

RESPIRATOR FIT TEST PROCEDURE GUIDE

Introduction

This technical guide supplements our *Practical Guide for OSHA Compliance & TB Management in Long Term Care*, *Sample Written Respiratory Protection Program as part of an Infection Control Program*, and *TB Respirator Note*, guides.

Respirator Selection

N95 respirators were approved and designed specifically for hospitals use for TB isolation rooms at the lowest cost possible. It is our recommendation that long-term care clients invest, instead in N99 respirators. They were formerly, HEPA, High Efficiency Particulate Air filter respirators. Hospital use of respirators for TB isolation is much more extensive, frequent, and likely.

Long term care use, based on the recommendations in our guides, provide for extremely limited use, by a select number of employees, in the *rare* event that it is necessary. In this way, the number of respirators needed and the frequency for the need to purchase them, is only be a fraction of hospital needs. The situation justifies the cost of the use of the N99 respirators. N99's provides a more prudent level of protection, especially during the more contagious window period of the disease progress when no confirmation or a negative or positive diagnosis has been made.

Pre-Fit Test Planning

- 1) Preferably, provide respirators by two different manufacturers.
- 2) Make a range of sizes available from both manufacturers. (Typically, S, M, L)
- 3) Provide two sets of each respirator in order that one may dry off the disinfectant, while the other one is available to be used to test fit. (minimizes session time)
- 4) Make sanitary wipes and disinfectant available to clean respirators in between fittings by different individuals.
- 5) Secure dedicated room space away from interference and distractions.
- 6) Install or enhance existing ventilation system, to provide for negative pressure flow from test area, at face height. (You may be able to use the same window fan set up for the temporary negative pressure isolation room)
- 7) Select banana oil, or smoke tubes, or make both available for the test.

Note: Both banana oil and smoke tubes have been used for fit testing in the history of industrial hygiene. Irritant smoke was the preferred, and more reliable method. It is based on reflex action, and not perception, which is less reliable. The smoke is irritating. If there is a leak, it will cause the employee to immediately react. If there is no leak, the employee can be ensconced in the plume, and have no adverse reaction.

In using banana oil, you must first ensure that the employee can detect the odor. It can also leave olfactory memory or cause olfactory fatigue. In either case, sometimes employees are not sure if they are smelling the presence of the oil, or if it is a lingering memory of the odor. Sometimes, they smell so much of it, they do not smell it any more during a difficult fit test session. It is also a pleasant odor, and subject to perception. Employees may prefer to think they do not really smell it any more especially when they want to leave the test session.

Fit test kit manufacturers and suppliers now, are only selling them with the banana oil because of fear of liability in today's litigious climate. Irritant smoke can, and have always, caused adverse reactions in some people. A recent death occurred when a fit tester inserted the tube into an employee's nose and pumped it several times. The individual died of pulmonary edema due to direct injections of acidic mist into the lungs. Obviously, this is an abuse of materials. Under normal circumstances, the room is well ventilated, and the employee is wearing a respirator, and stands in a plume of the smoke in the air stream of the exhaust system.

In consideration of the mild but real hydrochloric acid exposure necessary in this fit test protocol using smoke tubes, the medical clearance to be able to wear a respirator should include a question about hyper-sensitivity to smoke and chemicals. In addition, a respirator should be made available to the fit tester, should the smoke plume begin to irritate them during testing.

*In reality, the benefit of better insurance of proper sizing, judiciously outweighs the potential risk of such a low level, infrequent and limited exposure to the irritant smoke. **The new OSHA Respirator Standard issued on January 8th, 1998, allows for the use of smoke tubes for respirator fit testing.*

You may choose to use both, if you find you are having difficulty with the banana oil. Regardless, facilities should have smoke tubes available to conduct air flow tests and establish air flow patterns. Irritant smoke is the medium of choice of the industrial hygienist of this office for the above stated reasons.

- 8) Create a form of documentation to record the names, dates, sizes, and remarks.
- 9) Schedule fittings about 20 to 25 minutes apart. Longer for an initial fitting, shorter for re-fitting.

Fit Testing - Introduction to the Employee

Explain the following to the employee, this is part of RPP training:

- 1) The TB Infection Control Plan.
- 2) When the negative pressure isolation room would be used - as a failsafe to afford the facility, its residents and employees the benefit of proper infection control, and management during those ambiguous times when a resident is not yet determined to be suspect TB, or awaiting transfer, or awaiting test results, or has been prematurely discharged from the hospital.
- 3) The engineering infection control barrier is the ventilation system, the personal

protective respirator is a second line of defense.

- 4) The Respiratory Protection Program.
- 5) The need to fit test.
- 6) How to store, care and maintain the respirator.
- 7) The process that will be used, trying on different respirators for fit, fit checking, then banana oil and/or smoke testing to ensure there is no leakage.
- 8) How to don the respirator and the need to rearrange it on the face for optimal fit.
- 9) The need to periodically practice donning, and arranging respirator on the face throughout the year to enhance proper fit and confidence, should they need to use it
- 10) To close their eyes during irritant smoke tube testing, as it will burn and sting eyes.
- 11) To walk away from test area if the smoke becomes too overwhelming (this should not be too much of a problem if done in a properly ventilated space).
- 12) No beards, mustaches, or stubble that would interfere with seal of respirator.
- 13) Notify you if there has been any drastic change in weight, dental work, or facial scarring that could affect fit and seal.
- 14) Lastly, show how to don on respirator. Show how to *fit check* with the use of the fit cup. Explain this should be done before each use. Show how, in a few minutes, they will be asked to do the same, exhaling and inhaling with the cup in an attempt to find leaks and arrange the respirator on the face and straps for optimal fit.

Fit Testing - Relax & Practice for Quality Fit

Allow, as much as possible, for time so that the employee can play with the respirator, rearranging it on their face, and experiment with the fit test cup before actually testing the seal. This will help expedite the session and enhance proper fit selection. Employees will feel awkward and clumsy at first in handling the respirator and trying to coordinate breathing to learn how to fit check. This may be complicated by those who are made anxious or nervous by the entire process.

This is not generally an issue in industry. However, this is an alien and physically imposing process for many long-term care employees. If employees are nervous, feel uncoordinated and awkward, they will experience much greater difficulty in achieving a good fit. They will fumble, and fit and check improperly. This will extend the length of your fit test session, exacerbate their anxieties about proper fit and potential leakage, and decrease confidence about the proper fit and size ultimately chosen. Thus, take the time necessary to help them become acquainted with the new respirator, and the use of the fit cup. Minimize distractions, or maybe even play some soft background music.

Fit Test - Select Respirator

Select a respirator size that the employee may fit into, small, medium, or large. Let the employee begin to try it on for fit and comfort. Sometimes, a respirator may work better on a larger face, and vice versa, because of the structure of the individual's face. Therefore, suggest

sizes you may think will fit. Do not be discouraged if one is not achieved immediately. Encourage experimentation with other sizes. It may help the employee to learn how to fit the proper one on their face better.

When selecting for proper size, feel for gaps, holes, fissures between the respirator and face seal.

Fit Test - Fit Check Cups

The next step to enhance the check for proper size and fit, is to fit check, using the fit cup. Employee may like to experiment with the fit cup on different sizes.

Note: Fit checking is a protocol that should be conducted each time the employee dons on the respirator, before entering the negative pressure isolation room. This is a method to ensure that a proper seal has actually been achieved, even with the properly sized respirator. Fit checking on traditional respirators involved employees placing their hands over the round canisters of regular industrial respirators while inhaling, and a hand over an exhalation valve, while exhaling.

Obviously, this is not possible with the N95 or N99 respirators. These respirators are made to be lighter, disposable, and more economical. NIOSH has approved fit checking to be conducted with the hands covering as much of the filter areas as possible on these N95 and N99 respirators. Therefore, fit cups are not mandatory, but were provided by manufacturers as an enhanced means of fit checking.

3M, a leader in respirator manufacturing has declined issuing fit cups. Their position is another typical reaction to our litigious climate. They do not supply fit cups because they are not able to quantify and guarantee that the seal adequate. However, front line users, would probably prefer an additional tool, besides the sloppy use of one's hands over the mass of filter that is the respirator, to assist them in identifying leaks and arranging the respirator for better fit. It must be understood now, that the fit cup is not designed to ensure good fit and seal. But it is a very helpful tool.

Fit Test - Fit Check

Instruct employee to do the following:

- 1) Breath normally.
- 2) Place fit cup over respirator, and breath in.
- 3) Ensure that the respirator collapses on the face at seal point and no air rushes in.
- 4) Any leaks will be evident at this point, and there will be no pressure of the respirator collapsing on the face as air escapes via a break in the seal. If this occurs, instruct employee to readjust respirator to prevent this from occurring, and/or try a different sized respirator.
- 5) Breath normally.
- 6) Take a little deep breath.

- 7) Place fit cup on respirator.
- 8) Exhale forcefully.
- 9) Ensure that the respirator lifts off the face evenly across the seal and no air rushes out at one point of the seal, leaving the respirator to continue to lap on the rest of the face.
- 10) Any leaks will be evident at this point, and there will be no pressure pushing the respirator off the face as the majority of forcefully exhaled air escapes at one point where there is a break in the seal. If this occurs, have employee readjust the respirator to prevent this from occurring, and/or try a different sized respirator.

Fit Test

- 1) When you and the employee are confident that they have picked out the appropriate respirator, and fit checked it, then fit test with the banana oil or smoke tube.
- 2) If using banana oil, first check to see if employee can detect banana oil.
- 3) Ask employee to close their eyes.
- 4) Spray banana oil or wave a saturated cloth with banana oil, around the employee's face, particularly at the seal points above the nose, below the chin, and on the sides of the cheeks.
- 5) Ask them to count or recite the alphabet.
- 6) If employee still does not detect any odor, you can ask them to open their eyes, and read the Rainbow Passage under the hood. The Rainbow Passage contains words that contort the human face in every position possible, rigorously testing the seal and fit.
- 7) If employee detects the odor, then there is a leak in the seal. Refit, and retry.
- 8) If employee is unsure if they are still smelling the banana oil, or if they may not smell it any longer, or, if you would simply like to use the smoke tube irritant smoke test instead, or in conjunction with the banana oil test, then break the glass ends of the smoke tube and place the bulb at one end.
- 9) Ensure that employee's eyes are closed.
- 10) Spray several puffs of the irritant smoke in the breathing zone of the employee, again, above the nose, under the chin and on the sides of the cheek.
- 11) Have the employee recite the alphabets or count.
- 12) If the employee detects the irritant smoke, allow the exhaust to clear the smoke. Retry and refit.
- 13) If employee does not detect the smoke, you may want to let the exhaust clear away the smoke. Then ask the employee to don on eye goggles. Again, create a smoke plume in the breathing zone and ask the employee to recite the Rainbow Passage under the hood.

When done:

- 1) If the smoke tube is not spent, recap the tube with the rubber caps provided.
- 2) If the smoke tube is spent, submerge with water, recap, and dispose.
- 3) Disinfect all the respirators used for this individual and let dry.
- 4) Record size selection and remarks.