

## Tech Talk tips / techniques / training

### Brake Fluid - Changing technologies

#### Brake fluids are becoming more complicated. Why is this?

Vehicle technology has moved on and nowadays the modern passenger car weighs more, accelerates harder and travels substantially faster than its older counterpart. It therefore requires substantially more braking force to bring modern vehicles to a stop. Combined with complex, computer controlled functions such as ABS and ESP, the higher weight and faster speed of modern vehicles makes modern brake systems considerably more demanding on brake fluid than they ever were. Modern vehicles therefore need modern, high performance brake fluids in order to keep them braking effectively and safely.

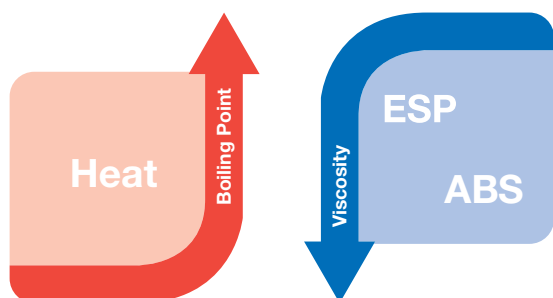


Figure 1 - A more demanding application

#### Are there any other types of brake fluid?

As well as synthetic PAG-based products there are other types of brake fluid. Mineral oil based products (Comma's LHM+) have been used in the combined hydraulic systems of Citroens for years. They are designed specifically for this type of application and are not suitable for use where DOT products are specified. They are also not compatible and should never be mixed.

#### Which brake fluid do I need for my car?

There are a range of products to meet the demands of modern vehicles. Synthetic fluids, based on polyalkylene glycol (PAG), are the most common type (DOT3, DOT4, DOT 4 ESP and DOT 5.1). They are compatible with one another and therefore can be mixed however, as with oil and coolant, you should always comply with the manufacturers' specifications for the intended vehicle as using the wrong fluid can seriously compromise braking performance.



Figure 2 - Synthetic DOT products



Figure 3 - Mineral LHM+



Figure 4 - Silicone DOT 5.0

The final type of brake fluid is rather confusingly called DOT 5.0 but it should not be confused with the other DOT specified brake fluids as it is completely different technology. DOT 5.0 is a silicon-based product designed for specialist applications, such as racing cars where the fluid is changed after every race. It is not compatible with any other type of brake fluid and is not recommended for conventional applications. (Comma doesn't make a DOT 5.0 fluid which is why the bottle on the picture is grey).

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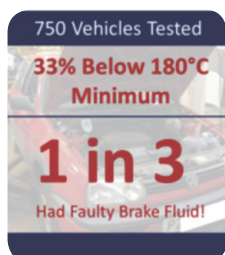
### I've heard that brake fluid is *hygroscopic*. What does that mean?

Brake fluid is hygroscopic which means that it absorbs water from the air around it hence why you are always advised to start each new brake fluid change with an unopened container of brake fluid.

However, absorbing water is part of the brake fluid's function. By keeping water locked in tight it stops it from pooling in the lower areas of a braking system. This helps to maintain hydraulic pressure, protects against corrosion and maintains the viscosity of the fluid (i.e. it keeps it doing its job). The downside is that as the brake fluid absorbs water its boiling point drops and eventually brake fluid will absorb enough water such that the boiling point becomes dangerously low. This is more or less how the service life of brake fluid is defined.

### The brake fluid test

Comma did some testing of their own with a brake fluid tester and the results were quite astonishing. We tested around 750 vehicles and of those approximately 33% were measured at below the 180°C minimum. One was as low as 100°C which is the boiling point of pure water! The risks associated with driving a vehicle with faulty brake fluid are self-evident and compelling. It's simply not enough to change brake fluid at the same time as faulty discs or pads. Like engine oil or coolant, brake fluid should be changed at the manufacturer's recommended intervals and at any time in between if it is found to be faulty with a brake fluid boiling point tester.



### When do I need to change the brake fluid?

As the brakes start to heat up temperature of water-contaminated brake fluid approaches and eventually exceeds its boiling point and this causes vapour bubbles to appear. This vapour is very compressible and absorbs large amounts of the force applied to the brake pedal before it ever reaches the calipers, thus making the brakes feel spongy. As the brake fluid gets older, it will continue to absorb more and more water such that the boiling point becomes dangerously low, and so, given the above information, manufacturers always recommend a change of brake fluid at a particular interval (typically between 1 and 2 years).

### How to select the right Brake Fluid

To make this increasingly complicated choice a lot easier you can use the Comma Application Guide or our website where you can select your vehicle using the VRN (Vehicle Registration Number) tool or by using the make and model search. Fluid should be changed at the manufacturer's recommended, you will then be presented with a printable full vehicle recommended product report including engine oil, antifreeze & coolant, transmission oils, brake fluid and greases if applicable.

