

# On the Line

## Brake System Failures Dealing With Brake Line Corrosion

I had just read with interest an article published by The Department of Transportation's National Highway Traffic Safety Administration (NHTSA) concerning a brake line investigation and how it had been closed without identifying a defect that would initiate a recall order on GM trucks and SUVs built in model years 1999-2003. More than four years was spent investigating corrosion related brake failures in similar trucks and SUVs made by other manufacturers. While there was no basis for a recall, the NHTSA did encourage owners of 2007 and older model year vehicles to inspect the brake lines for corrosion and to thoroughly wash the undercarriage to remove corrosive road salt. According to NHTSA, the corrosion seen in the GM vehicles was not unique and was instead similar to other vehicle manufacturers, especially in those states where road salt was used to remove ice from the roads.

NHTSA's safety advisory urges owners of trucks, SUVs and passenger cars that are more than seven years old to:

- 1) Maintain their vehicle and prevent corrosion by washing the undercarriage on a regular basis throughout the winter months and giving it a thorough cleaning in the spring to remove road salt and other de-icing chemicals.
- 2) Monitor the brake system for signs of corrosion and observe for signs of fluid loss, unusual leaks, or a soft or spongy pedal feel.
- 3) Address severe corrosion, evidence of flaking or scaling of the metal brake lines, all of which should involve replacement of the subject components.

### A PERSONAL EXPERIENCE

Two days following the reading of the NHTSA notice, I was nearly involved in an accident. Distracted, the person ran a red light, forcing me into a panic brake application. I applied enough force on the brake pedal to bend metal brackets and flex the firewall. Immediately following this encounter I noticed a difference in the feel of the brake pedal during brake application, plus an illuminated "Brake Light." Subsequent brake applications felt like stepping on a rotten apple. Exerting so much force, I was certain that I had blown a wheel cylinder or caliper seal. Arriving at the shop, further investigation revealed a leaking metal brake line. The metal lines looked perfect with the exception of where the rear brake line was se-

cured to the frame rail with a plastic clip. Heavy corrosion was evident at this attachment point when the line was removed from the clip, and brake fluid would spray from this area during brake application. The vehicle was a 1996 Z71 purchased new in Jackson, Tennessee, and has never been driven off-road. It has encountered maybe one snow per season and was washed thoroughly each time to remove any salt brine. Two weeks later a friend with a 1999 Z71 encountered the same brake line failure at the rear frame rail brake line attachment clip.

This experience has impressed upon me the necessity to perform a thorough system inspection to include the brake lines and attachment clips. Internal and external corrosion is a major concern in maintaining the braking system.



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THE INSPECTION OF THE CUSTOMER'S BRAKES WAS NOT VERY THOROUGH. HENCE, HIS EXCITING BUT UNEXPECTED VISIT TO THE CHRISTMAS TREE FARM.

### SOME FLUID FACTS

The most important and most neglected fluid in the vehicle is the brake fluid. Let's consider some fluid facts:

- 1) The system should be flushed every two years or 24K miles.
- 2) Brake fluid is hygroscopic and can absorb 2% of its volume in moisture in 12 months, affecting the boiling point of the fluid. A Dot 3 fluid with a 3% moisture accumulation can drop the boiling point 25%. Pedal fade under aggressive braking can result.
- 3) Moisture deteriorates the corrosion inhibitors in the fluid, promoting internal corrosion affecting seals, metal components and the brake lines internally.
- 4) Test strips are available to determine moisture and the presence of copper, which confirms internal corrosion is occurring. The copper alloy in the brake lines will be the first metal susceptible to the corrosive elements. Fluid that measures 200 parts per million (PPM) of copper or higher should receive a system flush.
- 5) Mileage doesn't matter. The condition of the fluid is affected by moisture, braking habits, pulling or hauling heavy loads, and high brake temperatures, all of which accelerate the dilution of the corrosive inhibitors. Within a 36 month period, 91% of the corrosive inhibitors in the fluid may be lost.