



National Institute for Occupational Safety and Health
National Personal Protective Technology Laboratory
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Procedure No. RCT-ASR-STP-0113	Revision: 1.1	Date: 20 September 2005
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DETERMINATION OF AIRFLOW RESISTANCE, CONTINUOUS FLOW,
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 airflow resistance requirements on Type C and CE, Continuous Flow, Supplied-Air Respirators submitted for Approval, Extension of Approval, or examined during Certified Products Audits, meet the minimum certification standards set forth in and 42 CFR, Part 84, Subpart G, Section 84.63(a)(c)(d), and Subpart J, Section 84.155; Volume 60, Number 110, June 8, 1995.

2. GENERAL

This STP describes the Determination of Airflow Resistance, Continuous Flow, 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 tests, and determine whether or not the product passes the tests.

3. EQUIPMENT/MATERIALS

3.1 The list of necessary test equipment and materials follows:



3.1.1. Teledyne Hastings - Raydist Mass Flow Meter - Model NAHL-25 or equivalent.

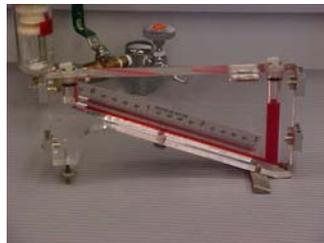
Approvals:	1 st Level	2 nd Level	3 rd Level
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- 3.1.2. Anthropometric Test Head with tube for measuring breathing resistance (Sierra Engineering Company Model 428) or equivalent.



- 3.1.3 A Helicoid calibrated pressure gauge and connecting fittings or equivalent.



- 3.1.4. Dwyer Slant Manometer 0-3", F. W. Dwyer Manufacturing Co., Michigan City, Indiana or equivalent.



- 3.1.5. An air tight container (35 Liter test tank with a depth and diameter of approximately 36 centimeters) that has an inlet and outlet. The inlet can accept various ten centimeter rubber gaskets with openings varying according to breathing tube size diameters. The container must have a removable cover on the inlet side to facilitate connecting the respirator-inlet covering connection to the

breathing tube inside of the container or equivalent.



3.1.6. A 300 cubic foot gas cylinder of compressed air or equivalent.



3.1.7. Air regulator, Model 8, from Matheson Gas Products 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. Turn on mass flow meter. The meter needs at least 30 minutes warm-up time.
- 5.2. Insert the respirator and air inlet tube in the 35 liter tank.
- 5.3. Pull the air inlet tube through the rubber gasket in the lid of the tank and secure the lid onto the tank. To insure that no air escapes, the hole of the rubber gasket should have a smaller diameter than the diameter of the air supply hose and caulk around sealing area.
- 5.4. Attach the air supply hose to the air regulating valve or orifice of the supplied-air respirator.
- 5.5. Attach the other end of the minimum length of air-supply hose to the downstream side of the regulator.
- 5.6. Connect the mass flow meter to the outlet of the 35 liter tank.
- 5.7. Adjust the regulator until a flow of 115 liters per minute is obtained. (See data analysis).
- 5.8. Record the reading on the pressure gauge and the position of the air regulating valve if used.
- 5.9. Turn off air supply.
- 5.10. Remove the respirator and air inlet tube from the 35 liter tank and mount on anthropometric head. Plug the breathing machine connection on the head with a cork.
- 5.11. Connect a slant manometer to the pressure tube exiting the anthropometric head.
- 5.12. Adjust air supply pressure to that obtained in step 5.7, insure the air regulating valve (if used) is in the same position as step 5.8.
- 5.13. Record pressure reading from slant manometer.

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 84.84.63(a)(c)(d), and Subpart J, Section 84.155; 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.

84.155 Airflow resistance test; Type C supplied-air respirator, continuous flow class and Type CE supplied-air respirator; minimum requirements.

The resistance to air flowing from the respirator shall not exceed 25 mm (1 inch) of water-column height when the air flow into the respiratory inlet covering is 115 liters (4 cubic feet) per minute.

7. RECORDS\TEST SHEETS

7.1. All test data will be recorded on the AIRFLOW RESISTANCE, CONTINUOUS FLOW CLASS, 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.

**AIRFLOW RESISTANCE, CONTINUOUS FLOW CLASS, TYPE C AND CE,
SUPPLIED-AIR RESPIRATORS**

Project No : _____ Date: _____

Company : _____

Respirator Type: _____

Reference: 42 CFR, Part 84, Subpart J, Section 84.155.

Requirement: The resistance to air flowing from the respirator shall not exceed 25 mm (1 inch) of H₂O col. ht. when air flow into respiratory inlet covering is 115 lpm. (4 cfm).

Results: Air Flow, 115 lpm. (4 cfm.)

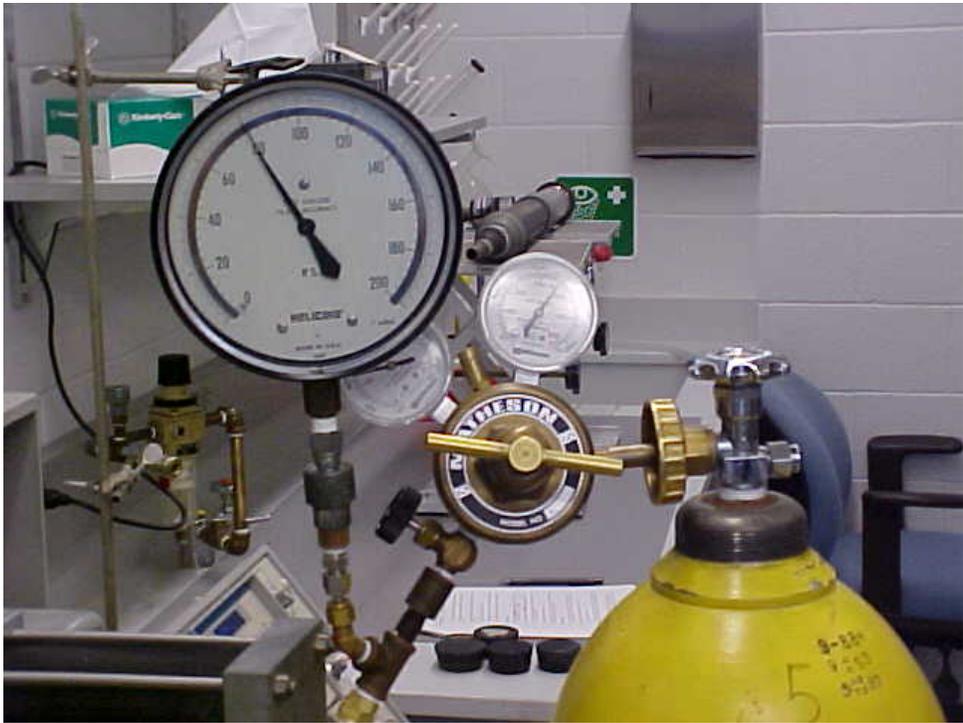
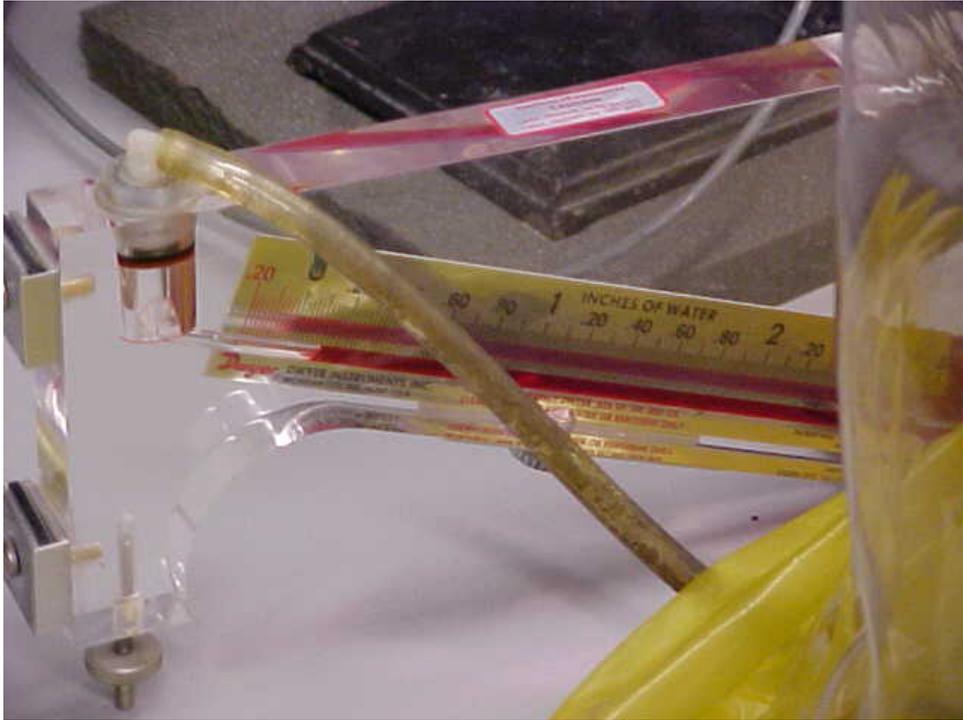
<u>Unit</u>	<u>Resistance / Inches of H₂O</u>
_____	_____
_____	_____

Comments:

Test Engineer: _____ PASS _____ FAIL _____







Revision History

Revision	Date	Reason for Revision
1.0	23 May 200	Historic document
1.1	20 September 2005	Update header and format to reflect lab move from Morgantown, WV No changes to method