Your Tested

PENRAY®

What should you look for when checking your coolant?

Color – Green, pink, red, blue. Coolant color is important. The color of your coolant indicates what kind of coolant you have and how it is to be maintained. Mixing of technologies and not maintaining them correctly can lead to cooling system problems. Know your coolant.

Clarity – Coolant comes in all different colors. All these different colors should have one thing in common. They all should be clear. If your coolant appears cloudy or has particulates floating in it, this could be a sign of bigger problems.

Freeze Point – Properly maintained coolant should have a freeze point of -34° Fahrenheit. This indicates that you have the proper 50/50 mix of antifreeze and water. Too much antifreeze can lead to water pump failures, drop-out and improper cooling of the engine. Maintain you freeze point between -25° and -50° Fahrenheit for optimum performance.

Chemical Protection – Chemical levels must be maintained and monitored in your coolant. Depending on the type of coolant in your engine, there are different maintenance practices that must be adhered to in order to keep your unit running.

NEVER LOSE YOUR COOL

THE PENRAY COMPANIES
1801 Estes Avenue • Elk Grove Village, Illinois 60007
Telephone 800-322-2143 • Fax 800-346-8454
email: mail@penray.com
www.penray.com

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Get Truck

When was the last time you had your coolant checked?

Industry experts estimate that about 40% of engine downtime is caused by cooling system problems. Understanding the common problems and implementing proven preventative maintenance practices significantly reduces their operating costs. It is recommended that coolant should be checked every 500 operating hours, 20,000 miles or three months, whichever comes first.

What happens if a cooling system is not properly maintained?

Downtime. The four major cooling system problems that result in unscheduled downtime are:

Cavitation-erosion (liner pitting)

One of the most common and costly results of improper cooling system maintenance is the perforation of wet-sleeve cylinder liners. The perforation is caused by repetitive pitting of the liner as a result of liner vibration. As the fuel inside ignites, the liner vibrates within the block. The outside wall of the liner actually moves away from the coolant causing a near vacuum for an instant. This low-pressure causes the surrounding coolant to boil, forming tiny bubbles. The liner then returns to its position at extremely high velocity, pressing against the bubbles with a violent force. The bubbles implode (collapse) against the liner wall surface at pressures up to 60,000 PSI! The collapse of these bubbles blast small holes in the cast iron liner. This pitting process will repeat, digging tiny tunnels through the liner. Eventually, the liner wall will become perforated, allowing coolant to enter the combustion side of the cylinder. If coolant enters the combustion side of the cylinder, an expensive in-frame overhaul is required. Cavitation-erosion is not usually covered under engine warranties and can take a significant bite out of your profits.

A cylinder liner destroyed by cavitation-erosion

Corrosion

Corrosion is the natural tendency of metals to revert back to their ore form. Cast iron, for example, will form reddish-brown iron oxide (common rust) on engine surfaces. Likewise, other metals form oxides. The color of these various corrosion products can vary from white to black depending on the specific oxide that is formed. A number of conditions in a cooling system will affect the degree and rate at which metal surfaces corrode. These include: coolant pH, the concentration of dissolved oxygen and carbon dioxide in a coolant, metal surface deposits, metal stress, coolant temperature, acids formed in the combustion process of the fuel, and the corrosion inhibitors present. All the metals in a cooling system will corrode under certain conditions. Some metals are more sensitive than others. When metals corrode they weaken and the component will eventually fail. The metal most prone to corrosion in a cooling system environment is aluminum. Cast iron, solder, steel, copper, and brass will also corrode.

aluminum corrosion

rust on iron

Scale

A diesel engine generates enough heat to warm a seven-room house during the winter. The engine must shed some of this heat to operate efficiently and prevent severe component damage. Two-thirds of this heat is lost through the exhaust and through the engine work. The remaining third must be pulled from an engine by the cooling system. It is critical that all cooling system heat exchange surfaces remain clean. Hard water scale can block a cooling system's ability to transfer heat, resulting in overheating. Only 1/16 inch of scale will reduce cooling system heat transfer efficiency by 40%!

The potential for scale formation on hot metal cooling system surfaces is affected by a number of dynamic conditions. Some of the mechanisms and parameters that affect the formation of these deposits:

Water hardness – the harder the water being used in an engine coolant, the greater the potential for scale formation.

Temperature – as coolant temperatures increase, hardness salts (calcium and magnesium) in solution have the potential to plate out on hot metal cooling system surfaces.

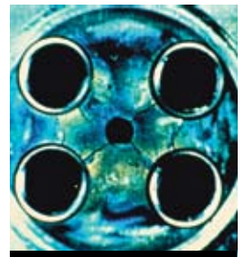
Flow characteristics – scale generally forms on the hot side of a cooling system and in areas of low or turbulent flow.

Entrapped air – any air bubble formation in a coolant area (bubbling around a hot source) increases the tendency for scale to form in that area.

pH – high pH will increase the potential for scale deposits.

Damage to water pump seals

Calcium and magnesium have the tendency to combine with the phosphates found in low grade antifreeze and some additive packages. They form calcium and magnesium phosphate scale on heat transfer surfaces, especially on water pump seal faces. These deposits can distort the flatness of a seal face, preventing the water pump seal from sealing. The result can be leaking water pumps.



scale ruined this head

Cooling system problems that result from overheating caused by scale:

- Cracked heads and warped engine blocks.
- Failure of the cooling system fan to turn on.
- Oil temperature running abnormally high.
- Scale deposits on cooling system block heaters.

Green Goo or Drop-Out

Many of today's antifreezes rely on the inhibitors silicate and phosphate. Although they serve as valuable corrosion inhibitors in engine coolant they have limited solubility. If antifreeze or additives get too concentrated in the coolant, the excess phosphate and/or silicate will drop out, forming green goo. This green goo can lead to premature water pump failure, radiator blockages, heater core problems, and extensive down time. By using low-silicate, phosphate-free fully formulated antifreeze in your coolant, you can eliminate the potential for green goo formation. This antifreeze is standard factory fill in many OE engines and is also readily available in the marketplace. Further, Penray's Pencool® 3000 with Stabil-Aid® Cooling System Treatment helps prevent drop out caused by over treatment and incorrect antifreeze concentrations.

Summary

Coolant is indeed a hot topic these days. With all the different colors and chemistries available, it is more important than ever to maintain one's cooling system. As mentioned earlier, an estimated 40% of engine downtime is caused by cooling system problems, but take comfort in the fact that cooling system problems are virtually 100% preventable.

Remember to:

- Know your coolant
- Check coolant every 500 operating hours, 20,000 miles or three months, whichever comes first.
- Check for color, clarity, freeze point and chemical protection.
- Adjust coolant freeze point and chemical protection as needed.
- Follow engine manufacturers' drain intervals for your coolant type.

Solution

Penray is the leader in cooling system technology. To maintain all types of antifreezes and prevent any cooling system problems, look to Penray as the solution.

Should you have any additional questions, ask your Service Manager, call Penray at (800) 322-2143 or visit us on the web at www.penray.com

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