

Considerations for **WINTERIZING VEHICLES**

Preparing for inclement winter weather can help fleets minimize unplanned downtime.

By Kayla Oschmann



[ON THE VEHICLE]

Cold weather can be detrimental to commercial vehicles, but with some early preparation fleets can stay ahead of the seasons and be ready for the change in temperature.

Understanding how various vehicle systems are affected by cold temperatures, how to prepare before the temperature drop, and what products to stock to help ease the stress of cold weather can help maximize vehicle uptime, reduce wear and tear, and keep drivers safe.

Electrical system

The demand on the electrical system increases significantly during winter months. From the starter having to turn over a cold engine to accelerated wiring corrosion from chemicals used to treat road surfaces, it is essential to check all electrical components and materials before winter begins to ensure proper functionality. This is also a good time to provide added protection to high-risk components.

During the summer months, battery components break down faster from the higher temperatures. Because of this, it is vital for fleets to understand the condition of the batteries before transitioning into the winter months.

“The cold temperature has more of an effect on the efficiency of the battery, and coming out of the heat of the summer those batteries are at their worst condition,” says Jeff Steer, national sales manager at Vanair, a manufacturer of engine starters, battery chargers, and boosters. “They have been stressed all summer long and now we’re going to ask them to be their most efficient when the temperatures turn cold.”

Batteries perform best at 80 degrees F. As temperatures drop, the chemical reaction within a battery slows down, thus reducing the battery’s efficiency.

“When you get down to 0 or 10 degrees Fahrenheit, the battery is 50 percent efficient,” Steer says. “If the batteries were fatigued during the summer, now you are compounding that inefficiency and the battery only has so much potential power.”

Another challenge in winter months is that a battery has the potential of freezing if it is discharged too low.

“A completely discharged battery will freeze at 32 degrees Fahrenheit,” says Larry Rambeaux, sales application engineer for electrical component and equipment provider Purkeys. “You drive all the acid into the plates and what is left is just water. When [the batteries] do freeze, you can burst connections apart inside the battery. You have to limit how low you discharge those batteries.”

Fleets heading into winter need to load test the battery, clean batteries and cables, and check the cables from the battery to the starter and alternator, Rambeaux recommends.

“You can have the best batteries, starter, and alternator, but if you can’t get the energy from one to the other properly, the system will never work properly,” he notes.

Rambeaux adds that when it comes to testing the electrical system in the bay, it is important

that technicians are properly trained on how to use the equipment, such as a good multimeter.

“If they don’t know how to use [the testing equipment] then what good does it do?” he says. “If they use it wrong, they can do just as much damage [as] if you didn’t do anything at all.”

Similar to batteries, cold temperatures also place an extra burden on a vehicle’s wiring harnesses.

“Wiring and harness materials become less flexible and more brittle with cooling temperatures,” says Kyle O’Dell, director of engineering at Optronics International, a vehicle lighting manufacturer. “Heavy ice and snow buildup can accumulate on cables and wiring, causing excessive strain on all elements. Connectors are vulnerable to being pulled loose and, in some cases, torn loose from their cables entirely.”

Adding heat-shrink moisture barriers to protect or shield some of the electrical system’s most at-risk locations, or employing an “over-molded” harness and electrical system, are ways fleets can prepare for winter, O’Dell says.

Electrical connection points are more prone to allowing moisture into the system, leading to corrosion.

“When connectors are located above, behind, or close to wheels, fleet maintenance professionals may want to consider plastic looms, moldings, or tubing as additional layers of protection,” O’Dell adds. “These protections can also reduce the potential of damage from rocks, road debris, and ice accumulation in winter.”



Considering that as the temperature drops so does tire pressure, planning ahead for each trip is even more important during winter and should be part of the driver’s pre-trip inspection.

Cooling system

Through the use of engine coolants and supplemental products such as a coolant heater, fleets are able to keep the engine protected from cold temperatures.

Engine coolants are used to keep the engine from overheating, but they also need to protect against fluid freezing and corrosion. This includes ensuring the correct mixture of antifreeze and water. Typically, a 50/50 mixture is efficient for most of the U.S. to protect the system to -34 degrees F, but in severely cold areas such as Alaska or Canada, a 60/40 mixture may be needed.

Obtaining the correct freeze protection is very important for fleets, says Stede Granger, OEM technical services manager at Shell Lubricants,

» Winter preparation will help reduce wear and tear, maximize uptime, and keep drivers safe.

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a global lubricant supplier. “If the mixture were to become frozen, it can damage the block, cause a crack, or cause significant damage to the engine.”

Engine coolants are not all the same. Coolant is comprised of three parts: water, ethylene glycol, and an additive chemistry that protects the engine and the cooling system from corrosion. The additive chemistry, or additives, is what makes antifreezes different, Granger says.

Granger recommends maintaining the same additives all year round and not just for winter.

“Not that you need freeze protection in the middle of summer, but it’s an indicator of the amount of additives you have in the coolant,” he says.

In the summer, fleets may dilute the mixture with water to protect the cooling system from corrosion, but this is not an acceptable practice as it does not provide the proper protection. With today’s extended life coolants, freeze protection is needed all year long.

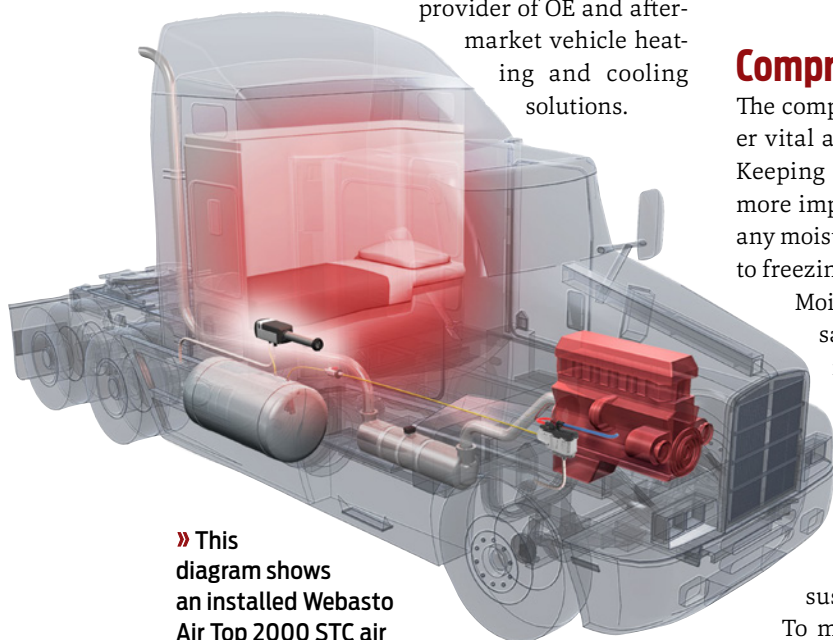
When adding coolant to a vehicle, it’s best to know which coolant has been used previously to prevent potential problems. If it’s a different type of additive technology, it can reduce the effectiveness of the coolant in the truck, Granger says. Shell offers a test strip, Shell Rotella Antifreeze Coolant Test, for fleets to determine if the additive for Shell Rotella ELC level is correct.

In addition to engine coolants, auxiliary products such as a coolant heater, or an engine block heater used to heat the engine, can help protect vital components in cold weather.

Both coolant heaters and engine block heaters are integrated within the vehicle’s cooling system and pre-heat the engine to its normal operating temperature of around 165 to 180 degrees F.

“With all newer equipment [that includes] a DPF (diesel particulate filter) and diesel activation catalyst, the sooner you can get the engine pre-heated, the less particulate matter or soot carbon is placed into that DPF coming from the engine because the engine is up to temperature more rapidly,” says Dan Erck, regional sales manager at Webasto, a provider of OE and after-

market vehicle heating and cooling solutions.



» This diagram shows an installed Webasto Air Top 2000 STC air heater and Thermo Top Evo coolant heater on a tractor. Both heaters are designed to improve uptime and reduce operating costs.

Image courtesy of Webasto



“By pre-heating [the engine], you avoid cold starts and reduce the particulate matter being sent into the aftertreatment system,” adds Marc Kirsten, marketing brand specialist for Webasto. “This extends the time between regenerations and extends the life of the DPF, which allows the truck to continue driving instead of coming in for maintenance.”

Additionally, pre-heating the engine helps relieve strain on the batteries by warming the engine oil, allowing it to flow easier through the gaskets and injectors.

There are several types of engine block heaters for fleets to consider, says Ian Vriese, director of global sales at Phillips & Temro Industries, a vehicle heating, cooling, and electrical components provider. “Some engine heaters include thermostats that measure the coolant temperature and regulate the engine block heater by cycling on and off according to the temperature range setting,” he says.

Compressed air system

The compressed air system on a truck is another vital area to inspect prior to colder weather. Keeping the air clean and dry becomes even more important because as temperatures drop, any moisture within the air system is susceptible to freezing.

Moisture is typically present due to condensation from the air compressor being mounted directly on or near the engine, and it is the air dryer’s responsibility to remove the majority of moisture that enters the air system before it reaches the air tanks. If moisture makes it past the air tanks, it can impact additional systems such as the transmission, suspension, and braking systems.

To maintain the air dryer, replace the air dryer’s cartridge regularly and to inspect the purge valve often to ensure it opens and closes appropriately, suggests Jason Kraus, product manager for air brakes at Meritor, a supplier of commercial vehicle brakes and components.

» Prior to winter is a good time to evaluate what oil your fleet is using and whether it makes sense to use a lower viscosity oil.

Photo courtesy of Shell Lubricants

“Technicians should be checking these throughout the year, but it’s a lot easier and less messy if you do it before winter sludge gets all over the vehicle,” Kraus says. “As you get into September, October, and November, there is a big push to maintain air dryers, air dryer cartridges, and purge valves to make sure they are functioning properly.”

He also suggests checking for low spots in the air system. A low spot will collect moisture, and without a heating element nearby, that moisture will freeze, Kraus says.

As for drivers, Krause advises they should drain the air tanks as part of their pre-trip routine. Drivers or technicians can do this manually by pulling a cord or by checking the automated drain valve. There are also a number of devices available on the market that will automatically purge air tanks. One example is Expello Air Products’ Drain Valves which expel contaminants with a blast of air to get rid of moisture, dirt, oil, and rust.

Richard Nagel, director of marketing and customer solutions – air supply and powertrain at Bendix, also recommends checking the drain valve. Bendix supplies air brake charging/control systems and components for commercial vehicles.

“The easiest check for a technician is to perform a drain valve test on the service [air] tanks to see if water and oil exhausts from the drain valves,” he says. “If there is an excessive blast of water from the service tanks, the fleet should consider changing the air dryer cartridge. A quick exhaust of moisture in the service tanks using the drain valve is a simple check during winter months.”

Nagel also suggests checking the heaters inside the air dryer to make sure they are operational, as well as inspecting the air brake connections and tubing connections to ensure the lines haven’t cracked or that there isn’t excessive corrosion on the fittings, which would lead to airline leaks.

Fuel system

Diesel fuel naturally contains paraffin wax. As temperatures drop, the paraffin wax binds together and forms crystals. These crystals separate from the diesel fuel and can potentially increase in size as temperatures continue to fall, blocking the vehicle's fuel filter. The process is called gelling and is something fleets want to avoid at all costs.

To prevent gelling, David Lunsford, commercial marketing manager at ExxonMobil, an oil and gas provider, says to purchase diesel fuel that is pre-blended with cold flow improvers.

"Cold flow improvers are used to modify the shape of the wax crystals so that [diesel] fuel keeps flowing through fuel filters at lower temperatures," Lunsford says. "Since the weather is not always predictable, a cold flow improver provides an added margin of safety for cold weather operability."

Kerosene blending is another option for cold weather treatment, Lunsford adds.

"Kerosene is typically more expensive and would need to be blended at significant levels to achieve the same results as the cold flow improver," he says. "For best results, the cold flow improver needs to be fully dispersed in the fuel at the appropriate treat rate."

Lunsford advises against using aftermarket cold flow additives, however.

"Adding additives to diesel fuel can cause more harm than good," he says. "Aftermarket cold flow additives can interact poorly with cold flow additives blended into the fuel at the refinery or the terminal, which can result in filter plugging and potentially worsen the fuel's cold flow properties. In addition, in cold temperatures, aftermarket additives become less soluble and may not dissolve correctly in the fuel. Instead we recommend purchasing diesel fuel that is already additized for winter conditions."

Oils and lubricants

The viscosity of oil – whether engine oil, transmission oil, axle oil, or any other kind – changes with temperatures. The lower the temperature, the higher the viscosity.

"It's an exponential curve, not a linear curve," says Shell

Lubricants' Granger. "When [the temperature] gets cold, [oils] actually thicken up at a faster rate than [they] thin at higher temperatures."

As oil thickens, it adds resistance to the engine, making it more difficult to start the vehicle.

"Startup and pumpability is key," says Jason Miller, heavy duty sales and strategy manager at CITGO Lubricants, a manufacturer of oils, fluids,

and greases. "With engine oils, if the viscosity is too high at low ambient temperatures, the oil will not pump, meaning critical engine parts won't receive the startup lubrication needed. Startup is where the majority of engine wear happens."

Both CITGO Lubricants and Shell Lubricants agree that fleets may want to consider transitioning to lower viscosity oils for the winter time.



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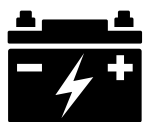
» If parking vehicles for an extended period of time, make sure to clean the batteries of dirt and grime to avoid self-discharge.

Photo courtesy of Purkeys

Storing unused vehicles over winter

Considerations prior to parking for the season.

When looking to park commercial vehicles for the winter, whether for a few weeks or a few months, there are some items fleets should consider to ensure the vehicles will be ready to go when they are needed.



BATTERIES

Fully charge batteries before parking the vehicle. In addition, turn everything off that may cause a parasitic draw. This may include computer memory, telematics and tracking systems, or other electrical equipment. Ensure the vehicle is outfitted with low-voltage disconnects, and clean any grime and dirt off the tops of the batteries to avoid self-discharge, advises Larry Rambeaux, sales application engineer at Purkeys.

Once parked, disconnect the battery cables. Periodically reconnect battery cables and run the vehicle long enough to replenish the lost charge, then disconnect the cables again, advises Kyle O'Dell, director of engineering, Optronics International.



AIR SYSTEM

Ensure the air system is dry before parking the vehicle.

The air system needs to be clean and dry, recommends Kevin Pfost, coordinator, technical service at Bendix Spicer Foundation Brake. Fleets should drain the system manually to exhaust any water that is at the bottom of the tank. He also advises against using alcohol in the system, since doing so can decay the rubber in the valves leading to valve problems.



ENGINE OIL

Start the vehicle's engine up on a regular basis for about 20 minutes to allow the engine oil to circulate.

"When an engine sits for a period of time, that oil will have a tendency to drip off the higher surfaces to a lower level, and after a period of time that surface can become dry," says Stede Granger, OEM technical services manager at Shell Lubricants.



TIRES

Michelin North America recommends placing a barrier such as plastic, plywood, cardboard, or rubber floor mats between the tire and the storage surface. If outdoors, cover tires to block direct sunlight and ultraviolet rays. If long-term storage exceeds three months, consider taking the vehicle for a monthly highway drive for about one hour of operational time, allowing the tires to generate internal heat which will promote longer life.

In addition to the above, greasing any components that may come into contact with snow or ice will help prevent the potential of corrosion.

"Going into winter, it may be [a] good time to evaluate what oil fleets are using and if it makes sense to use a lower viscosity oil like a lot of OEMs are using and recommending for their engines," Granger says.

He also notes some manufacturers have now approved 10W-30 and 5W-30 engine oils in both CK-4 and FA-4 API categories.

Utilizing premium products like synthetic engine oils, multi-grade hydraulic oils, and low-temperature greases are also considerations for better cold temperature operation, Miller adds.

Tires

Along with their regular tire maintenance program, fleets heading into cold climates require additional tire preparation. This includes ensuring correct inflation pressure and analyzing the tread to ensure proper traction.

With the onset of cold weather, the internal pressure of the tire will drop.

"We've found that a 10-degree Fahrenheit drop in ambient temperature will result in a 2 psi drop in inflation pressure," says Phil Mosier, manager of commercial tire development at Cooper Tire, a manufacturer of truck tires.

Considering that as temperature drops so does tire pressure, planning ahead for each trip is even more important during winter and should be part of the driver's pre-trip inspection.

If the driver starts their route in a state where temperatures are 20 degrees F, but then ends their route in a state where the temperature is 50 degrees F, Mosier advises to "pressure up in the morning with the low temperature."

It is also important for fleets to check the amount of tread remaining on their tires prior to the winter months.

"You should target having at least 50 percent or more of your tread depth remaining to ensure good traction throughout winter," Mosier says.

When looking to purchase tires for winter, both Cooper Tire and Michelin North America agree Three Peak Mountain Snowflake certified tires are best.

"Tires that have the Three Peak Mountain Snowflake are specifically designed to perform well in snow and adverse conditions," says Paul Tatarchuk, B2BN special services coordinator at Michelin North America, a tire manufacturer for heavy duty trucks.

In addition, tread design and tread pattern play a key role.

"For the best traction in winter, look for design elements within the tread design," Mosier says. "Siping, for example, provides better wet-weather gripping. And, pay attention to tread pattern. There could be similar tread block designs, but how the blocks are spaced, coupled with compounding, can make one pattern a good performer in snow while the other would be designed for exceptional snow performance."

In extreme winter climates, tire chains may be necessary.

"Tire chains are sometimes necessary in certain regions for truly severe winter conditions and are often required as determined by

local law enforcement,” Tatarchuk says. “Operators should make sure to follow the chain manufacturers’ instructions for properly mounting the chains with the correct type and size to ensure safe operations.”

Cab heating system

Just as important as the vehicle’s health is the safety and comfort of the driver. Fleets may consider the use of auxiliary power units (APUs) or bunk heaters as an alternative heating and powering solution to idling the engine. By reducing engine idle, fleets save not only on fuel costs but also wear and tear on the engine and emissions-related components.

Bunk heaters are typically installed underneath the driver’s bunk and draw fuel from the vehicle’s fuel tank. They also connect directly to the vehicle’s batteries.

Webasto’s Erck says the company’s Air Top 2000 STC air heater can heat a bunk area for up to 22 hours on a single gallon of fuel. The unit includes a low-voltage disconnect feature which will shut the device down at a certain voltage to maintain the battery’s ability to start.

When it comes to maintenance, Erck advises the unit will notify the driver every 30 days to run the heater for a minimum of 20 minutes. The fuel filter should also be changed annually.

Another method to provide heat without running the engine is utilizing an APU. APUs provide power to systems such as heating and cooling, as well as to power appliances and devices used by the drivers.

In addition, APUs such as Thermo King’s diesel-powered APU can be programmed to automatically monitor the tractor’s batteries and recharge them if they get too low, ensuring there is enough power to both restart the truck and provide hotel load power for the driver when stopped.

“This is a much more efficient way to recharge batteries than restarting the tractor’s large engine,” says Jim Flaherty, senior product manager, APU at Thermo King, a provider of auxiliary idle reduction and temperature management

systems. “Additionally, the Thermo King diesel APU can be programmed to heat the tractor’s engine coolant when temperatures drop. This means that they simply run the small APU engine, rather than running the large tractor engine.”

Maintenance is required every 2,000 run hours, amounting to about once per year, and includes oil changes, filter changes, and visual inspections.

Conclusion

Not knowing what the winter will bring each year is always a concern for fleets. But knowing that temperatures will drop and snow and sleet will fall, it is in the best interest for fleets to be prepared. Early preparation will help reduce the wear and tear on vehicles, maximizing uptime, and keeping drivers safe. ▀

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