NRF TECHNICAL ARTICLE

LIQUIDS IN THE COOLING SYSTEM

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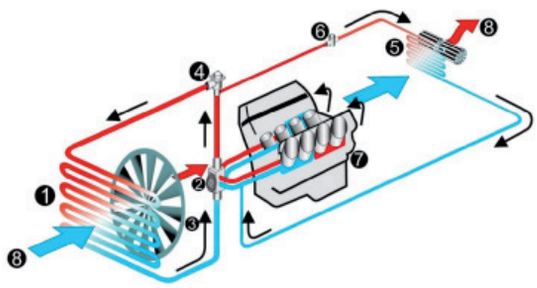
HOW IT WORKS?

A cooling system consist of a water pump that impulses the coolant, a radiator that disipates the engine heat, a thermostat that allows the system to open and close, some pipelines where the coolant flows and one or more temperature sensors.

The radiator have one (or few) inlets and one (or few) outlets. The hot coolant enters through the upper pipe, forced by the flow generated by the water pump, and comes out through the lower pipe.
In this journey, by the action of the flowing air, the temperature decreases. In the lower pipe of the radiator, coolant is recirculated to the engine again, doing a new cooling cycle.



Scheme of a refrigeration system: Picture 1. Cooling system schema: 1. Radiator, 2. Water pump, 3. Fan, 4. Thermostat, 5. Heater, 6. Heating valve, 7. Vehicle's engine, 8. Air flow

POSSIBLE SYSTEM FAILURES:

› **External agents**: The radiator is an element in direct contact with the outside, so it's susceptible to receive impacts from projections, to corrosion by salt or others pollutants present in the environment.

› **Use of non-recommended liquids**: Using of any non-recommended by the manufacturer liquid (tap water, not approved or recommended coolants, distilled water, etc) can damage the system, especially the radiator. Let's see why:

COMMON MISTAKES:

› **Tap water**: Tap water have in dissolution a lot of substances, some of them are ionic compounds (salts) that, in dissolution and high temperature can be corrosive for the ferrous metals what engine is made of. The continuated action of those substances progressively oxidizes the engine metal, making rust sediments.

Picture 2. and 3. Rust sediments inside the radiator's tubes

Naked eye, the coolant in the expansion tank turns rusty brown. As more time passes, this rust turns into corrosion, which makes more sediments, and it tears off some metal scales of the more damaged elements, that stucks the radiator's tubes, forcing him to work with overpressure and finally, making it leak for stucking.

Picture 4. and 5. Sample of tap water used as coolant, and engine's corrosion. (NRF Photo)

› **Not approval coolants:** A not approval coolant is normally tap water with some dye, it seems very similar to a good quality coolant. In order to reduce the costs, those products didn't have any system protector additives (anti rust, stabilizers, anti emulsifier or acid neutralizers). It takes a little more time, but the action in the system is the same that using tap water.

› **Distilled water:** Much people thinks that adding distilled water to the cooling system is not harmful for him. When you add distilled water, it's because the vehicle ran off of coolant. Mixing distilled water with coolant results on the dilution of it, reducing his properties and making in long term the same effect that using tap water or not approval coolant. Only mix distilled water with pure and clean coolant when manufacturer recommends to do.

› **Not recommended coolants:** Using not recommended coolants in a cooling system can lead to a failure for the decomposition of it, because it's possible to be not compatible with some elements of the system (rubber hoses, aluminum or even copper), making the same effect that the previous liquids.

Always use good quality and recommended by the manufacturer coolants! The use of nont allowed liquids will void the product's warranty!