



Fit Test Procedure

EHSS-Phos Program – Respiratory Protection, Appendix E

1 OSHA Accepted Requirements for Fit Testing:

1. The employee shall be allowed to pick the most acceptable size of respirator so that the respirator is acceptable to and correctly fits the user.
2. Prior to selection, the user shall be shown how to correctly put on a respirator, how to position it on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator.
3. The employee shall be informed that respirator selected should provide adequate fit, including holding each face piece up to the face in a mirror to eliminate those which would obviously not fit.
4. If the employee is not familiar with putting on a respirator, the employee will be asked to put on and take off the unit several times to allow the person to become familiar with the process.
5. Assessment of comfort includes a review of the following points with the respirator user:
 - Position of the mask on the nose
 - Room for eye protection (when required)
 - Room to talk
 - Position of the mask on the face and cheeks
6. The following shall be used to determine the adequacy of the fit:
 - Chin properly placed
 - Adequate strap tension, not overly tightened (no face rings)
 - Fit across the nose bridge (half faces)
 - Respirator of proper size to span distance from nose to chin
 - Tendency of the respirator to slip (should not slip)
 - Self-observation in mirror to evaluate fit and position
7. The employee shall conduct a leak check (seal check) positive or negative to confirm the fit of the respirator. If the user fails the leak check the mask position will be re-checked and re-tested. If the unit fails again a new size/mask will be selected and re-fit.
8. The test shall not be conducted if there is hair growth (including stubble beard growth, beard, mustache, sideburns, etc.) to interfere with the sealing surfaces of the face piece.
9. If an employee exhibits difficulty in breathing during the tests, the person shall be referred to the Licensed Health Care Professional (LHCP) for assessment and review as to whether the person can wear a respirator or not.
10. If the employee finds the respirator fit unacceptable, another face piece may be chosen and a new test conducted.



Fit Test Procedure

EHSS-Phos Program – Respiratory Protection, Appendix E

11. The employee shall be given a description of the test prior to beginning the test. The respirator shall be worn for 5 minutes before the test begins.
12. The test shall be conducted with the employee wearing any equipment that is normally worn using the unit.
13. Each exercise is performed for 1 minute, grimace is performed for 15 seconds.
14. Test conductor will question the user at the completion of the tests about the comfort of the respirator. Any re-adjustment of the respirator during the test (after beginning) shall void the test and require it to be repeated.
15. Test exercises:
 - a. **Normal Breathing:** In a standing position, without talking, user shall breathe normally.
 - b. **Deep Breathing:** In a standing position, user shall breathe slowly and deeply (take caution not to hyperventilate).
 - c. **Turning Head Side to Side:** Standing in place, user slowly turns head side to side between extreme positions on each side (look at shoulder: left and right). Breathe at each extreme.
 - d. **Moving Head Up and Down:** Standing in place, user shall slowly move head up and down (look at ceiling then floor). Inhale while looking up.
 - e. **Talking:** While standing, user shall talk out loud slowly and loud enough to be heard clearly by the test conductor. Use rainbow passage, count backward from 100, recite a memorized poem or song, etc.

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 his reach, his friends say he is looking for the pot of gold at the end of the rainbow.
 - f. **Grimace:** Smile or frown
 - g. **Bending Over:** User shall bend at waist as if to touch toes. Jogging in place can substituted.
 - h. **Normal Breathing:** Same as #1.



Fit Test Procedure

EHSS-Phos Program – Respiratory Protection, Appendix E

2 Qualitative Fit Test (QLF):

The below options can be used for performing a Qualitative Fit Test (QLFT)

- Isoamyl Acetate (banana oil): For organic vapor respirators only
- Saccharin Solution
- Bitrex™ (denatonium benzoate)
- Stannous Chloride (Irritant Smoke)

2.1 Odor Threshold Screening Procedure (use with Isoamyl Acetate only):

- 2.1.1 Isoamyl acetate can only be used for organic vapor respirators. See OSHA Fit Test Protocol for specific details.
- 2.1.2 Odor screening is performed without wearing a respirator to determine if the user can detect the test substance at low levels.
- 2.1.3 Use low levels of the test substance as well as odor free water (distilled, etc.).
- 2.1.4 Test substance and water are to be placed in identical containers.
- 2.1.5 The user must determine which container has the test substance (by odor).

2.2 Saccharin Solution Aerosol Protocol:

2.2.1 Saccharin Taste Threshold Screening:

- a. Explain the entire screening and testing procedure to the test subject prior to conducting the screening test.
- b. Perform taste threshold screening without wearing a respirator to determine if the user can detect the test substance by taste (sweet for saccharin and bitter for Bitrex™).
- c. Place the fit test hood over the user's head and shoulders.
- d. Conduct fit testing and screening in the hood.
- e. The user should breathe through a slightly open mouth, tongue extended.
- f. The user should notify the tester when they detect a sweet taste.
- g. Using a DeVilbiss Model 40 Inhalation Nebulizer or equivalent, the tester must spray the threshold check solution into the enclosure.
- h. Direct the nozzle away from the nose and mouth of the person.
- i. Clearly mark this test nebulizer to distinguish it from the fit test solution nebulizer.
- j. Prepare the threshold check solution and pour into nebulizer.
 - **Saccharin threshold check solution:** Dissolve 0.83 grams of sodium saccharin USP in 100 ml of warm water.
- k. Correct use of the nebulizer means that about 1 ml of liquid is used at a time in the nebulizer body.



Fit Test Procedure

EHSS-Phos Program – Respiratory Protection, Appendix E

- l. To produce the aerosol, squeeze the nebulizer bulb until it collapses completely, then release it and allow full expansion.
- m. Squeeze the bulb ten times rapidly, then ask the user whether they can taste the check solution. If the user reports tasting a sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten squeezes regardless of the number of squeezes actually completed.
- n. If the first response is negative, repeat ten more squeezes rapidly.
- o. Ask the user whether they can taste the check solution (saccharin). If the user reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of actual number of squeezes completed.
- p. If the second response is negative, repeat ten more rapid squeezes.
- q. Ask the user whether they can taste the check solution (saccharin). If the user reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of actual number of squeezes completed.
- r. The tester notes the number of squeezes required to solicit a taste response.
- s. If the saccharin solution is **not** tasted after 30 squeezes, the saccharin fit test cannot be performed. (Note: if the user has consumed sweet food or drink before the screening test, the subject may not be able to taste the weak saccharin solution).
- t. If the saccharin solution is tasted after 30 squeezes, ask the user to note the taste for reference during the fit test.
- u. After completing the test, rinse the nebulizer thoroughly with water, shake it dry, and store in dry clean location.
- v. If the nebulizer will be used continuously, rinse thoroughly with water, dry, and refill it at least each morning and afternoon or every four hours.

2.2.2 Saccharin Solution Aerosol Fit Procedure:

- a. The user may not eat, drink (except plain water), smoke, or chew gum for at least 15 minutes before the test.
- b. Use the fit test hood described in the Saccharin Taste Threshold Screening (above).
- c. User shall don the hood while wearing the respirator selected.
- d. The respirator shall be properly adjusted and equipped with any type of particulate filter(s).
- e. The user shall perform the leak/seal tests and make sure no leak is detected.
- f. The user should breathe through a slightly open mouth, tongue extended.



Fit Test Procedure

EHSS-Phos Program – Respiratory Protection, Appendix E

- g. A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution. Mark this unit clearly to distinguish it from the Threshold Screening nebulizer.
- h. Prepare the fit test solution by adding 83 grams of sodium saccharin to 100 ml of warm water.
- i. Pour the fit test solution into the nebulizer.
- j. The user shall report if they taste the saccharin (sweet taste).
- k. Insert the nebulizer into the hood through the hole in the front and spray an initial concentration of saccharin fit test solution (either 10, 20, or 30 squeezes). A minimum of 10 squeezes is required.
- l. After generating the aerosol, the user shall be instructed to perform test exercises as described in the fit test section above (#15).
- m. Replenish the aerosol concentration every 30 seconds using half of the original number of squeezes.
- n. The user shall indicate if the saccharin is detected at any time during the test.
- o. If the user detects the taste, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure repeated.
- p. The tester shall periodically check the function of the nebulizer, since it may clog during use. Clogging shall invalidate the test.

2.3 Bitrex™ Solution Aerosol Fit Protocol

The Bitrex™ (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex™ is routinely used as a taste aversion agent in household liquids which children should not drink.

2.3.1 Bitrex™ Taste Threshold Screening:

- a. Explain the entire screening and testing procedure to the test subject prior to conducting the screening test.
- b. Perform taste threshold screening without wearing a respirator to determine if the user can detect the test substance by taste (sweet for saccharin and bitter for Bitrex™).
- c. Place the fit test hood over the user's head and shoulders.
- d. Conduct fit testing and screening in the hood.
- e. The user should breathe through a slightly open mouth, tongue extended.
- f. The user should notify the tester when they detect a bitter taste.
- g. Using a DeVilbiss Model 40 Inhalation Nebulizer or equivalent, the tester must spray the threshold check solution into the enclosure.
- h. Direct the nozzle away from the nose and mouth of the person.



Fit Test Procedure

EHSS-Phos Program – Respiratory Protection, Appendix E

- i. Clearly mark this test nebulizer to distinguish it from the fit test solution nebulizer.
- j. Prepare the threshold check solution and pour into nebulizer.
 - **Bitrex™ threshold check solution:** Dissolve 13.5 milligrams of Bitrex™ to 100 mL of 5% salt (NaCl) solution in distilled water.
- k. Correct use of the nebulizer means that about 1 ml of liquid is used at a time in the nebulizer body.
- l. To produce the aerosol, squeeze the nebulizer bulb until it collapses completely, then release it and allow full expansion.
- m. Squeeze the bulb ten times rapidly, then ask the user whether they can taste the check solution. If the user reports tasting a bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten squeezes regardless of the number of squeezes actually completed.
- n. If the first response is negative, repeat ten more squeezes rapidly.
- o. Ask the user whether they can taste the check solution (Bitrex™). If the user reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of actual number of squeezes completed.
- p. If the second response is negative, repeat ten more rapid squeezes.
- q. Ask the user whether they can taste the check solution (Bitrex™). If the user reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of actual number of squeezes completed.
- r. The tester notes the number of squeezes required to solicit a taste response.
- s. If the Bitrex™ solution is **not** tasted after 30 squeezes, the Bitrex™ fit test cannot be performed.
- t. If the Bitrex™ solution is tasted after 30 squeezes, ask the user to note the taste for reference during the fit test.
- u. After completing the test, rinse the nebulizer thoroughly with water, shake it dry, and store in dry clean location.
- v. If the nebulizer will be used continuously, rinse thoroughly with water, dry, and refill it at least each morning and afternoon or every four hours.

2.3.2 Bitrex™ Solution Aerosol Fit Test Procedure:

- a. The user may not eat, drink (except plain water), smoke, or chew gum for at least 15 minutes before the test.
- b. Use the fit test hood described in the Taste Threshold Screening (above).
- c. User shall don the hood while wearing the respirator selected.



Fit Test Procedure

EHSS-Phos Program – Respiratory Protection, Appendix E

- d. The respirator shall be properly adjusted and equipped with any type of particulate filter(s).
- e. The user shall perform the leak/seal tests and make sure no leak is detected.
- f. Remind the subject to breathe through his or her slightly open mouth with tongue extended.
- g. Instruct the user to report when they detect a bitter taste.
- h. Prepare the fit test solution by adding 337.5 milligrams of Bitrex™ to 200 mL of 5% salt (NaCl) solution in warm water.
- i. Pour the fit test solution into the nebulizer.
- j. Insert the nebulizer into the enclosure through the hole in the front and spray an initial concentration of Bitrex™ fit test solution (either 10, 20, or 30 squeezes). A minimum of 10 squeezes is required.
- k. After generating the aerosol, the user shall be instructed to perform test exercises as described in the fit test section above (#15).
- l. Replenish the aerosol concentration every 30 seconds using half of the original number of squeezes (e.g. 5, 10, or 15).
- m. The user shall indicate if the Bitrex™ is detected at any time during the test.
- n. If the user does not report tasting the Bitrex™, then the test is passed.
- o. If the user detects the taste of Bitrex™, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure repeated.
- p. The tester shall periodically check the function of the nebulizer, since it may clog during use. Clogging shall invalidate the test.

2.4 Irritant Smoke (Stannic Chloride) Protocol

This qualitative fit test utilizes a user's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator

2.4.1 General Requirements:

- a. The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).
- b. Only stannic chloride smoke tubes shall be used for this protocol.
- c. No form of test enclosure or hood shall be used.
- d. The test shall be performed in an area with adequate ventilation to prevent exposure of the tester or the build-up of irritant smoke in the general atmosphere.
- e. The tester shall take precautions to minimize the user's exposure to irritant smoke.



Fit Test Procedure

EHSS-Phos Program – Respiratory Protection, Appendix E

- f. Use caution when performing the sensitivity screening checks. Use only the minimum amount of smoke necessary to elicit a response from the user.

2.4.2 Sensitivity Screening Check:

This test is used to determine if the user can detect a weak concentration of irritant smoke.

- a. User is not to don the respirator during the sensitivity screening check.
- b. The tester shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to an aspirator squeeze bulb.
- c. The tester shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.
- d. The tester shall advise the user that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his or her eyes closed during the test.
- e. The tester shall carefully direct a small amount of the irritant smoke in the user's direction to determine whether he or she can detect it.
- f. The user will inform the tester if he / she can detect the smoke.

2.4.3 Irritant Smoke Fit Test Procedure:

- a. User shall don the respirator without assistance.
- b. The respirator shall be properly adjusted and equipped with any type of particulate filter(s).
- c. The user shall perform the leak/seal tests and make sure no leak is detected.
- d. The tester shall instruct the user to keep his or her eyes closed.
- e. The tester shall begin at least 12 inches from the face piece and direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb.
- f. The tester shall move the smoke stream around the whole perimeter of the mask.
- g. The tester shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.
- h. If the user reports detecting the irritant smoke at any time, the test has failed. A different respirator shall be tried and the entire test repeated, including the sensitivity check and fit test procedure.
- i. If the user has not had an involuntary response (involuntary cough, irritation, etc.) and/or detected the irritant smoke, then proceed with the test exercises.
- j. The user shall perform the test exercises identified in fit test section above (#15).



Fit Test Procedure

EHSS-Phos Program – Respiratory Protection, Appendix E

- k. The tester shall continue to move the smoke stream around the whole perimeter of the mask at a distance of six inches.
- l. If no smoke is detected by the user at the end of the test exercises, then the user shall be given a second sensitivity screening check using the same smoke tube.
- m. User will remove the respirator.
- n. Tester will repeat the sensitivity test to determine whether the user reacts to the smoke.
- o. If the user does **not** respond to the smoke during the 2nd sensitivity test, then the fit test is void.
- p. If the user does respond to the smoke in the 2nd sensitivity test, then the fit test is passed.