

**YOUR COOLING SYSTEM IN SUMMER**

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**SPECIAL POINTS OF INTEREST:**

- **Actions are as critical as system condition.**
- **What are the preventive measures you can take?**
- **Strength and condition of antifreeze go hand in hand.**
- **Where is my antifreeze going?**

**DEMANDS ON YOUR COOLING SYSTEM**

Summer demands extreme performance from your cooling system. The loads created by the hottest ambient temperatures of the year in conjunction with maximum air conditioning needs and increased city traffic pushes your cooling system to its maximum. As cooling demands increase your system has to work harder and harder to dump excess heat and keep up. When the point is reached that the system can no longer keep up, the engine starts to overheat. What happens now depends on the driver and the vehicle coolant system.

If the driver notices the increase in temperature on the gauge and realizes the engine is overheating, there are several things that can be done.

First, he can turn off the air conditioning to reduce the demand. He can increase the engine rpm to increase the amount of coolant circulating through the system. He can also turn on the heater to dump some of the excess heat. And, of course, he can pull off the road, turn off the A/C, put the engine on high idle for 15 minutes then shut off the engine and wait for the engine to cool down before continuing. All of the above is dependent upon the condition not being the result of a coolant leak, broken belt, failed thermostat or a bad water pump.

And if the driver doesn't notice the gauge or realize the increase in temperature exists?

**WHAT HAPPENS NEXT.....**

If the driver keeps going and the demand does not change, things will get significantly worse. As the engine overheats, clearances get closer. Depending on the age and overall condition of the engine, internal damage to the valves and pistons begins. The engine head will become hot which will

result in crushing the head gaskets which leads to leaking and eventual head gasket failure.

The coolant will boil over and begin to vent past the radiator cap. The excess pressure on the cooling system may damage the radiator and will cause



You only have to imagine what it must be like to be on the side of this road. Overheating doesn't have to be the cause.

weak or sub-standard hoses to burst.

According to the U.S. Department of Transportation, coolant system problems and failures are the leading cause of mechanical breakdowns on the highway.

It doesn't have to happen to you.

## PREVENTIVE MEASURES

Rather than treat the problem after it occurs, preventive measures are easily done and will cost less in terms of both time and money. Since you will be checking your coolant system, it will also help to evaluate its performance in colder temperatures which will be in just a few

months.

There are five critical areas when you are checking your coolant system. They are listed below:

1. Coolant level
2. Strength of antifreeze
3. Coolant condition

4. System condition

5. Cooling fan operation

Each of these areas will be discussed individually but it must be remembered that each of these areas work in conjunction with the other areas.

## COOLANT LEVEL

If when you check your coolant level, it is not up to the top, there is either a leak or the radiator cap is not holding pressure. External leaks will be obvious. They are things such as the water pump, radiator, hoses, freeze plugs and the heater core. These should all be checked.

Internal issues are not as easy to find. A pressure check will usually reveal their

presence. The system should hold maximum rated pressure for at least 2 minutes with no drop in the gauge reading.

A weak radiator cap or the wrong one for the application, can allow large amounts of coolant to escape from the surge tank when the engine gets hot. This causes a low coolant level condition.

Check your radiator cap to

make sure that it holds pressure and is, in fact, correct for your application.

..maximum concentration of antifreeze to water **SHOULD NEVER** exceed 70% because..."

## STRENGTH OF ANTIFREEZE

Next you need to check your antifreeze strength. You can use a refractometer, hydrometer, or test strips that change color to indicate antifreeze strength. Before starting this test make sure that there is adequate antifreeze in the system.

As a rule, a 50/50 mixture of ethylene glycol antifreeze and water will provide boiling point protection up to 255 degrees with a 15 PSI cap, and freezing protection down

to -34 degrees. In comparison, a 50/50 mixture of propylene glycol antifreeze and water will provide boiling protection to 257 degrees and freezing protection down to -26 degrees. Increasing the concentration of either type of antifreeze will raise the boiling protection and lower the freezing protection. While this might lead you to be that more is better, the maximum concentration of antifreeze to water **SHOULD**

**NEVER** exceed 70% because too much antifreeze actually reduces the coolants ability to carry heat. This ultimately will increase the risk of overheating in a system that otherwise has a marginal capability.

Since both types of antifreeze have different specific gravities, it is important to point out the use of the right tools for the job. Know which type you have before you start.

## OVERALL COOLANT CONDITION

Looking at the appearance alone of your coolant will not tell you a thing about its condition. It can look like new but if the chemistry isn't right, it's a problem waiting to happen.

Most antifreezes are about 95% ethylene glycol, by weight. The rest of the ingredients include things such as corrosion inhibitors and other additives that are designed to help support your coolant system. Time and heat even-

tually deplete the chemicals which leaves your system more vulnerable to internal corrosion.

Ethylene glycol never wears out, but unless you have coolant recycling equipment that is capable of restoring the proper chemicals, the only alternative is to drain out the old coolant and replace it with new. Be sure to dispose of the used antifreeze properly within the guidelines for your state and local regula-

tions.

What is the best way to check the chemicals left in your antifreeze? Use a chemical test strip that indicates how much reserve alkalinity is left in the system. This is what prevents your corrosion. The test strip will change color when dipped into your antifreeze. Compare the color on the strip with that of the bottle. If the coolant test bad or is near borderline, it needs to be changed.

## THE COOLING SYSTEM AND WATER PUMP

Checks in this area include inspecting all the belts and hoses, checking the water pump for leaks, noise or shaft movement, then checking the radiator, surge tank, freeze plugs and engine for any signs of coolant leakage. Be sure to pressure check both the cooling system and the cap to check for internal leaks.

Even with exceptional maintenance the bearings and the seal will eventually deteriorate and ultimately fail. The bearings will get noisy and the seal will begin to leak. This is the time to replace it—not when it becomes more costly, with a failure.

It is also a good idea when inspecting your water pump to install silicone hose and

constant torque clamps if they are not already in place. The clamps expand and contract with temperature changes and prevent "cold water leaks". Silicone hoses have extended life in comparison to standard rubber hoses.

**"..the bearings and the seals will eventually deteriorate and ultimately fail."**

## OFTEN OVERLOOKED...THE COOLING FAN

One critical item, often overlooked, is the cooling fan. It's function is to pull extra air through the radiator at times of high demand (the engine is under heavy load or your air conditioning is on). If the fan isn't coming on or if your belt isn't snug enough, your engine may overheat.

Generally there are 4 things

that will cause the fan not to come on. They are: bad temperature switch or coolant sensor, bad fan relay, wiring issues or a bad fan. Determining what is the actual cause may be time consuming but is necessary in order to properly fix the problem.

Electronically controlled engines should be checked by a

certified mechanic for any possible "codes" with the use of factory authorized specialized equipment.

Be sure and check the general condition of your fan belt. In the event that it needs to be replaced, it is important to get the correct depth and length for your application.

## CONCLUSION...

**SPECIAL NOTE:** Belt tension is critical, especially on newer model engines using poly belts. Too much tension will cause premature failure of the associated components including the engine and alternator. A belt tension gauge is a must.

In conclusion, there are many things that effect exactly how efficiently your cooling system operates. All must be in good working order to get maximum performance and minimal road failures.

Taking into consideration the ambient heat of August, the extra load when using A/C, and the need for your cooling system to get rid of excess heat, now is the time to check the performance of your cooling system.

Reviewing our key points with your driver will certainly help. Ultimately the actions of the driver will be pivotal. It is important to recognize the early signs of trouble. "Cooling off" for a few minutes will cost you time but will potentially save you money.

Take this newsletter with you over this summer. Refer to it and if you have any questions, feel free to call us. It is our pleasure to be of service to you.

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