

RESPIRATOR FIT TESTING

UNDERSTANDING OSHA REQUIREMENTS AND TESTING OPTIONS

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A respiratory protection program is a formal, written workplace plan required by the Occupational Safety and Health Administration (OSHA) to protect workers from harmful airborne hazards when safe air cannot be achieved through engineering controls.

OSHA's Respiratory Protection Standard, 29 CFR 1910.134, requires employees who use tight-fitting respirators to pass an appropriate fit test. A respirator only provides its intended protection when it fits properly. Tight-fitting respirators rely on an adequate seal between the sealing surface of the respirator and the wearer's face to limit air from leaking around the facepiece. Fit testing is a formal procedure used to verify that a specific respirator properly fits the wearer.

Depending on the respirator and how it will be used, employers have two options: Qualitative Fit Testing (QLFT) or Quantitative Fit Testing (QNFT).

Both are allowed in respiratory protection programs, but the important distinction is what each test measures, where OSHA permits its use, and what information the employer receives from the test.

What OSHA Requires for Respirator Fit Testing

Under OSHA 29 1910.134, an employee using a tight-fitting facepiece respirator must pass an appropriate qualitative or quantitative fit test before using the respirator in the workplace.

The employee must be tested with the same make, model, style, and size of respirator that will be used on the job. Tight-fitting respirators must not have any interference with the sealing surface.

Fit testing is required:

- Before the employee first uses the respirator
- At least annually after the initial fit test
- Whenever the employee changes to a different respirator facepiece size, style, model, or make
- When physical changes occur that affect respirator fit, such as facial scarring, dental changes, cosmetic surgery, or a significant change in body weight

An employee who reports that a respirator no longer fits properly must also be given the option to select a different facepiece and be retested.

Fit testing must follow one of the OSHA-accepted protocols in Appendix A to 29 CFR 1910.134.

OSHA Requirements and Consensus-Standard Guidance

OSHA 29 1910.134 establishes the federal regulatory requirements employers must follow for respiratory protection, including when fit testing is required and which fit-testing protocols are accepted.

ANSI/ASSE Z88.2 (2015 edition) has also played an important role in respiratory protection programs by providing industry consensus for best practices. Its guidance covers areas such as respirator selection, use, fit, training, maintenance, and program administration.

For fit testing, the consensus standards provide more detailed technical guidance on how fit-testing programs and procedures should be managed. This guidance

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does not replace OSHA 29 1910.134, but supplements OSHA. Employers covered by the OSHA standard will still need to meet OSHA's regulatory requirements. ANSI/ASSE Z88.2 (2015 edition) Section 9.0 describes respiratory fit testing requirements. The ANSI/ASSE Z88.2 standard is available for purchase at ANSI/AIHA/ASSE Z88. Respirator Package

How Often Is Respirator Fit Testing Required?

Fit testing is required annually and whenever conditions change. A new fit test is also required if an employee changes the facepiece being used or experiences a physical change that affects fit. This is important because respirator fit is specific to both the individual wearer and the respirator facepiece being used.

Fit testing also differs from a user seal check. A user seal check is done by the wearer every time the tight-fitting respirator is worn to verify the respirator has a proper seal. Refer to the respiratory standard for additional guidance on positive and negative pressure seal checks. A user seal check does not replace the required annual fit test described above.

Qualitative Fit Testing

Qualitative fit testing is a pass/fail test. Instead of measuring leakage numerically, the test relies on the wearer's response to a challenge agent.

OSHA Appendix A includes qualitative protocols involving isoamyl acetate, saccharin solution aerosol, Bitrex solution aerosol, and irritant smoke. Each protocol has its own procedures and limitations.

For protocols based on taste or smell, the employee first undergoes a sensitivity screening. This confirms whether the person is able to detect the test agent. During the fit test, the employee wears the respirator and performs the exercises required by the applicable OSHA protocol.

Detection of the challenge agent during the test produces a failed test. If the challenge agent is not detected, the employee passes the fit test.

Advantages of Qualitative Fit Testing

QLFT has several practical advantages. The test is easy to perform, and the procedure is straightforward. OSHA accepts this method for certain respirators and applications within its permitted limits. For half-mask air-purifying respirators, a properly conducted qualitative fit test satisfies OSHA's fit-testing requirement.

Limitations of Qualitative Fit Testing

The main limitation is that this method is less reliable. Qualitative testing can lead to false positive or false negative results due to human dependency during the test. Each person's sensory response therefore becomes part of the test.

OSHA also limits where QLFT is permitted. Under 29 CFR 1910.134(f)(6), qualitative testing is limited to negative-pressure air-purifying respirators that need to achieve a fit factor of 100 or less. That means, OSHA does not allow a QLFT to be performed for an employee required to wear a full-face air-purifying respirator.

Quantitative Fit Testing

Quantitative fit testing takes a different approach.

Rather than relying on the wearer to report whether a challenge agent has been detected, QNFT uses instrumentation to measure respirator fit. The test produces a numerical result known as a fit factor. Simply put, OSHA defines fit factor as a quantitative estimate of how well a particular respirator fits comparing air inside respirator to air outside. This is not to be confused with the Assigned Protection Factor (APF) which is a regulatory value measuring a respirator's expected performance of workplace reduction of airborne contaminants.

When Is Quantitative Fit Testing Required?

OSHA permits qualitative fit testing tight-fitting positive-pressure atmosphere-supplying respirators and powered air-purifying respirators when testing is performed in negative-pressure mode.



A qualitative fit test uses a challenge agent to evaluate whether an adequate seal is maintained.

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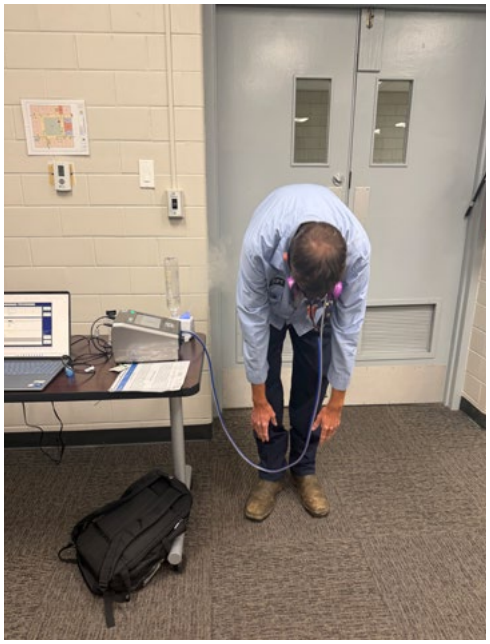


An employee performs required exercises during quantitative fit testing while instrumentation measures respirator fit.

OSHA-Accepted Quantitative Fit-Testing Protocols

Ambient Aerosol Condensation Nuclei Counter (CNC)

The ambient aerosol CNC method uses particles already present in the surrounding air as the challenge agent.

A probe allows the instrument to sample air from inside the respirator. The equipment compares particle concentrations inside the facepiece with concentrations in the surrounding environment and uses those measurements to calculate the fit factor.

OSHA also recognizes modified ambient aerosol CNC protocols. These use abbreviated exercise sequences established in Appendix A for specified respirator types.

Generated Aerosol

Generated aerosol testing creates a controlled concentration of a nonhazardous test aerosol inside a test chamber.

Instrumentation measures the concentration of the test agent in the chamber and inside the respirator. The instrument uses those measurements to calculate the fit factor.

Controlled Negative Pressure

Controlled negative pressure (CNP) testing measures leakage through the respirator face seal in a different way.

The wearer holds their breath while the equipment establishes and maintains a controlled negative pressure inside the facepiece. The system measures the amount of air needed to maintain the selected pressure and provides a measurement related to leakage through the respirator.

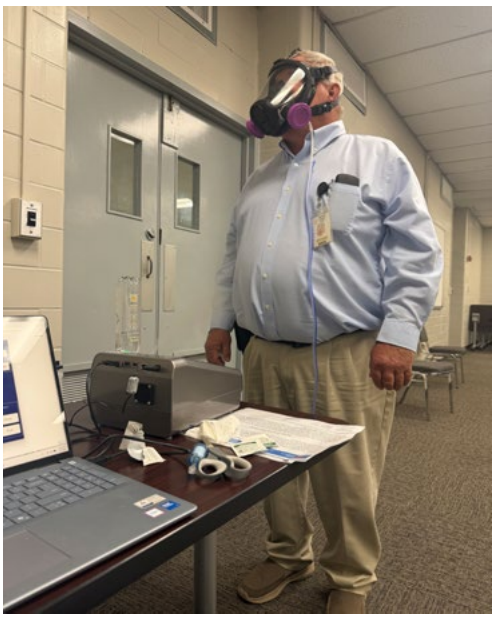
OSHA also recognizes a CNP REDON protocol (removal and redonning of the respirator as part of the test sequence).

Qualitative testing remains an OSHA-accepted option when used within its permitted applications. The limitation is not whether the test is compliant, but the amount of information it provides about respirator fit.

Choosing the Appropriate Fit-Testing Method

Respirator fit testing is much more than an annual compliance exercise. Fit testing is all about worker protection. Employers first need to identify the respirator being used, the level of respiratory protection required, and the OSHA requirements that apply. From there, they determine which OSHA-accepted testing methods are appropriate. In some situations, qualitative testing satisfies the requirements. In others, quantitative testing is required. An employer also has the option of using quantitative testing where qualitative testing is permitted when an objective fit factor is preferred.

The important point is understanding what each test tells you about fit. A QLFT pass shows that the wearer passed the applicable qualitative protocol. A QNFT result provides a measured fit factor. Neither eliminates the need for proper respirator selection, training, medical evaluation, routine user seal checks, maintenance, or other elements of an effective respiratory protection program.



An employee completes a respirator fit test to confirm proper fit and seal.

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Qualitative vs. Quantitative Fit Testing Table

	Qualitative Fit Testing (QLFT)	Quantitative Fit Testing (QNFT)
Result Type	A pass/fail result is based on whether the wearer detects a challenge agent	A numerical fit factor is measured by instrument
How Fit Is Determined	Wearer reports whether they taste, smell, or sense an irritant challenge agent	Instrument measures aerosol concentration or pressure leakage inside vs. outside the facepiece
OSHA-Permitted Use	QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less	Negative pressure tight-fitting half facepieces and tight-fitting full facepieces, as described below
Fit Factor Required to Pass	Not numerically measured (pass/fail only)	Negative pressure: ≥100 for tight-fitting half facepiece; ≥500 for tight-fitting full facepiece
OSHA-Accepted Protocols (Appendix A)	Isoamyl acetate, saccharin solution aerosol, Bitrex solution aerosol, irritant smoke	Ambient aerosol, generated aerosol, Controlled Negative Pressure (CNP)
Advantages	Simple equipment; less expensive, easy to administer	Measurable data, documented fit factor; more reliable
Limitations	Subjective, relies on senses, restricted to certain respirators, can result in false positive or false negative results	Require specialized equipment and adaptors for respirator connection

How Enviro-Con CAN HELP YOU

Enviro-Con provides quantitative respirator fit testing as part of its occupational health and respiratory protection program services. Testing is performed using the AccuFit PRO CNC system and applicable OSHA fit-testing protocols.

Contact Enviro-Con to discuss and schedule quantitative fit testing or respiratory protection needs for your workplace.

References

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