

# Technical Information

**LIQUI  
MOLY**

## Brake fluid

Brake fluid is a hydraulic fluid that is responsible for the transmission of power in the brake system. It is usually not made of mineral oil, but of polyglycol. In addition to power transmission, the brake fluid must protect the brake system from corrosion, lubricate it at the same time and be formulated in such a way that seals and other materials are not attacked.

The forces acting during the braking process cause the brakes and their surroundings to become very hot. This can also cause the brake fluid to heat up. A high boiling point is therefore crucial.

There is also the possibility that water may penetrate the brake system, e.g. due to humidity. The hygroscopic property of the brake fluid ensures that this water is absorbed and dissolved so that there is no impairment in the case of small quantities. This is necessary because otherwise water drops could form in the brake system. These lead to corrosion in the brake system. In addition, they freeze at low temperatures, which can lead to failure of the brake system.



Old brake fluid (left) compared to new, unused brake fluid (right).

### Problem

#### 1. Boiling point:

Bubbles may form when the brake fluid exceeds the boiling point. During additional brake applications, only the air bubbles are compressed, which means that the braking force can hardly be transmitted or, in the worst case, no longer be transmitted at all. For this reason water, for example, is unsuitable as a medium.

#### 2. Wet boiling point:

The wet boiling point describes the boiling temperature of the brake fluid at a water content of 3.5 %.

Over time, the water content in the brake fluid increases and impairs safety. The water dissolved in the brake fluid lowers the boiling point and can form bubbles when heated strongly, which endanger the transmission of the brake force. In winter there is a risk of the water freezing. In addition, the dissolved water promotes rust formation in the brake system, especially at the brake piston, and it reduces lubricity. From 3 % water content the brake fluid should therefore always be changed.

### Solution

In order to guarantee that the brake system works optimally, the following is necessary

- A regular service and replacement of the brake fluid must be performed (depending on the quality, within 1 to 3 years).
- A brake fluid must be used which complies with the legal and technical standards as well as the manufacturer's instructions.

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When changing the brake fluid, the manufacturer's specifications must be followed. A brake fluid of the correct standard must be used.

	DOT 3	DOT 4	SL6 DOT 4	DOT 5.1	RACE*
Classification	ISO Class 3	SAE J 1704	ISO Class 6	ISO Class 5.1	
Base	Polyglycol	Polyglycol	Polyglycol	Polyglycol	Polyglycol
Boiling temperature °C	≥ 205	≥ 230	≥ 260	≥ 260	≥ 320
Wet boiling point °C	≥ 140	≥ 155	≥ 180	≥ 180	≥ 195
Viscosity at -40°C mm²/s	≤ 1,500	≤ 1,800	≤ 900	≤ 900	≤ 1,800

\*Special product developed by LIQUI MOLY for extreme operating conditions in racing.

## Note

- Brake fluid of another standard can be problematic: If the standard is too low, the boiling point may be too low and cause problems. If the standard is too high, seals and other materials may be attacked by the additives.
- It is possible to refill brake fluids from the same manufacturer and of the same quality, but it makes no technical sense. A complete brake service is advisable when the brake fluid is very low.
- Brake fluid is considered hazardous waste and must therefore be disposed of in a proper disposal system. Brake fluid is a water-polluting fluid and must also not be added to the waste oil. Storage in the oil cabinet must be avoided at all costs.
- LIQUI MOLY brake fluid has a shelf life of 2 years. Depending on the formulation and the hygroscopic properties, some fluids can also be stored for up to 3 years. The type of container has no effect on the shelf life. The shelf life applies only to the closed container. Depending on the quality, the brake fluid has to be changed within 1 to 3 years.

**DOT 3** Brake fluids of this standard are often found in older vehicles. It should not be mixed with brake fluids of other standards, as the fluid with DOT 4 is much more aggressive and rubber seals in DOT 3 brake systems can swell as a result, which in the worst case can lead to failure of the brake system.

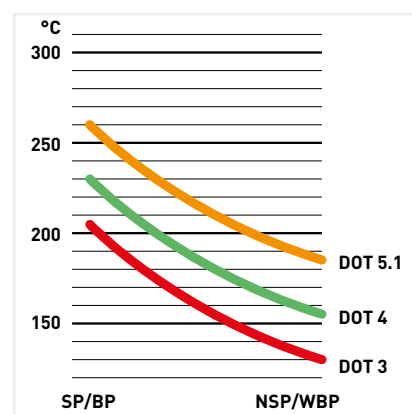
**DOT 4** The boiling point of fluids of this standard is higher than the boiling point of DOT 3. DOT 4 is mainly used in current vehicle models.

**SL6 DOT 4** Vehicles with electronically controlled braking systems such as ABS and ESP® also require brake fluids with particularly low viscosity based on DOT 4. LIQUI MOLY offers the SL6 DOT 4 standard especially for this purpose.

**DOT 5.1** The DOT 5.1 is a glycol-based fluid compatible with DOT 3 and DOT 4. It can combine outstandingly with water. Thus the boiling point sinks only minimally.

**RACE** Dry and wet boiling point of this special brake fluid based on DOT 4 exceed the high requirements of a DOT 5.1 brake fluid. It was specially developed for extreme operating conditions in racing.

**Mineral oil basis** Hydraulic fluids based on mineral oils are also used as brake fluid in individual cases, e.g. at the vehicle manufacturer Citroën. These liquids are recognizable by their fluorescent green-yellow color. They are not referred to as brake fluids and must never be mixed with DOT brake fluids.



**Graphic:** Reduction of boiling point with increasing water content



## Complete brake service with LIQUI MOLY products

Though it is possible to refill brake fluids from the same manufacturer and of the same quality, it makes no technical sense. The low fluid level normally indicates that the brakes are already worn. A complete brake service is therefore advisable when the brake fluid is very low. We recommend the following products for this.



**Rapid Cleaner**



**Brake Anti-Squeal**



**Wheel Hub**



**Brake Pin**

# Technical Information



## Problem

## Recommended product

## Functional characteristics/Application

Wear on the brake pads produces brake dust that then collects on the brake system. This must be removed before working on the brake system or replacing the brake pads if trouble-free operation is to be guaranteed.



### Rapid Cleaner

**Description:** Suitable for cleaning engine parts, drum and disk brakes, pads, tools, oil pans, etc.

**Application:** Spray contaminated components and allow to drain. After the solvent has evaporated, the components will be clean and free from grease.

Brake pads are generally assembled in the factory without a high-temperature paste between the contact faces of the brake pad carrier. This causes the carrier to jam in the braking process due to insufficient lubrication, which in turn leads to vibrations that become audible in the form of squealing.



### Brake Anti-Squeal

**Description:** Ensures smooth guidance of the brake pads. Thereby preventing jamming, keeping the carrier movable and making squealing a thing of the past.

**Application:** Rub into the back of brake pad as well as onto contact surfaces and fasteners. Do not apply to friction surfaces!

Particularly in winter or in areas with high humidity, corrosion occurs between the wheel hub and the rim due to (salt) water. In many cases this means that the rim can only be detached from the hub with great force.



### Wheel Hub

**Description:** Prevents corrosion and oxidation between the rim and wheel hub.

**Application:** Clean the wheel hub as well as reducing ring and aluminum rims, if necessary, with LIQUI MOLY Rapid Cleaner. After evaporation of the solvents, coat the components with Wheel Hub.

As the brake system ages or if the sealing sleeve suffers damage, the brake pin of the brake caliper becomes increasingly immobile. This means that the full braking force cannot be generated, so that the brake pads wear at uneven rates.



### Brake Pin

**Description:** Guarantees the best possible mobility of the brake pins of the brake caliper.

**Application:** Clean brake pins with LIQUI MOLY Rapid Cleaner and coat with Brake Pin after the solvent has evaporated.