

## Avoiding comebacks & repeat failures

There are many reasons why a radiator might fail, and finding the real cause will help reduce comebacks and repeat failures. Here are a few steps to follow:

1. Always ask yourself what caused the radiator to fail in the first place. Check all possible causes, such as:
  - External damage due to road debris or flying objects piercing the radiator
  - Internal damage due to dirty or incorrectly mixed coolant (radiators can corrode from the inside)
  - Negligence, such as running with a low coolant level for extended periods of time, or failure to replace coolant at the recommended intervals
2. Inspect the radiator cap with a tester. The radiator cap increases the boiling point of the coolant and helps ensure a constant level of coolant in the radiator. Replace the radiator cap if necessary.
3. **Thoroughly flush the system, including the heater core and overflow container. Any residue in the system may contaminate the new coolant and cause premature radiator failure. (Note: this is one of the most commonly overlooked service procedures when replacing a radiator.)**
4. Install a new, correct thermostat. Keeping the temperature right is what it's all about, and installing the right temperature range

thermostat will help ensure the system operates according to the manufacturer's design. Installing an incorrect thermostat will affect engine performance and may also shorten the life of cooling system components.

5. Inspect hoses and install new clamps. Replace any worn or damaged hoses while system is disassembled. This will help avoid comebacks (and blame) if the part should fail soon after repairs are made, and also save the customer labor charges to do the job a second time.

6. In most areas, use a 50/50 mix of antifreeze coolant and distilled water. This mix will provide protection against boiling and freezing temperatures while providing maximum corrosion protection. Also, remember to always use the OEM recommended coolant.

7. Once the work is completed, run the engine long enough for the electric cooling fans to turn on or inspect the mechanical thermal clutch fan for proper engagement. Cooling fans are crucial for proper system operation and preventing problems at low speeds. For electric cooling fans, see manufacturer specification in the shop manual as most vehicles use the on-board computer via the engine coolant temperature sensor to turn on the fans. Also, many fans are two-speed (or variable speed); just because they're on doesn't mean they're operating at the required speed. Make sure to check this out!

8. Ensure the drive belts (especially the one that runs the water pump) is tight and in good condition.

## Common causes of failure

Identifying what caused your radiator to fail in the first place may prevent a premature and repeated failure. After removing the radiator, visually inspect the inside of the connections, the inside of the overflow reservoir, the pressure cap and especially the thermostat. Below are some examples of what to look for.

Remember that the cooling system isn't just all about the radiator. Too often technicians swap out radiators without taking the time to inspect and treat the entire engine cooling system. It is after all a *system*, and all parts need to function together in unison in order for the system to operate properly.

Thermostats, for example, have a limited lifespan and should be re-

placed every 5 years. A thermostat is calibrated to always remain open under normal engine load. A worn out thermostat will have marks because of friction, a weaker spring and a higher opening temperature. A thermostat that opens higher than originally intended will cycle between open and close, stop coolant flow, produce a drop of the radiator core's temperature, and a contraction of the tubes. This higher cycling of the thermostat causing expansion and contraction of the tubes eventually leads to tube-to-header leaks in the corners. When installing a new radiator make sure to always replace the thermostat as this is often an overlooked cause of radiator failure.



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**Figure 5: Coolant contamination: Rust, grit or oil/grease inside a connection of the radiator are clear signs of contaminated coolant. Deposits like those in this sample of Dexcool are a sign that more remains in the engine block. **Simply replacing the coolant will not be enough to address this situation. Proper flushing is required.****



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**Figure 6: Radiator Cap (Pressure Cap): Weak springs, old rubber gaskets or a failed pressure test are signals for replacement. Caps have a limited lifetime and should be replaced when a new radiator is installed. A worn out pressure cap will not hold pressure as high as it should and will not open as per originally designed. A pressure cap not opening will cause severe damage, but a worn out pressure cap will cause constant additional stress on the radiator that will shorten its life expectancy.**