

RESPIRATORY PROTECTION: FIT TESTING

If your employer requires you to wear a respirator, they are required to follow government guidelines on its proper fit in order to keep you safe. These guidelines include being tested for a proper fit before its initial use and at least annually thereafter.

According to the Centers for Disease Control and Prevention, over three million American workers must wear respirators on the job to prevent inhaling toxic particles. But a respirator that doesn't fit well could endanger you and render the respirator useless. OSHA 29 CFR 1910.134(f) states, "Before an employee may be required to use any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style and size of respirator that will be used."

What is a tight fitting facepiece? OSHA defines it as a facepiece that is intended to form a complete seal with the wearer's face. This seal must be sufficiently tight to prevent any contaminants in the work environment from leaking around the edges of the facepiece into the user's breathing air. Two main types of respirators require fit testing. A negative pressure (air-purifying) respirator, such as a half-mask elastomeric respirator or full-facepiece elastomeric respirator; or a positive pressure (atmosphere-supplying) respirator, such as self-contained breathing apparatus (SCBA) atmosphere-supplying, or supplied-air respirator (SAR) which provides clean air from an uncontaminated source.

FIT TEST METHODS

The OSHA standard allows employers to use two types of fit testing methods: *qualitative fit testing* (QLFT) and *quantitative fit testing* (QNFT). The qualitative fit test procedures rely on a subjective sensation (taste, irritation, smell) of the respirator wearer to a particular test agent, while the quantitative uses measuring instruments to measure face seal leakage.

QUALITATIVE FIT TESTING (QLFT)

Qualitative fit testing relies on the respirator wearer's senses to determine if there is a gap in the seal of the respirator to the wearer's face.



The test agents used in the OSHA-accepted and ANSI-accepted qualitative fit testing protocols are:

- Saccharin – A sweet tasting solid aerosol
- Isoamyl acetate – A liquid that produces a sweet smelling vapor similar to bananas
- Bitrex™ – A bitter tasting solid aerosol
- Irritant smoke – A solid aerosol made of stannic oxychloride that produces hydrochloric acid when it comes in contact with water vapor; exposure to the hydrochloric acid produces an involuntary cough reflex

Note: NIOSH does not endorse or recommend the use of the irritant smoke fit test. NIOSH, in its formal comments to OSHA on the proposed revision of 29 CFR 1910, 1915, and 1926, strongly recommended against the use of this fit test method because of the health risk associated with exposure to the irritant smoke.



The test protocols include testing at a sensitivity level that demonstrates the user will be able to appropriately sense the presence of the test agent within the respirator by taste, smell or the urge to cough.

QUANTITATIVE FIT TESTING (QNFT)

This test confirms a respirator's fit by comparing concentration levels of a substance outside the respirator to the concentration levels of the same substance inside the respirator. Passing a quantitative respirator fit test with a quantitative fit test machine, such as a Portacount[®] made by TSI, proves that the facepiece is sized correctly.

In order to do these measurements, a small sampling tube is positioned to sample the air within the facepiece of the respirator and attached to a fit testing instrument able to calculate the percentage of particles leaking into the facepiece.

1. First, the wearer dons one of the respirator models/sizes provided by the employer that is expected to provide a good fit, in accordance with the manufacturer's instructions.
2. The wearer completes a user seal check to confirm that the respirator is properly seated on his/her face.
3. A fit testing adaptor is affixed to the respirator, and the respirator is attached to a fit testing instrument through a small sampling tube positioned within the facepiece.
4. The fit test operator then instructs the wearer to go through a series of prescribed exercises while the attached fit testing instrument

measures the ratio of particles both inside and outside of the respirator. From this data, a fit factor for the tested wearer is calculated that will determine whether or not the device (factoring in model, brand and size of the respirator) is suitable (passable) to be used regularly by that wearer.

When the use of respirators with tight fitting facepieces is voluntary, no fit testing is required. In addition, loose fitting respirators, such as powered air-purifying respirators (PAPRs), in which the hood or helmet is designed to form only a partial seal with the wearer's face or hoods which seal loosely around the wearer's neck or shoulders, do not require fit testing.

REQUIREMENTS FOR PEOPLE WHO CONDUCT RESPIRATOR FIT TESTING

Certification is not required.

ANSI/AIHA Z88.10-2001 – The standard states that personnel shall be “properly trained” and demonstrate a proficiency in the fit test methods being used. The respiratory program administrator is responsible for evaluating the qualifications and training of those personnel. Specific qualifications:

- Be familiar with Z88.10 (fit test methods) and Z88.2 (respiratory protection)
- Demonstrate general knowledge of respiratory face pieces
- Demonstrate knowledge of operation and practical aspects of fit test methods
- Demonstrate the ability to set up applicable equipment for the fit test method(s) used
- Demonstrate the ability to conduct the respirator fit test(s) used

REFERENCES

OSHA Appendix A to § 1910.134: Fit Testing Procedures (Mandatory)

Centers for Disease Control and Prevention –
The National Institute for Occupational Safety and Health (NIOSH)

ANSI Z88.10 Respirator Fit Test Methods

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