



Freeze plug heater



Circulation heater



Lower radiator hose heater



Timer

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Cold weather is a notorious enemy of diesel engines, but preheating the engine coolant or engine oil can help to ensure engine start-up with the first turn of the key. While engine heaters are standard on many diesel engines, after-market block heaters are an excellent alternative for engines that don't offer this feature.

THREE HEATER OPTIONS

Freeze plug heater

These heaters (sometimes called frost plug heaters) are inserted through a freeze plug hole in the engine block and protrude into the coolant chamber of an engine. They're very engine-specific and their design depends on the freeze plug location, shape, length and the wattage needed to keep the engine warm—typically 400 watts to 2,000 watts. On the plus side, these heaters are extremely efficient because they're installed inside the engine block. On the down side, they can be more difficult to wire and pipe—because of their location—and run a greater risk of coolant leaks after installation.

Circulation heater

This type of heater consists of a heating element inside a can with an inlet and an outlet on opposite ends of the can. A heater hose is connected between an engine coolant port near the base of the engine (usually the drain port) and the inlet on the heater; a second hose connects the outlet of the heater

and an engine coolant port near the top of the engine. Thermal buoyancy forces the coolant to circulate through the heater and into the top of the engine. These heaters can fit any engine and are generally sized by the coolant capacity of an engine. They are available in wattages from 750 watts to 2,250 watts.

Lower radiator hose heater

With this model the heater is inserted directly into the lower radiator hose. The heating element heats the engine coolant which then flows via thermal buoyancy into the engine. Proper coolant level in the radiator is required for this heater to work. The heaters are available for radiator hose sizes from 1" to 2 ½" and come in 400 watts and 600 watts styles. A note of caution: relatively low wattages make this type of heater unsuitable for preheating large engines.

COST OF OPERATION

The cost to operate an engine block heater is minimal if done correctly. Most heaters will warm an engine sufficiently to start easily in two hours to three hours, but many operators leave the heaters plugged in continuously or overnight. The cost difference can be substantial. For instance, a 1,000 watt engine block heater that operates 10 hours a day (a typical overnight time period) from late November through mid-March will use about \$120 in electricity at \$0.10/kWh. If that same heater was plugged in for a few hours a day, the cost would be closer to \$25—a \$95



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savings per year.

A plug-in timer is an easy and inexpensive way to optimize heater use. For 120-volt block heaters of 1,800 watts or less, plug-in timers are available at a cost of about \$20, for those over 1,800 watts or heaters that operate on 240 volts, timers will cost \$40 to \$60 plus installation. In both cases the payback will be 30 days to 60 days. Timers are available at most hardware stores, building centers or electrical equipment suppliers. Timers should be rated for outdoor or weatherproof use and installed on properly

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Interested in learning more about ways to improve your energy efficiency? Contact Focus on Energy at 800.762.7077 and ask to speak with a member of the Agriculture and Rural Business Team. Or visit our Web site at www.focusonenergy.com.

Reference:

Product Safety Tips: Extension Cords, Underwriters Laboratories, Inc. Access available at www.ul.com/regulators/educational/ExtensionCords.pdf.

APPROXIMATE OPERATING COSTS			
Heater wattage	Cost for 10 hours/day	Cost for 2 hours/day	Savings for shorter usage
400	\$ 48	\$ 10	\$ 38
600	\$ 72	\$ 14	\$ 58
750	\$ 90	\$ 18	\$ 72
1,000	\$ 120	\$ 24	\$ 96
1,250	\$ 150	\$ 30	\$ 120
1,500	\$ 180	\$ 36	\$ 144
2,000	\$ 240	\$ 48	\$ 192

grounded electrical circuits.

Assuming 8 hours or less of operation per day for 120 days @ \$0.10/kWh

OTHER BENEFITS OF PREHEATING

When air temperatures are less than 20°F, starting a cold engine produces 50 to 100 times more greenhouse gas emissions in the first minute than starting a pre-warmed engine does. Warmed engines also deliver better fuel economy, plus improved oil flow provides better lubrication to the engine during start-up, which reduces wear and increases engine life.

EXTENSION CORDS

An extension cord may be needed to connect the heater to the time clock. The size of the extension cord needs to match both the length to reach the heater plug and the power requirement of the engine block heater (amperage rating/gauge of wire). The cord also needs to be rated for outdoor use and for the temperature range it will be used in. A 50-foot, 16-gauge cord can be used on heaters up to 1,625 watts while a 14-gauge, 50-foot extension cord is rated for a maximum of 1,875 watts at 120 volts. Heaters with wattage ratings higher than 1,875 will require special plugs and heavier cords. Consult the heater installation instructions, or an electrician, for proper sizing. Heavier extension cords will typically save money in the long run because they generally last longer and minimize voltage drop caused by cord resistance.

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