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SUBJECT: BRAKE FLUIDS

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IMPORTANT INFORMATION ON BRAKE FLUIDS

BRAKE FLUIDS

Brake fluids are simple hydraulic fluids which are incredibly important to the safety of your vehicle. DOT 3, DOT 4, and DOT 5.1 fluids are typically made from ethylene oxide (EO) derivatives – ethylene glycols, ethylene glycol ethers, and ethylene glycol ether borate esters. These are industrial solvents that are known for their exceptional stability, very high boiling points, and good cold-flow. It is for these reasons that these commodities are used to make brake fluids.

DOT 5 brake fluids are silicone-based fluids which are incompatible with the EO derived fluids. DOT 5 brake fluids are dyed purple to differentiate them from the other fluids, and should absolutely never be mixed with EO derived fluids. It is very important to use the correct fluid in your brake systems to prevent catastrophic failure.

UNDERSTANDING THE DEPARTMENT OF TRANSPORTATION (DOT) CATEGORIES

The department of transportation separates brake fluid into four categories which are mainly divided by their reflux boiling points, boiling points of humidified fluids, and their viscosities at -40°C. These properties are critically important because the fluid must flow in all conditions, and must never boil – boiling fluid would produce compressible vapor in the brake line, causing spongy or unresponsive brakes.

For most drivers a DOT 3 fluid works well enough to ensure no vapor forms in brake lines and that the fluid flows in cold temperatures. In fact, DOT 3 fluids have better cold-flow properties than other types of brake fluids, providing more responsive brakes in cold weather. A DOT 4 fluid may be necessary for some drive cycles – particularly where terrain is steeply graded and when stop-and-go driving conditions

are more prevalent. This is one reason why most European automotive OEMs specify that a DOT 4 fluid be used in their braking systems. For the most extreme driving cycles, such as racing and high-performance engines, a DOT 4 fluid which has an extra-high boiling point (such as Champion 600 Series Racing Brake Fluid) or a DOT 5.1 fluid may be necessary.

Silicon-based DOT 5 brake fluids (and mineral oil fluids) are used almost exclusively in heavy-duty equipment and military vehicles. The DOT 5 fluids are immiscible with water and retain their properties even in very humid conditions – this is a primary reason for their use in military vehicles. They are, however, more compressible than the EO derived fluids, and are usually associated with a spongy pedal feel.

BRAKE FLUID SPECIFICATIONS

It is important that the brake fluid you use meets safety and quality standards set forth by the Department of Transportation, the International Standards Organization (ISO) and the Society of Automotive Engineers (SAE). All of these organizations specify a certain quality of brake fluid to ensure long component-life, prevent catastrophic equipment failure, and to prevent accidents caused by unexpected brake failure.

It is important that you only use fluids which meet or exceed the requirements of the Federal Motor Vehicle Safety Standard (FMVSS) no. 116. Other qualifications that you should look for when choosing brake fluids are those that meet SAE J1703 (for DOT 3 fluids), SAE J1704 (for DOT 4 fluids) and ISO 4920 for non-petroleum hydraulic brake fluids. And always use the correct type of fluid for your vehicle.