

Appendix B
Respiratory Protection Fit Test Protocols

Appendix B - CSULB Respirator Fit Testing Procedures

Respirator fit tests are essential to ensuring that a respirator forms a good seal against the user's face and prevents contaminants from leaking into the mask. It is also a regulatory requirement for proper respirator use. Each manufacture provides fitting instructions and use limitations on the product package. Respirator face pieces are made in various sizes to fit a wide variety of face shapes and sizes. Some workers simply will not be able to get a good seal with any available respirator and should not be assigned to duties requiring respiratory protection. This problem can be acute for negative pressure respirators.

- Tight Fitting Respirators (negative pressure):
 - Fit testing **shall** be conducted by SRMIS **prior** to issuance of a respirator, and annually thereafter.
 - Quantitative Fit Testing Procedures:
 - The university may, at its discretion, contract with an external provider for this service.
 - The university shall employ quantitative fit testing as the primary tool for assessing proper fit for tight fitting respirators. The equipment used for this purpose will be a controlled negative pressure (CNP) fit test apparatus, FitTest 3000, currently manufactured by Occupational Health Dynamics.
 - The procedures for conducting quantitative fit tests using the Fit Test 3000 are internally contained within the unit software. They are identical to the requirements under CCR Title 8, section 5144, Appendix A - Fit Test Procedures.
 - The following list of exercises is analogous to the exercises listed in CCR title 8 Section 5144, Appendix A, and will be successfully completed by all employees required to wear tight fitting respirators:
 1. Normal breathing
 2. Deep breathing
 3. Turning head side to side
 4. Moving head up and down
 5. Talking
 6. Grimace
 7. Normal breathing
 - The minimum acceptable fit factors for employees using tight fitting respirators are **100** for a half – face negative pressure respirators, and **500** for full - face negative pressure respirators.
 - Alternative test protocols, approved by NIOSH and accepted by Cal/OSHA, may be used by SRMIS.
 - Qualitative Fit Testing

If, during equipment failures, quantitative fit testing cannot be applied to employees requiring the use of tight fitting respirators, qualitative fit testing shall be employed, using any agent and procedure detailed in Appendix A of this document.

The employee shall properly don the respirator and wear it for at least ten minutes prior to commencing the fit test.

SRMIS shall review this protocol with the employee prior to testing.

The employee shall perform the conventional positive pressure and negative pressure fit tests as later described.

A totally enclosed hood shall not be used to conduct irritant smoke (stannic chloride) fit tests.

SRMIS shall use an approved "smoke tube" for testing the seal with an aspirator around the employees donned respirator or may use a computerized device in lieu of the irritant smoke.

SRMIS shall inform the employee of the irritant smoke properties and advise the employee that their eyes should remain closed during the test.

SRMIS will direct the stream of smoke towards the faceshield until it is within one inch of the faceshield, moving around the seal, asking the employee if they have detected the smoke.

The Smoke Test will continue for at least one minute per exercise

The following exercises will be performed with the smoke:

- Normal Breathing
- Deep Breathing
- Turning head side to side
- Moving head up and down
- Talking (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....-

- Grimace
- Bending Over
- Normal Breathing
- Jogging in place
- Normal breathing

- If the irritant smoke produces a cough or is detected by the employee, the test will stop. Another respirator will be selected and re-tested.

- When the test is passed, the employee will be given a sensitivity test to the smoke. Failure to react to the irritant smoke will void the test.

- Employees passing the test may use respirators in atmospheres up to ten times the Personnel Exposure Limit (PEL)

All Single Use Respirators (Filtering Facepieces)

Saccharin Solution Aerosol Test

If, during equipment failures, quantitative fit testing cannot be applied to employees requiring the use of tight fitting respirators, qualitative fit testing shall be employed, using the saccharin solution aerosol test procedure detailed in CCR Title 8, sec 5144 Appendix A.

- **Sensitivity test** - This test is conducted to assure that the individual being fit tested can detect the taste of the test solution at very low levels. The test subject should not eat, drink or chew gum for fifteen minutes prior to the test.
 - The employee dons the fit test hood (3M FT 14/15) without a respirator in place.
 - The employee is instructed to breath through the mouth only.
 - The solution is injected into the hood with ten squeezes of the injection bulb.
 - The employee is asked if they can detect the taste of the solution. If tasted, the number of squeezes is noted and the fit test is initiated.

- If the taste is not detected, another ten squeezes are injected into the hood until thirty squeezes are achieved, if the employee does not detect the taste the test is terminated and the employee is not cleared to use a single use respirator.
- If the above threshold test is successful, and the employee is able to detect the presence of saccharin solution, the following fit test protocol shall be used.
- The employee shall not eat or drink anything, except plain water, for 15 minutes prior to the test.
- The employee dons the selected respirator and dons the fit test enclosure hood.
- A minimum of 10 squeezes of the fit test saccharin solution is introduced into the enclosure.
- The following exercises are performed:
 - Normal Breathing
 - Deep Breathing
 - Turning head side to side
 - Moving head up and down
 - Talking (rainbow passage)
 - Grimace
 - Bending Over
 - Normal Breathing

“ The 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....-

A fit test is successful if the entire routine results in the subject not reporting the taste of saccharin.

Fit testing – Isoamyl Acetate

- The employee is instructed to don the respirator.
- The employee then dons the test hood.
- Using the bulb from the previous test, inject the same number of squeezes as was injected in the sensitivity test.
- Maintain an adequate concentration of the aerosol by injecting at least half of the squeezes in the first thirty seconds.
- After the aerosol is fully injected, perform the following exercises for sixty second each:
 - Normal breathing
 - Deep breathing
 - Turning head side to side
 - Nodding head up and down
 - Read the “Rainbow Passage”
 - Normal breathing

Terminate the test at any time when the aerosol is tasted.

If the test is completed without the taste being detected, the fit is deemed adequate.

Fit Testing – Bitrex

Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test 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 be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

- (a) Taste Threshold Screening. The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.
- (1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts #14 and #15 combined, is adequate.
 - (2) The test enclosure shall have a 3/4 inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.
 - (3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste.
 - (4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.
 - (5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.
 - (6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.
 - (7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.
 - (8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.
 - (9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject 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 the number of squeezes actually completed.
 - (10) The test conductor will take note of the number of squeezes required to solicit a taste response.
 - (11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.
 - (12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Bitrex Solution Aerosol Fit Test Procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure as that described in 4. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall not be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

(6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.

(11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).