

Chronology Related to Haldex IRV Non-compliance Report

January 2023 - May 2023: Spartan Fire notified ZF of a potential intermittent delay when applying the parking brake in certain vehicles. ZF jointly investigated the potential issue with Spartan, including engineering analysis and inspection / analysis of affected parts. Initially, the investigation focused on excess grease. Parts were tested to established supplier test parameters, which did not address delay timing. On-site testing of instrumented vehicles began in March of 2023. ZF subsequently created a test bench protocol to replicate valve release, and initiated analysis and reviews with the valve supplier, Haldex, to further understand the problem.

June 2023 - July 2023: Haldex implemented 100% end-of-line testing for park brake (valve) application timing. This test replicated the vehicle application and ensured any parts being supplied were released within the required time.

August 2023 - September 2023: Collaborative root cause investigation efforts between Spartan, ZF, and Haldex identified the main piston as shifting slow on suspect parts.

September 17, 2023: Spartan initiated a non-compliance recall of 659 vehicles containing suspect Haldex valves (23V-631).

September 2023 - December 2023: Detailed dimensional reviews of returned parts from Spartan Fire identified the main piston concentricity of three different O-Ring grooves as the likely cause of the slower release valves. ZF also visited Haldex to confirm their processes and current controls for testing valves, to evaluate concentricity concerns, and to review interim corrective actions for valve machining.

November 2023: ZF notified DTNA of the Spartan Fire recall and that similar components had been supplied to DTNA.

December 2023: ZF informally provided information NHTSA's Recall Management Division related to the Spartan Fire recall.

January 2024: DTNA initiated a related non-compliance recall of 149 vehicles containing suspect Haldex valves (24V-013). Following DTNA's recall, NHTSA contacted ZF and requested that ZF submit a defect information report based on the non-compliance decision of two vehicle manufacturers (Spartan and DTNA).

February 2024: Air brake systems under FMVSS No. 121 are certified by the vehicle manufacturer based on their complete system. ZF does not have certification obligations relative to FMVSS No. 121, nor does ZF have sufficient information from its vehicle manufacturer customers to determine compliance of their vehicles. Although ZF has not determined that a non-compliance or safety-related defect exists in the subject parking brake actuation systems, ZF is providing this defect information report under 49 CFR 573.3(f) in the interest of cooperating with NHTSA following the non-compliance reports of Spartan and DTNA. To date, ZF has not received any reports of accidents or injuries related to the recalled vehicles, or the vehicles of other manufacturers in which the subject inversion relay valves are installed.