

Part 573 Safety Recall Report

18V-750

Manufacturer Name : Proterra Inc.**Submission Date :** DEC 20, 2018**NHTSA Recall No. :** 18V-750**Manufacturer Recall No. :** NR**Manufacturer Information :**

Manufacturer Name : Proterra Inc.

Address : 1815 Rollins Road
Burlingame CA 94010

Company phone : 4380000

Population :

Number of potentially involved : 66

Estimated percentage with defect : 100 %

Vehicle Information :

Vehicle 1 : 2015-2017 Proterra Catalyst 40 & Catalyst 35

Vehicle Type : BUSES, MEDIUM & HEAVY VEHICLES

Body Style : OTHER

Power Train : HYBRID ELECTRIC

Descriptive Information : Recall population was determined based on the affected axle serial number list provided by ZF to Proterra.

Per ZF: It has been identified that ZF axles that incorporate axial and radial air disc brake calipers manufactured by Knorr-Bremse in a specific production period may experience issues in the field.

Production Dates : MAY 11, 2015 - AUG 01, 2017

VIN Range 1 : Begin : 1M9TH16J8FS816086 End : 1M9TG16J0JS816224

 Not sequential

VIN Range 2 : Begin : 1M9TH16J8FS816086 End : 1M9TG16J0JS816224

 Not sequential

Description of Defect :

Description of the Defect : PER ZF

It has been identified that ZF axles that incorporate axial and radial air disc brake calipers manufactured by Knorr-Bremse in a specific production period may experience issues in the field. Improper surface roughness of a guide pin in radial brake calipers supplied by Knorr-Bremse may cause increased friction, creating noise and, if undetected, potentially leading to uneven brake pad wear, tapered wear of the brake pads, breaking of the brake carriage guide pin support bolt, and brake pad contact with the surface of the wheel. ZF reported a potential safety risk associated with this issue for radial brakes in North America to NHTSA on April 26, 2018. ZF and Knorr-Bremse continue to investigate and assess whether other potential safety risks are associated with this issue. Any potential safety risk in specific vehicle types or applications should also be evaluated by the vehicle manufacturer. ZF supplied axles with the potentially affected brake calipers to several bus manufacturers.

FMVSS 1 : NR

FMVSS 2 : NR

Description of the Safety Risk : PER ZF

System reactions:

If issue is undetected, it could lead further to the following symptoms on a radial brake:

- Tangential taper wear of the brake pads

If further undetected, this failure mode can progress to:

1. Significant tangential tapered wear, which could potentially lead to a reduced service brake torque on an affected wheel end of the center or drive axle. Our assessment is that unaffected wheels would keep their braking force due to the redundancy of the brake system.

2. Significant tangential tapered wear, which could potentially lead to a breaking of the fix guide pin support bolt and, as a consequence, the brake caliper or pad may contact the inner surface of the wheel rim.

3. Significant tapered wear, which could potentially lead to a reduction of the parking brake functionality of affected wheels, most specifically for 2 axle buses (<= 40').

Items N°2 and N°3 mentioned above are considered in the safety risk analysis by ZF and Knorr-Bremse and are further discussed in this presentation

Description of the Cause : Increased surface roughness of fix pin after change of supplier by Knorr-Bremse

- Reduced sliding at caliper fix pin plain bearing ☐ slip-stick or seized plain bearing

Identification of Any Warning Excessive noise during braking precedes any decreased brake function that can Occur :

Supplier Identification :

Component Manufacturer

Name : ZF

Address : 777 Hickory Hill Drive
Vernon Hills 60061

Country : NR

Chronology :

On June 13, 2018, ZF Group told Proterra's quality assurance team that ZF was voluntarily recalling certain ZF axles with defective brake calipers. ZF supplied a list of 66 affected axle serial numbers.

On June 13, 2018, Proterra began identifying buses that included the affected axles. Proterra compared the delivery dates and serial numbers of axles with production dates and VINS of buses to determine which customer VIN numbers were affected. Based on ZF's identification of the 66 affected axles, Proterra estimated that up to 66 of its buses were potentially affected.

On June 26, 2018, ZF provided Proterra an official owner letter concerning the equipment recall.

On July 3, 2018, Proterra presented information from the ZF equipment recall on its monthly customer roundtable meeting, describing the potential brake caliper defect. Proterra is a low volume bus manufacturer with a relatively small number of customers. Proterra's buses are battery electric and use regenerative braking, resulting in less use of the brake system, such that brake parts are low wear items. No customers have reported any crash or other issue involving the brake caliper subject to this recall, nor has Proterra received any customer reports or warranty claims for the affected brake caliper.

On October 11, 2018, ZF supplied Proterra with repair kits and recommended that the repair remedy for Proterra customers is to swap out the affected calipers with new calipers supplied by ZF.

On October 12, 2018, Proterra released a service bulletin including the ZF work instructions to replace the calipers on vehicles identified to date by the Proterra Service team.

On October 22 2018, Proterra began distributing repair kits and work instructions to affected customers.

On October 23, 2018, Proterra filed with NHTSA a Part 573 report to initiate a recall of the brake calipers in the up to 66 ZF axles on affected Proterra buses.

Description of Remedy :

Description of Remedy Program : Replace the calipers on affected axles with new calipers provided by Bendix/ ZF. Proterra will ship the parts from our facility in Greenville, SC where parts were received from Bendix. Proterra's customers will file a warranty claim with Proterra for the completion time, and Proterra will file a warranty claim with ZF to recoup the costs of labor. Proterra has identified 1 customer in Chicago who will not be able to perform the work at their site, so the work will be completed at a ZF site.

How Remedy Component Differs from Recalled Component : ZF has the serial numbers for all ZF axles delivered to Proterra that are impacted by the ZF equipment recall. We have determined when Proterra began using ZF axles with serial numbers that are not on the list of affected axles.

Identify How/When Recall Condition was Corrected in Production : ZF delivered 66 axles to Proterra. Proterra is accounting for all 66 axles delivered by ZF. Current bus production is not using the affected axles.

Recall Schedule :

Description of Recall Schedule : All owners will be notified by December 21, 2018. We do not have dealers so there are no deal notification letters.

Planned Dealer Notification Date : NR - NR

Planned Owner Notification Date : DEC 18, 2018 - DEC 18, 2018

* NR - Not Reported