



National Institute for Occupational Safety and Health
National Personal Protective Technology Laboratory
P.O. Box 18070
Pittsburgh, PA 15236

Procedure No. TEB-CCER-STP-0600	Revision: 0.0	Date: 25 March 2014
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DETERMINATION OF GASOLINE PERMEATION TEST ON BREATHING BAGS, CLOSED-CIRCUIT ESCAPE RESPIRATOR (CCER)

1. PURPOSE

This procedure establishes the test for ensuring that the level of protection provided by the breathing bag requirements submitted for Approval, Extension of Approval, or examined during Certified Product Audits, meet the minimum certification standards set forth in Section 84.302(e) of Subpart O—Closed Circuit Escape Respirators updated requirements to 42 CFR, Part 84, Volume 60, Number 110, June 8, 1995 as published in Federal Register / Vol. 77, No. 46 / Thursday, March 8, 2012 / Rules and Regulations pp. 14168-14197.

2. GENERAL

This STP describes the Determination of Gasoline Permeation Test on Breathing Bags, Closed-Circuit Escape Respirator 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/INSTRUMENTS/MATERIALS

3.1 The list of necessary test equipment and materials follows:



3.1.1. Mechanical Breather with 622 Kg-m/min. cam as per U.S. BOM Drawings C-1748 (3/17/69) Breathing Machine and B-1198 (3/6/69) Breathing Cam or equivalent.

3.1.2. Electric Timer, calibrated to hundredths of a minute (Precision Scientific Co.) or equivalent.

Approvals: First Level	Second Level	Third Level	Fourth Level

- 3.1.3. Matheson Toxic Gas Detector - Model 8014KA or equivalent.



- 3.1.4. Large container or tub, (14" deep x 22" W x 22" L) approximately 20 to 30 gallon capacity or equivalent.
- 3.1.5. A plastic cover for top and tray for the tub to set in.
- 3.1.6. (As alternative to large air tight chamber) Glove bag, 37" x 37" x 25" Glas-Col catalog number 108D X-37-37HG or equivalent
- 3.1.7. Quick closing clamps required for equipment sleeve
- 3.1.8. Gasoline (premium unleaded or equivalent).



- 3.1.9. General Electric 1/10 h. pump or equivalent

4. TESTING REQUIREMENTS AND CONDITIONS

- 4.1. Prior to beginning any testing, all measuring equipment and instruments to be used must have been calibrated using a method traceable to the National Institute of Standards and Technology (NIST) in accordance with the manufacturer's calibration procedure and schedule.
- 4.2. Any laboratory using this procedure to supply certification test data to NPPTL will be subject to the provisions of the NPPTL Supplier Qualification Program (SQP). This program is based on the tenets of ISO/IEC 17025, the NIOSH Manual of Analytical Methods and other NIOSH guidelines. An initial complete quality system audit and follow on audits are requirements of the Program. Additional details of the Program and its requirements can be obtained directly from NPPTL.
- 4.3. The test duration will be the longest duration obtained for any unit that underwent capacity testing according to Subpart O, Section 84.304, of Subpart O—Closed Circuit

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Escape Respirators updated requirements to 42 CFR, Part 84, Volume 60, Number 110, June 8, 1995 as published in Federal Register / Vol. 77, No. 46 / Thursday, March 8, 2012 / Rules and Regulations pp. 14168-14197. Refer to Standard Test Procedure for Capacity Determination of Closed- Circuit Escape Respirators (CCER).

- 4.4. Normal laboratory safety practices must be observed. These include safety precautions given in the current *NIOSH-Pittsburgh Health and Safety Manual*, Job Hazard Analysis (JHA), work instruction documents and test equipment manufacturer recommended practices.
- 4.5. Mandatory Safety Requirements. (The following practices are to be fully complied with during this testing):
 - 4.5.1. A fire extinguisher and telephone will be present and available during testing. Personnel present will know the door combination and the guard's telephone number.
 - 4.5.2. All wrist watches, rings, pens, etc. and particularly any aluminum objects are not to be taken into the chamber at any time. If rings can't be removed then gloves are required to be worn.
 - 4.5.3. The test tub holding the gasoline must have a secondary containment in order to guard against accidental discharge. (When using a glove bag instead of the chamber, the secondary containment will be outside the glove bag.)

5. PROCEDURE

When using glove bag, special note:

Set up breathing machine with a 622 Kg-m/min. cam and set for 24 respirations per minute giving a 40 L/minute volume. The breathing machine is to be stationed adjacent to the area where the glove bag containing the tub is located.

Place the tub inside the glove bag.

- 5.1. Suspend the breathing bag 6 to 8 inches above the bottom of the tub. (Use ring stands, clamps, etc.).
- 5.2. Make all necessary connections between the breathing machine and breathing bag thru glove bag port(s).
- 5.3. Connect a length of Tygon tubing to a port of the breathing bag and extend outside chamber connecting to a "T" containing a pump in line and pinch-off on other side of "T". This serves as the sampling line.
- 5.4. Check all connections for tightness and secure with hose clamps, wire, tape, etc. Make final tightness test by injecting air thru sampling line until there is 6 to 8 inches of positive pressure and let stand for one-half hour. If pressure holds, proceed.

- 5.5. Fill bag to desired test capacity with fresh air (approximately 4 to 5 liters) with the breathing cam positioned to start on the inhalation cycle.
 - 5.6. Place closed airtight container filled with 100 milliliters gasoline inside tub and close glove bag. Check closure for tightness.
 - 5.7. Start breathing machine and take an initial sample to use as a blank.
 - 5.8. Through gloves in bag open container and pour gasoline into bottom of tub. Take care not to allow any liquid gasoline to contact the breathing bag while pouring gasoline into the tub.
 - 5.9. Take periodic samples at intervals listed on test/data sheet using gasoline detector tubes. Compare stain in detector tube to scale inscribed on surface of stain tube. Record results on test data sheet. If bag begins to totally collapse when breathing machine inhales then use pump to add fresh air. Care must be taken not to add too much.
 - 5.10. At the conclusion of the test, take a sample over the gasoline (through the glove bag port) to check detector tube. Shut off breathing machine, put the test gasoline into an approved gasoline safety can, and store in the flammable cabinet.
6. PASS\FAIL CRITERIA
- 6.1. Breathing bag test.
 - 6.1.1. The air within the bag(s) shall not contain more than 100 parts per million of gasoline vapor throughout the duration of the test.
7. RECORDS\TEST SHEETS
- 7.1. Data shall be recorded and stored in a secure and easily retrievable format.
 - 7.2. All recordings and photographs of the test shall be maintained as part of the permanent record.
8. ATTACHMENTS
- 8.1. Sample Data Sheet
 - 8.2. Test Setup Photographs

8.1. Sample Data Sheet

**GASOLINE PERMEATION - BREATHING BAG TEST, CLOSED-CIRCUIT,
SELF-CONTAINED BREATHING APPARATUS**

Project No : _____ Date: _____

Company : _____

Respirator Type: _____

Reference: Subpart O, Section 84.302(c), of Subpart O—Closed Circuit Escape Respirators updated requirements to 42 CFR, Part 84, Volume 60, Number 110, June 8, 1995 as published in Federal Register / Vol. 77, No. 46 / Thursday, March 8, 2012 / Rules and Regulations pp. 14168-14197.

Requirement: The test duration will be the longest duration obtained for any unit that underwent capacity testing. Refer to Standard Test Procedure for Capacity Determination of Closed- Circuit Escape Respirators (CCER).

The air within the bag(s) shall not contain more than 100 parts per million of gasoline vapor during of the test.

Results:

PENETRATION

Time (minutes)	Stain	Remarks
0		
5		
15		
30		
45		
60		
90		
120		
150		
180		
210		
240		

270		
300		
330		
360		
390		
420		
450		
480		

Comments:

Test Engineer: _____

Pass: _____ Fail: _____





Revision History

Revision	Date	Reason for Revision
1.0	15 November 2011	Revisions applied to PSDB-STP-0134 from Federal Register/Vol. 73, No. 238/Wed. December 10, 2008/ proposed rules 75040
2.0	20 February 2012	Added glove bag option.
3.0	23 March 2012	Administrative changes made to include information from the release of the proposed rule.
		Former document number - STP-00001-PSDB-0002
0.0	25 March 2014	New document number to reflect numbering in the approval library, normalization of format. Grammatical edits have been incorporated for clarification, but there are no changes to procedure from historical document.