

# UNDERSTANDING BRAKE FLUIDS

## CHOOSING THE RIGHT BRAKE FLUID

Most drivers today probably don't have much of an idea of what type of brake fluid they have in the vehicle. Brake fluids that do not meet current DOT specifications can speed up the deterioration of brake components and can also lead to the malfunctioning of ABS (Anti Brake Skid), ESP (Electronic Stability Program) or AEB (Automatic Emergency Braking) systems.

## BRAKE FLUID SPECIFICATIONS

DOT (Department of Transportation), is an American government transport department. DOT set standards such as FMVSS (Federal Motor Vehicle Safety Standard) very similar to the JIS in Japan or DIN in Germany. AS (Australian Standards), SAE and ISO also set standards for brake fluids.

The table below shows brake fluid specifications.

PROPERTY	AS 1960.1			FMVSS 116			SAE		ISO
	GRADE 1	GRADE 2	GRADE 3	DOT 3	DOT 4	DOT 5.1	J1703	J1704	4925
DERBP °C min	230	260	260	205	230	260	205	230	205
WERBP °C min	140	155	170	140	155	180	140	155	140
VISCOSITY (-40 °C) max	1500	1800	1800	1500	1800	900	1800	1800	1800

### DERBP (Dry Equilibrium Reflux Boiling Point):

Boiling point temperature when the fluid is brand new, no moisture absorption.

### WERBP (Wet Equilibrium Reflux Boiling Point):

Boiling point temperature with fluid that has 3.7% water by volume, typically after 1-2 years of fluid use.

## OTHER BRAKE FLUIDS

### Mineral Brake Fluid:

Mineral based brake fluids as used by Rolls Royce in a few of its models during the 1980's as well as other makes are suspension and brake fluids that have different properties to DOT fluids.

### Silicone Brake Fluid:

A silicone brake fluid is also known as a DOT 5 brake fluid. Silicone brake fluids are not hygroscopic so they do not absorb moisture. They are extremely expensive compared to standard polyglycol based fluids.

## VISCOSITY

A measure to represent the brake fluid flow property. Higher the value, the more difficult for the fluid to flow. If the value is high when the air temperature is low, the fluid can have a negative effect on ABS performance.

## pH VALUE

Value to show acidity/basicity of a solution. If the pH value is lower than 7.0 (acidic), the fluid can accelerate corrosion of other brake components.

## WHAT IS BOILING POINT TEMPERATURE?

The temperature at which the fluid boils. Water boils at 100°C whereas brake fluid with high boiling point will boil at over 300°C, and low boiling point brake fluid will boil around 140°C depending on condition of fluid.

## WHY IS A LOW BOILING POINT TEMPERATURE NOT ACCEPTABLE?

When driving a vehicle, brake pads can reach extremely high temperatures (up to 300°C). This heat is passed onto the brake fluid through the brake calipers, which can raise the fluid temperature over 200. If the brake fluid is repeatedly heated past its boiling point, some of the fluid vaporizes and creates air bubbles within the brake lines. This can lead to a very dangerous situation where the brake lines are carrying air instead of brake fluid.

Air can be compressed which is why it must bleed out of brake systems so that the brake fluid can properly compress the pistons inside the brake caliper, thereby applying the brakes.

## WHAT IS PERCENT WATER BY VOLUME?

The most common ingredient of brake fluid is glycol-ether. This fluid is hygroscopic which means it absorbs moisture from the atmosphere. The 'percent by volume' is a measure of the water content in the brake fluid.

## HOW FREQUENTLY SHOULD BRAKE FLUID BE REPLACED?

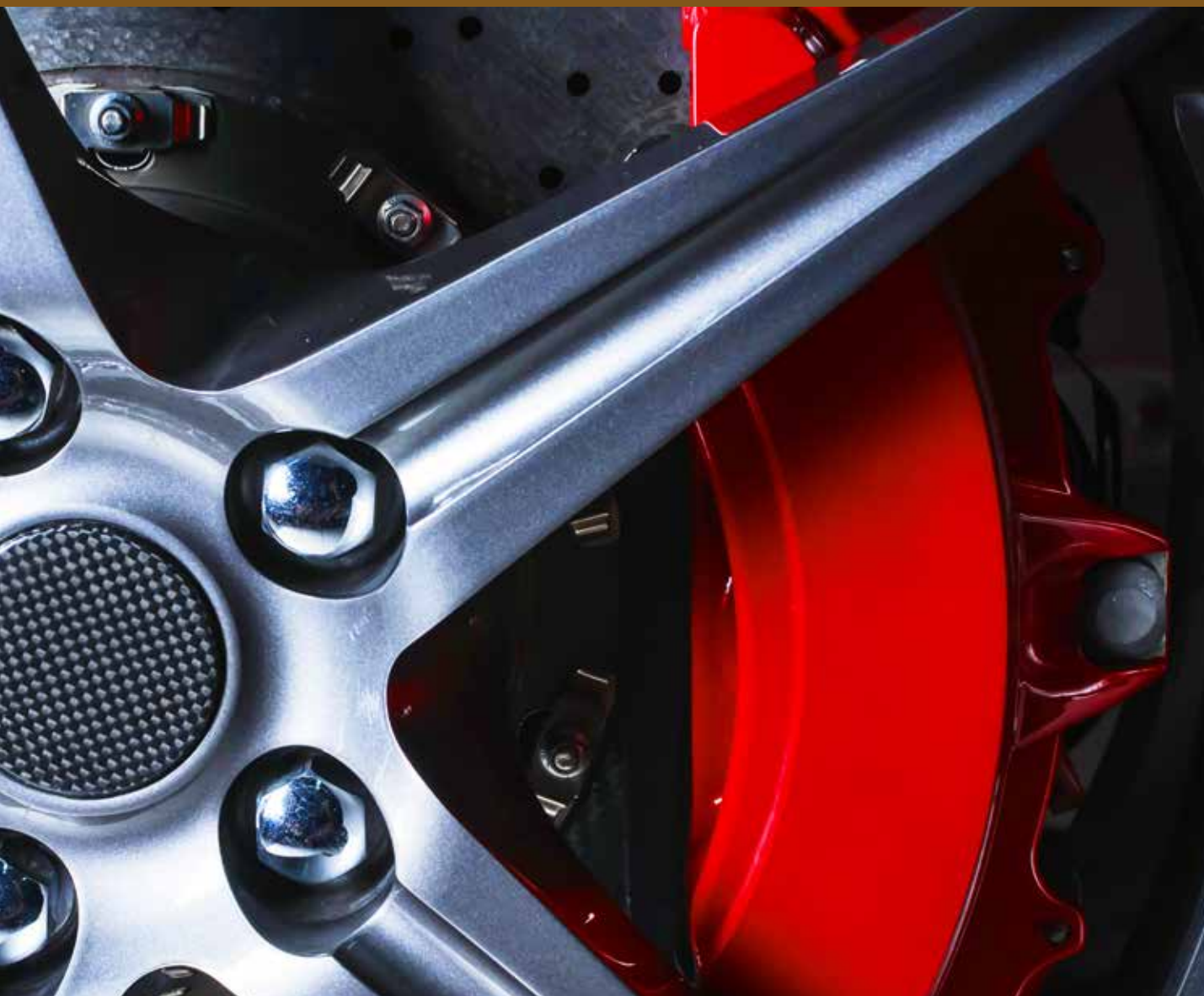
For everyday drivers, who use brake fluid that exceed DOT 4 specification, fluid replacement once every 2 years is acceptable. For people who use DOT 3 fluid, fluid replacement every year is recommended. For people who drive aggressively on winding roads, fluid replacement every six months to a year is recommended. For people who drive their cars on the race circuit, replacement before each event is recommended.

## MIXING BRAKE FLUIDS

This is not recommended. By adding new brake fluid to old brake fluid, you are potentially mixing water absorbed brake fluid with new product, lessening the effect and lowering the lifespan of the newer fluid. DOT 3, DOT 4, Super DOT 4 and DOT 5.1 fluids are miscible although this is not recommended. DOT 5 fluid is NOT mixable with DOT 3, DOT 4, Super DOT 4 or DOT 5.1 fluids.



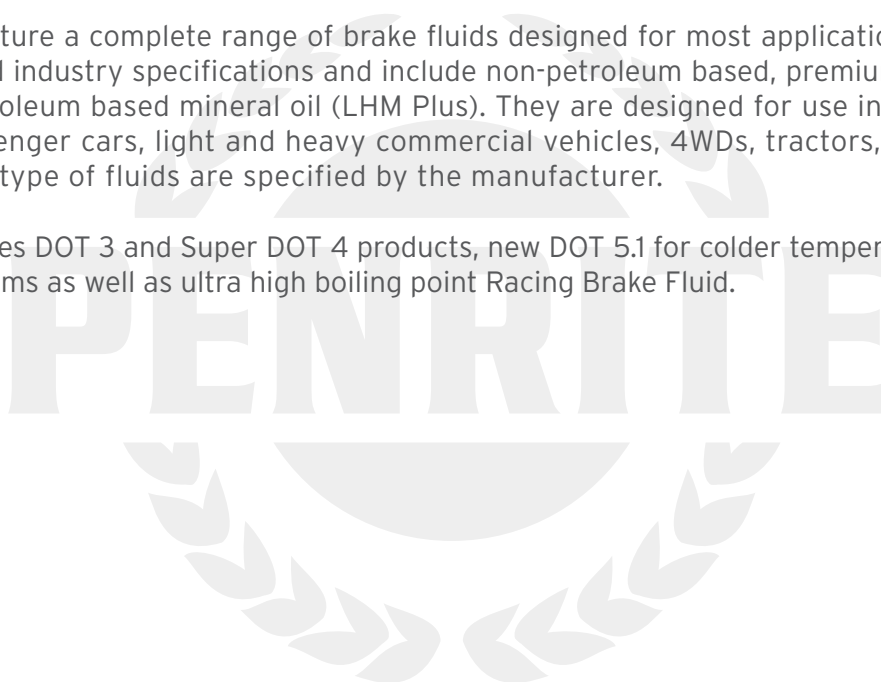
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## BRAKE FLUIDS

Penrite manufacture a complete range of brake fluids designed for most applications. Our products meet and exceed industry specifications and include non-petroleum based, premium synthetic fluids as well as a petroleum based mineral oil (LHM Plus). They are designed for use in brake and clutch systems in passenger cars, light and heavy commercial vehicles, 4WDs, tractors, motorcycles and wherever these type of fluids are specified by the manufacturer.

The range includes DOT 3 and Super DOT 4 products, new DOT 5.1 for colder temperatures and micro-valved ABS systems as well as ultra high boiling point Racing Brake Fluid.



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## DOT 3 Brake Fluid

Product Code	Pack Size	Carton Qty
DOT30005	500 Millilitres	6
DOT3004	4 Litres	4
DOT3020	20 Litres	1

**Base Oil:** Full Synthetic

**Colour:** Amber

**Key Specifications:** AS 1960-2005 Grade 1, ISO 4925 Class 3, US FMVSS No 116 DOT 3, SAE J1703

Penrite DOT 3 Brake Fluid is a premium quality, non-silicone, non-mineral/petroleum based, full synthetic brake fluid designed for use in a wide range of brake and clutch applications, where a DOT 3 fluid is specified. DERBP: 240° C / 465° F.



## DOT 4 ESP Brake Fluid **NEW**

Product Code	Pack Size	Carton Qty
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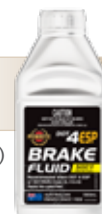
DOT4ESP0005	500 Millilitres	6
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**Base Oil:** Full Synthetic

**Colour:** Amber

**Key Specifications:** FMVSS 116 DOT 4, SAE J1704, ISO 4925 (3, 4 & 6)

Penrite DOT 4 ESP Brake Fluid is a premium quality, non-silicone, non-mineral/petroleum based, full synthetic low viscosity brake fluid optimised for use in vehicles with ABS and ESP systems as well as standard brake and clutch applications. Suitable for use in many European applications. DERBP: 265° C / 509° F.



## Super DOT 4 Brake Fluid

Product Code	Pack Size	Carton Qty
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BF0005	500 Millilitres	6
BF004	4 Litres	4
BF020	20 Litres	1

**Base Oil:** Full Synthetic

**Colour:** Amber

**Key Specifications:** AS 1960.1-1995, Ford ESZ-M6C55-A, Holden HN 1796 (suitable for use), ISO 4925, JIS K2233 (Japan), Rover, SAE J1703/J1704, US FMVSS No 116 Super DOT 4

Penrite Super DOT 4 Brake Fluid is a premium quality, non-silicone, non-mineral/petroleum based, full synthetic brake fluid designed for use in a wide range of brake and clutch applications where a DOT 4 fluid is required. Also suitable for use in applications requiring a DOT 3 fluid. DERBP: 275° C / 525° F.



## DOT 5.1 Brake Fluid

Product Code	Pack Size	Carton Qty
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DOT510005	500 Millilitres	6
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**Base Oil:** Full Synthetic

**Colour:** Amber

**Key Specifications:** FMVSS 116 DOT 5.1, DOT 4 and DOT 3, SAE J1703/J1704, ISO 4925 (5.1, 4 & 3)

Penrite DOT 5.1 Brake Fluid is a premium quality, full synthetic, non-silicone, DOT 5.1 brake fluid designed where DOT 5.1 lower viscosity fluids are required in colder climatic conditions or in systems requiring faster circulation fluid to perform correctly. Compatible with DOT 3, DOT 4 & Super DOT 4 fluids. DERBP: 269° C / 515° F.



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## 10 Tenths Racing Brake Fluid

Product Code	Pack Size	Carton Qty	Base Oil: Full Synthetic	Colour: Amber
RBF0005	500 Millilitres	6	<p><b>Key Specifications:</b> AS 1960.1-2005, SAE J1704, US FMVSS No 116 Super DOT 4</p> <p>Penrite 10 Tenths Racing Brake Fluid is a premium full synthetic polyalkylene glycol ether ester based brake fluid for long life and maximum performance in severe braking conditions. Not compatible with DOT 3 or silicone based DOT 5 fluids. Compatible with DOT 5.1 and other DOT 4 fluids. DERBP: 310° C / 600° F.</p>	



## LHM Plus

Product Code	Pack Size	Carton Qty	Base Oil: Premium Mineral	Colour: Green
LHMP001 LHMP020	1 Litre 20 Litres	6 1	<p><b>Key Specifications:</b> Renault PSA B71 2710, Ford ESN M6C59-A, ISO 7308, Massey Ferguson MF 1151, VW 2000</p> <p>Penrite LHM Plus is a Premium Mineral oil specifically designed for use in power steering, suspension, hydraulic and braking systems, where a mineral LHM fluid is required. Meets ISO 7308 for petroleum based fluids used in stored energy systems.</p>	



### Key Features & Benefits of the Brake Fluids range:

- Excellent braking response due to minimal vapour formation over a wide temperature range, ensuring good breaking performance.
- Compatible with all common brake system materials.
- Product application from road to racing vehicles.

PENRITE PRODUCT	Millilitres	Litres			
	500	1	4	20	
DOT 3 Brake Fluid	⊙	-	⊙	⊙	
DOT 4 ESP Brake Fluid	⊙	-	-	-	
Super DOT 4 Brake Fluid	⊙	-	⊙	⊙	
DOT 5.1 Brake Fluid	⊙	-	-	-	
10 Tenths Racing Brake Fluid	⊙	-	-	-	
LHM Plus	-	⊙	-	⊙	

(All products are available in 1000L Pods, on request)



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