## Water - The Best Coolant

This article is the best I have ever read at explaining the reasons why I recommend the cooling system that I use. See what Hot Rod Magazine says about water as an engine coolant in the transcribed article below. Bud Warren

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You've previously said water was the best coolant. It has always been my understanding that a 50/50 mixture of glycol and water will increase the boiling point of the mixture as well as decrease the freezing point. Doesn't that make the mixture a better coolant than just plain water? Of course, the 50/50 mix also provides the necessary water pump lubricants and the needed rust inhibitor for the entire cooling system. Brian Miller, Florence KY

The specific heat capacity of ethylene glycol-based water solutions is less than the specific heat capacity of pure water. In a 50 percent solution, ethylene glycol's specific heat capacity compared with pure water is decreased at least 20 percent at 36 degrees F, and about 17 percent at 200 degrees F. Propylene glycol, another common coolant, has an even lower specific heat. Compensating for the reduced heat capacity of coolant/water mixes would require circulating more fluid through the system, but assuming a fixed amount of circulating fluid and radiator capacity, this makes water the most efficient coolant in terms of its ability to conduct heat with minimal temperature rise. In other words, of all common liquids, water requires the most heat energy to changes its temperature.

Looking at some concrete numbers, according to cooling system guru Howard Stewart, on a typical engine with a coolant flow rate of 100 gpm (gallons per minute) and an energy loss through the coolant system of 189.5 HP, the water temperature increase would be 10 degrees F, the ethylene glycol water mix would gain 20 degrees, and the propylene glycol would gain 33.3 degrees F.

Admittedly, this is the relationship in its pure form that does not account for differences in the vapor point of the three different coolants. Ethylene glycol and propylene glycol have higher vapor points and therefore can absorb heat at higher temperatures without boiling. However, even with its lower vapor point, water still carries more heat per unit than the other coolants.

Also remember you cannot look at just water in isolation. It's just one part of the total cooling system. You can raise water's effective vapor point by using a higher pressure radiator cap. For every point of system pressure increase, the boiling point of water will increase by 3 degrees F. A higher boiling point also helps reduce evaporation losses, water pump cavitation, and heat-soak-induced-after-boil. You can get away with a higher system pressure by using a quality aluminum radiator that's much stronger than an old-school brass/copper radiator, making that aluminum unit a dual pass configuration to speed up coolant flow enhances heat transfer even more.

In short, a dual-pass aluminum radiator with at least a 20 psi cap running only water is by far the best heat transfer setup, provided the vehicle is not subject to freezing conditions. Be sure to add a corrosion inhibitor to protect the system.