



National Institute for Occupational Safety and Health  
National Personal Protective Technology Laboratory  
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Procedure No. RCT-ASR-STP-0101	Revision: 1.1	Date: 3 June 2005
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DETERMINATION OF TIGHTNESS OF HOSES AND COUPLINGS,  
TYPE 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 tightness of hoses and couplings requirements on Type 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 8, 1995.

2. GENERAL

This STP describes the Determination of Tightness of Hoses and Couplings, Type 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. Fisher Scientific model-TPX 50cc graduated cylinders or equivalent.
- 3.1.2. A source of compressed air (a 300 cubic foot gas cylinder) capable of delivering 250 psig or higher or equivalent.
- 3.1.3. Air regulator, Model 8, from Matheson Gas Products or equivalent
- 3.1.4. A Helicoid calibrated pressure gauge and connecting fittings or equivalent.
- 3.1.5. Two sections of applicant's supplied air hose and couplings.
- 3.1.6. Electric timer, calibrated to hundredths of a minute (Precision Scientific Co.) or equivalent.
- 3.1.7. A sink, or container, filled with water, of sufficient size to allow emersion of the hoses and couplings, and the graduated cylinder 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

#### 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. Use the test procedure as follows;
    - 5.1.1. 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).
- 5.1.2. Put the air-supply hose connection used in RCT-ASRS-STP-0100 into a container or sink filled with water.
  - 5.1.3. Attach one end of the connected hoses to a two-stage regulator with gauge and compressed air source.
  - 5.1.4. Connect the other end of the hoses to the SAR being tested and bring up to applicable test pressure levels, or separate the SAR from the hose at the quick disconnect and pressurize the hoses against the check valve in the quick disconnect.
  - 5.1.5. Immerse the hose fittings or connections to be tested in the container of water.

- 5.1.6. Slowly increase air pressure within connected hoses until a constant pressure of 25 psig or twice the maximum respirator service pressure, whichever is greater, is reached, and check for air leaks. Record the pressure level on the test data sheet.
- 5.1.7. When connections are properly tightened and the air pressure is properly adjusted, invert the immersed graduated cylinder over the hose fittings or connections and simultaneously start a timer (stopwatch).
- 5.1.8. Measure the cc of displacement for one minute or until the graduated cylinder is empty, whichever occurs first. Record the cc of leakage and the elapsed time at one minute into the test on the test data sheet. Continue this process for four more consecutive one minute periods (five minutes total).
- 5.1.9. Calculate the "cc/min" leakage rates and record them on the data on the test data sheet.

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 Types C and CE supplied-air respirators shall meet the minimum test requirements set forth in Table 8 of this subpart.

Leakage of air exceeding 50 cc per minute at each coupling shall not be permitted when the hose and couplings are joined and are immersed in water, with air flowing through the respirator under a pressure of 173 kN/m<sup>2</sup> (25 pounds per square inch) gauge applied to

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the inlet end of the air-supply hose, or at twice the maximum respirator-supply pressure that is specified by the applicant, whichever is higher.

7. RECORDS\TEST SHEETS

- 7.1. All test data will be recorded on the TIGHTNESS 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.

**TIGHTNESS 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: Leakage of air exceeding 50 cc per minute at each coupling shall not be permitted when the hose and couplings are joined and are immersed in water, with air flowing through the respirator under a pressure of 173 kN/m<sup>2</sup> (25 pounds per square inch) gauge applied to the inlet end of the air-supply hose, or at twice the maximum respirator-supply pressure that is specified by the applicant, whichever is higher.

Test Data: Hose internal air pressure = \_\_\_\_\_ (Psig)

<u>Time\Seconds</u>	<u>cc</u>
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- 1.
- 2.
- 3.
- 4.
- 5.

Comments :

Test Engineer: \_\_\_\_\_ PASS \_\_\_\_\_ FAIL

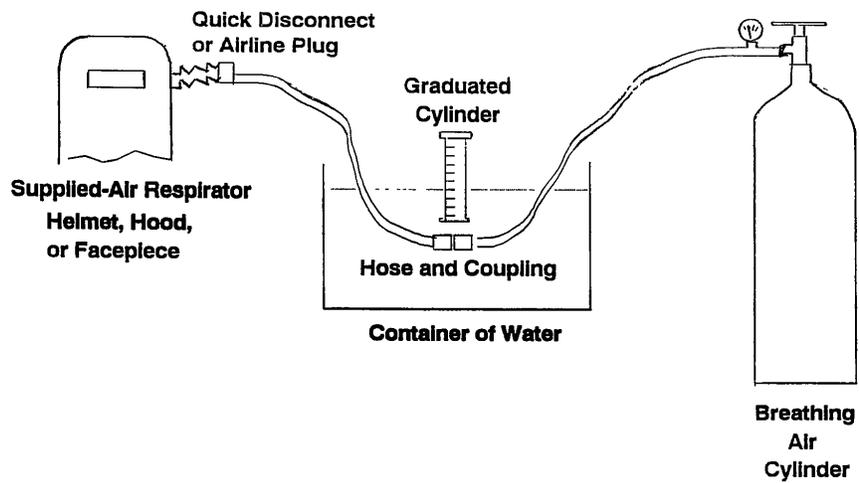


Figure 1

Schematic of Tightness Test Apparatus Arrangement

### Revision History

<b>Revision</b>	<b>Date</b>	<b>Reason for Revision</b>
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