



# TECH TIP

## COOLING SYSTEM

BULLETIN TT002-13

› PART NUMBER:

Water Pumps

› MAKE:

All

› MODEL:

All

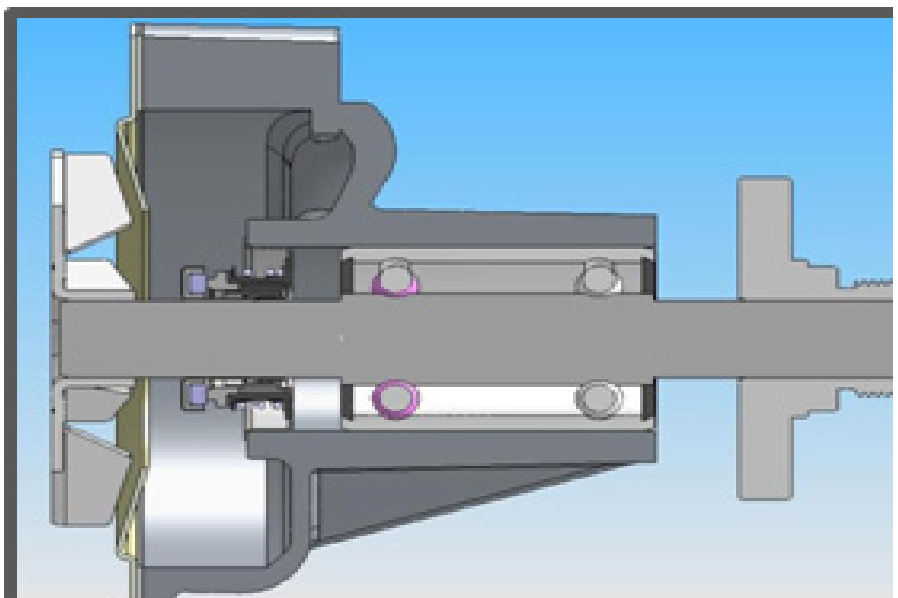
› YEAR:

All

› ENGINE:

All

## Keep the cooling system free of debris and corrosion to prevent premature water pump failure



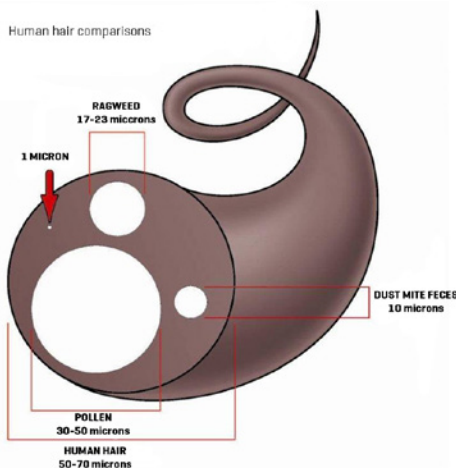
COOLANT TRAVEL PATH

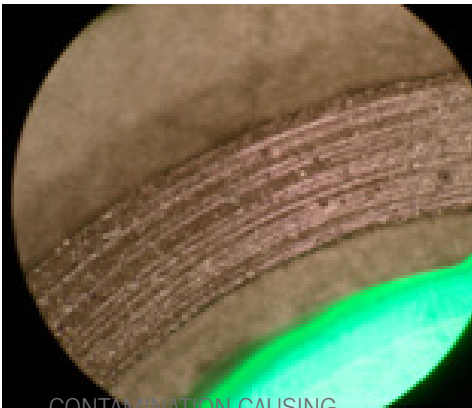
### FLUSHING:

Over time, coolant in the cooling system can break down resulting in the need to service the system. The protectants in many of today's coolants become depleted and weak leading to corrosion, rust and scale. When this depletion takes place, heat and chemical reactions can eat away at the inside of the system creating small particulates. These particulates, as small as 50 microns, can get trapped in the water pump seal causing damage. The damage leaves small areas for coolant to leak out through the weep hole. Excessive damage can lead to fluid backing up into the bearings resulting in bearing failure. A properly flushed system will remove those contaminants. Make sure the flush is complete with the old pump still in place. Flushing after the new pump is installed can lead to premature failure due to particulates getting caught in the seals during the flush. We recommend a complete flush of the system utilizing the Gates PowerClean Flush Tool (91002).

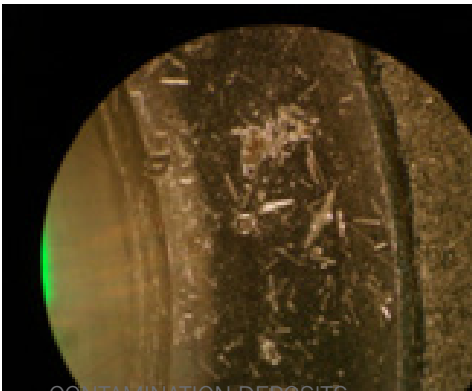
### HOW BIG IS A MICRON?

Human hair comparisons





CONTAMINATION CAUSING  
SCRATCHES ON SEAL  
RING SURFACE.



CONTAMINATION DEPOSITS  
ON SEAL RING SURFACE.

AS YOU CAN SEE, THIS IS A UNIVERSAL ISSUE. IT IS RECOMMENDED TO FLUSH THE SYSTEM THOROUGHLY AND REPLACE COOLANT WITH RECOMMENDATIONS SPECIFIED IN THE OWNER'S MANUAL OF EACH VEHICLE.

#### MIXING COOLANTS:

So what leads to contaminated systems besides depleted coolant protectants? Mixing coolants of different chemistries can lead to corrosion within the system. There are 4 main combinations used today and none of them are compatible. These coolant types work differently to protect the engine.

| Types  | Inhibitor Technology         |
|--|------------------------------|
| Inorganic Additive Technology [IAT]              | Silicate                     |
| Organic Acid Technology [OAT]                    | Organic Acid – Silicate Free |
| Hybrid Organic Acid Technology [HOAT]            | Silicate & Organic Acid      |
| Phosphate Hybrid Organic Acid Technology [PHOAT] | Phosphate & Organic Acid     |

Inorganic Additives - silicates and phosphates are used to plate the cooling system with a protective layer.

Organic Additives react chemically with the metal surfaces when needed for protection.

Corrosion inhibitors and additives from one coolant can negate the effects of inhibitors in another coolant. Corrosion can take over well before 5,000 miles and then the car is back in the shop with a leaking water pump and clogged radiator and heater core.

Topping off the system is a common practice at many shops. This practice can begin the corrosion process unless the proper coolant is used. Most shops use Universal antifreeze because it says on the container that it is OK to mix with any color coolant. But, take a look at the back of the bottle. They all either recommend or require a drain, flush and fill to experience the expected corrosion protection. Below are a few comments from coolant manufacturers and recyclers.

Zerex: "There are at least several distinct coolant types commonly used today, and using a type incompatible with the coolant recommended in the owner's manual (or on the underhood label) is inviting disaster (no exaggeration here)."

EcoFreeze: "What happens if you mix conventional Antifreeze with Extended Life antifreeze? Extended Life (OAT) antifreeze is NOT compatible with conventional (IAT) antifreeze. Aside from discoloration of antifreeze when the two are mixed together, a chemical reaction is caused when the carboxylate salts are mixed with the inorganic salts and caustics found in conventional antifreeze. If they are mixed, the antifreeze can become cloudy, precipitation can generate and the coolant will lose its extended life properties."

EET Corp.: "Color does not necessarily indicate what kind of corrosion inhibitor is contained in antifreeze. You have to read the label. Mixing different types of antifreezes can reduce their corrosion protection and can actually lead to corrosion problems."

#### DISTILLED WATER, DEIONIZED WATER OR 50/50 PREMIX:

In order to reduce the chances of corrosion it is highly recommended to use only distilled or deionized water or 50/50 premix coolant. Tap water contains large amounts of minerals that can create deposits in the system and then break off causing damage to the water pump seal.

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For more information, please contact our Technical Department at 303.744.5651 or [apateam@gates.com](mailto:apateam@gates.com).

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