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Subchapter 7. General Industry Safety Orders
Group 16. Control of Hazardous Substances
Article 107. Dusts, Fumes, Mists, Vapors and Gases

Amend Appendix A to Section 5144 as follows:

Appendix A to Section 5144: Fit Testing Procedures (Mandatory)

Part I. OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures-General Requirements. The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

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14. Test Exercises.

(a) Employers must perform the following test exercises for all fit testing methods prescribed in this appendix, except for the two modified ambient aerosol CNC quantitative fit testing protocols, the CNP quantitative fit testing protocol and the CNP REDON quantitative fit testing protocol. For ~~these two~~ the modified ambient aerosol CNC quantitative fit testing protocols, employers ~~must~~ shall ensure that the test subjects (i.e., employees) perform the exercise procedure specified in section I.C.4(b) of this appendix for ~~the CNP quantitative fit testing protocol~~ full-facepiece and half-mask elastomeric respirators, or the exercise procedure described in section I.C.5(b) of this appendix for filtering facepiece respirators. Employers shall ensure that the test subjects (i.e. employees) perform the exercise procedure specified in section I.C.6(b) of this appendix for the CNP quantitative fit-testing protocol, or the exercise procedure described in section I.C.7(b) of this appendix for the CNP REDON quantitative fit testing protocol. For the remaining fit testing methods, employers ~~must~~ shall ensure that ~~employees perform~~ the test exercises are performed in the appropriate test environment in the following manner:

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B. Qualitative Fit Test (QLFT) Protocols

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2. Isoamyl Acetate Protocol

NOTE: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

(a) Odor Threshold Screening. Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

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(6) A test blank shall ~~by~~be prepared in a third jar by adding 500 cc of odor-free water.

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3. Saccharin Solution Aerosol Protocol. 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 saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

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

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(b) Saccharin solution aerosol fit test procedure.

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

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(6) As before, the test subject shall breathe through the slightly open mouth with ~~the~~ tongue extended, and report if ~~he/she~~they taste~~s~~ the sweet taste of saccharin.

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4. BitrexTM (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol. The BitrexTM (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.

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(b) Bitrex Solution Aerosol Fit Test Procedure.

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(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.

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5. Irritant Smoke (Stannic Chloride) Protocol. This qualitative fit test uses a person's response to the irritating chemicals released in the “smoke” produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

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(c) Irritant Smoke Fit Test Procedure

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(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the ~~faceseal~~ face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

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C. Quantitative Fit Test (QNFT) Protocols. The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

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2. Generated Aerosol Quantitative Fit Testing Protocol

(a) Apparatus.

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(6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used ~~t~~so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least ¼ inch.

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3. Ambient ~~a~~Aerosol ~~c~~Condensation ~~n~~Nuclei ~~c~~Counter (CNC) ~~q~~Quantitative ~~f~~Fit ~~t~~Testing P~~p~~rotocol. The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (~~Portacount~~ ™ PortaCount®) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The primary CNC instrument manufacturer, TSI ~~Inc.~~Incorporated, also provides probe attachments (TSI mask sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator (elastomeric

or filtering facepiece), and a minimum fit factor pass level of at least 500 is required for a full facepiece ~~negative pressure~~ elastomeric respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) ~~Portacount~~PortaCount® Fit Test Requirements.

(1) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used ~~by~~for the fit test (e.g. NIOSH 42 CFR 84 series 100, series 99 or series 95 particulate filter) per manufacturer's instruction.

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(5) Follow the manufacturer's instructions for operating the ~~Portacount~~PortaCount® and proceed with the test.

(6) ~~t~~The test subject shall be instructed to perform the exercises in section I.~~-~~A.~~-~~14. of this appendix.

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(b) ~~Portacount~~PortaCount® Test Instrument.

(1) The ~~Portacount~~PortaCount® will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

(2) Since the pass or fail criterion of the ~~Portacount~~PortaCount® is user programmable, the test operator shall ensure that the pass or fail criterion meets the requirements for minimum respirator performance in this A~~a~~ppendix.

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4. Modified Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol for Full-Facepiece and Half-Mask Elastomeric Respirators.

(a) When administering this protocol to test subjects, employers shall comply with the requirements specified in section I.C.3. of this appendix (ambient aerosol condensation nuclei

counter (CNC) quantitative fit testing protocol), except they shall use the test exercises described below in subsection (b) of this protocol instead of the test exercises specified in section I.C.3(a)(6) of this appendix.

(b) Employers shall ensure that each test subject being fit tested using this protocol follows the exercise and duration procedures, including the order of administration, described in Table A-1 of this appendix.

Table A-1 - Modified Ambient Aerosol CNC Quantitative Fit Testing Protocol for Full Facepiece and Half-Mask Elastomeric Respirators

Exercises[1]	Exercise procedure	Measurement procedure
Bending Over	The test subject shall bend at the waist, as if going to touch their toes for 50 seconds and inhale 2 times at the bottom.[2]	A 20 second ambient sample, followed by a 30 second mask sample.
Jogging-in-Place	The test subject shall jog in place comfortably for 30 seconds.	A 30 second mask sample.
Head Side-to-Side	The test subject shall stand in place, slowly turning their head from side to side for 30 seconds and inhale 2 times at each extreme.[2]	A 30 second mask sample.
Head Up-and-Down	The test subject shall stand in place, slowly moving their head up and down for 39 seconds and inhale 2 times at each extreme.[2]	A 30 second mask sample followed by a 9 second ambient sample.

[1]Exercises are listed in the order in which they are to be administered.
[2]It is optional for test subjects to take additional breaths at other times during this exercise.

5. Modified Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol for Filtering Facepiece Respirators.

(a) When administering this protocol to test subjects, employers shall comply with the requirements specified in section I.C.3 of this appendix (ambient aerosol condensation nuclei

counter (CNC) quantitative fit testing protocol), except they shall use the test exercises described below in subsection (b) of this protocol instead of the test exercises specified in section I.C.3(a)(6) of this appendix.

(b) Employers shall ensure that each test subject being fit tested using this protocol follows the exercise and duration procedures, including the order of administration, described in Table A-2 of this appendix.

Table A-2 - Modified Ambient Aerosol CNC Quantitative Fit Testing Protocol for Filtering Facepiece Respirators

Exercises[1]	Exercise procedure	Measurement procedure
Bending Over	The test subject shall bend at the waist, as if going to touch their toes for 50 seconds and inhale 2 times at the bottom.[2]	A 20 second ambient sample, followed by a 30 second mask sample.
Talking	The test subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor for 30 seconds. They will either read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.	A 30 second mask sample.
Head Side-to-Side	The test subject shall stand in place, slowly turning their head from side to side for 30 seconds and inhale 2 times at each extreme.[2]	A 30 second mask sample.
Head Up-and-Down	The test subject shall stand in place, slowly moving they head up and down for 39 seconds and inhale 2 times at each extreme.[2]	A 30 second mask sample followed by a 9 second ambient sample.

[1]Exercises are listed in the order in which they are to be administered.
[2]It is optional for test subjects to take additional breaths at other times during this exercise.

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~~4~~6. Controlled ~~n~~Negative ~~p~~Pressure (CNP) ~~q~~Quantitative ~~f~~Fit ~~t~~Testing ~~p~~Protocol. The CNP protocol provides an alternative to aerosol fit test methods. ~~The CNP protocol provides an alternative to aerosol fit test methods.~~ The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer Occupational Health Dynamics of Birmingham, Alabama also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes ~~his or her~~their mouth and holds ~~his/her~~their breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) CNP Fit Test Requirements.

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(7) The QNFT protocol shall be followed according to section I.~~-~~C.~~-~~1.~~-~~ of this appendix with an exception for the CNP test exercises.

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(c) CNP Test Instrument.

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(1) The test instrument must have an effective audio warning device, or a visual-warning device in the form of a screen tracing, that indicates when the test subject fails to hold ~~his or her~~their breath during the test. The test shall be terminated and restarted from the beginning when the test subject fails to hold ~~his or her~~their breath during the test. The test subject then may be refitted and retested.

*****

~~5~~7. Controlled ~~n~~Negative ~~p~~Pressure (CNP) REDON ~~q~~Quantitative ~~f~~Fit ~~t~~Testing ~~p~~Protocol.

(a) ~~CNP REDON Fit Test Requirements.~~ When administering ~~the CNP REDON~~this protocol to test subjects, employers must comply with the ~~CNP fit test~~ requirements specified in sections I.C.~~4.~~6(a) and (c) of this appendix ("Controlled negative pressure (CNP) quantitative fit testing protocol,") as well as use the test exercises described below in subsection (b) of this protocol instead of the test exercises specified in section I.C.6(b) of this appendix.

(b) ~~CNP REDON Test Exercises. (1)~~ Employers must ensure that each test subject being fit tested using this protocol follows the exercise and measurement procedures, including the order of administration~~,~~ described ~~below~~ in Table A-~~1~~3 of this appendix.

Table A-~~1~~3. - CNP REDON Quantitative Fit Testing Protocol

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(~~2~~c) After completing the test exercises, the test administrator must question each test subject regarding the comfort of the respirator. When a test subject states that the respirator is unacceptable, the employer must ensure that the test administrator repeats the protocol using another respirator model.

(~~3~~d) Employers must determine the overall fit factor for each test subject by calculating the harmonic mean of the fit testing exercise as follows:

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~~(c) CNP-REDON Test Instrument. When administering the CNP-REDON protocol to test subjects, employers must comply with the CNP test instrument requirements specified in section I.C.4.(c) of this appendix.~~

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Note: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.