Train the Trainer – PPE: Respirator Fit Testing

Respirator Fit Testing

Some PPE is “one size fits most”, as in the case of safety glasses, and getting the right fit doesn’t take much more than taking them out of the package and trying them on to see if they are comfortable. Respirators aren’t like that. While comfort is certainly a factor, having the right size and an air-tight fit on a respirator can be a matter of life and death.

Understanding what respirators must be fit tested and the different fit testing methods is something supervisors and respirator wearers should be familiar with.

Which Respirators Must Be Fit Tested

Fit testing is required for respirators that have a tight-fitting facepiece designed to form a complete seal with the worker’s face. That includes both air-purifying and supplied-air respirators whether operating in a positive pressure mode or negative pressure mode.

By contrast, loose-fitting facepiece respirators like hoods and helmets that form only a partial seal don’t require fit testing. Nor do you have to provide fit-testing to workers who aren’t required to wear a tight-fitting respirator because the conditions don’t warrant it but choose to wear one anyway.

Positive pressure mode – respirator maintains positive air pressure inside the facepiece throughout the user’s breathing cycle so that leaks result in air escaping from inside the facemask to the outside environment rather than the other way around.

Negative pressure mode – respirator maintains a lower air pressure inside the facemask so that leaks result in outside air seeping into the facemask.

When Fit Testing Must Take Place

Best practice and many safety regulations require a fit test be done:

- Before a worker uses a respirator for the first time.
- At least once a year.

- After any changes that could impact the protection’s effectiveness, i.e.
    - a change to the model or size of the equipment; or
    - a change in the worker’s physical condition, facial scarring, dental changes, cosmetic surgery, obvious changes in body weight.

Two Fit Testing Methods

Quantitative Fit Testing (QNFT)

QNFT is a method of measuring leakage. First, sampling probes or other devices are placed to measure aerosol concentrations on the inside and outside of the facepiece. The person wearing the respirator then performs a user seal to verify that he or she put on the respirator the right way and that it’s functioning properly. The wearer stands in a test chamber containing a nontoxic aerosol and measurements of concentration levels are made.

To determine how well a respirator fits, you must use a quantitative measure called the fit factor which measures the ratio of the concentration of a contaminant in the environment to the concentration inside the mask.

Example
User is inside a test chamber containing 300 ppm of aerosol. Air inside the mask is found to contain 3 ppm.
Fit factor = 100

Acceptable fit factors for different respirators:

- Half or quarter facepiece: Fit factor must be at least 100;
- Full facepiece: Fit factor must be at least 500.

QNFT fit testing of air-supplying and air-purifying respirators must be conducted in the negative pressure mode, even if the respirator will be used with positive pressure.

Qualitative Fit Testing (QLFT)

QLFT is a non-numeric pass/fail test in which a user stands in an enclosure into which a nontoxic test agent like banana oil is introduced. If the user detects the agent, it means the facepiece is leaking and the test is a fail and the worker must then be tested with another respirator make, size or model.

Which Test Methods to Use with Which Respirators

Most respirators can be tested using either QLFT or QNFT. But there are exceptions:

Respirator Type	Acceptable Testing Method

Half face, negative pressure, air-purifying respirator (< 100 fit factor)	**QNFT or QLFT**
Full face, negative pressure, air-purifying respirator (< 100 fit factor) used in atmospheres up to 10 times the PEL	**QNFT or QLFT**
Full face, negative pressure, air-purifying respirator (> 100 fit factor)	**QNFT**
Positive air-purifying respirator (PAPR)	**QNFT or QLFT**
Supplied-air respirator (SAR) or self-contained breathing apparatus (SCBA) used in negative pressure (demand mode) (> 100 fit factor)	**QNFT**
SCBA, structural firefighting, positive pressure	**QNFT or QLFT**
SCBA/SAR for IDLH atmospheres, positive pressure	**QNFT or QLFT**
Mouth bit respirators	**No fit testing required**
Loose-fitting respirators	**No fit testing required**