

Tips for Managing Respirator Fit Testing Programs

Description

Respirator fit testing is an important component of a respiratory protection program and is required in many circumstances. Respiratory protection programs are required when respirators are used in workplaces to help reduce exposures to biological, chemical, or particulate airborne contaminants. While at a minimum this program must meet regulatory and other authoritative body requirements, a successful respiratory protection program can also help reassure respirator wearers that they can use their respirators effectively under conditions where certain hazards may be present.

This document is intended to help employers identify strategies for managing the respirator fit testing needs for their workforce. While not intended to be a detailed description of fit testing procedures, the discussion of items below may be helpful in shaping facility fit testing policies:

- Reasons for fit testing
- Which respirators must be fit tested
- When fit testing is required
- Who can perform fit testing
- Overview of fit testing methods
- Considerations for which fit testing method to choose
- How to prepare for fit testing

Reasons for fit testing

Tight-fitting respirators are worn to help reduce inhalation of airborne hazards. To be effective, the respirator needs to seal properly to wearer's face, directing air through the filter – and not through leaks in the faceseal. If there are leaks, contaminated air can enter the respirator through the leaks, and the wearer could breathe in airborne contaminants. Therefore, it is important that the respirator should seal properly to the wearer's face – i.e. fit properly. Fit testing is a legal requirement in many countries, including the U.S., and is becoming increasingly adopted as a best practice even where it is not legally mandated. Fit testing helps confirm that a selected respirator is suitable for the wearer and can also provide an opportunity to educate the respirator wearer on proper use to help ensure exposure reduction to airborne hazards.

Which respirators must be fit tested

In general, any tight-fitting respirator with a seal to the skin of the face should be fit tested. Where these types of respirators are required in the workplace, many countries, including the U.S., include fit testing in their respiratory protection standards because a proper fit is important for effective protection. Types of tight-fitting respirators may include half-facepiece, full-facepiece, disposable filtering facepiece and reusable elastomeric respirators. Loose-fitting hoods and helmets, such as those used with powered air-purifying respirators (PAPR) do not have a tight seal to the skin and do not require fit testing.

When fit testing is required

Since fit testing is important for effective respiratory protection - and a good opportunity for wearer education,- U.S. OSHA requires it prior to using a tight-fitting respirator in the workplace and annually thereafter. In addition to this, since respirator fit may be affected by changes in a wearer's facial features, testing should be repeated if the wearer experiences significant changes due to facial injury, excessive weight loss or gain, dental work, etc., or upon request of the wearer. Fit testing is done on the same make, model, and size of the respirator(s) selected for use in the workplace and must also be repeated if a new respirator make, model, or size is selected.

Which Respirators Require Fit Testing?



Who can perform fit testing

According to U.S. OSHA: Anyone with “appropriate knowledge” and “experience” is qualified to conduct fit testing. No formal course work or certification is required.

All Fit Test Administrators should have knowledge of how to:

- Calibrate equipment as needed
- Perform tests properly, including preparation and any calculations
- Recognize invalid tests
- Ensure that test equipment is in proper working order

Some employers may elect to combine any required training with fit testing to take advantage of the time already scheduled with the respirator wearer. In that case, it would also be important that the fit test administrator has the knowledge and experience necessary to conduct respirator training, including contents of the written Respiratory Protection Program such as hazards that lead to product selection, donning and doffing, changeout schedules, and any other training requirements as listed by relevant regulations.

Overview of fit testing methods

There are two types of methods specified by U.S. OSHA for respirator fit testing that are also commonly used in other regions of the world; a qualitative fit test (QLFT) or a quantitative fit test (QNFT). As the name would indicate, a quantitative test provides a numerical result, while a qualitative test requires a subjective response on the part of the respirator wearer – that they can taste or smell the test agent. QNFT requires an electronic device, which can be a significant expense, and which requires periodic calibration and maintenance. However, device rental may be a lower-cost option with less administrative burden. QLFT has a lower initial cost but may not be an option where fit test subjects are not able to detect the test agent or the employer does not want to rely on a subjective response for results.

Examples of both method types are shown below:



Quantitative fit test (QNFT) method example



Qualitative fit test (QLFT) method example

Considerations for which fit testing method to choose

Which test method is best will depend on an individual employer's circumstances, but there are some general advantages and disadvantages of both methods. One of the circumstances to consider when choosing a fit testing method is the resources available to an employer for respirator fit testing. Quantitative fit testing may have additional equipment expense, but the US employer might be able to utilize the [recent OSHA addition of a modified protocol](#) that allows for a shortened number of exercises and durations. Another important resource need for QNFT is an adequate number of filtering facepiece respirators, such as N95', to use for fit testing, since at least one respirator per employee will need to be modified with a probed insert for attachment to tubing, which makes that respirator unsuitable for later workplace use.

A popular feature of QLFT is the ability to test more than one respirator wearer simultaneously, where fit test administrator skill and employer policy allow. Note that while experienced fit testers may be able to test multiple wearers in the same session, that practice may be discouraged in some countries or may present some difficulties due to infection control policies in times of a pandemic. However, testing multiple wearers at the same can result in an overall time savings, even though QLFT may require an additional 10 minutes or so per person due to the requirement for a sensitivity test prior to the fit test. The lower

cost of QLFT materials is a main advantage where employers have fewer budget resources. And since QLFT is not destructive testing, the respirator used for the fit test is still available for later use in the workplace.

See the following resources for additional information about fit test methods:

- [Fit Testing: Frequently Asked Questions](#)
- [Quick Reference Guide: Qualitative Fit Testing](#)
- [Quantitative Fit Testing of Respirators](#)
- [Modified Ambient Aerosol CNC Quantitative Fit Testing Protocols](#)

How to prepare for fit testing

Adequate preparation for fit testing will be helpful in minimizing the scheduling of make-up sessions and increasing fit test administrator efficiency. Before a fit test session is scheduled, the following should be considered:

- Respirator wearers may need reminders prior to the session of the need for avoiding eating, chewing gum, smoking or drinking for 15 minutes prior and for men to arrive clean-shaven.
- Administrators may want to have a stocked supply of the variety of respirators allowed for use so that options are available if the employee is not bringing a respirator to the fit test session, or has trouble obtaining a fit with a select make, model or size.
- Where medical evaluation is required, such as by U.S. OSHA, that clearance for the employee to wear the respirator(s) selected should be in place prior to fit testing.

Allow adequate time for fit testing, including time for re-testing as needed. Depending on the fit test method chosen, allow at least 15-30 minutes per test. Using a QNFT with a modified, shortened protocol will typically take less time than using a QLFT, especially if testing multiple subjects with the latter method. It is important to allow time for all of the steps of fit testing:

- 1) Sensitivity test (QLFT only)
- 2) Preparation of facepiece for the test
- 3) Instruct the wearer in the fit test exercises
- 4) Donning and seal checking of the respirator
- 5) Comfort assessment period (5 minutes)
- 6) Fit test exercises (see table below)
- 7) Removal of facepiece
- 8) Explanation of the results of the fit test
- 9) Cleaning of fit test equipment

Quantitative Fit Testing (QNFT) One minute each unless noted	QNFT (CNC) Modified Protocol Shortened exercises and times	Qualitative Fit Testing (QLFT) One minute each
Normal breathing Deep breathing Head side to side Head up and down Talking Grimacing (15 seconds) Bending at waist or jogging in place Normal breathing	Bending at waist (50 seconds) Talking* (30 seconds) Head side to side Head up and down *jogging for elastomeric respirators	Normal breathing Deep breathing Head side to side Head up and down Talking Bending at waist or jogging in place Normal Breathing

Multiple subjects fit testing

Respirator fit testing can be a time-consuming process, and especially during annually repeat fit testing, finding ways to improve efficiency can become important. With qualitative fit testing (QLFT), it may be feasible to fit test multiple subjects simultaneously. The maximum number of subjects is somewhat limited by the required durations of the fit test exercises and the experience of the fit test administrator, but it might be possible to fit test up to five subjects at the same time. This number may decrease where infection control policies create additional fit test hygiene burden or when subjects need additional attention to find an appropriate fit or become familiar with the process. Note also that subjects found to be at a higher sensitivity level for the test agent will require more of the test agent administered, such as by additional nebulizer squeezes of saccharin or Bitrex™ test agent, which can take a little extra time and so may decrease the number of multiple subjects that can be tested.



Example of fit testing five subjects simultaneously

Tips for troubleshooting fit

If at any time during the fit test the subject can taste or smell the QLFT test agent, or the QNFT device indicates loss of fit, the fit test is stopped and considered a failed fit test. This demonstrates that the facepiece has not sealed properly to the wearer's face. To try to achieve an acceptable fit, the following can be considered. Note that conducting another QLFT after a failed fit test should begin with the sensitivity test, after allowing sufficient time for the fit test subject's palate to clear by having the subject rinse their mouth and wait at least 15 minutes.

First, try to troubleshoot the fit of the current respirator model:

- Check for interference by hair, jewelry and eyewear.
- Look for creases in the respirator seal that may create leaks.
- Repositioning the facepiece may be tried if a visual examination indicates the facepiece may not be correctly donned, or if it is noted that the facepiece has moved on the face. Observing the bottom of the respirator while the wearer is looking up and the top at the nose bridge while the wearer is looking down, can help determine if leakage at the seal may occur and guide selection of alternate respirators.

- Tightening or readjustment of adjustable straps or noseclips can also be tried, but it is important to evenly tighten straps without overtightening and to smoothly adjust noseclips without pinching.

Keep in mind that the way the respirator is worn during a successful fit test is the way it also should be worn while performing the tasks where it is required; therefore, it is important that the fit of the respirator is comfortable in addition to effective. The facepiece should offer a stable but comfortable fit.

An alternate model or size of respirator may be needed when fit cannot be obtained after attempting repositioning or readjustment of the initial respirator choice, including inspection of it for damage. In some cases, an entirely different type of respirator may be required – such as a change from half facepiece to full facepiece. When no tight-fitting respirator can be found to successfully fit, a loose-fitting headgear with PAPR may be required.

Recordkeeping Requirements

At the conclusion of each fit test, be sure to record all points of information that are necessary and required by local regulations. U.S. OSHA requires the following items to be documented and retained until the next fit test:

- Date of fit test
- Name of fit tester
- Name of person being fit tested
- Type of fit testing and agent used
- Make, model, style & size of respirator
- Results
- Comments

3M offers a downloadable fit test record form to help organizations maintain their fit test records: [Respirator Fit Test Record](#).

Further Reading

These additional resources may be useful to fit testers:

- [3M Fit Testing Video](#)
- [3M Center for Respiratory Protection](#)
- [U.S. OSHA fit test protocols](#)

For information specifically relevant during outbreaks of infectious diseases, see the following:

- [Fit Test Hygiene During COVID-19 Pandemic](#)
- [U.S. OSHA Position on Fit Testing during COVID-19](#)

Healthcare organizations might find additional value in the quick reference guide: [Respiratory Protection in Healthcare: Fit Testing](#).

IMPORTANT: Always read and follow respirator user instructions.

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