

## PREVENTIVE MAINTENANCE: FLUIDS & FILTERS

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Preventive maintenance may be a dirty subject in some people's minds, but it's a perfectly acceptable and politically correct means of keeping vehicles in good running condition. Checking fluid levels regularly and changing the fluids and filters periodically can minimize the risks of breakdowns and prolong the life of the engine, transmission, cooling system and brakes. So if you are driving a "maintenance challenged" vehicle, isn't it about time to start paying closer attention to the fluids and filters?

### OIL

Let's start with one of the most important fluids of all: motor oil. It not only lubricates the engine, but also cools, cleans and protects it. But the oil itself can't do all of these jobs without some help. Nearly half a pint of various additives are added to the typical quart of oil to improve the oil's ability to resist heat, friction, oxidation and contamination.

Short trip driving is especially hard on oil because the engine never warms up enough to boil off the moisture that accumulates inside the crankcase. The moisture comes from combustion gases that blowby the piston rings (the older the engine, the greater the amount of blowby). Most of these gases are removed by the Positive Crankcase Ventilation (PCV) system. But in a cold engine much of the moisture condenses and ends up in the oil. Water reacts with oil to form sludge and acids, and the result is accelerated engine wear.

The only way to get rid of the accumulated moisture, acids and sludge is to change both oil and filter. The filter only removes suspended solids such as dirt, carbon and metal particles -- not moisture, acids or sludge.

The oil and filter change intervals recommended by the vehicle manufacturers vary depending on the vehicle application and how the vehicle is driven. For "normal service" (which means mostly highway driving, NOT short trip city stop-and-go traffic driving), the scheduled maintenance intervals for changing the engine oil and filter range from 3,000 to as much as 7,500 miles, with the time interval being up to one year. Some vehicle manufacturers even say it's okay to replace the oil filter at every other oil change rather than every oil change.

But if you study the maintenance recommendations closely, most vehicles come under the "severe service" schedule, which generally calls for oil and filter changes every 3,000 miles or six months, whichever comes first—which is the same recommendation most aftermarket experts make. Severe service is short trip driving (7 miles or less, especially during cold weather), towing a trailer, or driving in dusty conditions.

If a newer low mileage engine is driven mostly on the highway, you can probably get away with the longer service intervals. But as an engine accumulates miles, it experiences more blowby which dumps more moisture and fuel into the crankcase. For this reason, engines with more than 70,000 miles should not use the extended oil change intervals regardless of how they're driven. Some engines, such as diesels, suffer more blowby than others so they typically require more frequent oil and filter changes. For most passenger car and light truck diesels, 3,000 miles is the recommended interval for all types of service.

Turbocharged engines likewise require more frequent oil changes because of the high temperatures encountered in the turbocharger bearings. A turbo can spin at tremendous speed (over 100,000 rpm in many instances). This, combined with the heat of the exhaust gases passing through the housing, creates an environment that accelerates oxidation of the oil. When the engine is shut off, for example, the temperatures inside the turbo bearing housing can soar to the point where it "cokes" the oil, forming hard black crusty deposits that can damage the turbo. Because of this, the recommended oil change interval for most turbocharged engines is 3000 miles or six months. The motor oil should be "turbo-approved" for such applications.

## **OIL RECOMMENDATIONS**

What type of oil should you use? Follow the viscosity recommendations in your vehicle owner's manual. Most vehicles today are factory-filled with 5W-30 because 5W-30 improves cold starting, fuel economy, and allows the oil to reach critical upper valvetrain components in overhead cam engines more quickly than heavier viscosity oils. Most vehicle manufacturers also approve 10W-30 for year-round driving. Yet many people prefer 10W-40 or even 20W-50 because they believe the higher numbers provide better protection—which they do at higher temperatures. But GM isn't keen on 10W-40 because they say it tends to break down more quickly than 10W-30 and can gum up the rings. And 20W-50 is too thick for cold weather (below 32 degrees).

You might upgrade to a synthetic motor oil or a synthetic blend. Synthetics are more expensive, but provide superior hot and cold temperature performance compared to petroleum based conventional motor oils. They are especially good for turbocharged and high output engines. Synthetic oils also experience less viscosity breakdown over time. Even so, users should stick to their normal oil and filter change intervals for maximum engine protection. You might also suggest a crankcase oil additive. Some additives are designed to reduce oil consumption in older, high mileage engines. Others, such as the teflon-based crankcase treatments, are designed to reduce engine wear.

## **OIL FILTER**

An engine's main line of defense against abrasion and the premature wear it causes is the oil filter. The filter's job is to remove solid contaminants such as dirt, carbon and metal particles from the oil before they can damage bearing, journal and cylinder wall surfaces in the engine. The more dirt and other contaminants the filter can trap and hold, the better.

In today's engines, all the oil that's picked up by the oil pump is routed through the filter before it goes to the crankshaft bearings, cam bearings and valve train. This is called "full-flow" filtration. In time, though, accumulated dirt and debris trapped by the filter begin to obstruct the flow of oil. The filter should be changed before it reaches this point because if the bypass valve is forced open, unfiltered oil will go to the engine.

Though many vehicle owner's manuals say filter replacement at every other oil change is acceptable, most professional technicians recommend changing the filter at every oil change. Why contaminate the clean oil with up to a quart of dirty oil? And why risk expensive engine damage if the old filter is on the verge of clogging up? A new oil filter is cheap insurance against premature engine wear.

Make sure you get the correct oil filter for your engine. In other words, follow the application listing in the oil filter supplier's catalog. Don't try to match filters by external appearances alone. Some filters have SAE threads while others have metric threads. Many overhead cam engines also require a filter that has an "anti-drainback" valve to prevent oil from draining out of the filter when the engine is shut off. This allows oil pressure to reach critical engine parts more quickly when the engine is restarted. Filters that are mounted sideways on the engine typically require an anti-drainback valve.

## **ATF**

Automatic transmission fluid is rarely changed for preventive maintenance, yet is often the cause of premature transmission failure. Considering how expensive a transmission is to replace, the cost of changing the fluid and filter periodically is peanuts.

Most vehicle owner's manuals do not specify a change interval for automatic transmission fluid—unless the vehicle is used for towing. But most transmission experts say changing the fluid and filter (which is located inside the transmission) every 25,000 to 30,000 miles can significantly prolong the life of the transmission. But if a transmission has a lot of miles on it and the fluid has never been changed, they also say it may be best to leave the fluid alone.

Why? Because changing the fluid may loosen accumulated varnish deposits that could cause sticking of control valves in the valvebody.

At the very least, the transmission fluid level should be checked periodically. On most vehicles, this should be done after the vehicle has been driven and the fluid is hot. The dipstick is then read while the engine idling and the transmission is in park.

If the level is low, fluid should be added to gradually bring the level up to the full mark—but not overfilled (which can cause the fluid to aerate and foam). If the transmission is leaking fluid from the pan gasket or rear seal, these parts are not difficult or expensive to replace.

Very important! Make sure you get the correct type of fluid for your transmission. Refer to the owner's manual or markings on the dipstick if in doubt.

General Motors applications usually require Dexron II, Dexron IIe or Dexron III, or a fluid that meets these specs. Dexron IIe is required in newer electronic transmissions, and Dexron III is a long-life fluid that can also be used in older applications that require Dexron II or IIe.

Older Fords as well as some imports require Type F, but most newer Fords require Mercon. Mercon can also be used in older Fords that requires type H or CJ fluids (which are obsolete). 1998 and newer Fords require Mercon V.

Chrysler typically specifies Dexron II for older automatics, but requires a special fluid that meets its Mopar ATF Plus 7176 specs in its newer four-speed electronic automatics. This includes ATF+2, ATF+3 and ATF+4 fluids. In fact, Chrysler warns that using Dexron II in one of these transmissions can cause shudder and shifting problems.

## **COOLANT**

The antifreeze in the coolant performs three very important jobs: it prevents the coolant from freezing during cold weather, it raises the boiling temperature of the coolant to prevent overheating during hot weather, and it fights corrosion.

Besides checking the level of the coolant periodically to make sure it isn't low (which usually indicates a leak), the strength and condition of the antifreeze should also be checked. Most vehicle manufacturers recommend a 50/50 mixture of water and antifreeze for normal freezing and boil over protection. Up to a 70/30 mixture of antifreeze and water can be used to maximize freezing protection, but higher concentrations should not be used. Straight water or straight antifreeze should never be used in a vehicle's cooling system.

Determining the condition of the coolant is a little more difficult because appearances alone can be deceiving. If the coolant is brown and discolored, it's obviously long overdue for a change. But even if it's still green, there's no way to tell how much corrosion protection is still in the coolant without measuring its "reserve alkalinity." This can be done with chemically-treated test strips that give a good-bad indication by color changes.

Most vehicle manufacturers recommend changing the coolant every two to three years or 30,000 miles to replenish the corrosion inhibitors in the antifreeze. If the cooling system is dirty, use a flush to remove rust and scale.

Starting in 1996, new General Motors vehicles were factory-filled with a new 5 year, 150,000 mile long-life coolant called "Dex-Cool." The coolant is dyed orange to distinguish it from ordinary antifreeze. If it is intermixed with ordinary coolant, the corrosion inhibitors can react reducing the corrosion protection to that of normal coolant (2 to 3 years or 30,000 miles). A number of long-life aftermarket antifreezes have been introduced recently to extend the coolant change interval to four or five years or 50,000 to 100,000 miles.

For the environmentally conscious, there is also a propylene glycol based antifreeze that is less toxic than ordinary ethylene glycol antifreeze.

## **BRAKE FLUID**

Brake fluid is another fluid that's often sadly neglected. The only time it's changed is when the brakes are relined (if then!). Yet brake fluid is hygroscopic and absorbs moisture over time. After two or more years of service, it can become badly contaminated with moisture. This lowers its boiling point up to 25% (which may contribute to pedal fade if the brakes overheat). It also promotes internal rust and corrosion that can damage calipers, wheel cylinders and antilock brake system components. Though the vehicle manufacturers have no requirements for changing the fluid, many brake experts say changing the fluid every two years for preventive maintenance would greatly prolong the life of the hydraulic components in the brake system and improve safety.

Changes aside, the fluid level should be checked periodically to make sure it isn't low. The fluid level in the master cylinder will gradually drop as the brake linings wear, but a sudden drop usually means a leak and a possible loss of hydraulic pressure.

Make sure you use the correct type of brake fluid for your vehicle. Most domestic and Japanese passenger car and light truck applications require DOT 3 fluid, but most European and some domestic performance cars require higher temperature DOT 4 fluid. DOT 5 silicone fluid is not recommended for any vehicle with ABS brakes.

## **POWER STEERING FLUID**

Like brake fluid, power steering fluid is never changed unless a hose fails or the steering gear has to be replaced. There is no recommended replacement interval for preventive maintenance, but the fluid should be replaced if the pump or steering gear has failed and is also being replaced. It's also important to check the fluid level in the pump reservoir periodically (a low fluid level usually indicates a leaky hose or seal somewhere in the system).

If fluid is needed refer to the vehicle owner's manual for the type of fluid that's recommended. Some require a special power steering fluid while others use ATF.

## **AIR FILTER**

The air filter keeps dirt out of the engine, so its service life depends on its operating environment. If you do a lot of driving on rural gravel roads, you may need a new filter every couple of months. A city dweller, on the other hand, might go a year or more between changes.

To assure a proper fit, it's not a bad idea to compare the old filter to the new one to make sure they're the same height and size. A related sales opportunity here would be the PCV breather filter, which is located inside the air cleaner housing on many vehicles. This filter should also be replaced if a new PCV valve is being installed.

## **CABIN AIR FILTER**

If your vehicle is equipped with a cabin air filter that cleans air entering the passenger compartment, the filter should usually be replaced every 30,000 miles or as recommended by the vehicle manufacturer. Refer to your owner's manual for the filter's location.

## **FUEL FILTER**

For reliable engine operation and fuel system performance, a clean fuel supply is absolutely essential. The fuel filter is the fuel system's primary line of defense against dirt, debris and small particles of rust that flake off the inside of the fuel tank. If not trapped by the filter, such contaminants can plug fuel metering orifices in a

carburetor or prevent valves from seating. In fuel injected engines, fuel debris can clog the injector inlet screens and starve the injector for fuel. And if debris gets inside the injector, it can wear or jam the pintle valve and seat.

With diesel engines, clean fuel is even more important because of the extremely close tolerances inside the injection pump.

The typical OEM recommendation today for fuel filter replacement is every 30,000 miles—but many professional mechanics say yearly fuel filter changes is a good way to prevent fuel-related problems.

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