

PGT-17047
FMVSS 121 Brake Performance Test
On a
ARBOC Spirit of Equest Bus



Date Issued: June 15, 2017

Performed By:

Navistar Proving Grounds
32104 State Road 2
New Carlisle, Indiana 46552

Navistar Proving Grounds Engineering Test Report

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Report Number: PGT-17047

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Report Date: June 15, 2017
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Subject: FMVSS 121 Brake Performance Test on an ARBOC Spirit of Equest Bus.

Objectives: The purpose of this testing was to evaluate the braking performance characteristics of the subject test vehicle when tested in accordance with the requirements of the Federal Motor Vehicle Safety Standard Number 121 (FMVSS 121).

Conclusions: The subject test vehicle met all of the FMVSS 121 braking performance requirements related to timing, stopping distance, parking on a grade, braking in a curve, and stability within a 12 foot lane.

Results: Page 1 of Attachment "A" summarizes, in tabular form, the performance of the subject vehicle relative to each section of the FMVSS 121 standard related to timing, stopping distance, parking on a grade, braking in a curve, and stability within a 12 foot lane.

Page 2 of Attachment "A" presents a graph showing stopping distance as a percentage of the FMVSS 121 standard's requirements.

During FMVSS 121 testing, the smallest margin of safety achieved for the best stop of any test section was 27.1%. This occurred during the GVW Full System portion of the standard. Conversely, the largest margin of safety was 60.6%, which was achieved during the GVW Failed Rear Relay Control Line portion of the standard.

Attachment "B" presents the Brake and Vehicle Information Sheet and a list of instrumentation used during testing.

Attachment "C" presents the itemized data sheets for each section of the FMVSS 121 standard relating to timing, stopping distance, parking on a grade, braking in a curve, and stability within a 12 foot lane. For those sections with a stopping distance requirement, the best stop is shown in bold type.

Recommendations: None.

Parts Tested: See Attachment "B", page 1.

Test Procedure: Federal Motor Vehicle Safety Standard Number 121 (FMVSS 121), reference 49CFR571.121.

Note: Section 5.4, Service Brake System - Dynamometer Tests, of the FMVSS 121 standard are not part of the procedure performed by the NPG.

Discussion: The test vehicle was received with 2207 miles on the odometer and the brake hardware was in like-new condition. New front and rear brakes pads were installed.

Instrumentation was installed, and the timing tests were conducted. Following successful completion of the timing tests, the vehicle was then loaded to the GVW specified by the customer.

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The 500-snob burnish was conducted with the vehicle loaded to GVW, in accordance with the FMVSS 121 procedure. During the burnish, issues developed with the transfer case and repairs were made by the customer. The brake system was not disturbed during the repairs. After repairs were made, the burnish was completed.

The GVW stops were then conducted. These stops consisted of full system, failed secondary system, failed primary system, and failed rear relay control line stops. Parking on a 20% grade was then performed with a full brake system, failed secondary system, and failed primary system.

The vehicle was then unloaded. All ballast was removed. The "braking in a curve" stops were performed on a low coefficient of friction surface (wet jennite). Four stops were made at LLVW while the vehicle traveled through a 12-foot wide lane on a 500-foot radius. Each stop consisted of a full brake application, starting at 30 mph (75% of maximum drive thru speed of 40 mph). The vehicle maintained stability within the lane during all stops.

This was followed by the performance of full system, partial system, and failed rear control line stops; and parking tests at LLVW. The end of test brake clearance measurements were then taken.

A correction factor was used correct the stopping distance to the target velocity. This correction factor is represented by the following formula:

$$\text{Corrected Distance} = \left(\frac{\text{Target Velocity}}{\text{Actual Velocity}} \right)^2 (\text{Measured Distance})$$


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- Attachments:
- A. Summary of Test Data – Tabular and Graphical (2 pages).
 - B. Brake and Vehicle Information, Instrumentation (2 pages).
 - C. Test Data (15 pages).