

# REAL Torque

January 2019

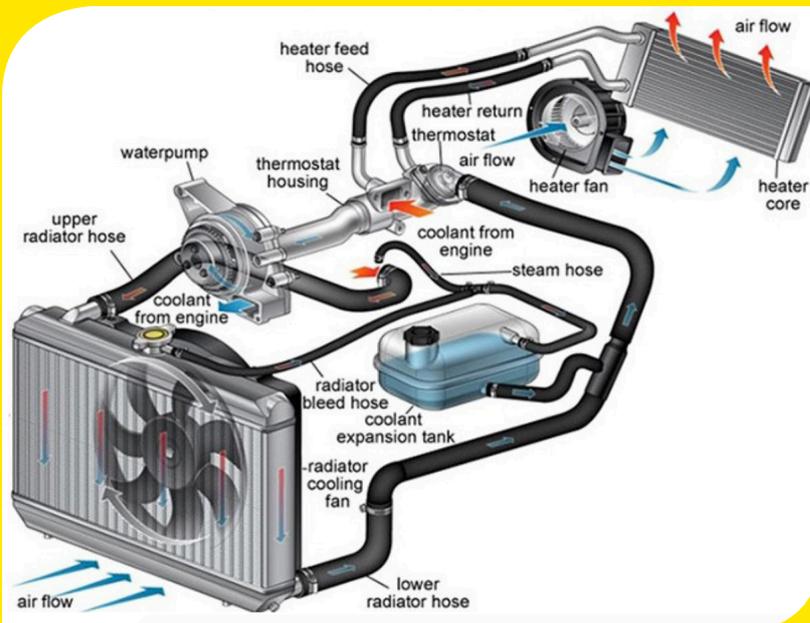
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## Engine Cooling System

Although internal combustion engines have improved significantly over the years, they are still not very efficient at turning chemical energy into mechanical power. Most of the energy in the fuel (perhaps 70%) is converted into heat, and it is the job of the cooling system to take care of that heat. In fact, the cooling system on a vehicle driving down the freeway dissipates enough heat to heat two average-sized houses! The primary job of the cooling system is to keep the engine from overheating by transferring this heat to the air, but the cooling system also has several other important jobs.

Engines run best at around 75-85°C. When the engine is cold, components wear out faster and the engine is less efficient along with emitting more pollution. Another important job of the cooling system is to allow the engine to heat up as quickly as possible, and then to keep the engine at a constant temperature.

**Below is a great example of the cooling system and its components.**



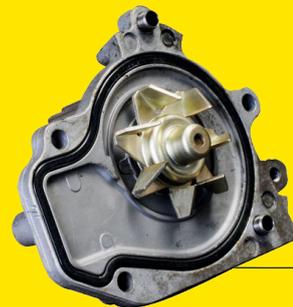
In this article, we'll learn about the parts of a automotive engine cooling system and how they work. First, let's look at some basics.

### Water Pump

The water/coolant engine pump sends the fluid into the engine block, where it makes its way through passages in the engine around the cylinders. Then it returns through the cylinder head of the engine. The thermostat (water temperature regulator) is located where the fluid leaves the engine. The plumbing around the thermostat sends the fluid back to the pump directly if the thermostat is closed. If it is open, the fluid goes through the radiator first and then back to the pump.



An example of a water pump that has been exposed to water turning to sludge and causing premature engine component failure.



This is what the water pump should look like by using the correct coolant for the specified engine.

### Engine

If the engine goes without cooling for very long, it can seize. When this happens, the metal has actually gotten hot enough for the piston to weld itself to the cylinder. This usually means the complete destruction of the engine.



## Radiator



Here is an example of an engine radiator. In this case the radiator has been blocked to a level where it no longer cools properly because the air flow fins are blocked and in turn restricting the air flow to keep the coolant fluid to its

required temperature. This generally gets blocked up externally from road debris, bugs, grass or any air bound objects that could find its way into the radiator cooling fins. This could cause engine overheating or premature engine failure resulting in high repair cost. **If in doubt, check it out!**

**A radiator is a type of heat exchanger.** It is designed to transfer heat from the hot coolant that flows through it to the air blown through it by the fan.



An example of a radiator that's had bad coolant and is being inspected at a radiator repair workshop.



What the radiator core should look like.

## Dash Warning Lights

Bad engine coolant will cause the engine to overheat and premature engine component failure. In severe cases, the engine could overheat and fail prematurely resulting in high cost of repair.



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## Radiator Cap

The radiator cap actually increases the boiling point of your coolant by about 45°F (25°C). How does this simple cap do this? The same way a pressure cooker increases the boiling temperature of water. The cap is actually a pressure release



valve, and on trucks it is usually set to 15 psi. The boiling point of water increases when the water is placed under pressure.

**An example of telltale sign that the coolant needs changing urgently or the engine could require attention. In this case, call a mechanic to inspect immediately.**

## Coolant

Water is one of the most effective fluids for holding heat, but the freezing point is too high to be used in automotive engines. The fluid that most trucks use is a mixture of water and ethylene glycol (C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>), also known as antifreeze. By adding ethylene glycol to water, the boiling and freezing points are improved significantly. The antifreeze coolant also has anti corrosion properties that limits the chance of sludge built up in the engine internals and cooling system. There are many different types of coolant on the market so make sure you are using the correct one for your specified engine.



An example of antifreeze coolant being added into an engine radiator.

## Tips and Tricks

- ▶ Never remove a radiator cap after a truck or car has been driven, as the cooling system is extremely hot and it could shoot hot coolant all over you, causing injury.
- ▶ If your temperature gauge starts rising into the red, pull over safely and call a mechanic.
- ▶ Check your coolant level regularly.
- ▶ Ensure your radiator is clean and unblocked.
- ▶ **IF IN DOUBT, CHECK IT OUT!**



TR Tips

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