



National Institute for Occupational Safety and Health
National Personal Protective Technology Laboratory
P.O. Box 18070
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Procedure No. RCT-ASR-STP-0103	Revision: 1.1	Date: 3 June 2005
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DETERMINATION OF GASOLINE PERMEATION OF HOSES AND COUPLING,
TYPES C AND CE, SUPPLIED-AIR RESPIRATORS
STANDARD TESTING PROCEDURE (STP)

1. PURPOSE

This test establishes the procedures for ensuring that the level of protection provided by the permeation of hoses and couplings by gasoline requirements on Types C and CE Supplied-Air Respirators submitted for Approval, Extension of Approval, or examined during Certified Product Audits, meet the minimum certification standards set forth in 42 CFR, Part 84, Subpart G, Section 84.63(a)(c)(d), and Subpart J, Section 84.150, Table 8; Volume 60, Number 110, June, 1995.

2. GENERAL

This STP describes the Determination of Gasoline Permeation of Hoses and Couplings, Types C and CE, Supplied-Air Respirators test in sufficient detail that a person knowledgeable in the appropriate technical field can select equipment with the necessary resolution, conduct the test, and determine whether or not the product passes the test.

3. EQUIPMENT/MATERIALS

- 3.1 The list of necessary test equipment and materials follows:
 - 3.1.1 Matheson Toxic Gas Detector Pump (Model 8014Ka) or equivalent.
 - 3.1.2 Dry gas meter (Singer) (Model 806) or equivalent.
 - 3.1.3 Electric Timer, calibrated to hundredths of a minute (Precision Scientific Company) or equivalent.
 - 3.1.4 A 300 cubic foot gas cylinder of compressed air or equivalent.
 - 3.1.5 Large container or tub, (14" deep x 22" W x 22" L) or equivalent.
 - 3.1.6 Air regulator, Model 8, from Matheson Gas Products or equivalent.

Approvals:	<u>1st</u> Level	<u>2nd</u> Level	<u>3rd</u> Level
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4. TESTING REQUIREMENTS AND CONDITIONS

- 4.1. Prior to beginning any testing, all measuring equipment to be used must have been calibrated in accordance with the manufacturer's calibration procedure and schedule. At a minimum, all measuring equipment utilized for this testing must have been calibrated within the preceding 12 months using a method traceable to the National Institute of Standards and Technology (NIST).
- 4.2. The compressed gas cylinder must meet all applicable Department of Transportation requirements for cylinder approval as well as for retesting/requalification.
- 4.3. Normal laboratory safety practices must be observed. This includes all safety precautions described in the current ALOSH Facility Laboratory Safety Manual.
 - 4.3.1. Safety glasses, lab coats, and hard-toe shoes must be worn at all times.
 - 4.3.2. Work benches must be maintained free of clutter and non-essential test equipment.
 - 4.3.3. When handling any glass laboratory equipment, lab technicians and personnel must wear special gloves which protect against lacerations or punctures.
- 4.4. Only trained laboratory personnel will be permitted to perform tests. Any other personnel will not be permitted in laboratory during tests.
- 4.5. A fire extinguisher and telephone in working order will be present and available during tests. Personnel present will know both the door combination and guard desk telephone number.
- 4.6. All wrist watches, rings, pens, etc., and particularly any aluminum objects, are not to be taken into chamber at any time. If rings can't be removed, then gloves are required to be worn.
- 4.7. The following sequence is mandatory during set-up, test and equipment break down:
 - 4.7.1. Exhaust ventilation is turned on 15-minutes prior to entering chamber.
 - 4.7.2. The electric light in chamber, although explosion proof, will not be used.
 - 4.7.3. No smoking in laboratory is permitted.
 - 4.7.4. All combination doors will be kept shut.
 - 4.7.5. A sign will be placed on hallway door to indicate, "Test is in Progress."
 - 4.7.6. Required volume of gasoline will be poured directly into test tub and all personnel will immediately leave chamber.

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- 4.8. Any deviations from those described herein must be brought to the Team Leader's attention for his consideration and written approval prior to actual implementation.
 - 4.8.1. Before starting the test a minimum of 3 wire port plugs must be pulled from the chamber to assure adequate ventilation. The ports pulled should allow for air flow across the gasoline.
 - 4.8.2. Check the flow by mechanical means (tissue paper, flow meter, etc.) At the chamber exhaust. Flow should be strong.
 - 4.8.3. Gasoline shall be transferred only within chamber.
 - 4.8.4. A vessel holding the gasoline must have secondary containment in order to guard against accidental discharge.
- 4.9. At test conclusion gasoline should be poured directly into safety can; hose and couplings wiped off; and, chamber ventilated for one hour. Then test system may be dismantled.

5. PROCEDURE

Note: Reference Section 3 for equipment, model numbers and manufacturers. For calibration purposes use those described in the manufacturer's operation and maintenance manuals.

- 5.1. Connect two sections of the supplied-air hose following the applicant's instructions.

Note: The two sections of air-supply hose and connection must be the same ones used for the Strength of Hose and Coupling Test (Ref. RCT-ASRS-STP-0100).

- 5.2. Put the connected hoses and couplings in large container in the gas chamber.
- 5.3. Pull the unconnected ends of the hoses (one at each end) at least five(5) feet from chamber ports.
- 5.4. One end of hose is connected to a source of compressed air capable of delivering 8 liters of air with a regulator.
- 5.5. The other end of the hose is free for use with stain tubes for vapor detection.
- 5.6. Both ends of the hoses are outside the chamber. The exhaust fan is kept running in the chamber, before, during, and after the test.
- 5.7. The regulator is turned on and adjusted with a dry gas meter to give 8 liters per minute through the hoses.
- 5.8. A Matheson Gas Detector Pump and detector tubes are used to detect vapors.
- 5.9. An electric timer, calibrated to hundredths of a minute, is used for timing test durations.

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5.10. A blank sample is taken before the test starts. Sample after 5 minutes, then at 15 minutes, 30 minutes, 45 minutes, and 60 minutes for Type C and CE SAR.

5.11. The stain tube is checked after the test to see if it was operating properly. This is done by sampling over the exposed gas vapors from container with hose and couplings submerged.

Note: Hoses and couplings used in this test are first tested for strength of hose and coupling, tightness, and nonkinkability. Hoses are destroyed after gasoline permeation test.

5.12. Data Analysis

The air-supply hose and couplings shall be considered unacceptable when detection of gasoline vapors is in excess of 0.01% of gasoline vapor (by volume) over the blank sample.

6. PASS/FAIL CRITERIA

6.1. The criterion for passing this test is set forth in 42 CFR, Part 84, Subpart G, Section 84.63(a)(c)(d), and Subpart J, Section 84.150, Table 8; Volume 60, Number 110, June 8, 1995.

6.2. This test establishes the standard procedure for ensuring that:

84.63 Test requirements; general.

(a) Each respirator and respirator component shall when tested by the applicant and by the Institute, meet the applicable requirements set forth in subparts H through L of this part.

(c) In addition to the minimum requirements set forth in subparts H through L of this part, the Institute reserves the right to require, as a further condition of approval, any additional requirements deemed necessary to establish the quality, effectiveness, and safety of any respirator used as protection against hazardous atmospheres.

(d) Where it is determined after receipt of an application that additional requirements will be required for approval, the Institute will notify the applicant in writing of these additional requirements, and necessary examinations, inspections, or tests, stating generally the reasons for such requirements, examinations, inspections, or tests.

84.150 Air-supply line tests; minimum requirements.

Air supply lines employed on Type C and CE Supplied-air respirators shall meet the minimum test requirements set forth in Table 8 of this subpart.

The permeation of the hose by gasoline will be tested by immersing 7.6 mm (25 feet) of hose and one coupling in gasoline, with air flowing through the hose at the rate of 8 liters per minute for one hour for Type C and CE Supplied-air respirator. The air from

the hose shall not contain more than 0.01 percent by volume of gasoline vapor at the end of the test.

7. RECORDS\TEST SHEETS

- 7.1. All test data will be recorded on the GASOLINE PERMEATION OF HOSES AND COUPLINGS, TYPE C AND CE, SUPPLIED-AIR RESPIRATORS test data sheet.
- 7.2. All videotapes and photographs of the actual test being performed, or of the tested equipment shall be maintained in the task file as part of the permanent record.
- 7.3. All equipment failing any portion of this test will be handled as follows:
 - 7.3.1. If the failure occurs on a new certification application, or extension of approval application, send a test report to the RCT Leader and prepare the hardware for return to the manufacturer.
 - 7.3.2. If the failure occurs on hardware examined under an Off-the-Shelf Audit the hardware will be examined by a technician and the RCT Leader for cause. All equipment failing any portion of this test may be sent to the manufacturer for examination and then returned to NIOSH. However, the hardware tested shall be held at the testing laboratory until authorized for release by the RCT Leader, or his designee, following the standard operating procedures outlined in Procedure for Scheduling, and Processing Post-Certification Product Audits, RB-SOP-0005-00.

**GASOLINE PERMEATION OF HOSES AND COUPLINGS, TYPE C AND CE,
SUPPLIED-AIR RESPIRATORS**

Project No : _____ Date:

Company :

Respirator Type:

Reference: 42 CFR, Part 84, Subpart J, Section 84.150, Table 8.

Requirement: The permeation of the hose by gasoline will be tested by; immersing 7.6 m (25 feet) of hose and coupling in gasoline, with air flowing through the hose at the rate of 8 liters per minute for type C SAR. The air from the hose shall not contain more than 0.01% by volume of gasoline vapor at the end of test.

Test Data:	<u>TIME (min)</u>	<u>PENETRATION(stain tubes)</u>
	0	
	5	
	15	
	30	
	45	
	60	

Comments:

Test Engineer: _____ Pass: _____ Fail

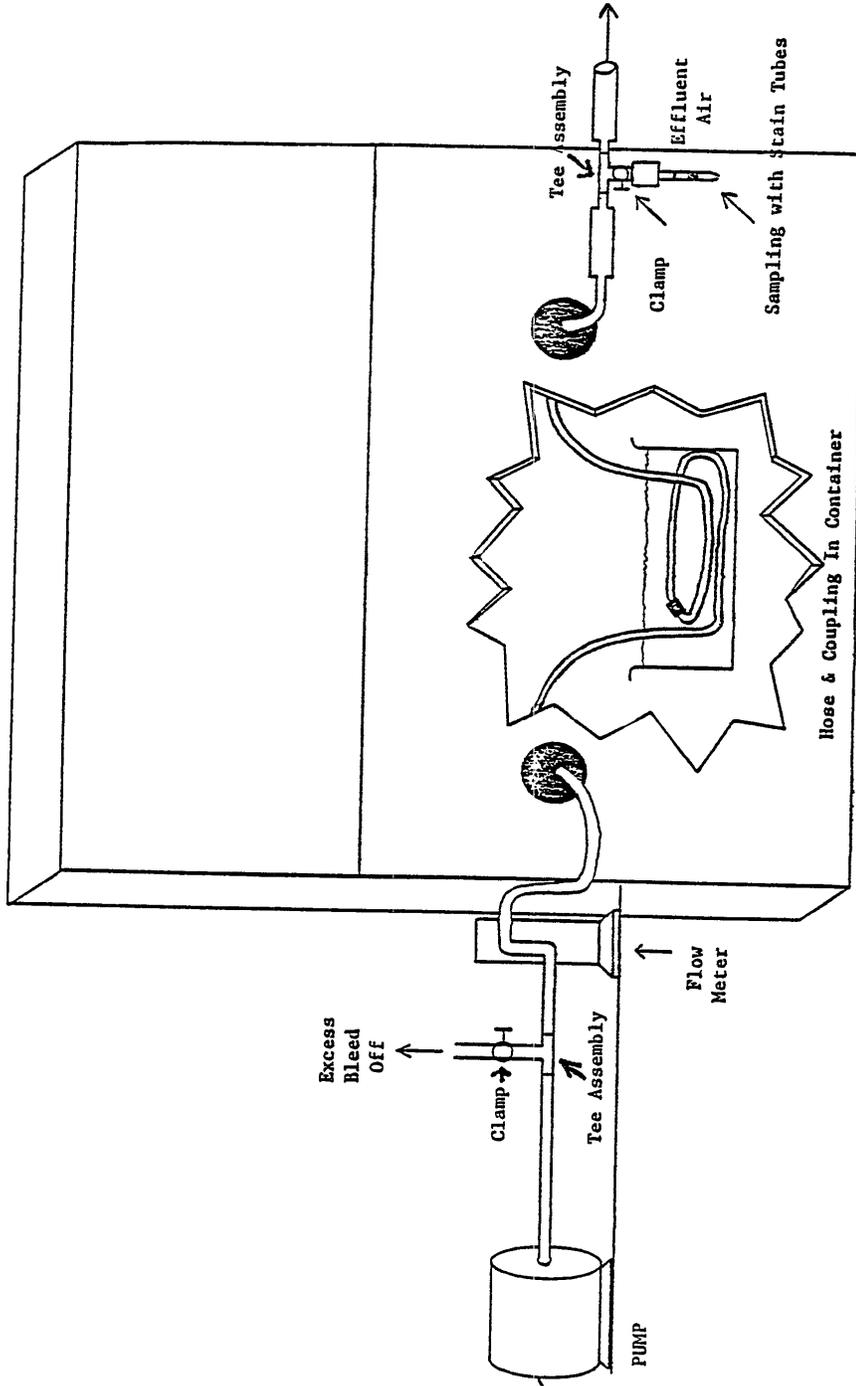


Figure 1. Schematic Diagram
Gasoline Permeation Test

Revision History

Revision	Date	Reason for Revision
1.0	27 June 2001	Historic document
1.1	3 June 2005	Update header and format to reflect lab move from Morgantown, WV No changes to method