers normally associated with effects on fuel efficiency. | | |
| Power Service Diesel Kleen | Contains injector detergents which can yield a mileage improvement (claimed up to 8%). | | |
| Does Not Improve | Mileage & Power | | |
| Diesel Mate 2000 | Claims an average fuel economy improvement of 5%. However, like ILFC 1032, an analysis of its SDS indicates no ingredients shown to have a positive effect of mileage. | | |
| ILFC 1032 | According to its SDS (safety data sheet), does not contain anything shown to have an effect on mileage or power in an internal combustion engine | × | |
| Sta-Bil | Sta-Bil is a fuel stabilizer, therefore it has no direct effect on mileage or power. | X | |



Cleans Injectors & Engine Deposits – Four of the eight formulations show evidence of detergency and deposit removal when added to fuel - Dee-Zol, Sta-Bil, Power Service and Marvel Mystery Oil.

The other four products – Lucas Fuel Treatment, Pri-D, ILFC 1032 and Diesel Mate 2000 – show no evidence of the ability to remove engine and injector deposits.

| Cleans Fuel Injectors & Engine Deposits | | | |
|---|--|--------------|--|
| Dee-Zol | Contains a package of multiple detergents for injectors (PFI), valves and combustion chambers, along with a non-alcoholic surfactant package to clean deposits in stored fuel. | | |
| Sta-Bil | Sta-Bil's formulation claims to include detergency along with its stability package. | | |
| Power Service Diesel Kleen | Provides satisfactory added detergency for injectors. | \checkmark | |
| Marvel Mystery Oil | Does not contain a dedicated "port fuel injector" detergent, which is the standard for the industry. Marvel's formulation does provide a general level of detergency that has been shown, in certain cases, to provide some level of positive benefit. | | |
| Does Not Provide I | Essential Detergency | | |
| Lucas Fuel Treatment | Does not list detergency among its product benefits. | × | |
| Diesel Mate 2000 | According to its SDS (safety data sheet), does not contain anything shown to have an effect on removing injector or other engine deposits. | | |
| ILFC 1032 | According to its SDS (safety data sheet), does not contain anything shown to have an effect on removing injector or other engine deposits. | × | |
| Pri-D | According to its SDS (safety data sheet), does not contain anything shown to have an effect on removing injector or other engine deposits. | × | |



Controls/Removes Water – Four of the eight products contain an ingredient to effectively control and remove water – Dee-Zol, Sta-Bil, ILFC 1032 and Diesel Mate 2000.

The other four products – Lucas Fuel Treatment, Power Service Diesel Kleen, Marvel Mystery Oil and Pri-D – do not have any effect on water problems essential to treating diesel fuel.

| Controls & Removes | Water | | |
|-------------------------------|--|---|--|
| Dee-Zol | Has traditionally used a non-alcoholic fluoro-surfactant package to suspend water in fuel, based on Robert Bell's surfactant technology first developed in 1927. | | |
| Sta-Bil | Contains at least one ingredient to control water, as part of fulfilling the essential functions of a fuel stabilizer. | | |
| ILFC 1032 | Contains a water-control ingredient. However, it's extraordinarily-low treat rate of less than 1:10,000 calls into question just how effectively it can accomplish this. | | |
| Diesel Mate 2000 | Contains a relatively small concentration of water-dispersing ingredient to turn free water into dissolved water. | | |
| Does Not Control Wat | ter | | |
| Lucas Fuel Treatment | Does not contain any water-control ingredients | × | |
| Power Service Diesel Kleen | Does not contain any water-control ingredients | | |
| Marvel Mystery Oil | Does not contain any water-control ingredients | | |
| Pri-D | Does not contain any water-control ingredients | | |



Increases cetane rating – Cetane rating improvement is a specific but essential product claim that can be easily verified. There are only a few common ingredients that effectively raise fuel cetane rating, provided they are present in a high-enough concentration in the fuel.

Only three products have anything in their formulation to positively impact fuel cetane rating – Dee-Zol, Power Service Diesel Kleen and Diesel Mate 2000.

The other five products – Sta-Bil, Lucas Fuel Treatment, Marvel Mystery Oil, Pri-D and ILFC 1032 – have no impact on fuel cetane.

| Increases Cetane Rating | | | |
|-------------------------------|---|--|--|
| Dee-Zol | Contains enough cetane improver to raise fuel cetane rating by 2 points at normal treat ratio. | | |
| Power Service Diesel Kleen | Claims an improvement of "up to" 6 points. However, more likely cetane improvement is 2 points under normal treat rate. A 6 point improvement is almost impossible unless higher dosage is used (which can also be said for Dee- Zol and Diesel Mate). | | |
| Diesel Mate 2000 | Contains the most cetane improver of the formulations examined – enough to raise fuel cetane rating by 3 points at normal treat rates. | | |
| Does Not Improve Cet | tane | | |
| Sta-Bil | Sta-Bil is a fuel stabilizer and does not contain any cetane improving ingredients. | | |
| Lucas Fuel Treatment | Does not contain cetane improver | | |
| ILFC 1032 | Does not contain cetane improver | | |
| Marvel Mystery Oil | Does not contain cetane improver | | |
| Pri-D | Does not contain cetane improver | | |



Improves Lubricity & Top Cylinder Lubrication – Lubricity is an effect that is easier to attain than others, due to the prevalence of fuel-soluble lubricants and lubricity-improving compounds.

As such, Dee-Zol, Lucas Fuel Treatment, Power Service Diesel Kleen, Marvel Mystery Oil and Diesel Mate 2000 all have some positive fuel on fuel lubricity and top cylinder lubrication.

The other three products – Sta-Bil, Pri-D and ILFC 1032 – have no effect on lubricity.

| Provides Lubricity & | Top Cylinder Lubrication | | | |
|-------------------------------|--|--------------|--|--|
| Dee-Zol | Is formulated with a fuel-soluble lubricant to improve fuel lubricity | | | |
| Power Service Diesel Kleen | Is formulated with a fuel-soluble lubricant to improve fuel lubricity | | | |
| Diesel Mate 2000 | Is formulated with a fuel-soluble lubricant to improve fuel lubricity | \checkmark | | |
| Marvel Mystery Oil | Arguably the best at doing this, due to the largest proportion of its formulation being fuel-soluble lubricant | | | |
| Lucas Fuel Treatment | Is formulated with a fuel-soluble lubricant to improve fuel lubricity | | | |
| Does Not Provide Lub | Does Not Provide Lubricity | | | |
| Sta-Bil | Sta-Bil is a fuel stabilizer and does not contain any lubricity improver. | | | |
| ILFC 1032 | Does not contain lubricity improver | × | | |
| Pri-D | Does not contain lubricity improver | X | | |



Stabilizes fuel – Fuel stabilizer ingredients are typically listed on a product's SDS.

Six products – Dee-Zol, Power Service Diesel Kleen, Sta-Bil, Diesel Mate 2000, Pri-D and ILFC 1032 – show evidence of containing ingredients associated with extending the effective storage life of petroleum fuel.

The two remaining products – Marvel Mystery Oil and Lucas Fuel Treatment – show no evidence of being able to extend fuel storage life.

| Stabilizes Fuel | | | |
|-------------------------------|---|--|--|
| Dee-Zol | Contains a package of multiple stabilizing and dispersant ingredients to protect stored fuel. | | |
| Power Service Diesel Kleen | Contains fuel stabilizing ingredients | | |
| Diesel Mate 2000 | Contains fuel stabilizing ingredients in small concentrations | | |
| Pri-D | Contains fuel stabilizing ingredients | | |
| ILFC 1032 | Contains fuel stabilizing ingredients. | | |
| Sta-Bil | Sta-Bil is a highly effective fuel stabilizer, the most well-known on the market. | | |
| Has No Effect On Fue | l Stability | | |
| Marvel Mystery Oil | No indication of any fuel stabilizing ingredients in the formulation | | |
| Lucas Fuel Treatment | No indication of any fuel stabilizing ingredients in the formulation | | |



Comparisons of Treat Rate Relative To Claimed Benefits

Treat rate ultimately determines the cost of use. Four of the products stood out from the rest by having more economical treat rates compared to the other four. The most economical choices were Dee-Zol, Sta-Bil, ILFC 1032 and Diesel Mate 2000. However, as the table below shows, a low treat rate may not be able to make up for the lost value of a limited number of benefits as compared to competitors that may do more in the treated fuel.

To summarize the findings, we've listed all eight formulations compared, their total number of benefits, and the claimed treat rates recommended to achieve those benefits.

| Product | # of Benefits | Benefits Claimed | Treat Rate |
|-------------------------------|---------------|--|-------------------------------|
| Dee-Zol | 6 | Mileage improvement, Cleans injectors, Removes water, Increases cetane, Lubricity, Stabilizes fuel | 1 oz: 10 gallons (1:1280) |
| Power Service Diesel Kleen | 5 | Mileage improvement, Cleans injectors, Increases cetane, Lubricity, Stabilizes fuel | 1 oz: 3 gallons (1:384) |
| Diesel Mate 2000 | 4 | Removes water, Increases cetane, Lubricity, Stabilizes fuel | 1 oz: 10 gallons (1:1280) |
| Pri-D | 2 | Mileage improvement, Stabilizes fuel | 1 oz: 15 gallons (1:1920) |
| ILFC 1032 | 2 | Removes water, Stabilizes fuel | 1 oz: 80 gallons (1:10240) |
| Sta-Bil | 3 | Cleans injectors, Removes water, Stabilizes fuel | 1 oz: 10 gallons (1:1280) |
| Marvel Mystery Oil | 3 | Mileage improvement, Cleans injectors, Lubricity | 4 oz: 10 gallons (1:320) |
| Lucas Fuel Treatment | 2 | Mileage improvement, Lubricity | 3 oz: 10 gallons (1:426) |

Armed with this information, there are some important observations we can make about each product.

Dee-Zol – Has the best combination of doing the most number of beneficial things (6) at a competitive treat rate of 1:1280.

Power Service Diesel Kleen – Gives the second-highest number of benefits (5), but at a much higher treat rate that is more than 300% higher than Dee-Zol. This makes it more expensive to use, for fewer benefits (does not remove water).

Diesel Mate 2000 – Gives the third-highest number of benefits (4), and at the same treat rate as Dee-Zol.



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Pri-D – Pri's treat rate is advertised to be very cost-effective - 50% lower than the treat rates for competitors like Dee-Zol and Diesel Mate. However, it only does two things effectively, far fewer than the other alternatives. This makes Pri-D a poor choice for an all-purpose diesel fuel treatment.

ILFC 1032 – Like Pri-D, ILFC only does two things (fuel stabilization and water control), and one of those is not the universally-desired mileage improvement. However, the most notable characteristic of ILFC is a treat rate that borders on miniscule: just 1:10240. It is very possible to stabilize fuel at such a low treat rate, but one should be extremely skeptical at the level of water control possible at that treat rate. And this makes ILFC 1032 a poor choice.

Sta-Bil – This choice only does three things, but at a treat rate that is very reasonable to support its product claims. And Sta-Bil has an excellent reputation for its primary function of fuel stabilization. So it does not do as much as Dee-Zol or Power Service, but is a better choice than Pri-D or ILFC.

Marvel Mystery Oil – One of the oldest products on the market, Marvel Mystery Oil does fewer things than other comparatives (3), and takes a higher dosage (in other words, more expensive) to do them (its treat rate is 1:320). In fact, Marvel's treat rate was the highest of all eight products. This makes Marvel Mystery Oil a poor combination of effectiveness and value.

Lucas Fuel Treatment – Lucas suffers from the same problems as some of these others. It does few things well (only 2) while requiring a high treat rate approaching three times higher than Dee-Zol, Diesel Mate or Sta-Bil. Not a good combination when it costs a lot to do very little.

Conclusions

There are many choices on the market for diesel fuel additives. Many of these choices claim to do the same things. A careful examination should lead us to conclude the following (we listed our conclusions by product in the order of best to worst choice, by our assessment):

- *Power Service Diesel Kleen* is a relatively good choice, although it costs more than others.
- *Diesel Mate 2000* costs less but does fewer things. It is a better choice than some others.
- Sta-Bil doesn't stack up to others in terms of broadest range of benefits. But what it does do, it does very well, and at an economical treat rate.
- **Pri-D** is a poor choice for diesel fuel treatment because it doesn't do very much, no matter how low its treat rate is advertised to be.
- Lucas Fuel Treatment has tremendous name recognition. But like another recognized name before it (STP), it has the insurmountable problem of not actually doing very much. But unlike STP, Lucas' treat rate makes it expensive to use for very little benefit.
- Marvel Mystery Oil also has great name recognition, but doesn't do very much while requiring the most to use.
- *ILFC 1032* wins the prize for the worst choice of all. It makes a lot of broad claims, yet shows no evidence that it contains enough ingredients to back up those claimed benefits. Worse yet, its treat rate is so low that its overall marketing borders on false to the point of dishonesty.

The final overall conclusion is that Dee-Zol is the best combination of value and cost for diesel additives on the market today. It does the most while costing the least to use of the reputable choices in this comparison. That is why we believe that Dee-Zol is your best diesel fuel additive choice.