



SURFACE VEHICLE RECOMMENDED PRACTICE

J360™

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Superseding J360 AUG2020

Truck and Bus Grade Parking Performance Test Procedure

RATIONALE

This document has been updated in keeping with the five-year review process. The Brake Systems Subcommittee has sanctioned the following changes:

- Removed the parking brake test procedures from SAE J1626 and incorporate as appropriate into SAE J360 and SAE J1729. The SAE J1626 will only reference these two procedures as appropriate when required.
- Added SAE J1729 as reference.
- Removed SAE J1626 specific section numbers based on the upcoming and ongoing revisions with this document.
- Revised Section 5.3 to agree with SAE J1626 burnish snub procedure changes with the transmission in the highest gear appropriate for 40 mph.
- Removed pressure-applied/mechanically locked actuators from Section 5.11.
- Other editorial changes for clarity as appropriate.

SAE J360 has been reaffirmed to comply with the SAE Five-Year Review policy.

FOREWORD

The ability to hold a vehicle stationary on a grade involves two performance factors: (a) overcoming the downhill grade force with the parking brake system by preventing rotation of the braked wheels, and (b) having sufficient weight on the braked wheels to prevent the vehicle from sliding intended for roadway use.. By the use of this procedure, the manually applied input effort required to prevent braked wheel rotation can be measured and the sliding or stability of a vehicle parked on a grade can be observed. This procedure applies to truck-tractors, trailers, trucks and buses.

1. SCOPE

This SAE Recommended Practice establishes methods to determine grade parking performance with respect to:

- Ability of the parking brake system to lock the braked wheels.
- The vehicle holding or sliding on the grade, fully loaded or unloaded.
- Applied manual effort.
- Unburnished or burnished brake lining friction conditions.
- Down and up grade directions.

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1.1 Purpose

This document establishes a uniform procedure for determining the parking performance on a grade by the parking brake systems of new vehicles over 4536 kg (10 000 lb) gross vehicle weight rating (GVWR) intended for roadway use.

2. REFERENCES

2.1 Applicable Publications

The following publication forms a part of this specification to the extent specified herein. Unless otherwise specified, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J293	Truck and Bus Grade Parking Performance Requirements
SAE J1626	Braking, Stability, and Control Performance Test Procedures for Air- and Hydraulic-Brake-Equipped Trucks, Truck-Tractors and Buses
SAE J1729	Parking Brake Drawbar Pull Test Procedure—Truck and Bus
SAE J2115	Air Brake Performance and Wear Test Code Commercial Vehicle Inertia Dynamometer

2.1.2 Federal Publications

Available from the Superintendent of Documents, U.S. Government Printing Office, Mail Stop: SSOP, Washington, DC 20402-9320.

49 CFR 571.105 Brake Performance—Hydraulic Brake Systems

49 CFR 571.121 Brake Performance—Air Brake Systems

3. INSTRUMENTATION AND EQUIPMENT

3.1 Force Measuring Device

0 to 890 N (0 to 200 lbf), to measure park brake hand or foot application force and hydraulic brake vehicle service brake application measurements.

3.2 Decelerometer

0 to 9.8 m/s² (0 to 32.2 ft/s²), to measure vehicle deceleration during burnish or establishing initial brake temperature (IBT).

3.3 Temperature Measuring Device

0 to 540 °C (0 to 1000 °F), to measure parking brake lining pad or shoe as per figure described in SAE J2115 and display monitor/recording brake lining temperature accurate to ±5.6 °C (±10 °F).

3.4 Stopwatch

0 to 5 min, method to measure and document test time.

3.5 Pressure Gauge

0 to 900 kPa (0 to 130 lbf/in²) for air brake application pressure measurements.

3.6 Inclinator

0 to 30%, or other method to measure surface grade/slope.

3.7 Axle Weight Measuring Device

±1.0% of indicated weight.

3.8 A device, ±50 mm (±2.0 in), or method to measure vehicle movement once the parking brake has been applied.

4. VEHICLE INFORMATION AND DATA

4.1 Test Data Sheet 1 (Figure 1) to be used as a work sheet during testing.

4.2 Vehicle information shall be documented as described in SAE J1626 Data Sheets – Vehicle Information.

4.3 Vehicle Conditions

To insure the accuracy and validity of results, the following conditions should be met:

4.3.1 On the brakes applied by the parking brake system, use new thermocouple lining and drums or discs of original equipment material and install in accordance with the vehicle manufacturer's specifications.

4.3.2 Parking brake assemblies and actuation systems are to be installed, lubricated, adjusted and inspected in accordance with the vehicle manufacturer's specifications.

4.3.3 Tires must not be more than 20% worn, largest diameter specified for the vehicle at the test GVWR and inflated to the pressure specified by the vehicle manufacturer for the GVWR, measured cold (at the beginning of each test day).

4.3.4 For driveline type parking brakes, the rear axle ratio should be at the specified manufacturer value to generate the highest torque in combination with 4.3.3 tire size during grade holding.

4.3.5 The vehicle is to be tested in both the fully loaded and unloaded condition. For the purposes of this test procedure, fully loaded shall be the manufacturer's gross vehicle weight rating (GVWR) distributed proportionately to individual axle weight ratings (GAWR's) per SAE J1626 Definitions. The vehicle shall be loaded to GVWR. The unloaded vehicle shall be as defined in SAE J1626 Definitions.

NOTE: FMVSS 121 allows the option of performing the grade holding test at LLVW and GVWR or the static retardation force parking brake test at GVWR as per SAE J1729.

The sequence of testing may be arranged to suit the desired order of vehicle loading and unloading.

5. TEST CONDITIONS AND FACILITIES

5.1 Ambient air temperature must be between 0 and 38 °C (32 and 100 °F).

5.2 Wind velocity should not exceed 24 km/h (15 mph).

5.3 Unless otherwise specified, the transmission shall be in the highest gear appropriate for a speed of 40 mph during burnish snubs per SAE J1626.