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Brake Fluid

Should brake fluid be changed periodically?

Yes! Almost all of the vehicle manufacturers have specific recommendations for the periodic changing of brake fluid. Examples of recommendations are:

- Mercedes, BMW, VW, and Volvo recommend changing brake fluid every 24 months.
- Nissan has started recommending at 15,000 miles.
- Honda, Acura, and Mazda recommend brake fluid change every 36 months.
- Chrysler, Ford and GM recommend that brake fluid be changed “when needed.”
- The Motorist Assurance Program (MAP) and the Uniform Inspection and Communication Standards (UICS) require brake fluid be changed whenever copper contents exceed 200 ppm.
- The National Highway Traffic and Safety Administration (NHTSA) states that brake fluid’s boiling point can be below minimum standards in as little as 18 months.
- AAA recommends that brake fluid be changed every two years or 50,000 miles whichever comes first.

Why does brake fluid need to be changed?

- 1) Corrosion resistance
- 2) Moisture

What about corrosion resistance?

In 1998, NHTSA and NIST (National Institute for Standards and Technology) released a study “Preliminary Investigations into Corrosion in Anti-Locking Braking Systems” The study was in response to complaints about the operation and performance of anti-lock brake systems (ABS). The conclusion was that ABS systems, with their increased circulation and closer tolerance valves are more susceptible to corrosion than conventional brakes.

When brake fluid is new it contains corrosion inhibitors. These inhibitors decline over time. As they decline the rate of deterioration increases. A good measure of the deterioration of the inhibitors is the amount of copper in the fluid. New fluid will have no copper, but over time copper is leached from brake lines and other sources. The amount of copper is a good determination of the loss of corrosion resistance and the “virtual” age of the fluid.

Without the corrosion resistance, parts of the brake system, ABS, and vehicle stability control systems can be damaged.

What impact does this have on my ABS (antilock or stability control braking system)?

Per AlliedSignal’s Bendix (a leading brake manufacturer) “The ABS modulator unit isn’t just



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complicated and expensive, it will get damaged if the fluid is either dirty or moisture-contaminated. Since most brake fluid naturally absorbs moisture from the atmosphere, the only way to fight this problem is to regularly flush and replace fluid every 2 years or 24,000 miles.”

Why is moisture a problem?

Brake fluid is a non-compressible liquid (like hydraulic fluid.) As the brake pedal is pushed, this force is transmitted to the individual brakes via the brake fluid. Fluids are generally non-compressible, while gases (vapor/moisture) are compressible. If brake fluid boils (becomes a gas) it will lose its ability to transmit force - in other words, brake failure. The Department of Transportation (DOT) requires that brake fluid have a dry (no moisture) boiling temperature of at least of 401 degrees, with a wet temperature of no less than of 284 degrees.

A 3% moisture content in DOT3 brake fluid will reduce the boiling point to 293 degrees. Which is dangerously close to DOT and OEM requirements. Based on NHTSA (National Highway Traffic Safety Administration) studies, brake fluid can absorb 3% moisture through hoses and valves in 18 months. 20% of the cars tested had a moisture content over 5%.

DOT4 brake fluid does not absorb moisture as fast but is impacted by the moisture to a greater degree. A 3% moisture content in DOT4 fluid reduces the boiling point up to 50%.

Are some vehicles more susceptible to these problems than others?

Vehicles that have hotter brakes are more subject to problems due to moisture in the brake fluid. Example vehicles are:

Front wheel drive brake systems cars with semi-metallic linings run significantly hotter than rear drive vehicles.

Vehicles that carry heavy loads, pull trailers, are used in mountainous terrain, and have a lot of hard (panic) stops are particularly vulnerable to overheated brake fluid.

Source material:

National Institute for Standards and Technology (a US Government agency)

National Highway Transportation Safety Administration (a US Government agency)

MAP in conjunction with UICS

Phoenix Systems



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