



National Institute for Occupational Safety and Health
National Personal Protective Technology Laboratory
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Procedure No. RCT-ASR-STP-0147	Revision: 1.1	Date: 12 September 2005
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DETERMINATION OF MODE TRANSFER TEST OF COMBINATION, OPEN-CIRCUIT, SELF-CONTAINED BREATHING APPARATUS AND SUPPLIED-AIR RESPIRATORS SCBA/SAR STANDARD TESTING PROCEDURE (STP)

1. PURPOSE

This test establishes the procedures for ensuring that the level of protection provided by the mode transfer test requirements on Combination Open-Circuit, Self-Contained Breathing Apparatus and Type C, Supplied-Air Respirators SCBA/SAR 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); Volume 60, Number 110, June 8, 1995.

2. GENERAL

This STP describes the Determination of Mode Transfer Test of Combination Open-Circuit, Self-Contained Breathing Apparatus and Supplied-Air Respirators SCBA/SAR 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. A 300 cubic foot gas cylinder of compressed air or equivalent.

Approvals:	<u>1st</u> Level	<u>2nd</u> Level	<u>3rd</u> Level
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3.1.2. Timer, Digital stopwatch, calibrated to hundredths of a minute or equivalent. (Cronus Precision Products, Inc.)



3.1.3. Matheson Air Regulator - Model 8-250 or equivalent.



- 3.1.4. Helicoid standard test gauge and connecting fittings or equivalent.
- 3.1.5. Two test subjects meeting requirements of the NIOSH Human Subject Review Board (HSRB) approved Protocol. Refer to HSRB-73-DSR-01, "Protocol for the Testing of Respiratory Protective Devices" for the proper consent form and complete details on the use of human test subjects in respirator certification testing.



3.1.6. 10' x 12' Gas-tight chamber 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 during all testing.
 - 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.

- 5.1.1. Subject dons unit, after detailed reading of the manufacturer's instruction manual.
- 5.1.2. Subject breathes on the supplied-air mode (subject's back toward technician).
- 5.1.3. Technician turns off the supplied air.
- 5.1.4. Subject breathes until 0 psig is reached in supplied air mode (determined when airflow is no longer available upon demand).
- 5.1.5. When air-supply is terminated, simultaneously:
 - A. Technician starts timer.
 - B. Subject turns on SCBA cylinder air supply (proper transfer sequence is determined from the user's instructions).
- 5.1.6. Transfer is fully effected when:
 - A. Air is now supplied from the SCBA, mode or
 - B. It may be necessary to disconnect airline hose to fully effect transfer to

SCBA mode of air supply. Stop timer after A or B.

5.1.7. Disconnect coupling (if this hasn't been accomplished in 5.1.6. as a sequence requirement).

5.1.8. Repeat five times with 2 test subjects and record data.

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.)

5.2. Data Analysis

Transfer time must be fully accomplished in 15 seconds or less for each event to meet minimum performance requirements.

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); 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.

6.3. Transfer from SAR mode to SCBA mode must be accomplished in 15 seconds or less.

7. RECORDS\TEST SHEETS

7.1. All test data will be recorded on the SPECIAL TEST - MODE TRANSFER - COMBINATION, OPEN-CIRCUIT, SELF-CONTAINED BREATHING APPARATUS AND SUPPLIED-AIR RESPIRATORS SCBA/SAR 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.

SPECIAL TEST - MODE TRANSFER - COMBINATION, OPEN-CIRCUIT, SELF-CONTAINED BREATHING APPARATUS AND SUPPLIED-AIR RESPIRATORS SCBA/SAR

Project No : _____ Date: _____

Company : _____

Respirator Type: _____

Reference: 42 CFR, Part 84, Subpart G, Section 84.63(a)(c)(d)

Requirement: For combination units, the transfer time between modes must be accomplished in less than 15 seconds.

- Procedure:
1. Don unit.
 2. Breathe on Supplied Air mode. Turn off air supply and breathe down to "0" psig.
 3. When air is exhausted, start timer.
 4. Switch to SCBA mode, (following the instruction manual) when the transfer is fully effected - stop timer.
 5. Repeat test five times.

Results:

<u>Subject #1</u> _____	<u>Event</u>	<u>Time / Sec.</u>
	1	_____
	2	_____
	3	_____
	4	_____
	5	_____
 <u>Subject #2</u> _____	1	_____
	2	_____
	3	_____
	4	_____
	5	_____

Comments :

Test Engineer: _____ PASS _____ FAIL _____

Revision History

Revision	Date	Reason for Revision
1.0	21 February 2001	Historic document
1.1	12 September 2005	Update header and format to reflect lab move from Morgantown, WV No changes to method