

	SURFACE VEHICLE RECOMMENDED PRACTICE	
	SAE	J1794 AUG2011
	Issued Stabilized	1996-12 2011-08
Superseding J1794 DEC1996		
SAE Restraint Systems Effluent Test Procedure		

RATIONALE

This document outlines a procedure that, according to experts in the field, is unlikely to change in any significant way in the foreseeable future. Though the procedure is still conducted in many labs, and it is referenced in related documents, its use has diminished. The document's usage may be inferred from the following SAE purchasing data:

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1. **Scope**—This SAE Recommended Practice describes a method to collect, identify, and quantify effluent resulting from deployment of in-vehicle stored energy restraint systems. Deployment and collection is completed in a 2.83 m³ (100 ft³) chamber. This procedure is written as a guideline for the identification and quantification of both particulate effluent (size, concentration, and composition) and gaseous effluent (concentration and composition). The intent of this procedure is to describe and recommend testing methods and not to establish limits for the effluent. This procedure should be used in conjunction with performance specifications from the customer and/or manufacturer of the device(s) being tested. This is a general procedure for repetitive and comparative testing, and suggests only general guidelines for the safe conduct of tests and reliable data correlation.

2. References

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

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J211—Instrumentation for Impact Tests

SAE J1538—Glossary of Automotive Inflatable Restraint Systems

SAE J1630—Driver or Passenger Airbag Module Deployment Test Procedure

3. **General Test Requirements**—The deployment test equipment for performance and effluent testing shall provide a reliable, accurate, and repeatable testing method, adaptable for mounting various in-vehicle stored energy restraint systems.

3.1 **Test Facility**—Stored energy restraint systems are typically Department of Transportation classified. Therefore, facilities for conducting tests on pyrotechnic or stored gas devices must comply with all local and state building codes. A suitable floor plan and work area design is also very important for proper execution of tests. Features include a physical barrier between test personnel and the device being tested. An exhaust fan is recommended to vent gas and particulate from the test chamber and work area.

3.2 **Safety Requirements**—In consideration of safety for test personnel working with experimental devices, appropriate facilities and training must be provided. Examples of the necessary safety equipment include the following: remote deployment systems and equipment shielding for personnel, warning system (i.e., siren and/or light), and personal safety items such as lab coats or clothing, safety glasses, gloves, hearing protection, respirators, and grounding straps, if required. Proper written safety procedures should be followed in accordance with standard ordinance and pyrotechnic industry practice. In addition, each operator should be familiar with the hazards of the devices being tested and hazards of the effluent being evaluated. All general safety practices should be followed. Test chamber should be appropriately grounded and be constructed to preclude the buildup of static electricity. All applicable government safety and health standards (e.g., OSHA) must be followed.

3.3 Equipment List

3.3.1 FIXTURES AND SUPPORT EQUIPMENT

- a. 2.83 m³ (100 ft³) chamber constructed of suitable noncorrosive metal (Figure 1)
 1. Sampling ports (for gas and particulate sampling)
 2. Mounting fixtures
 3. Expansion diaphragm or one-way exhaust vent
- b. Temperature, pressure, and humidity indicators
- c. Timer

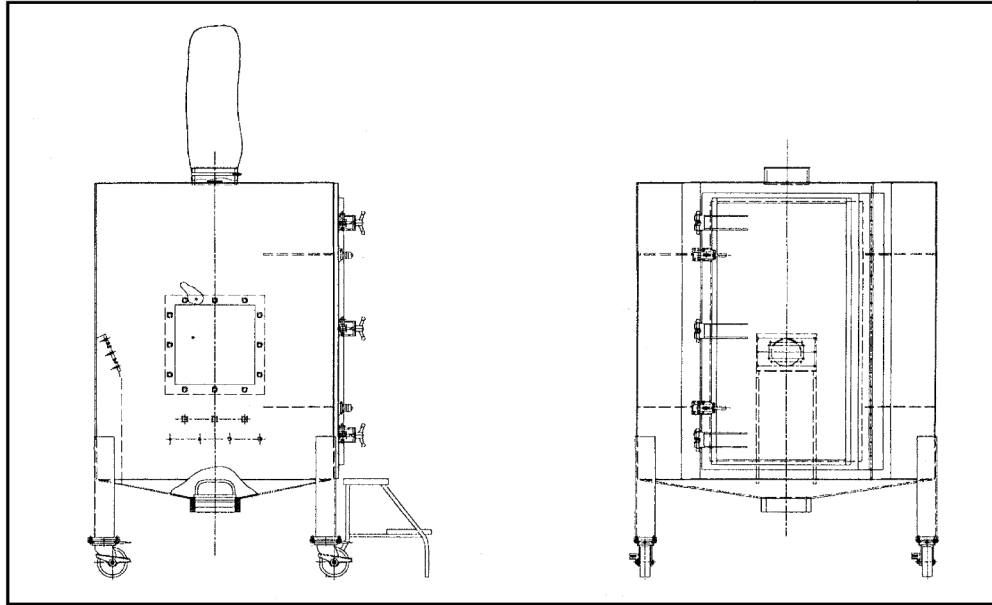


FIGURE 1—TYPICAL 2.83 m³ (100 ft³) CHAMBER

3.3.2 SAMPLE COLLECTION

- a. Cascade impactor (Anderson Model One CFM Ambient Sampler or equivalent)
- b. Single total particulate filter holder
- c. Particulate filter (Pallflex 47 mm or equivalent)
- d. Hermetic air sampling pump
- e. Flowmeters
- f. Inert sampling bag (Tedlar bag or equivalent)

3.3.3 DATA ACQUISITION SYSTEM (OPTIONAL)—Records and displays the internal bag and/or inflation device pressure versus time data.

3.3.4 DEPLOYMENT SOURCE—Provides the proper stimulus to actuate the inflator.

3.3.5 SAMPLE ANALYSIS (STANDARD EQUIPMENT)

- a. Gas Analysis
 1. Gas chromatograph
 2. Fourier transform infrared spectrometer
 3. Chemiluminescence analyzer
 4. Direct reading indicator tubes
- b. Particulate Analysis
 1. Analytical balance
 2. Atomic emission or atomic absorption spectrometer
 3. Ion chromatograph
 4. Acid/base titrator
 5. pH meter