



THE ULTIMATE GUIDE TO

MAINTAINING DIESEL ENGINES IN COLD WEATHER CLIMATES



Presented by Maxim Truck & Trailer



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With Winter each year comes colder weather and an annual reminder for heavy duty truck fleets and drivers to make sure they take the proper care of their diesel engines.

Just in case you're wondering if this Guide was really created by cold weather experts, consider that it was created in Winnipeg, Manitoba Canada that sees temperatures as low at -39 Celsius in Winter. And to be fair, the City also sees temperatures of +39 Celsius in the summer - so we are experts at extreme weather conditions.

Blair Haas, with over 35 years as both a parts & service manager at Maxim Truck & Trailer, has a list of do's and don'ts to help ensure your diesel engine runs at maximum efficiency until the snow starts to melt and beyond.

This Guide features the Top 12 winter tips for caring for your heavy-duty truck's diesel engine.





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1 Why is fuel treatment important, when should you start using it and what are your options?

Contrary to popular opinion, fuel treatment in diesel engines can and should be used 12 months of the year. Some fleets and drivers feel they don't need the special additive in the summer but fuel additives boost lubricity and increase octane in all temperatures. It can also improve gas mileage. Summer and Winter fuels are somewhat different and formulations have changed. Year-round treatment of today's diesel fuel is very important – especially in Winter.

The downside of not using fuel treatment is water build-up in the fuel tanks. Many fuel additive products on the market do not properly manage moisture in the fuel. Drivers can get away with it in the summer without the water freezing but they may still experience injector failures causing costly repairs from moisture in the fuel. And if you use Biofuel, you should be aware that it holds up to 10 times more parts per million of water than regular diesel fuel. The key is to use an additive that lubricates AND manages any moisture. Any water in the fuel system can freeze in the winter which is detrimental to the engine's performance and lifespan. In extreme cases, the fuel will gel and your diesel engine simply shuts down.

Maxim carries a wide variety of Diesel fuel treatments. The product we recommend and use in our own fleet of 1,000 lease and rental trucks is from [EnerTech Labs](#) because it is the best product for managing moisture in fuel.





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2 Why are winter fronts important in the Western Canadian climate and what can happen to an engine without them?

Winter fronts have been used by truckers for many years to keep engines warmer and to improve gas mileage. Sometimes they're no more than a big piece of cardboard but they seal off the front of the engine and keep the cold air out. The warmer an engine runs, the more efficient it is.

You don't see winter fronts as much as you used to but you should. The electronic components of an engine have changed a lot over the years but what hasn't changed is the bitterness of our winters. The colder the engine, the less efficient it is. An inefficient engine can damage downstream exhaust components, which can be very expensive to fix or replace.

Find the right [winter front](#) for your semi-truck at Maxim Truck & Trailer or ask about [having one installed for you.](#)

3 Should modern diesel engines be left to idle in cold weather? How long should you warm up a cold diesel engine?

It might be counter-intuitive when you're used to warming up your personal vehicle on a wintry day in January, but manufacturers actually recommend not warming up your engine. Instead, simply start your vehicle and drive slowly at first. When you achieve engine temperature, drive the speed limit. There's no reason to let the engine run because you're just wasting fuel. Modern synthetic oils don't thicken like old ones used to.

By the time you get to the highway, there's a very good chance your engine will be sufficiently warm, and you can drive to the speed limit.





It's always best to follow OEM recommendations on maintenance service intervals.

4 Do heavy duty trucks need block heaters?

Block heaters should be used from Fall to Spring because they improve engine starting and fuel economy. They are particularly important in the winter months. You should use a block heater before you truly need it, such as when you see frost on the ground.

When you start a cold diesel engine, there's a lot of smoke because it can't burn the fuel and that can lead to other issues with modern machinery. Using a block heater can greatly reduce this smoking problem. When combined with the appropriate fuel additive, your engine will burn cleaner.

[Find a block heater](#) that fits your diesel truck at Maxim Truck & Trailer or [have us install one for you.](#)

5 What should you do to preserve your batteries in cold weather?

There's only so much that you can do in a wintery climate but at the very least you should make sure you have clean connections and that the alternator is doing what it's supposed to do. Check the output of your alternator. At -40°C, the battery loses 50 per cent of its efficiency so keep the electrical system in good shape. You need to have good wiring. It's a general maintenance issue. [Battery Blankets or heater pads](#) are also available but not very practical for fleets.

6 When should fuel filters be checked and/or changed?

Every fleet has a different cadence for changing filters but in general they should be changed at service intervals every 20,000 miles. The electronics in some trucks will tell you when the filter needs to be changed. With the quality of filters and synthetic oils and with oil analysis, intervals can be extended to 40,000 miles and beyond. It's always best to follow OEM recommendations on maintenance service intervals.

The downside of not changing your fuel filter is simple — your vehicle will run poorly and will be hard to start due to fuel flow restriction. A dirty filter makes the engine less efficient and everything boils down to efficiency.

Shop [fuel filters](#) at www.maximinc.com





**In extreme cold,
Synthetic oil remains
much more fluid than
conventional oils.**

7 What engine oil should be used in cold weather?

Synthetic oil is the best because it doesn't thicken nearly as much as conventional oil in extreme cold which greatly improves your engine's cold cranking. While Synthetic oil still does thicken somewhat in extreme cold, it remains much more fluid than conventional oils. In extreme cold, conventional oil becomes thick as molasses, slow cranking, hard starting and a drain on your battery when trying to start a cold engine.

Synthetic oil is simply much more efficient than its predecessors at cold cranking in extreme temperatures. It does a great job of lubricating and cold starting. One of the top diesel oils is 5w40 Synthetic. This is mainly due to the additive packages used by manufacturers when compared to some of the other grades available.

Shop [oil & grease](http://www.maximinc.com) at www.maximinc.com

8 What engine coolant/mixture should be used in cold weather?

There are a few options here but the best one is a pre-mixed 50-50 version made up of anti-freeze and water. In the old days, you'd have to do the mixing yourself. The 50-50 can work to -37°C and lower depending on manufacturer specifications. This protects your engine on the worst winter days in Canada. If you don't use engine coolant your engine can freeze.

Today, most Heavy-Duty diesel engines are using a Red Noat antifreeze formulation. However, the latest trend in antifreeze for Heavy-Duty diesel engines is that they come with OAT antifreeze from the factory. An organic additive technology (OAT) coolant uses organic acids to protect your vehicle's engine from corrosion. This coolant type also has additional additives to protect the engine.

Shop [antifreeze](http://www.maximinc.com) at www.maximinc.com





Condensation builds up in fuel tanks but you don't want water running through your engine.

9 How should you address diesel exhaust fluid (DEF)?

Modern engines won't run without it. DEF is injected into the exhaust system and transforms NOx gases (harmful emissions) into nitrogen and water cleaning up the exhaust gas as it flows through the engine and out the exhaust pipe. DEF freezes naturally and there's no way to prevent it from freezing.

Modern systems have heaters built in or have aftermarket heaters installed so that when the engine starts, the heaters will thaw out the DEF to the point where the DEF becomes liquid again and becomes useable.

Shop [DEF](#) and accessories at www.maximinc.com

10 Why is water a separator important?

Quite simply, it separates water from the fuel. Condensation builds up in fuel tanks but you don't want water running through your engine. Not only is it very inefficient and doesn't burn very well, it can also cause significant damage.

Shop [Fuel Water Separator Filter](#) at www.maximinc.com





If you are paying for a quality heater, don't scrimp on a DIY installation job - get your heater professionally installed.

11 What should you look for in a die sel engine heater system and what are the potential installation issues?

Diesel engine heating systems are very common and work very well when hooked up and installed correctly.

A small heater is plumbed into the engine's cooling system and runs through the electrical system for its power. When installed properly, it will keep your engine constantly at its operating temperature of 180 degrees and the engine will run smoothly.

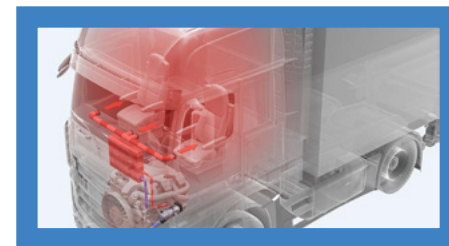
The installation, though, is critical. At Maxim Truck & Trailer and our subsidiary Tereck Diesel, we sell and install thousands of engine heaters so we understand them better than most dealers. Especially since we live and operate in a climate that gets extremely cold which is very hard on diesel engines. If the plumbing isn't done properly, it won't move coolant and the engine will overheat. You'll get the same result if the power systems aren't installed properly, too. If the wires are crimped, you'll have a bad connection and the heater won't function.

The main reason for using a coolant heater is to eliminate the need for idling the engine when the temperature drops. That can not only waste a significant amount of fuel but also cause unnecessary wear and tear on the engine.

An idling engine will burn about six litres of fuel per hour while a coolant heater will run for about 20 hours on the same amount of fuel.

An idling engine also doesn't generate enough heat to burn fuel efficiently, which can cause downstream exhaust components to malfunction prematurely.

The cost of commercial diesel engine heaters from manufacturers like [Espar/Eberspacher](#) and [Webasto](#) are not cheap but they are worth it. If you are paying for a quality heater, don't scrimp on a DIY installation job - get your heater professionally installed by a dealer with experience like [Maxim Truck & Trailer](#) or [Tereck Diesel](#).





**The maximum run time
on an engine heater is
two hours.**

12 What should you know about cab/bunk heaters for sleeper trucks and other heavy equipment?

Bunk or cab heaters pump heat into the cabin area while engine heaters described above pump warm coolant into the engine. In many cases, we sell and install complete units that heat both the engine and the bunk - but each component is separate. For the complete package, a cabin cooling system can also be added to provide air conditioning inside your sleeper truck while the engine is turned off.

The bunk heater, also known as an air heater, is for cabin comfort and will help keep you warm when sleeping at night. So with a bunk and engine heater, your diesel truck engine will not be running but you'll be warm and toasty in the bunk while your engine will not freeze up and will start in the morning. The engine and bunk heaters run on only a minimal amount of diesel from your truck's fuel tanks as well as a minimal amount of electricity from your batteries to operate.

The maximum run time on an engine heater is two hours so it's important to program it to start two hours before your departure time. Doing so will pre-heat the engine and help it run at maximum efficiency.

Maxim Truck & Trailer is an expert in cold weather servicing and parts for diesel engines. See our website for more information at www.maximinc.com.



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