The Engineering Society For Advancing Mobility Land Sea Air and Space®
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SURFACE VEHICLE RECOMMENDED PRACTICE

Submitted for recognition as an American National Standard

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(R) TEST PROCEDURE FOR AIR RESERVOIR CAPACITY—HIGHWAY TYPE VEHICLES

1. ***Scope—***This SAE Recommended Practice provides instructions and test procedures for air braked vehicles including but not limited to trucks, truck-tractors, trailers, dollies, and buses used on highways but does not include off-highway vehicles.

1.1 **Purpose—**This document provides a method of determining the air reservoir capacity of highway type vehicles using compressed air to actuate or transmit actuation power to the foundation brakes. Air reservoir capacity is the ability to provide adequate brake pressure after a number of brake applications.

2. ***References***

2.1 **Applicable Publications—**The following publications form a part of this specfication to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-001.

SAE J813—Automotive Air Brake Reservoir Volume
SAE J1609—Air Reservoir Performance Guide—Commercial Vehicles

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

Federal Motor Vehicle Safety Standard 121—Air Brake Systems

3. ***Instrumentation and Equipment***

3.1 **Instrumentation**

3.1.1 Timing device accurate to within 1% of elapsed time.

3.1.2 Pressure gauges or electronic pressure measuring systems accurate to within 2% of pressure.

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3.2 Equipment

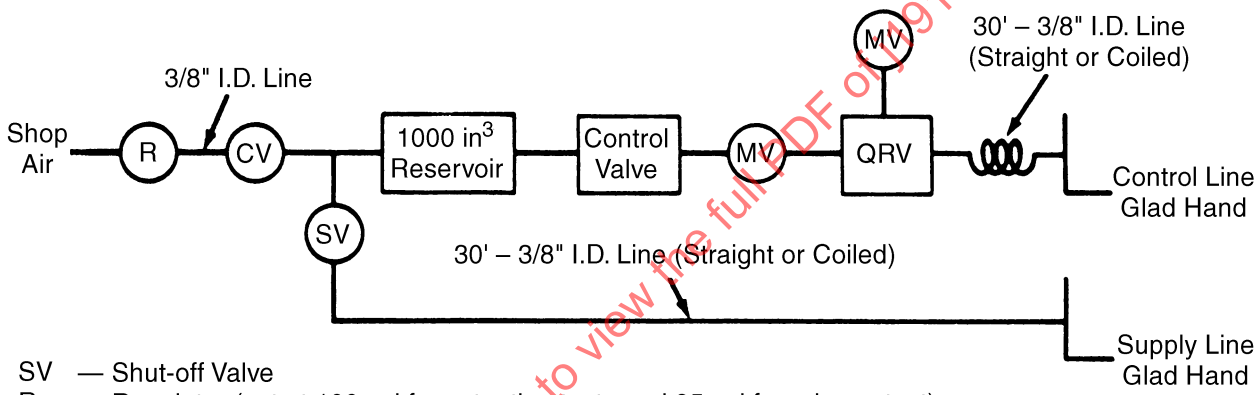
3.2.1 POWERED VEHICLES

3.2.1.1 (Optional) Two pressure regulator valves which can be set to limit output pressures to 85 psi with input pressures up to the air compressor cut-out pressure. The pressure drop through the valve shall not be more than 1/2 psi when the input pressure is between 40 and 85 psi.

3.2.2 TRAILERS AND DOLLIES

3.2.2.1 Air source regulated to 120 psi ± 5 psi with shut-off valve.

3.2.2.2 "Trailer test rig" (test fixture described in Figure 1 of FMVSS 121) with an additional reservoir volume plumbed directly into the "trailer-test rig" reservoir to give a total "trailer test rig" reservoir volume of 1200 in^3. See Figure 1.



SV — Shut-off Valve
R — Regulator (set at 100 psi for actuation tests and 95 psi for release test)
CV — Check Valve
MV — Metering Valve (Variable or Fixed)
QRV — Quick Release Valve

Figure 1—Trailer Test Rig

3.2.2.3 (Optional) Pressure regulator valve, connected between two gladhand couplers, which can be set to limit output pressures to 85 psi with input pressures up to 150 psi. The pressure drop through the valve shall not be more than 1/2 psi when the input pressure is between 40 and 85 psi.

3.2.3 ADDITIONAL EQUIPMENT FOR TOWING VEHICLES

3.2.3.1 Dummy coupler capable of sealing the supply (emergency) line.

3.2.3.2 A "50 in^3 reservoir" attached to an air line coupler by a pipe/tube having an inside diameter of at least 1/2 in so that the total volume of the assembly is 50 in^3.

4. Vehicle Condition

4.1 All air connections shall be secured so that the leakage rate for the entire air system, with all service brakes applied and parking brakes released, with pressure of 85 psi ± 5 psi, shall not exceed 1 psi per minute. For leakage rate evaluation of towing vehicles, the "50 in^3 reservoir" coupler shall be connected to the rear control line coupler and the dummy coupler to the rear supply line coupler. Parking brake and trailer air supply valves shall be positioned so that the parking brakes are released and the supply line to any towed vehicle coupler is pressurized. The control line to any couplers for towed vehicles shall also be pressurized to 85 psi ± 5 psi.

4.2 Brakes on new vehicles shall be burnished in accordance with paragraph S6.1.8 of FMVSS 121. Brakes on used vehicles need not be burnished if the friction material contact surface is over 80% for drum brakes and over 99% for disc brakes.

4.3 Brakes are to be adjusted to the vehicle manufacturer's published instructions. Where instructions differ between new and burnished linings/pads, adjustments specified for burnished linings/pads shall be followed.

4.4 If the vehicle is equipped with any type of load proportioning valve(s), the vehicle axles, which are affected by these valves, shall be loaded to their GAWRs or the valve(s) bypassed.

4.5 If the vehicle is equipped with any air reservoir(s) to operate systems other than the brake system, such reservoirs shall be isolated. All air operated equipment outside of the brake system shall be in the "off" position.

5. Test Procedure

5.1 Trucks, Truck-Tractors, and Buses

5.1.1 Park the vehicle on a level surface and chock the wheels.

5.1.2 On towing vehicles, attach the "50 in^3 reservoir" coupler to the vehicle's trailer control line coupler and the dummy coupler to the trailer supply line coupler.

5.1.3 Install a pressure gage (transducer) in the "50 in^3 reservoir," the reservoir that controls the compressor "cut-in" and "cut-out," and in one service brake actuator of each set of actuators having a common input pressure.

5.1.4 If the optional regulator valves are used to regulate brake application pressures, install one in each line supplying air to the foot valve at its respective reservoir.

5.1.5 Position the parking brake air control valve(s) in the cab so that the parking brakes are released and, if the test vehicle is a towing vehicle, the trailer air supply line is pressurized.

5.1.6 Charge the air system to the vehicle manufacturer's specified minimum "cut-out" pressure.

5.1.7 Make at least 5 full brake applications, by fully depressing the foot valve, to exercise the brake system.

5.1.8 If the regulator valves specified in 3.2.1.1 are used, adjust the valves so that the ouput is 85 psi when the foot valve is fully depressed.

5.1.9 Charge the air system to the vehicle manufacturer's specified minimum "cut-out" pressure. Isolate the air system from the air supply so that the reservoirs are not supplied with air during the test.

5.1.10 Apply the service brakes so as to pressurize the actuator with the least pressure to 85 psi (or maximum possible if 85 psi cannot be obtained) and hold for 5 to 15 s. While holding, record the brake actuator pressure(s).

5.1.11 Repeat 5.1.10 seven additional times, pausing for 5 to 10 s between each successive application.

5.1.12 Reapply parking brakes, remove instrumentation, and restore vehicle to original condition.

5.2 Trailers and Dollies

5.2.1 Park the vehicle on a level surface and chock the wheels.

5.2.2 On towing vehicles and dollies, connect the "50 in^3 reservoir" coupler to the rear control line coupler and the dummy coupler to the rear supply line coupler.

5.2.3 Install a pressure gage (transducer) in the "50 in^3 reservoir," the "trailer test rig" reservoir, and each set of service brake actuators having a common input pressure.

5.2.4 Connect the "trailer test rig" control and supply line couplers to the test vehicle's front control and supply line couplers. If the pressure regulator valve assembly specified in 3.2.23 is used, insert it between the two control line couplers.

5.2.5 Charge the "trailer test rig" reservoir to pressure of 120 psi ± 5 psi and make 5 full brake applications using the trailer test rig control valve to exercise the brake system.

5.2.6 If the pressure regulator valve assembly is used, adjust the output during the full brake applications so that the output is 85 psi when the control valve is actuated.

5.2.7 Charge the "trailer test rig" pressure to 120 psi and then isolate the rig from the air source.

5.2.8 Make a brake application that results in 85 psi (or the maximum possible when 85 psi is not obtainable) in the brake actuator with the least pressure and hold for 5 to 15 s. Record the brake actuator pressure(s). Fully release the brakes.

5.2.9 Repeat 5.2.8 seven additional times, pausing for 5 to 10 s between each successive application.

5.2.10 Release the pressure in the supply line, disconnect the "mini-tractor" couplers, and restore test vehicle to original condition.

NOTE—In 5.1.10 and 5.2.8, the 85 psi limiting pressure specified is a target. If this procedure is used by an inspector seeking to determine if a vehicle complies with SAE J1609, 85 psi should not be exceeded. If this procedure is being used for design purposes, the pressure should be less than 85 psi. In any event, the pressure should not deviate from 85 psi by more than ±2 psi.

6. Notes

6.1 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.