Handbook Supplement

Published March 1965.

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HYDRAULIC BRAKE FLUID CONTAINER COMPATIBILITY - SAE J75

SAE Information Report

Report of Ad Hoc Brake Actuatuing System Coordinating Committee approved February 1965.

PURPOSE

Hydraulic brake fluids for use in the braking system of motor vehicles must conform to the requirements of SAE J70b, Hydraulic Brake Fluid, not only when manufactured, but also after extended storage in any commercial packaging container. Testing of hydraulic brake fluid containers has failed to uncover any commercial container with an adequate preservative capability to encompass every type of hydraulic brake fluid. It is known that some commercial containers may be satisfactory for a specific brake fluid or a number of fluids, but not for all commercial brake fluids. The purpose of this report is to generate an awareness of the major problems involved in the storage of brake fluids and, to some extent, provide means of circumventing them. It is also the purpose of this report to relate experience and test data accumulated and to list certain conclusions drawn which should aid in the selection of containers for brake fluids.

BACKGROUND

The primary problem in selecting containers for brake fluids is the fact that many containers are not capable of preserving all types of brake fluid in their original state. For instance, SAE J70b requires that no more than 0.05% sediment may be found in the fluid when tested in the Water Tolerance Test at 140 F. Some commercially packaged brake fluids known to meet SAE standards when manufactured have been found to exceed the 0.05% limit by as much as thirtyfold, due to contamination from the container.

The variable reactivity of certain inhibitors, as well as other components commonly used in brake fluids, with tin plate, the soldered seams of tin-plated steel cans, organic coated steel, and plastic containers, may create a storage problem because of the formation of precipitates. These precipitates may or may not be soluble in the brake fluid but are often precipitated under the conditions of the Water Tolerance Test and cause the brake fluid to fail to meet this specification test. Other properties of the brake fluid, such as boiling point, corrosion, and stability, may also be affected adversely by storage in certain containers.

EXPERIMENTAL DATA

Rather extensive studies have shown that storability of many brake fluids in soldered tin-plated steel cans, as judged by the quantity of precipitate formed, may be improved by limiting the lead content of the solder and preferably having the solder seam on the outside of the can. The least reactive solders, and therefore best for this use, would contain 100% tin. However, there is no assurance that any solder will be suitable with every brake fluid.

Limited test data suggest that moisture pickup during storage may cause an undesirable drop in boiling point. The effect on the corrosion and stability characteristics of brake fluids due to accelerated and long term storage is being studied but to date no definite trends have been established.

CONCLUSIONS

Those responsible for the packaging of brake fluid should be made aware that the selection of the container is critical with respect to preserving the fluid in the original state which may be necessary in order to conform to Public Law 87-637. One important problem concerns the formation of precipitates in the Water Tolerance Test at 140 F, but consideration must also be given the effect of storage on other properties of the fluid.

Although not a practical solution, it has also been found that less precipitate is formed in fluids stored in large containers (that is, quarts rather than 12 oz cans) probably due to the lower ratio of surface area of exposed solder to unit volume of fluid.

Storage at elevated temperatures tends to accelerate precipitate formation. Where possible, it is recommended that canned brake fluid be stored at or below normal room temperature.

The use of other materials such as glass or polyethylene for containers should be at least as satisfactory as tin-plated cans with 100% tin solder. However, further studies will be necessary to confirm the usefulness of these containers in other ways.

It is recommended that the following SAE J70b test procedures be used for the evaluation of packaging containers by both accelerated storage methods and by long term shelf storage.

1. Boiling Point, Paragraphs 4.1 and 8.1 - For evaluation of moisture pickup, to determine package sealing efficiency. An aluminum foil cap liner and/or an inner seal is recommended if moisture pickup appears to be a problem.

2. Corrosion, Paragraphs 4.6 and 8.6 - For evaluation of possible depletion of brake fluid inhibitor systems under storage conditions.