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Standard Guide for Respirator Fit Testing Methods¹

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1. Scope

1.1 This guide provides guidance on how to conduct fit testing of tight-fitting respirators and appropriate methods to be used. Fit testing is only one element of a complete respiratory protection program. Examples of complete respiratory protection programs are defined in Practice F3387, 29 CFR 1910.134, and so forth.

1.2 *Purpose*—This guide provides requirements for conducting respirator fit testing and includes:

- 1.2.1 Qualifications for fit test operators,
- 1.2.2 Specific fit test methods,
- 1.2.3 Interpretation of fit test results,
- 1.2.4 Recordkeeping, and
- 1.2.5 Methods to validate new fit test methods.

1.3 *Should and Shall*—The provisions of this guide are mandatory in nature when the word “shall” is used and advisory in nature when the word “should” is used.

1.4 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

F3387 Practice for Respiratory Protection

¹ This guide is under the jurisdiction of ASTM Committee F23 on Personal Protective Clothing and Equipment and is the direct responsibility of Subcommittee F23.65 on Respiratory.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

2.2 ANSI Standards:³

ANSI/ASSE Z88.2 Practices for Respiratory Protection
ANSI/AIHA Z88.6 Respiratory Protection—Respirator Use—Physical Qualifications for Personnel

2.3 Federal Standard:⁴

29 CFR Part 1910.134 Respiratory Protection

3. Terminology

3.1 Definitions:

3.1.1 *aerodynamic diameter, n*—diameter of a unit density sphere having the same settling velocity as the particle in question.

3.1.2 *aerosol, n*—particles, solid or liquid, suspended in air.

3.1.3 *canister/cartridge, n*—container with a filter, sorbent, catalyst, or combination of these items that removes specific contaminants from the air passed through the container.

3.1.4 *challenge agent, n*—aerosol, vapor, or gas used by the fit test method for detecting respirator leakage.

3.1.5 *challenge pressure, n*—negative static pressure established inside the respirator facepiece during a controlled negative-pressure fit test.

3.1.6 *facepiece, n*—see *tight-fitting respirator*.

3.1.7 *filter, n*—component used in respirators to remove aerosols from the inspired air.

3.1.8 *fit factor, n*—numeric expression of how well a tight-fitting respirator fits a wearer during a quantitative fit test.

3.1.8.1 *Discussion*—It is the ratio of the measured challenge agent concentration outside the respirator (C_{out}) to its concentration inside the respirator (C_{in}). (Fit factor = C_{out} / C_{in}).

3.1.9 *fit test, n*—use of a qualitative or quantitative protocol to evaluate sealing surface leakage of a specific tight-fitting respirator while worn by an individual.

3.1.10 *fit test method, n*—combination of instrumentation, technology, and protocols used to conduct a respirator fit test.

3.1.10.1 *Discussion*—An accepted method may have more than one accepted protocol.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from U.S. Government Publishing Office (GPO), 732 N. Capitol St., NW, Washington, DC 20401, <http://www.gpo.gov>.

3.1.11 *fit test operator, n*—person qualified by training and experience with demonstrated ability to perform properly qualitative or quantitative fit tests and evaluate test results.

3.1.12 *fit test protocol, n*—specific step-by-step instructions for conducting a respirator fit test.

3.1.13 *penetration, n*—numerical expression of how well a tight-fitting respirator fits a wearer during a quantitative fit test.

3.1.13.1 *Discussion*—For aerosol-based quantitative fit test methods, it is the ratio of the measured challenge agent concentration inside the respirator (C_{in}) to its concentration outside the respirator (C_{out}). (Penetration = C_{in} / C_{out}).

3.1.14 *qualitative fit test, QLFT, n*—pass/fail fit test included in this guide that relies on the subject's sensory response to detect a challenge agent.

3.1.15 *quantitative fit test QNFT, n*—fit test included in this guide that uses an instrument to measure face seal leakage.

3.1.16 *required fit factor, RFF, n*—numeric value established as a pass/fail point or acceptance criterion for a quantitative fit test.

3.1.17 *respirator, n*—personal protective device designed to protect the wearer from the inhalation of hazardous atmospheres.

3.1.18 *tight-fitting respirator, n*—respirator with a facepiece, hood, or helmet that is designed to form a complete seal with the face or neck.

3.1.18.1 *Discussion*—This includes a hood or helmet with a neck seal (neck dam).

3.1.19 *user seal check, n*—procedure conducted by the wearer to determine if a tight-fitting respirator is properly donned.

4. Significance and Use

4.1 The purpose of this guide is to provide clear and consistent guidance with regard to the respirator fit-testing components of an effective respiratory protection program.

4.2 The respirator fit test itself is simply one facet of fit testing. An effective program requires much more, including a qualified person to perform the fit test. This guide provides guidance on exactly what knowledge and skills are necessary to perform as a qualified fit test operator.

4.3 This guide contains information to aid program managers and fit test operators in preparing to perform a proper fit test. This includes guidance regarding potential interference from other personal protective equipment (PPE) with the respirator, detailed information on respirators used for fit testing, selection of respirators before fit testing, and other considerations that shall be met if the fit test is to be effective.

4.4 A single fit test exercise protocol cannot model all workplace activities encountered by respirator users. Recognizing this, this guide provides flexibility regarding fit test exercise protocols. Exercises may be selected that are more representative of actual workplace activities, including repeated respirator donning.

4.5 *Exceptions*—Users of this guide should be aware that regulatory agencies may have requirements that are different from this guide.

5. Fit-Testing Rationale

5.1 The purpose of respirator fit testing is to verify that the selected make, model, and size of a tight-fitting respirator adequately fits the wearer. This is accomplished so there is reasonable assurance that the wearer has learned to don the respirator properly and can achieve the anticipated protection during use. Fit testing is a critical component of a respirator training program.

6. Qualifications for Fit Test Operators

6.1 General Qualifications:

6.1.1 Fit test operators shall be properly trained and demonstrate a proficiency in the fit test method(s) being used. The respiratory protection program administrator is responsible for evaluating and verifying the training and qualification of operators.

6.1.2 Program administrators may wish to consider the benefits of formal training programs from outside providers for fit test operators. An evaluation form for fit test operators is in [Annex A2](#). Continue training fit test operators until all questions on the form can be marked “acceptable” by the evaluator. Determination of acceptability for each item is left to the discretion of the respiratory protection program administrator.

6.2 Specific Qualifications for Fit Test Operators:

6.2.1 They shall be familiar with this guide along with the appropriate sections of the respiratory protection program concerning respirator fit testing, inspection, cleaning, maintenance, and storage.

6.2.2 They shall demonstrate a general knowledge of respirators used by the wearer in the workplace by:

6.2.2.1 Identifying respirator components and their functions;

6.2.2.2 Demonstrating respirator inspection, cleaning, and maintenance procedures;

6.2.2.3 Identifying different make, model, style, and size respirators;

6.2.2.4 Discussing respirator capabilities and limitations as related to respirator fit testing; and

6.2.2.5 Demonstrating and evaluating proper donning and doffing procedures, including user seal checks.

6.2.3 They shall demonstrate knowledge and application of the fit test method(s) being used by:

6.2.3.1 Explaining the purpose of respirator fit testing;

6.2.3.2 Explaining fit test procedures;

6.2.3.3 Explaining the limitations of the fit test method;

6.2.3.4 Identifying indications of erroneous fit test results (for example, quantitative fit factors that are unusually low or high); and

6.2.3.5 Demonstrating knowledge of the health and safety hazards associated with the chemicals or equipment, or both, used in the fit test.

6.2.4 They shall demonstrate the ability to set up all applicable equipment for the fit test method(s) being used by: