

**Бузулукова В.**

## **BRAKE FLUIDS**

Brake fluid is a type of hydraulic fluid used in hydraulic brake and hydraulic clutch applications in automobiles, motorcycles, light trucks, and some bicycles. It is used to transfer force into pressure. Because oils damage rubber seals and hoses in the braking system, brake fluids are not petroleum-based. Most brake fluids used today are glycol-ether based, but mineral oil and silicone based fluids are also available. Brake fluids must have certain characteristics and meet certain quality standards for the braking system to work properly.

Brake fluid is subjected to very high temperatures, especially in the wheel cylinders of drum brakes and disk brake calipers. It must have a high boiling point to avoid vaporizing in the lines. This vaporization is a problem because vapor is compressible and negates hydraulic fluid transfer of braking force.

Quality standards refer to a brake fluid's "dry" and "wet" boiling points. Wet boiling point, which is usually much lower, refers to the fluid's boiling point after absorbing a certain amount of moisture. This is several (single digit) percent, varying from formulation to formulation. Glycol-ether brake fluids are hygroscopic (water absorbing), which means they absorb moisture from the atmosphere under normal humidity levels. Non-hygroscopic fluids (e.g. silicone), are hydrophobic, and can maintain an acceptable boiling point over the fluid's service life, although at the cost of potential phase separation/water pooling and freezing/boiling in the system over time - the main reason single phase hygroscopic fluids are used.

For reliable, consistent brake system operation, brake fluid must maintain a constant viscosity under a wide range of temperatures, including extreme cold. This is especially important in systems with an anti-lock braking system (ABS), traction control, and stability control (ESP). Brake fluids must not corrode the metals used inside components such as calipers, master cylinders, etc. They must also protect against corrosion as moisture enters the system. Additives (corrosion inhibitors) are added to the base fluid to accomplish this. Brake fluids must maintain a low level of compressibility that remains low, even with varying temperatures..

Most automotive professionals agree that glycol-based brake fluid, should be flushed, or changed, every 1–2 years. Many manufacturers also require periodic fluid changes to ensure reliability and safety. Electronic testers and test strips are commercially available to measure moisture content. The corrosion inhibitors also degrade over time. New fluid should always be stored in a sealed container to avoid moisture intrusion.

Silicone fluid like DOT 5 does not allow moisture to enter the system, but does not disperse any that is already there. A system filled from dry with silicone fluid does not require the fluid to be changed at intervals, only when the system has been disturbed for a component repair or renewal. The United States armed forces have standardised on silicone brake fluid since the 1990s. Silicone fluid is used extensively in cold climate, particularly in Russia and Finland.

Brake fluid can be dangerous as it is toxic and flammable but has a high flash point. It can become explosive in the presence of Chlorine powder and acts as a mild paint remover if left on painted surfaces.

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