U.S. Department of Transportation

National Highway Traffic Safety Administration

ODI RESUME

OFFICE OF DEFECTS INVESTIGATION
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Investigation: PE 14-027
Date Opened: 08/22/2014 **Date Closed:** 02/03/2015
Investigator: Chris Lash **Reviewer:** Jeff Quandt
Approver: Frank Borris
Subject: Front brake hose failure

MANUFACTURER & PRODUCT INFORMATION

Manufacturer: Ford Motor Company
Products: 2013 Ford Explorer Police Interceptor
Population: 13,776

Problem Description: Front brake hoses may fail resulting in increased stopping distance.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	11	18	18**
Crashes/Fires:	0	0	0
Injury Incidents:	0	0	0
Fatality Incidents:	0	0	0

** Total eliminates duplicates received by ODI and manufacturer.

ACTION / SUMMARY INFORMATION

Action: This preliminary evaluation is closed.

Summary:

The Office of Defects Investigation (ODI) opened PE14-027 based on a report of 13 front brake hose (jounce hose) failures in 11 vehicles in the District of Columbia Metropolitan Police Department (DCMPD) fleet of 46 model year (MY) 2013 Ford Explorer Police Interceptor (PI) vehicles (VOQ 10621634). The DCMPD fleet provided Ford with 71 jounce hoses for analysis, including 4 of the 13 failed hoses. Inspection of each of the failed hoses identified a small tear in the outer cover on the body end of the hoses on the outboard side.

Ford's lab analysis of these hoses identified splits in the inner liners 1.5-2.0mm from the end of the nipple (outside of the crimped ferrule joint). Ford conducted pressure testing of 10 randomly selected samples of the remaining 67 hoses that had not experienced leaks and 9 of the samples leaked at 6,000 psi. Ford's examination of the 9 hoses that leaked in the pressure tests found 4 that failed on the outboard side of the hose (similar to the 4 leaking field parts) and 5 that failed on the body end of the hose on the inboard side. Four additional non-leaking hoses were sent to the hose supplier, Hitachi, for analysis. Broken yarn was observed in scanning electron microscope examinations at both the body side and caliper side hose to ferrule crimps, indicating severe bending stress had occurred at these locations. Hitachi supplied an additional set of non-leaking field return hoses and a brand new set of hoses to an outside laboratory (Element Materials Technology) for analysis. The lab did not identify any manufacturing or material deficiencies in the hoses and concluded that the hose failures were caused by excessive bending stresses.

Based on the examinations of the returned jounce hoses, Ford conducted durability testing on new hoses that were the same design as those found on the subject vehicles. Ford first determined the worst case conditions for the hoses; jounce bumpers removed, internal rebound stops fully compressed, and shock absorbers attached. With the jounce hose installed, the steering was rotated to the maximum turn angle while the suspension was translated from full jounce to full rebound. This determined the maximum hose length of 13.0in (331mm) and a minimum hose bending radius of 1.6in (40mm). Using these conditions hoses tested on a Suspension Motion Simulator far surpassed Ford's performance specifications.

Twenty (20) complaints of front brake jounce hose failure were identified on a total of 18 Explorer PI vehicles, including the 13 hose failures in 11 vehicles from the DCMPD fleet that prompted PE14-027. The remaining 7 complaints included 3 from one fleet that reportedly occurred on the banjo block end of the hose assembly and single complaints from 4 other fleets. Only two brake hose assemblies were used in the subject and peer Explorer vehicles, with the BB53 level hose used until June 20, 2012, and an updated DB53 level hose used thereafter. No pattern of failures was observed by hose assembly, with 15 of failures involving the BB53 hose assembly (including the 13 from DCMPD manufactured in March 2012) and 5 the DB53 hose assembly built after June 20, 2012. No root cause was determined for the reported Explorer PI jounce hose failures, but Ford identified improper service repair procedures (e. g., hanging the brake caliper from the brake hose during brake pad replacement) as a possible contributor to higher than expected rate of front brake jounce hose leaks.

ODI's analysis of field data, hose inspection and test data did not identify evidence of any defects in hose material, manufacture or vehicle installation. The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exist. The Agency will continue to monitor complaints and other information relating to the alleged defect in the subject vehicles and take further action if warranted.