

The Ultimate Guide to
**GET YOUR ENGINES AND
FUEL THROUGH WINTER**



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WELCOME TO THE ULTIMATE GUIDE TO GET YOUR ENGINES AND FUEL THROUGH WINTER

The cold weather can change the composition of some fuels, and do funny things to your engine.

Whether it's the idling to keep warm that's wrecking your mileage or your diesel fuel gelling, the winter months can be a nightmare. You don't want your car or small engines to stop working when you need them the most. If your car or truck breaks down on the side of the road it will not be much fun sitting around in the cold trying to fix it or waiting for help.

In this guide we will cover all of the essentials for getting through the cold weather with a minimum of problems, from storing equipment all the way to winterizing your diesel engine. This is the ultimate guide to getting you through the cold weather months.



Winter Care For Stored Equipment and Engines

Winter and cold weather means that most people around the country are packing their small equipment – lawn mowers, ATVs, chainsaws and leaf blowers and other lawn & garden equipment – away for the winter.

Even in warm states like Florida, lawns stop growing in the winter and there's no need to have the equipment ready for use during that time.

However, not all small equipment are kept stored away during the harsh winter months. Some small equipment, like snow blowers and generators, still get used during the winter, so it's helpful to know what you can do to keep those important pieces running at their best.



THE RIGHT OIL

Winter oils provide the best benefit for small equipment during cold weather. Oils that have a “W” included in the viscosity label, such as 10W30, are considered variable weight “winter oils” suitable for winter use. Check your owners manual for the proper winter oil recommendation. Use a lighter viscosity oil like 5W30 or 10W30 at temperatures below freezing.



ENGINE MAINTENANCE

In two-cycle engines, maintenance is pretty simple – replace the spark plug and check the condition of the fuel. For four-cycle engines, you have a few other steps before you’re ready to go.

OTHER STEPS

Check your belts for wear and replace as necessary. Also remember to check the fuel line and other parts to make sure they haven’t been damaged by any ethanol fuel left in the equipment during storage. Ethanol will eat and dissolve these materials over time. Next, lubricate the chassis and other parts like the drive.

For snow blowers, check the scraper bar and paddles by tipping the machine over and looking underneath. Make sure the rubber isn’t too worn and the scraper bar is still in good condition. Replace as necessary. It’s important to keep an eye on the scraper bar, as otherwise it can damage the blower’s housing, which makes the repair bills mount up quickly.

Lastly, tighten the important screws, nuts and bolts, including those on the handles (you don’t want a broken handle).

USE FRESH GAS

If you used an ethanol fuel stabilizer during storage like Mix-I-Go Small Engine, the ethanol fuel is more likely to still be good enough to use (i.e. it won’t have undergone phase separation). If not, then you need to drain the fuel tank and replace it with fresh gas.



TREAT YOUR FUEL OVER THE WINTER

Remember that ethanol damage happens just as much in the winter as in warmer weather.

For the pieces you're going to use during the winter, treat the ethanol fuel with **Mix-I-Go Small Engine**, to protect the piece from ethanol damage and keep it running its best.

Diesel fuel and gasoline-ethanol blends both pose potential problems if they're stored long term in your vehicle. Both of them attract water from the atmosphere, though ethanol blends are by far the worst at doing that. Ethanol has a chemical attraction to water so strong that even industrial manufacturers of ethanol can't legally sell a 100% product – the most they can go up to is 99.5%, because there's always going to be a little bit of water impurity in it. And water causes bigger problems in stored ethanol blend than it does in stored diesel.



The worst thing that happens when water gets into stored diesel is microbial growth. The water sinks to the bottom of the tank and the bacteria or fungus grows between the fuel and the water layers, feeding off both. There are few things worse than going to use your equipment and finding a big infestation of stinky microbes in your fuel tank.

Unlike diesel, when water gets into ethanol blends, it causes the blend to break apart. The ethanol will separate from the gasoline and sink to the bottom, stripping the octane from the gas and leaving you with a tank full of poor quality fuel that can even damage your engine.

Beyond water absorption, ethanol left stored in a tank will dissolve plastic and rubber parts in the tank and fuel system, dissolving resins that can gum up your injectors when you restart it or can even damage equipment. None of this is good news.

Here is a checklist of things mentioned above that you should do when winterizing your stored equipment:

- i. If possible, drain or run all the fuel out of the tanks – purging the fuel will minimize stored fuel problems detailed above. Add a stabilizing additive to the tank as well before putting it up for the winter.
- ii. If you're going to leave fuel in the tank, apply some additive like Bell Performance Mix-I-Go, Dee-Zol, Marine MXO or Marine Dee-Zol to control water buildup and keep the fuel fresh for later use.
- iii. Check any belts for signs of wear and damage. Wash them with soap and water and dry.
- iv. Apply lubricant to moving parts.
- v. For vehicles, apply wax to painted areas to prevent damage from condensation.
- vi. Change the oil; clean and replace your air filter.
- vii. For mowers, remove the blade and have it sharpened (of course you should replace it when you are done)

Winterizing a Diesel Engine

Diesel users know that special steps need to be taken to prepare diesel engines for inactivity during the winter.

Marine diesel engines and stationary diesels are most likely to fall into these categories - over the road diesels that run during the winter don't need the same treatment (but do require certain types of fuel treatment to winterize the fuel for cold weather).

Here are some tips for preparing your valuable diesel engines, whether boats or generators, for their winter hibernation. It's worth your while to take some of these steps to protect your investment.

FOR BOATS, DRAIN THE WATER AND TRANSMISSION COOLER



When you go to your marine dealer, they'll tell you the same thing. A critical part of a winterizing regiment for diesel boats is to drain the water and change the antifreeze.

Once you have the boat out of the water and in a dry dock, where should you target? First, go to the raw water strainer for the boat's cooling system. Open the seacock to allow the water to drain out of the strainer. Be sure to close it back up when that's done.

Next, you should drain the cooling water out of the engine block. You can do this by locating the drain plugs. All diesel engines will have one or more of these. Let the water drain and then close them back up again. If you're having trouble locating all the drain plugs, look in your owner's manual.

It's also important to drain the water out of the transmission cooler and the water lift muffler (if you have one installed). Locate all the drain plugs and loosen them to accomplish this. Again, tighten them back up when you're done, except for the lowest one on the water lock. Leave that one open.

Next, use plumbing antifreeze to add to the raw water strainer. Plumbing antifreeze is pink in color. It will also keep the pump from burning out. You'll want to do this with the engine running. Unscrew the top of the strainer and add the antifreeze until you see it coming out of the water lift muffler drain or the boat's exhaust. Now you can tighten this last open drain plug and top up the strainer before sealing it back up.



CHANGE YOUR FILTERS AND TREAT THE FUEL

Putting a set of new fresh filters is always a good idea. This way, it's done and you don't have to worry about that when you fire up the machine after the weather warms back up. Don't forget the coolant filter if you have one.

It's also a good idea to add some kind of diesel fuel stabilizer treatment to the fuel that will be sitting in the fuel system during winter storage. Fill the fuel up as much as you can to reduce the possibility of water condensation from forming, then add a multi-purpose fuel stabilizer.

WINTERIZING DIESEL STANDBY GENERATORS

The most important step for winterizing diesel generators is to condition the fuel for the winter. Add a good multi-purpose fuel stabilizer and conditioner, and run the generator to make sure the conditioner diffuses all the way through the fuel system. Since you're only prepping for short-term winter storage, all you have to do is run the generator for a couple minutes, then close the fuel valve and keep it running until it goes dry.

Next, take the recoil starter handle and pull it out until you meet a point of resistance. This is the point where the intake and exhaust valves will be closed. If you leave the handle in this position during the winter, it will prevent rust inside the engine.

Winterizing your diesel engines is something you have to choose to do, and it takes a little bit of effort. Not a LOT of effort, but a little bit. And this is definitely a case where a little bit of effort on the front end will save you lots of time and money on the back end by preventing problems and making your expensive diesel engine investments last as long as possible.



Prevent Diesel Fuel From Gelling In Cold

When the weather gets frigid, water isn't the only thing freezing. In winter weather, drivers also need to be aware of the potential for fuel to gel- specifically, diesel fuel.

Diesel fuel gels in cold temperatures because it contains paraffin wax, which normally improves fuel viscosity and lubrication.

When temperatures begin to fall, this paraffin wax thickens and turns into a cloudy mixture. This is a part of a phenomenon called "diesel fuel gelling," in which the problem can become so advanced that the paraffin wax can actually clog fuel filters and solidify to the point where the fuel will no longer flow, basically rendering your engine useless.

Diesel fuel gelling has the potential to occur when temperatures drop below 32 degrees Fahrenheit, although the exact temperature it happens at will vary from fuel batch to fuel batch. Here's a look:

HEATED STORAGE

A primary way to prevent diesel fuel gelling is to control the temperature of the facility that the engine is being stored in. When the engine is running, the fuel is moving and flowing and doesn't have the opportunity to solidify. Storing your vehicle or equipment in a heated garage or climate-controlled structure is enough to do the trick. However, this option may not be realistic for many.

KEROSENE

Mixing in amounts of kerosene with diesel fuel reduces the plug point temperature, or the temperature at which paraffin wax crystals solidify and begin to clog fuel filters. Many winter climate fuel suppliers will offer diesel fuel that's already pre-mixed with kerosene for user convenience.



FUEL TREATMENT

Adding a winter diesel fuel additive is one of the easiest and most popular ways to prevent diesel fuel gelling. These additives can prevent the paraffin wax from gelling together and solidifying. Many fuel additives also offer other winter weather benefits, such as helping improve cold engine starts and removing harmful deposits from your vehicle's fuel injectors.

During the harsh winter months, you will find that your vehicle, equipment and diesel fuel need a little more care. Failure to take the proper precautions, such as adding kerosene, storing the diesel engine in a temperature controlled facility or implementing a fuel additive can take your diesel engine out of service.

Additives For Your Propane in Cold Weather

Propane heating fuel is good stuff. And that's great news considering that the United States and Canada have access to more natural gas resources than Saudi Arabia has oil.

We have so much natural gas available that the cost of it ends up being way below the cost of other fuels like fuel oil - which is why a lot of power generation facilities use natural gas and propane almost exclusively to generate electricity for their customers.

One advantage propane fuel has over fuel oil is that it is a cleaner burning fuel that gives off fewer emissions. That's not to say there's no room for improvement with propane - there are areas where, for example, one could use propane additives to get the most out of the fuel. For example, a homeowner with a propane furnace might use an opportunity to use propane additives to clean their furnace system and increase the heat coming from their gas flame. Since the weather is turning cold and much of the Northeast is firing up their home heating systems, here's some areas to think about.

AREAS FOR IMPROVEMENT WITH PROPANE HEATING FUEL

Heating systems using fuel oil have significant and obvious areas that can be touched on by fuel treatment, such as black smoke problems at startup and the development of residues left over after the burning of the oil. These are why many fuel oil customers treat their storage tanks with an additive.

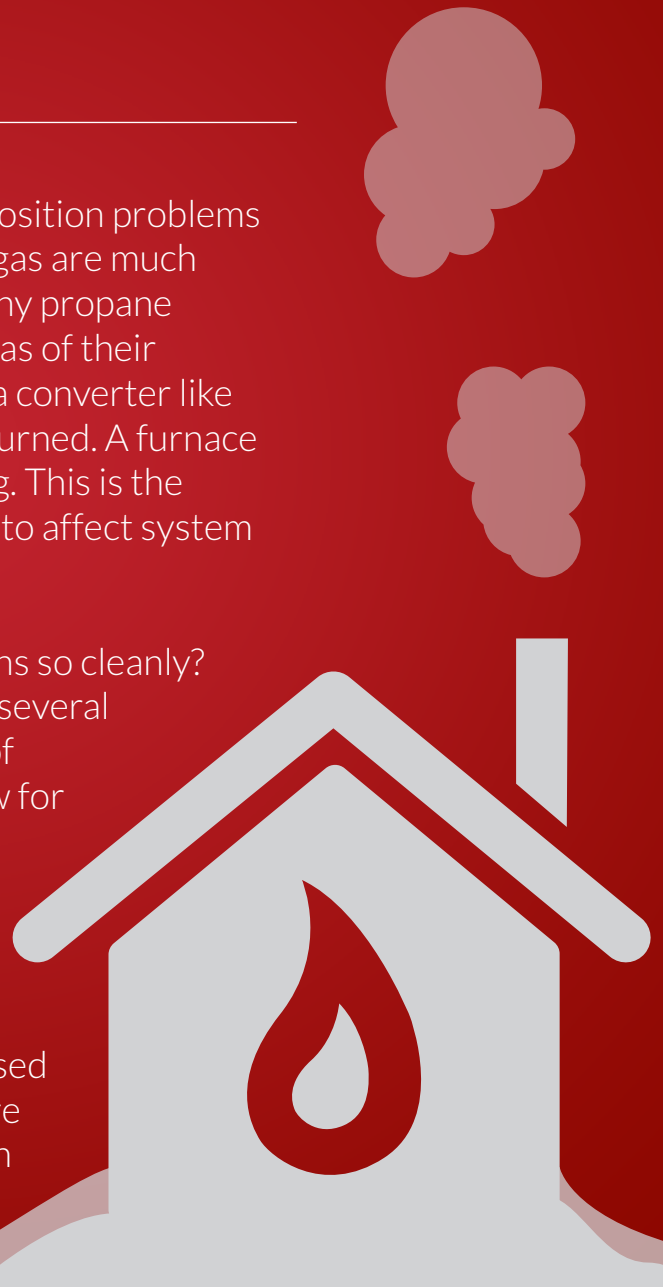
What areas of improvement do residential and industrial propane users have?

RESIDUES

While it doesn't have the larger scale soot and deposition problems that heating oil has (because propane and natural gas are much smaller molecules that burn more completely), many propane users report seeing deposits in the "converter" areas of their burner systems. An LPG-powered vehicle utilizes a converter like a carburetor to achieve a mix of gas and air to be burned. A furnace system will have a similar area to do the same thing. This is the area which can see a buildup of deposits that start to affect system performance.

Where do these deposits come from if the gas burns so cleanly? Commercial-grade natural gas and LPG is a mix of several kinds of gas and typically contains small amounts of heavier contaminants. Most LPG is 'spec'd' to allow for a maximum amount of this. It is these larger trace contaminants that may react and build up in these areas.

Adding a fuel treatment to an LPG- or propane-storage tank while add detergents to the compressed gas that work to clean that deposits out and restore the furnace system to more of its peak efficiency, in much the same way that detergents in gasoline or diesel do for cars and trucks.



FLAME COLOR

Flame color is an indicator of temperature and efficiency. If you have a gas stove and you turn the burner on, you know that a nice blue color means you're getting a nice complete burn and lots of heat.



When the flame turns orange or other colors, it's an indication that, whether it's not getting enough oxygen or for some other reason, the gas is not burning completely and the flame temperature actually goes down, with obvious effects on the system's ultimate efficiency.



There are fuel treatments which, again, may be added to the bulk gas storage tank, that contain catalysts to ramp up the heat release of the fuel. A good treatment may use organometallic catalysts to do this - get an catalytic improvement of the heat release. Propane users who have noticed that their system flames don't always appear to be at their "bluest" might consider this.

This is not to say, however, that a simple propane fuel treatment can give you 110% performance on a 100% scale. There's so much out there with respect to fuel treatments of every kind, that some products will make whatever outlandish claim they think they have to in order to make a homeowner part with their money. A propane additive isn't going to raise your furnace's efficiency by 50%. But it probably will give you back enough of the efficiency the system has lost over the years that you'll save several times what you paid for it, and that's really the definition of success.

Winter Blend Gasoline Could Be Dropping Your Fuel Mileage

You may notice that your gas mileage has gone down a little bit in the past couple of months.

Before we go blaming on ethanol (even though ethanol's been in the fuel all year), you might want to consider the little-known fact that "summer blend" gas is actually different from "winter blend" gas.

*What's this? Gas isn't the same all year round? **Well no, it really isn't.***

Gasoline formulations vary the composition of gas in the hot summer months and the colder winter months, in order to meet emissions and air quality standards.

This "reformulated" gas is blended in such a way that it has a lower vapor pressure in the summer and a high vapor pressure in the winter blends. This means the summer gas evaporates less and thus contributes less to the "evaporative emissions" which represent million of gallons of gasoline per year evaporated in the air. Winter gas is more volatile and evaporates more quickly, so it is ideal for it is used in the colder air of winter.

In terms of gas mileage, you get better mileage on summer blends than winter blends because the summer blend gasoline has about 2% greater energy value than winter blend. So the gas you are using now most likely has a lower energy value than the gas you used in the winter. That means a little bit lower mileage for you until the spring time, when they will reintroduce summer blend gasoline. And this is beyond mileage loss you see with ethanol being blended into both summer and winter fuels. Cars, trucks, boats and small engines, all will see the difference in mileage and fuel consumption between the seasons.

Why can't they just use summer blend gas all year round? Summer blend gas doesn't work as well in the cold winter months because it is less volatile and doesn't evaporate as well. This contributes to starting problems in the winter. Hence winter blend gas is prepared to eliminate this issue.

This was a lot of information, but we wanted to include it all so you are ready for the next winter. Stop spending unnecessary repair fees on your equipment because it isn't making it through the cold months.

Bell Performance has several fuel additives to help you through winter and you should take advantage of it.

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