

Repairing Cooling System Leaks

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Okay, you replaced your lower radiator hose last week after it burst on the freeway, and the syrupy, turkish bath odor of boiling glycol coolant hitting a red-hot exhaust manifold is something you can live the rest your life without ever smelling again. Lying face-up in a spreading pool of cooling coolant to change the hose is pretty low on the list, too. So it's a bad omen when that smell hits your nose at a tollbooth a week later--and a worse omen when you open the hood and realize the new hose is leaking from both ends. What gives?

Drip Patrol

There are about two dozen coolant hose connections underhood today, and it's a constant effort to find and fix the loose ones that leak coolant. Ingesting air is a routine issue. It used to be simple: Look for an antifreeze stain, then just tighten the hose clamp, right? Sorry, but that's not always true anymore.

First, the powertrain compartment is so tight that you can hardly spot a leak without a dedicated inspection. You're more likely to look closely at a hose connection when you have to disconnect a hose to reach something else. In either case, when you do look at the coolant hose connections under your hood, you may see very few of the type you loosen and tighten with a screwdriver.

Today's engines have complex coolant flow patterns and the compartments are so tight that the engineers have to use special hose designs to provide safe routing. Some of those hoses have plastic fittings, called quick-connects, to help an assembly line worker make error-free connections.

Depending on the age of your car and whether clamps were replaced, you could have a variety of hose clamps. You can tighten some of these, but not all. These are the ones you can tighten:

Screw-tower--The screw is perpendicular to the band, and turning it down tightens the band. It's been around forever, it's cheap and it rust-freezes in place, so tightening an old one usually is impossible. To get it off, spray it generously with penetrating solvent, loosen the tower screw and slip in a slim screwdriver, if necessary, to pry it open. Or just cut it off.

DEGREE OF DIFFICULTY



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They make special pliers for wire-band constant-tension hose clamps, but ordinary pliers will usually get them free. It's a lot tougher in constricted areas, though.

Double-wire or band with retaining screw and nut--A double-winding of wire or a band is held together by a tangential screw at one end that fits into a nut at the other. When it's overtightened, the wire type digs into the hose and may cut through.

Worm-drive clamp--This has been the longtime favorite, and even was considered a premium design. Some worm-drives are, but most aren't. One reason it's popular is that it can be opened up and taken off without disconnecting the hose, although that feature has limited utility.

The quality worm-drives have such features as: rust-resistant plating; rolled edges so the band doesn't dig into the hose if overtightened; offset teeth that keep the band from twisting when tightened; and even "teeth" that aren't cut through the band, so the hose rubber doesn't extrude into the slots.

Constant-tension worm-drive--The best ones (by Oetiker, a leading European maker with extensive U.S. marketing) have an internal band that glides through a slot inside the main band, bridging the joint of the worm-drive. Result: The clamp provides true 360° clamping. That clamp also has a coil spring to provide constant tension even if the hose underneath takes a compression set.

Spring-Band Clamp

Today most carmakers are using a clamp that you can't tighten, so it also never can be retightened. It's the spring-band, an inexpensive form of constant-tension clamp. It may not be everywhere under the hood, but it usually is in a lot of places. Because it can't be pretightened to any spec, it's sized so even if the hose takes a set underneath, it maintains some tension--hopefully adequate to prevent a leak--but only if the hose neck is in perfect shape.

Shrink-Band Clamp

Would you like a low-cost non-adjustable clamp that not only maintains tension but seals well even if the hose neck is far from perfect? It's here, and it also can help with other problem clamping situations: the plastic shrink-band clamp.

You must buy a shrink band that's sized for your particular hose diameter. The band comes on a thick cardboard roll so it doesn't shrink in storage. Just crush the roll, remove the band, lube the hose neck with antifreeze, slip the band onto the hose and the hose onto the neck. Unlike a conventional clamp, the shrink band should be positioned so it extends onto a bead on a hose neck.

Apply heat with a hair dryer or heat gun (from within a couple of inches or so), and in a couple of minutes the band conforms completely to the neck and bead, increasing leak resistance. And the heat from the coolant will cause it to continue to shrink in service to compensate for any compression set in the hose.

How do you get it off? If you're replacing the hose, just cut it with a single-edge razor blade. If you're planning to reuse the hose, you have these choices: 1) Cut the band itself with a soldering iron, but be careful; 2) Force a feeler gauge



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Spring-band clamps can usually be removed or replaced with pliers or locking pliers.

between band and hose, and run the razor blade through the band just over the feeler; 3) If you plan to use these shrink bands everywhere on your cars, get a band-slitter, a tool that does basically the same thing but is easier to use.

Those Quick-Connects

In many cases, today's cars and trucks use quick-connects instead of clamps for many heater circuit hoses and also for some radiator hoses. The quick-connect is a fitting with an O-ring seal, and if it ever leaks, you have something else—one or two O-rings—to check and replace.

Every quick-connect comes off a bit differently, but it's usually obvious. On GM pickups you unthread a retainer, then turn a metal tab that provides a secondary hold and pull the hose. The hose end is a plastic fitting with O-ring seals. Just peel them off and install new ones. Clean out any debris from inside the female metal fitting on the engine.

So if the leak is from the quick-connect, get a replacement from the car dealer, then just pry open and remove the old quick-connect's permanent clamp and install the new quick-connect on the hose.

If you can't get a new quick-connect, you may be able to cut through a metal section in a long underbody coolant line, install a short hose section (secure it with some form of constant-tension clamps), and that should give you the extra hose length at the end that has the leaking quick-connect. Then you should be able to remove the quick-connect and make a hose-to-metal fitting clamp joint.

The Hoses

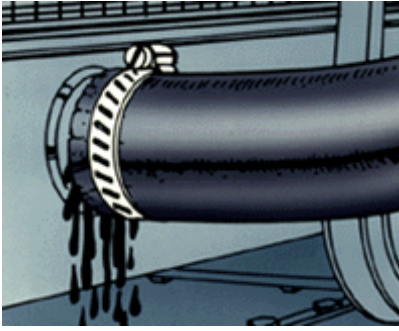
Many of today's hoses, particularly for the heater circuit, have crimped-on sections, and crimps are known to leak. A brand-new hose is a simple but expensive solution. An alternative is to grind or saw into the crimp, just enough to be able to break it apart.

Even without crimp sections, the coolant hoses themselves are anything but simple, flexible lines of rubber. On cars with pressurized coolant reservoirs (where the cap is on the reservoir, not the radiator or engine), the upper radiator hose typically has a tee fitting with a secondary hose to the reservoir (and the lower hose may have one to the heater circuit). So unless a repair tee is available, don't be surprised if the hose prices out at \$100. Other hoses (also not cheap) are permanently crimped to metal lines, much like an air conditioning line or power steering hose. And even where there is a simple-looking hose, it may be a molded design, so that it fits into a very tight area (perhaps so it can connect to a metal line) without the possibility of kinking.



CLICK TO ENLARGE

Shrink-fit hose clamps will continue to shrink as engine warms up, ensuring a tight seal.



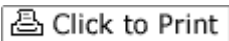
How It Works: How Coolant Hose Leaks Occur

Why does a coolant hose connection leak after you've tightened a conventional clamp? After all, the clamp itself doesn't loosen. What happens is this: Both the hose neck and the hose expand when the coolant warms up. The clamp, however, is relatively unchanged, so it squeezes the rubber underneath even more, and this causes the rubber to become permanently compressed, which is called a set. When the engine cools, the neck contracts more than the hose. Many hose materials become virtually glued to the neck, so a seal is maintained. Others do not. In fact, silicone is almost immune to sealing. That makes the silicone hose easy to replace, but it is the most prone to cold coolant leakage. Always install the clamp next to, but not overlapping, the raised bead on the fitting to keep from trapping a bubble of coolant in the void space inboard of the bead.

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