

Why Change Brake Fluid

A Guide to Brake Fluid Inspection & Testing

Brake Fluid



Brake Fluid is a hot topic because most people don't know why it should be changed. Did you know the average motorist who drives 10,000 to 15,000 miles a year uses his brakes about 75,000 times a year? Did you know that nearly half of all motorists in a recent Car Care Council survey said brake failure was their number one fear amongst driving emergencies?

So consider this: After three years of service, the average boiling point of the brake fluid has dropped to a potentially dangerous level because of moisture contamination and may not meet minimum federal requirements for brake fluid.

Note: Workhorse Custom Chassis recommends fluid check with replacement ever two (2) years or 24,000 miles. (Whichever comes first)

Probably half of all cars and light trucks that are 10 or more years old in the U.S. have never had their brake fluid changed. Yet in many European countries, regular brake fluid checks are required, and half of all cars routinely fail such tests. That's a good case for changing brake fluid.

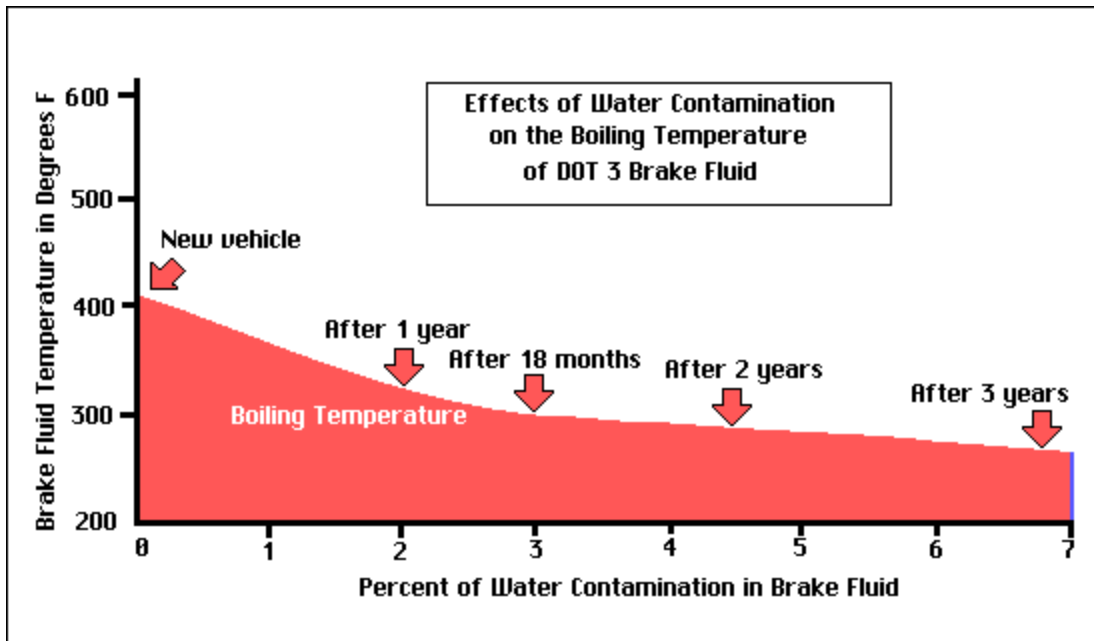
Replace Brake Fluid

Brake fluid is one of the most neglected fluids in vehicles today, yet is vitally important for safe driving. Consequently, professional technicians should be checking the fluid and recommending that the brake fluid be changed if it is contaminated. The issue is old brake fluid may not be safe if moisture contamination is above a certain level.

Brake Fluid Preventive Maintenance

Many experts have long recommended changing the brake fluid every year or two for preventative maintenance. Their rationale is based on the fact that glycol-based brake fluid starts to absorb moisture from the moment it is put in the system. The fluid attracts moisture through microscopic pores in rubber hoses, past seals and exposure to the air. The problem is obviously worse in wet climates where humidity is high.

After only a year of service, the brake fluid in the average vehicle may contain as much as two percent water. After 18 months, the level of contamination can be as high as three percent. And after several years of service, it is not unusual to find brake fluid that contains as much as seven to eight percent water.



An NHTSA survey found that the brake fluid in 20% of 1,720 vehicles sampled contained 5% or more water!

As the concentration of moisture increases, it causes a sharp drop in the fluid's boiling temperature. Brand new **DOT 3** brake fluid must have a dry (no moisture) boiling point of at least 401 degrees F, and a wet (moisture-saturated) boiling point of no less than **284 degrees**. Most new **DOT 3** fluids exceed these requirements and have a dry boiling point that ranges from **460 degrees** up to over **500 degrees**.

Only one percent water in the fluid can lower the boiling point of a typical **DOT 3** fluid to **369 degrees**. Two percent water can push the boiling point down to around **320 degrees**, and three percent will take it all the way down to 293 degrees, which is getting dangerously close to the minimum **DOT** and **OEM** requirements.

DOT 4 Fluid: has a higher minimum boiling temperature requirement (446 degrees F dry and 311 degrees wet) soaks up moisture at a slower rate but suffers an even sharper drop in boiling temperature as moisture accumulates. Three percent water will lower the boiling point as much as 50%!

Considering the fact that today's front-wheel drive brake systems with semi-metallic linings run significantly hotter than their rear-wheel drive counterparts, high brake temperatures require fluid that can take the heat. But as we said earlier, the brake fluid in many of today's vehicles cannot because it is old and full of moisture.

Water contamination increases the danger of brake failure because vapor pockets can form if the fluid gets too hot. Vapor displaces fluid and is compressible, so when the brakes are applied the pedal may go all the way to the floor without applying the brakes!

In addition to the safety issue, water-laden brake fluid promotes corrosion and pitting in caliper pistons and bores, wheel cylinders, master cylinders, steel brake lines and ABS modulators.

Fluid Related Brake Failures

From time to time we hear about reports of "unexplained" brake failures that caused accidents. When the vehicle's brakes are inspected, no apparent mechanical fault can be found. The fluid level is normal, the linings are within specifications, the hydraulics appears to be working normally and the pedal feels firm. Yet the brakes failed. Why? Because something made the brakes hot, which in turn overheated the fluid causing it to boil. The underlying cause often turns out to be a dragging rear parking brake that does not release. But that's another story.

The same kind of sudden brake failure due to fluid boil may occur in any driving situation that puts undue stress on the brakes: a sudden panic stop followed by another, mountain driving, towing a trailer, hard driving, etc.

OEM Fluid Recommendations

What do the auto makers say about fluid changes? General Motors and Chrysler do not mention brake fluid in their scheduled maintenance recommendations. A General Motors spokesman said **Delco Supreme 11 DOT 3 brake fluid** contains additives than many other brake fluids do not, so it is essentially a lifetime fluid. Starting in 1993, GM began using a new type of rubber brake hose with an EPM lining and outer jacketing that reduces moisture penetration by 50%. So GM does not consider fluid contamination to be a significant problem.

Ford, however, recently changed its position and now recommends fresh fluid every 36,000 miles or three years, and to replace the fluid each time the brake pads are changed.

Several import vehicle manufacturers also recommend brake fluid changes for preventive maintenance. In Europe, brake fluid changes are often recommended. BMW says the fluid should be changed every two years. Honda recommends a flush & fill every 25,000 to 30,000 miles. Subaru also recommends a 30,000 mile brake fluid change. Volkswagen recommends changing the fluid every two years, and clearly states this in their **owner's** manuals.

If motorists would only follow this simple advice to change their brake fluid periodically, they could greatly reduce the risks associated with moisture-contaminated brake fluid. **They** could extend the life of their brake systems and likely save themselves a lot of money in the long run, especially if their vehicle is equipped with ABS (because ABS modulators are very expensive to replace!).

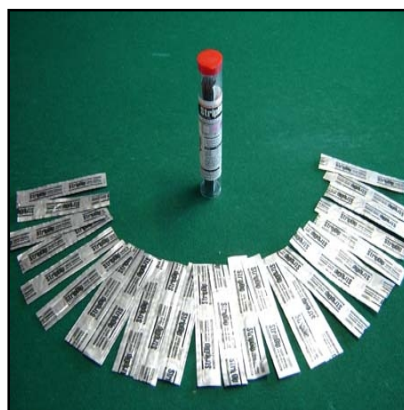
Testing Brake Fluid

Since you can't tell how badly contaminated brake fluid is by its appearance alone (unless the fluid is full of rust or is muddy brown), the fluid should be tested unless you are changing it for preventive maintenance or as part of a brake job.

There are three ways to check the condition of your brake fluid; Listed Below are examples of the three:



- **An optical refractometer.**
- Will clearly show the amount of moisture in the brake fluid. A small drop of fluid is placed in the tester, and then the tester is held up to a light to read the amount of contamination. This tester is extremely accurate and shows both the percent of moisture and the fluid's boiling point. A source for this type of tool is Misco or Reichert.



- **Chemical Test Strip**

- A chemical test strip made by **Phoenix Systems (888-749-7977)** www.stripdip.com called "**Strip Dip**" can reveal the condition of the corrosion inhibitors in the brake fluid. The FASCAR chemicals react to the presence of copper in the fluid. The test strip changes color to reveal the condition of the fluid. When copper levels reach 100, it indicates the corrosion inhibitors are nearing the end of their life. If the copper level is 200 or higher, the corrosion inhibitors are worn out and the fluid needs to be changed.



- **Electric Brake Fluid Tester.**

- Actually measure the fluid's boiling point. The test takes only about a minute and is quite accurate. If the fluid's boiling temperature is getting dangerously low, replacement is recommended to minimize the risks of pedal fade caused by fluid boil. Sources for electronic brake fluid testers include Alba Diagnostics, MISCO and OTC.

Changing Brake Fluid



When the fluid is changed, use the type of brake fluid (**DOT 3 or 4**) specified by the vehicle manufacturer. The cap on the fluid reservoir will usually indicate what type of brake fluid is required. You can also find this information in your Owner's Manual (look under brake fluid).

As any brake fluid supplier will tell you, brake fluid is NOT a generic product. Just because a fluid meets the minimum DOT 3 or DOT 4 specifications does not mean it can tolerate moisture or provide the same degree of corrosion protection as another brand of fluid.

Raybestos, for example, recently introduced a new "**Super Stop Super High Performance**" **DOT 3 fluid** with a dry boiling point of 550 degree F, which meets Ford's latest requirements.

So the next time you are inspecting or servicing the brakes, be sure to check the condition of the fluid as well as the level. If you add or change fluid, use **types specified by the vehicle manufacturer (DOT 3 or 4)** and use the highest quality fluid you can get. And above all, remember the benefits of changing the brake fluid for preventive maintenance.