



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

Procedure No. RCT-ASR-STP-0144	Revision: 1.1	Date: 12 September 2005
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DETERMINATION OF CONTINUOUS GAS FLOW ON CONSTANT FLOW,  
 CLOSED-CIRCUIT, SELF-CONTAINED BREATHING APPARATUS  
 STANDARD TESTING PROCEDURE (STP)

1. PURPOSE

This test establishes the procedures for ensuring that the level of protection provided by the gas flow requirements on Constant Flow, Closed-Circuit, Self-Contained Breathing Apparatus (SCBA) 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 H, Section 84.94(a); Volume 60, Number 110, June 8, 1995.

2. GENERAL

This STP describes the Determination of Continuous Gas Flow on Constant Flow, Closed-Circuit, Self-Contained Breathing Apparatus 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. Electric Timer, calibrated to hundredths of a minute (Precision Scientific Company) or equivalent.

Approvals:	1 <sup>st</sup> Level	2 <sup>nd</sup> Level	3 <sup>rd</sup> Level
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- 3.1.2. Dry test - Gas meter, (Singer-American Meter Division - Model DTM-200A) or equivalent.



- 3.1.3. Wet Test - Gas Meter (Singer-American Meter Company - Model AL17-1) or equivalent.

#### 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.

#### 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. The regulator or constant flow outlet is connected to a calibrated wet test meter (traceable to NIST using Dry Test Gas Meter).
- 5.2. Flow readings are recorded initially and every 10 minutes for the rated service time of the unit. The last 10 minutes are monitored every other minute.
- 5.3. Data Analysis

Record flow readings directly from the wet test gas meter.

Note: This test should be done on a minimum of two respirators, or more if additional testing is required (42 CFR, Part 84, Sections 84.12, 84.30, and 84.60).

## 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 H, Section 84.94(a); 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.

84.94 Gas flow test; closed-circuit apparatus.

(a) Where oxygen is supplied by a constant-flow device only, the rate of flow shall be at least 3 liters per minute for the entire rated service time of the apparatus.

## 7. RECORDS\TEST SHEETS

- 7.1. All test data will be recorded on the GAS FLOW TEST, CONSTANT FLOW, CLOSED-CIRCUIT, SELF-CONTAINED BREATHING APPARATUS test data sheet.

- 7.2. All videotapes and photographs of the actual test being performed, or of the test 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.

**GAS FLOW TEST, CONSTANT FLOW, CLOSED-CIRCUIT,  
SELF-CONTAINED BREATHING APPARATUS**

Project No. : \_\_\_\_\_ Date: \_\_\_\_\_

Company : \_\_\_\_\_

Respirator Type: \_\_\_\_\_

Reference: 42 CFR 84, Subpart H, Section 84.94(a).

Requirement: Where oxygen is supplied by a constant-flow device only, the rate of flow shall be at least 3 liters per minute for the entire rated service time of the apparatus.

Results:

<u>Unit #1</u>	<u>Time/Min.</u>	<u>Flow/LPM</u>	<u>Unit #2</u>	<u>Time/Min.</u>	<u>Flow/LPM</u>
	0-1	_____		0-1	_____
	1-2	_____		1-2	_____
	2-3	_____		2-3	_____
	3-4	_____		3-4	_____
	4-5	_____		4-5	_____
	5-6	_____		5-6	_____
	6-7	_____		6-7	_____
	7-8	_____		7-8	_____
	8-9	_____		8-9	_____
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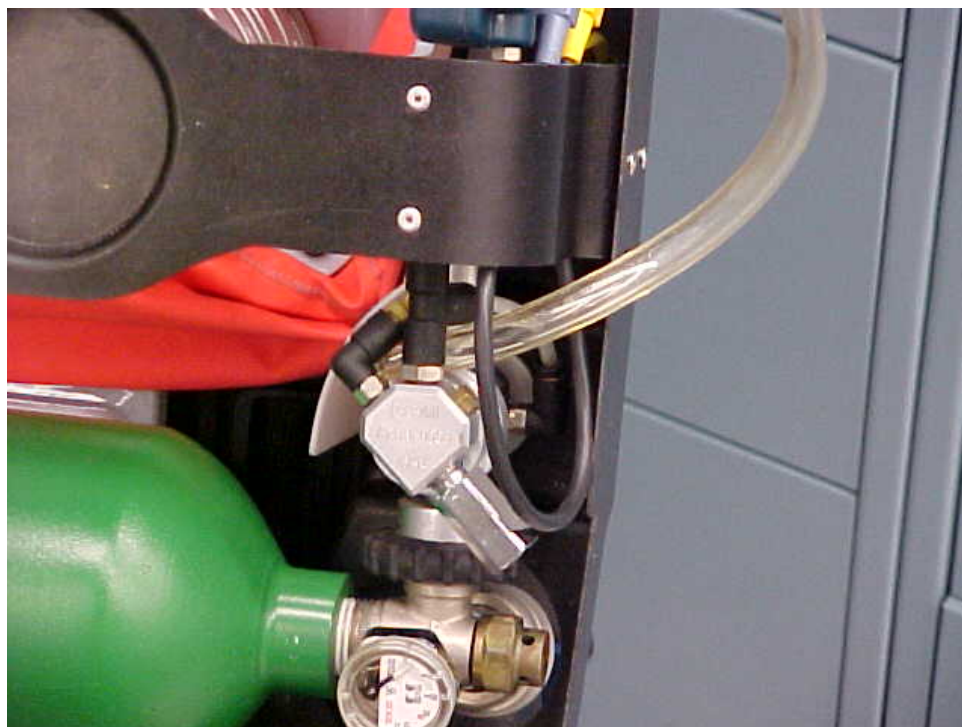
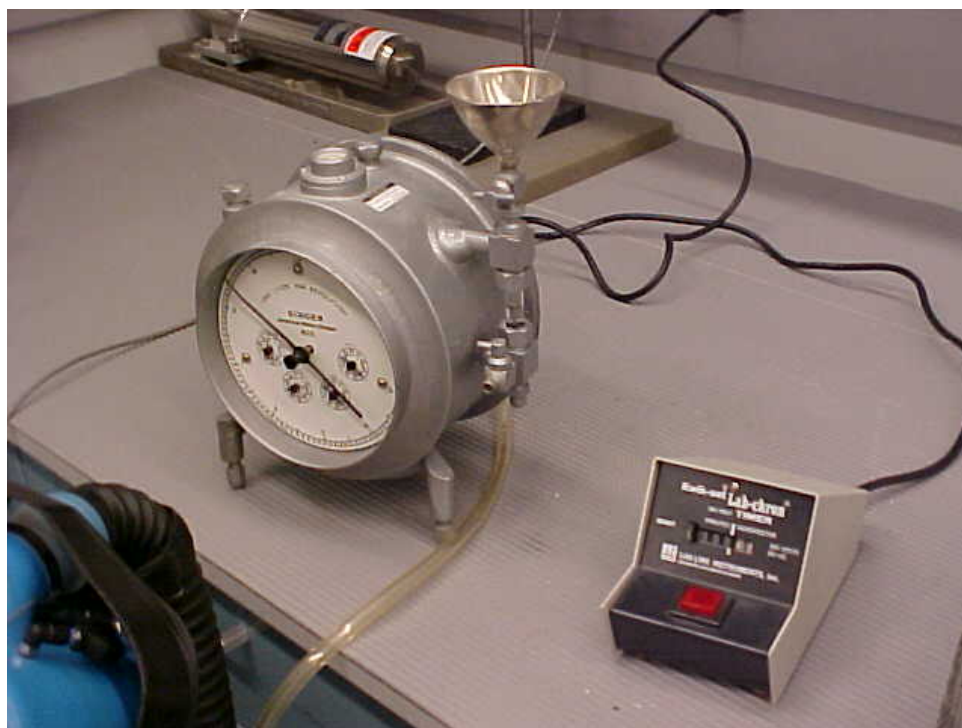
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Test Engineer: \_\_\_\_\_ PASS \_\_\_\_\_ FAIL \_\_\_\_\_





### Revision History

<b>Revision</b>	<b>Date</b>	<b>Reason for Revision</b>
1.0	24 May 2001	Historic document
1.1	12 September 2005	Update header and format to reflect lab move from Morgantown, WV No changes to method