

FIT TESTING PROCEDURES

There are several methods available for testing the face to facepiece seal of a respirator. All methods fall into the general categories of qualitative fit testing or quantitative fit testing.

A. Qualitative Fit Testing

Qualitative fit testing procedures shall be conducted only on negative pressure air purifying respirators that must achieve a fit factor of 100 or less. The qualitative fit testing procedures shall be conducted as follows:

1. Negative User Seal Check: With the intake port(s) blocked, the wearer inhales gently and holds. The respirator should collapse slightly on the wearer's face. No leakage around the face seal should be noted while maintaining a negative pressure inside the respirator for several seconds.
2. Positive User Seal Check: With the exhaust port(s) covered, the wearer exhales gently to generate a slight positive pressure within the facepiece. No leakage outward around the seal should be noted.

(NOTE: Positive and negative user seal checks are not feasible with all brands of respirators).

3. If the wearer fails to obtain a good facial fit on either the negative or positive user seal checks, the head straps should be adjusted and the procedure repeated. Extreme or uncomfortable tightening of the respirator straps to obtain an adequate face seal is prohibited.
4. If a respirator cannot be made to fit by adjusting the straps, a different model and/or size should be tried.

Irritant Smoke Test: Once a satisfactory fit is obtained on the negative and positive user seal checks, the quality of the facial seal is verified by the use of stannic oxychloride (an irritant smoke). Air purifying respirators must be equipped with P100 High Efficiency Particulate Air (HEPA) filters for this test.

Testing procedures should proceed as follows:

- a. Inform the employee of the purpose and procedure for irritant smoke testing.
- b. Instruct the employee to remove contact lenses if he or she is wearing them. If the employee must wear eyeglasses, he or she will be fitted for a half-mask respirator while wearing these glasses. If a full facepiece respirator is to be fitted, eyeglasses must be removed. A spectacle insert can be purchased to accommodate eyeglass wearers who must use full facepiece respirators.
- c. To determine if the test subject can detect the irritant smoke, a weak concentration is directed at the subject prior to donning the respirator.
- d. Once sensitivity to irritant smoke is verified, have the test subject don their respirator performing the correct user seal checks.
- e. Instruct the employee to close his or her eyes tightly and to breathe normally.
- f. Irritant smoke is puffed around the entire face seal and cartridge seal, slowly at first and with increasing smoke density if the wearer experiences no irritation.

Smoke is continually introduced as the employee goes through a series of exercises. These include slowly moving his or her head from side to side in 180 degree arcs, up and down 90 degrees, bending over, deep breathing and talking. For the talking exercise, the test subject may choose to recite a song or poem, count backwards from 100, or repeat the Rainbow Passage (see below). Each exercise should be continued for at least 15 seconds.

- g. If no discomfort from the smoke is noted, the fit testing is complete. If coughing, gagging or irritation occurs, readjust the respirator straps or select a different model and repeat negative and positive user seal checks.

Rainbow Passage: When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow

B. QUANTITATIVE FIT TEST PROTOCOL

The following protocol establishes procedures for quantitative fit testing.

1. General Information
 - a. Whenever possible, each employee will be fit tested with his/her own personal respirator.
 - b. A special pre-probed filter or mask will be used depending on the type and brand of respirator.
 - c. A TSI Portacount Plus Model 8020 Respirator Fit Tester(insert your own fit testing machine here) will be used to determine measured fit factors for each employee.

2. Procedures

Preliminary Procedures

- i. Set up and turn on Portacount (let instrument complete "Daily Checks" self-diagnosis cycle). Make certain ambient particulate concentration is sufficient to attain adequate sensitivity.
- ii. Inspect all test respirators for defects and cleanliness.

3. Quantitative Fit Test Procedures

- i. Describe test procedures to subject ensuring that he/she understands actions expected of him/her.
- ii. Instruct subject to don respirator and adjust until a comfortable fit is achieved, according to established procedures. (Note: Compatibility with eyewear is a key consideration in the trial process. Every effort should be made to select a brand of respirator which does not interfere with eyewear.)
- iii. Equip respirator with a set of P100 HEPA filters (in some cases, one of which is specially probed to accept a sample line). Cap or cover the probed inhalation port and conduct positive and negative user seal checks. Attach sampling line from Portacount to the probed filter or probed mask.

- iv. Instruct test subject to perform the exercises displayed by the Fit Test Plus software. Each exercise used to determine the overall measured fit factor will be conducted for 60 seconds. The following exercises will be performed by the test subject in a normal standing position.
 - a. normal breathing with head motionless
 - b. deep breathing with head motionless
 - c. turning head slowly side to side while breathing, pausing for at least two breaths before changing direction
 - d. moving head up and down while breathing, pausing for at least two breaths before changing direction
 - e. talking out loud while breathing normally; subject may count backward from 100, read the Rainbow Passage, or recite a memorized poem or song
 - f. grimace and distort face to challenge seal of mask (only performed for 30 seconds and not included in determination of overall fit factor)
 - g. bend at waist to touch toes or jog in place while breathing normally
 - h. normal breathing (same as (a) above)
- v. After the test, sampling line is disconnected and subject removes respirator. Subject is then questioned on overall comfort of respirator and any pressure points are noted.
- vi. The Fit Test Plus software calculates fit factors for each exercise and for the entire test as a whole. Exercise specific fit factors are displayed directly by the Portacount and the overall fit factor is calculated by taking the arithmetic average of all individual exercise values.
- vii. Results from each test subject should be recorded to identify the test by number, date, subject, type of respirator, protection factors for each exercise, and overall fit factor for the test. This information will be entered on the subject's fit test record. Satisfactory performance on the test shall be determined by the overall measured fit factor, not the individual tests.
- viii. For half-mask air-purifying negative pressure respirators, an overall fit factor of at least 100 must be attained to provide adequate protection. For full-face air-purifying negative pressure respirators, an overall fit factor of at least 500 must be attained to provide adequate protection. For full-face masks used with a SCBA, quantitative fit testing will be performed in the negative pressure mode and an overall fit factor of at least 500 must be attained to provide adequate protection.
- ix. Regardless of the fit factor achieved, the determining factor on whether the respirator is issued should be based upon user comfort.

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