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National Personal Protective Technology Laboratory
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DETERMINATION OF EXHALATION AIRFLOW RESISTANCE, PRESSURE-DEMAND, TYPE C AND CE, SUPPLIED-AIR RESPIRATORS STANDARD TESTING PROCEDURE (STP)

1. PURPOSE

This document establishes the procedure for ensuring that the operational level of protection provided by the exhalation resistance requirements on Type C and CE, Pressure-Demand, 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 J, Section 84.157(c); Volume 60, Number 110, June 8, 1995.

2. GENERAL

This STP describes the Determination of Exhalation Airflow Resistance, Pressure-Demand, 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. A 300 cubic foot gas cylinder of compressed air or equivalent.

3.1.2. A calibrated pressure gauge and connecting fittings or equivalent.

3.1.3. Air regulator, Model 8, from Matheson Gas Products or equivalent.

3.1.4. An anthropometric headform or fixture on which to mount the complete respirator assembly in the configuration as worn by the user.

3.1.5. Setra Datum 2000 Model 239 digital manometer with an accuracy of ±0.04%R ± 1 digit – Connect manometer to a pressure tap on the line between the flow controller and headform.

3.1.6. Brooks Instrument Co. model 5853S Mass Flow Controller with Brooks Control and Read-Out Unit model 0154 – accuracy ± 0.70%R ± 0.20% f.s.

3.1.7. Ground glass joint.

3.1.8. Pinch clamp.

3.1.9. Compressed air source capable of delivering a minimum of 85 liters per minute (lpm).

4. TESTING REQUIREMENTS AND CONDITIONS

4.1. Prior to beginning any testing, confirm that all measuring equipment employed has been calibrated in accordance with the testing laboratory's calibration procedure and schedule. All measuring equipment utilized for this testing must have been calibrated using a method traceable to recognized international standards when available.

5. PROCEDURE

5.1. Set up respirator as per manufacturer's instructions using maximum pressure and minimum hose length.

5.2. Mount the facepiece on an anthropometric head with tube for measuring breathing resistance. Insert a ground glass joint connector at the breathing port at backside of head. Use a pinch clamp to pinch off the small pressure port tube on back of head. Set the digital manometer to read zero.

5.3. Turn on airflow and set flow controller to 85 lpm, tolerance ± 1.4 lpm

5.4. Turn on air supply to respirator and adjust to manufacturer's maximum air pressure.

5.5. Insert the connection of the headform to the connection of the resistance tester.

5.6. Read resistance in inches of water to the nearest hundredth of an inch on the digital manometer.

5.7. Record the measurement.

5.8. Data Analysis

5.8.1. To convert inches of water to mm of water, multiply reading in inches by 25.4.

5.8.2. If pressure-demand unit is being tested, take reading obtained in step 5.7 and subtract static pressure obtained in bench test for air flow resistance (inhalation) RCT-ASR-STP-0106.

Note: This test should be done on a minimum of two respirators, or more if additional testing is required (42 CFR, Part 84, Section 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 J, Section 84.157(c); Volume 60, Number 110, June 8, 1995.

84.63 Test requirements; general.

84.157 Air Flow Resistance Test; Type C Supplied-Air Respirator, Pressure-Demand Class, minimum requirements.

(c) The exhalation resistance to a flow of air at a rate of 85 liters (3 cubic feet) per minute shall not exceed the static pressure in the facepiece by more than 51 mm (2 inches) of water-column height.

7. RECORDS\TEST SHEETS

7.1. Record test data in a format that shall be stored and retrievable. Data is to be reported as shown in the attached example data sheet.

AIRFLOW EXHALATION RESISTANCE, PRESSURE-DEMAND CLASS, TYPE C AND CE, SUPPLIED-AIR RESPIRATORS

Project No : _____ Date: _____

Company :

Respirator Type:

Reference: 42 CFR, Part 84, Subpart J, Section 84.157(c).

Requirement: (c) The exhalation resistance to a flow of air at a rate of 85 lpm. (3 cfm.) shall not exceed the static pressure in the facepiece by more that 51 mm (2 inches) of H_20 col. Ht.

Results: Exhalation Resistance at 85 lpm:

Unit #1

Exhalation resistance: ____ (in of H_2O)
Static pressure: ____ (in of H_2O)
Result: ____ (in of H_2O)

Unit #2

Exhalation resistance: ____ (in of H_2O)
Static pressure: ____ (in of H_2O)
Result: ____ (in of H_2O)

Comments:

Test Engineer: _____ PASS_____ FAIL

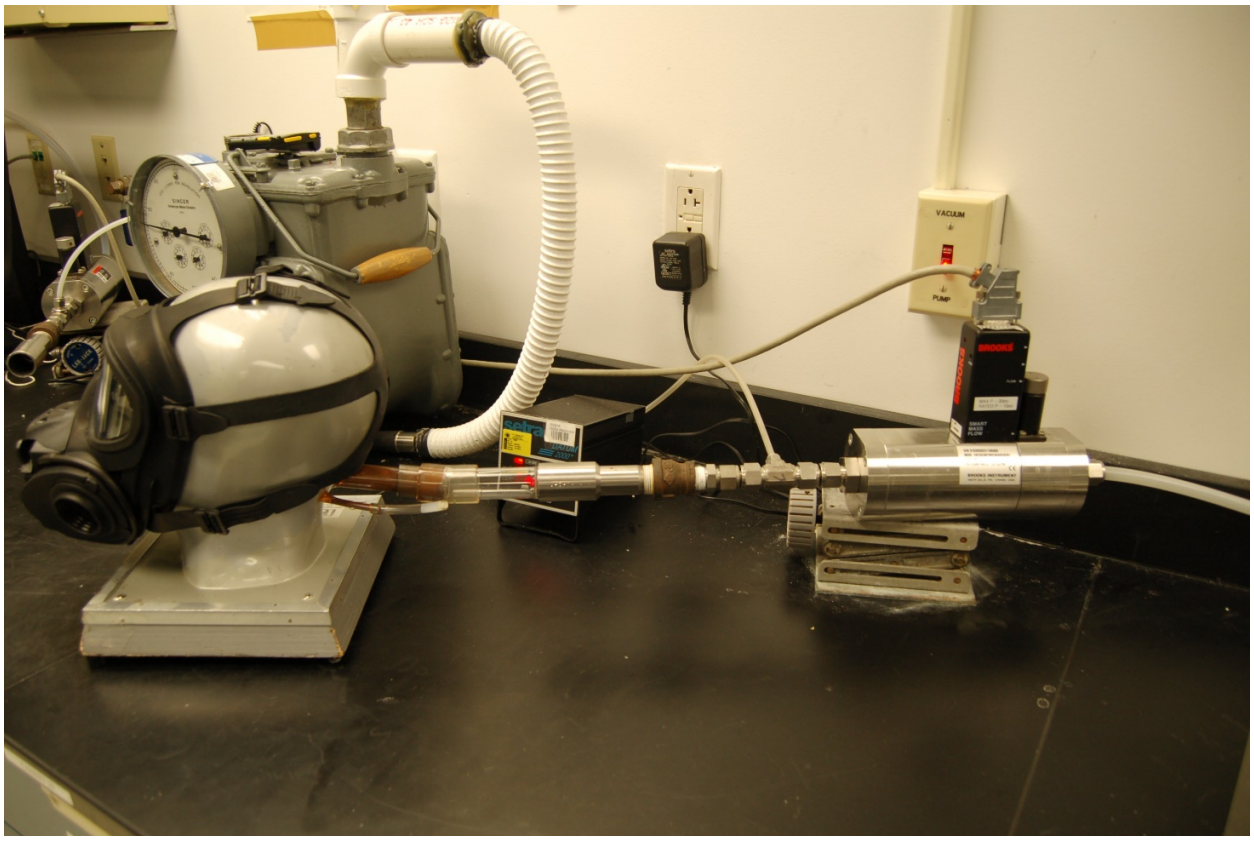

Figure 1: Exhalation resistance setup

Revision History

Revision	Date	Reason for Revision
1.0	27 June 2001	Historic document
1.1	26 September 2005	Update header and format to reflect lab move from Morgantown, WV. No changes to method
1.2	10 June 2021	Updated NIOSH Logo. Updates to procedure and figures to reflect current test setup. The older version of the STP used the silica dust chamber to perform the testing; this system is no longer used.