



# (-) Subtraction by (+) Addition

*Cooling system additives can reduce corrosion, prevent deposits, and keep your system operating near peak efficiency. What they cannot do, experts say, is lower your water temperature.*

By Karl Fredrickson and Rob Sneddon

Chris Paulsen has been through this before. “Get ready for the nasty letters,” Paulsen says when asked to address the widespread manufacturer claims that cooling system additives can lower a race car’s water temperature. “We have tested many of those products extensively and still have not found anything that you can pour into water that will lower water temperature in a race car.”

But Paulsen, president of C&R Racing in Indianapolis, also has some good news. “That’s not to suggest that there aren’t benefits [to additives]. And some of those benefits will result in lower temperatures.”

Really, it comes down to semantics. Additives can’t lower water temperature per se. But they can make your system more efficient—which can lead to lower operating temperatures than if you *didn’t* use an additive.

Chas Howe of Howe Racing Enterprises concurs with Paulsen’s assessment. “Some of those cooling system additives serve purposes, such as helping as a water pump lubricant,” he says. “But I’ve never seen one lower the temperature to the level that some manufacturers claim. They’re more valuable for their anti-corrosion benefits.”

As an example, Paulsen cites CSP (Coolant System Protector) from Joe Gibbs Driven. “I have tested the Joe Gibbs product,” Paulsen says. “That’s more of a cooling system treatment—they don’t make a lot of claims of lower temperatures. And it really works great. It greatly reduces the corrosion in aluminum. That is a wonderful thing because it keeps the mineral deposits from sticking to the aluminum surfaces. It does a great job controlling the block rust. It’s a water-soluble oil, basically, so it also lubricates the water pump seal.”



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Chas Howe of Howe Racing Enterprises cautions that his tests have shown that some additives can actually contribute to the corrosion process, depending on the type of water that you use. "We recommend using distilled water or filtered water," he says.

Use plain water in your cooling system, and the effects of corrosion show up soon enough. "After a season, if you look inside your surge tank or the radiator, you'll see the corrosion on the inside," Paulsen says. "And it's not just what you can see—it's what you can't see, too, like the little tubes in the radiator."

The breakdown of metal, and buildup of deposits, starts within weeks in a new, untreated system because the aluminum hasn't had a chance to passivate. "Passivation is a process where water can condition the bare aluminum, making it less likely to corrode," Paulsen says. "This is what the Joe Gibbs product does, along with Redline WaterWetter and Neo Keep Cool. If you start with a brand-new aluminum radiator and use one of the products mentioned, it will passivate the aluminum and greatly reduce the potential for corrosion and mineral buildup. That will keep [the radiator] working more efficiently for longer. The same 'passivation' process applies for aluminum blocks and heads."

But Howe cautions that his tests have shown that some additives can actually contribute to the corrosion process, depending on the type of water that you use. "Realizing that water is different just about everywhere, we had our guys bring in water from their homes," he says. "We had well water, city water, and everything in between.

We discovered that the presence and amount of lime, as it is used in water treatment for potable water, can create a concoction that reacts with certain cooling system additives. When that happens, it removes the aluminum oxide and eats through the radiator material. So, we recommend using distilled water or filtered water."

Further, while additives can make a noticeable improvement to some older systems, they can't reverse the effects of severe corrosion. "You're not going to put an old rusty block together and expect these products to clean it out and make it pristine," Paulsen says. Additives can, however, keep a new system operating at near peak efficiency. "If you start with a new cast-iron block and always use these products like the Joe Gibbs product, Keep Cool, and WaterWetter, those products will help keep block rust and corrosion down. In turn, if you use one of them all the time, your cooling system is going to stay in pristine shape. It doesn't keep rocks out of the radiator, but it certainly keeps the inside very nice. And that helps keep those temperatures in check."

Again, he's referring to the system temperature, not the actual water temperature. It's the blurring of this line that rankles him about some advertising claims.

Another Paulsen peeve involves "wetting" agents. "Wetting" is releasing

Says Chris Paulsen, president of C&R Racing, "I have tested the Joe Gibbs product. That's more of a cooling system treatment—they don't make a lot of claims of lower temperatures. And it really works great."



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## Buyer's Guide: Cooling System Additives

Here's a look at a few of the many products available.

**The Company:** Joe Gibbs Driven

**The Product:** CSP

(Coolant System Protector)

**The Pitch:** According to the company, "When you travel around the country you run into different water at each track. Some tracks have water that will eat right through your radiator. The idea behind Coolant System Protector is to hold calcium and minerals in suspension rather than letting them stand in the bottom of your radiator."

**JOE GIBBS DRIVEN**

Huntersville, N.C.

866-611-1820

**The Company:** Red Line

**The Product:** WaterWetter

**The Pitch:** According to the company, WaterWetter "reduces or eliminates bubbles or vapor barrier that form on hot metal surfaces... Rust and corrosion protection allows for use of straight water in racing."

**RED LINE SYNTHETIC  
OIL CORPORATION**

Benicia, Calif.

707-745-6100

**The Company:** Neo Synthetics

**The Product:** Keep Cool

**The Pitch:** According to the company, Keep Cool "prevents the buildup of substances on the interior of cylinder blocks, liners, water pumps, impellers, heads, radiators, and water transfer systems, which prevents good radiation of heat."

**NEO SYNTHETICS**

Perris, Calif.

951-943-4710

**The Company:** Royal Purple

**The Product:** Purple Ice

**The Pitch:** According to the company, "Purple Ice fosters optimum coolant flow by helping to prevent formation of scale deposits in the radiator. It also lubricates the water pump seals."

**ROYAL PURPLE, INC.**

Porter, Texas

281-354-8600

**The Company:** DEI

**The Product:** Radiator Relief

**The Pitch:** According to the company, Radiator Relief "supercharges your radiator by transferring heat more efficiently through the radiator to prevent overheating."

**DESIGN ENGINEERING, INC.**

Avon Lake, Ohio

800-264-9472

**The Company:** Amsoil

**The Product:** Dominator Coolant Boost

**The Pitch:** According to the company, "Dominator Coolant Boost is formulated with proprietary tiered surfactant technology, providing quick and effective heat transfer inside radiators and cylinder heads,"

**AMSOIL**

Superior, Wis.

800-956-5695

**The Company:** Firefreeze

**The Product:** MotorMax

**The Pitch:** According to the company, "MotorMax is a natural plant-based product that is environmentally friendly and leaves no residue if spilled during accidents or car maintenance."

**FIREFREEZE WORLDWIDE, INC.**

Rockaway, N.J.

973-627-0722

**The Company:** Flex-a-lite

**The Product:** Flex-a-Chill

**The Pitch:** According to the company, "This formula has a lower pH value (8.5) and is specifically designed for aluminum systems."

**FLEX-A-LITE**

Fife, Wash.

866-447-5967

**The Company:** Mishimoto

**The Product:** Liquid Chill

**The Pitch:** According to the company, "Liquid Chill is non-corrosive and compatible with all coolant and/or water mixtures."

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## Convolutions, Kinks, and Multiple Passes

*A few more observations from the cooling experts.*

**• Surge Tanks and Multiple-Pass Radiators**  
 "Lately it seems like everyone is getting into double-pass and even triple-pass radiators," says Chas Howe of Howe Racing Enterprises, "but implementing a surge tank can make a less expensive radiator far more efficient because it bleeds air off the system and puts water back in. The cooling system uses the whole radiator instead of just the bottom."

Howe does the math: "In a single-pass radiator that is 100% full, the water is cooled with 100% of the radiator's capacity in one pass. With a double-pass, the water is cooled on the first pass at 50% of the radiator's capacity. The second pass is also cooled by 50% of the radiator's capacity, but starting at a lower temperature. The net result is that a completely full single-pass with a surge tank has slightly greater cooling capacity than the double-pass. The double-pass will, however, use more of the radiator when not completely full and can create the impression that it cools better when in fact it is disguising a problem that can be cured with a surge tank."

Howe cautions that this basic comparison "does not take into consideration the differences in flow rates. Multi-pass radiators create greater resistance to flow, which can help or hurt the efficiency depending on the water pump. The most valid reason to use a double-pass radiator is to locate the inlet and the outlet on the same side for ease of installation. The actual performance difference is in our experience negligible."

**• Convoluted Hose**  
 Not a problem, says C&R Racing president Chris Paulsen. "Convoluted hoses are fine," Paulsen says. "Every car in NASCAR has a convoluted upper hose. It doesn't hurt anything in cooling. Unless you get into supersonic flow rates, convoluted bore flows just as well as smooth-bore hose."

"It's not that convoluted hoses are bad for cooling. Racers get into trouble with convoluted hoses by kinking them too much, so it's an installation issue."

**• Keep It Air Tight**  
 "The most common cause of radiator failure is air in the coolant system," Howe says. "Not only does the air reduce the radiator's efficiency to cool, it can also cause damage. When air is trapped in the block it allows surfaces in the engine block to overheat. If the air pocket moves, the water will contact the hot spot and produce steam and a resulting surge in pressure. The steam cannot reach the vent of the cap before the pressure reaches 50 psi. At this pressure the flat tubes of the aluminum radiator bulge and crush the fins blocking off all air flow. This can also be caused by a blown head gasket."

**• Simple Steps Can Help, Too**  
 If you race on pavement, Howe leaves you with one last maintenance tip: "Remove the radiator and drop it forward side down on a piece of cardboard over concrete floor from six or eight inches. That will dislodge a lot of Speedi-dri."

the surface tension of water," Paulsen says. Sounds impressive—until he points out that "wetting in a pressurized cooling system is really not necessary.... Due to temperature expansion in a closed system with a radiator cap—or in modern cases with a pressure release valve—that pressure creates the wetting of that water to the cylinder head.

"Since we have pressure [in a cooling system], that pressure overcomes water's ability to wet. It's a non-issue. Ivory dish soap is a wetting agent, just like any dish soap, so if you're really concerned about wetting of the water, just put three drops of Ivory dishwashing liquid in your system and it will do the same thing."

In short, says Paulsen, the wetting argument "is a great sales and marketing tool, but in reality it's nothing as far as racing cooling systems are concerned."

Paulsen says he feels obligated to debunk these claims because he's looking out for his customers—who are racers like him. "The average guy will find it difficult to prove these claims wrong," he says. "When we test these products, we do it the right way. We send them up to our lab in Detroit, and we run the product in a calorimeter. That's a precise, accurate piece of equipment for developing cooling systems and measuring radiators and cooling.

"These calorimeters are accurate to within one-hundredth of a degree in temperature. So, if something is going to lower temperatures, that piece of equipment is going to pick it up. And after we run a product on the calorimeter, I always put it in a race car and test with it there, too. We use a data acquisition system so we can measure temperature in the radiator, temperature out of the radiator, and get total data from that test."

Paulsen concludes: "I'm one of the premier radiator manufacturers in the world. If I ever found something that you could simply pour in the cooling system and lower water temperatures by even five degrees, I would be endorsing it until hell wouldn't have it." ☞

**Sources**  
 C&R Racing, Inc.  
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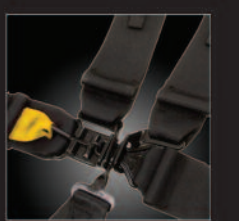
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