

CleanSpace™

wearable protective masks



www.cleanspacetechnology.com

FIT TEST INSTRUCTIONS WITH TSI PORTACOUNT EQUIPMENT - HALF MASK



These Instructions describe the procedure for fit testing the CleanSpace Respirator with Half Mask using TSI PortaCount Equipment. The test procedure assesses the total inward leakage through filter and around the facepiece and generates a fit factor. The test is used as a comparative tool to assess both the optimal sized mask fit for a given user, as well as to compare inward leakage performance between CleanSpace and other devices.

IMPORTANT: Respirator testing must be completed by trained safety specialist personnel only. Keep these instructions for reference. If you have questions regarding this device contact PAFtec Customer Service on +612 8436 4000 or e-mail support@paftec.com.

Equipment and tools required to complete testing:

- ✓ CleanSpace Respirator
- ✓ CleanSpace Half Mask
- ✓ Half Mask Portaount Adaptor
- ✓ TSI Portacount Fit Test Equipment

References

1.1. PORTACOUNT® PRO – Operation and Service Manual

1.2. AS / NZS 1716:2012 Respiratory Protective Devices

Equipment

NAME	MODEL #
CleanSpace Respirator Notes 1 & 2	PAF-0034, PAF-0060 or PAF-0070
CleanSpace Half Mask Note 3.	PAF-0027, PAF-0033, PAF-1010
CleanSpace Quantitative Fit Portacount Adaptor for Half Mask	PAF-0025
TSI PORTACOUNT® Respirator fit tester	TSI Model: 8020 or 8030

Notes:

1. *These instructions apply to all CleanSpace Respirators.*
2. **IMPORTANT:** *Ensure a CleanSpace filter is in place.*
3. *CleanSpace Half Masks come in three (3) sizes: small, medium and large.*

Test Procedure

3.1 INITIAL SETUP

1. Connect PORTACOUNT® Respirator fit tester to power supply
2. Make sure the PORTACOUNT® Respirator fit tester is turned off.
3. Remove the Alcohol Cartridge from the PORTACOUNT® Respirator fit tester by twisting it counter-clockwise.
4. Open the Alcohol Fill Capsule by twisting the Storage Cap off (counterclockwise).
5. Set the Storage Cap and Alcohol Cartridge down on a clean surface to prevent contamination.



8030 MODEL



8020 MODEL

6. Squeeze alcohol into the Alcohol Fill Capsule until it is even with or slightly above the fill-line.
7. Recap the alcohol bottle immediately.
8. Make certain the alcohol cartridge is clean. If it has been contaminated, refer to the Service and Maintenance chapter and follow the instructions to replace it. If it is clean, insert the Alcohol Cartridge into the Alcohol Fill Capsule and turn the capsule clockwise until it locks in place.



9. Set the Alcohol Fill Capsule down and wait at least 2 minutes while the alcohol wick inside the Alcohol Cartridge soaks up alcohol.
10. Remove the Alcohol Cartridge from the Capsule and gently shake it to allow excess alcohol to drip back into the Alcohol Fill Capsule. Stop when excess alcohol is no longer dripping; it is not necessary to wait until the outside surface of the Alcohol Cartridge is dry.



8030 MODEL



8020 MODEL

11. Insert the Alcohol Cartridge into the Cartridge Cavity of the PORTACOUNT® Respirator fit tester. It should slide in with little effort. **DO NOT FORCE IT** (see Note below). As you approach full insertion, firmly twist the Alcohol Cartridge clockwise until it locks into position. **Note:** To ease insertion of the Alcohol Cartridge, apply a bit of supplied silicone vacuum grease to the wick O-ring



8030 MODEL



8020 MODEL

IMPORTANT: Recap the alcohol fill capsule with the storage cap.



8030 MODEL



8020 MODEL

3.2 SET UP THE TSI PORTACOUNT AND PERFORM A ROOM COUNT

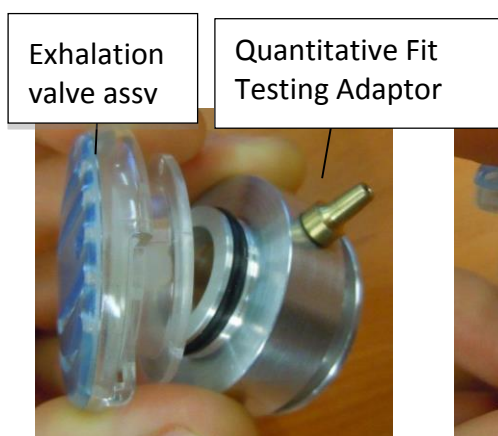
1. Connect twin Tube Assembly into "SAMPLE" and "AMBIENT" ports onto PORTACOUNT Respirator fit tester as outlined below.

IMPORTANT: The Twin Tube Assembly consists of a pair of tubes: the Sample Tube and the Ambient Tube approx 1.7 meters (5.5 feet) long. It must never be lengthened by more than a few inches for fit testing (except for the few inches added by a Tube Adapter). The Sample Tube is 18 cm (7 inches) longer than the Ambient Tube. The Sample Port is used when sampling air from a respirator during a fit test. The clear tube marked "SAMPLE" of the Twin Tube Assembly (3) connects here. The Sample Port fitting is silver and marked with the letter "S". The Ambient Port is used to sample ambient air during a fit test. The blue tube marked "AMBIENT" of the Twin Tube Assembly (3) connects here. The Ambient Port fitting is blue and marked with the letter "A".

2. Prior to connecting "SAMPLE" hose to another device, press "COUNT" to verify if surrounding environment is suitable for conducting the test. **Note: Fit testing should not be completed if particle concentration is less than 1000 particles/cm³. USE a count 6000 to 50000 range.**
3. To automate data capture: load 'FitPlus Fit Test Software' (for 8020 model) or 'FitPro™ Fit Test Software' (for 8030 model). Data can be collected manually.
4. If test is being conducted automatic data collection, connect the PortaCount's Data Port to a computer using the provided cable/adaptor.
5. Run the 'FitPlus' or 'FitPro' software.
6. **IMPORTANT:** Check there is a CleanSpace P3 filter fitted to the respirator

3.3 INSTALLING THE HALF MASK FIT TEST ADAPTOR (PAF-0025)

7. Remove the Exhalation Valve assembly and install onto o-ring section of Quantitative Fit Testing Adaptor (PAF-0025) then install test jig with Exhalation valve into Valve port in the mask.



Installing the adaptor



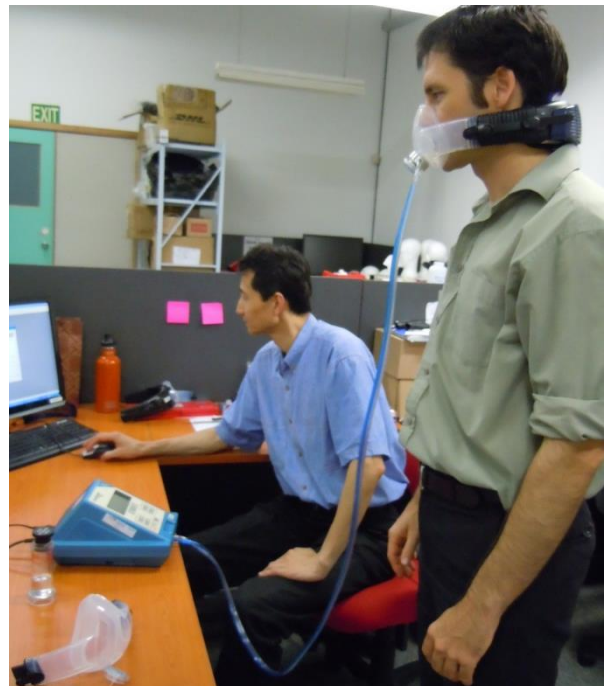
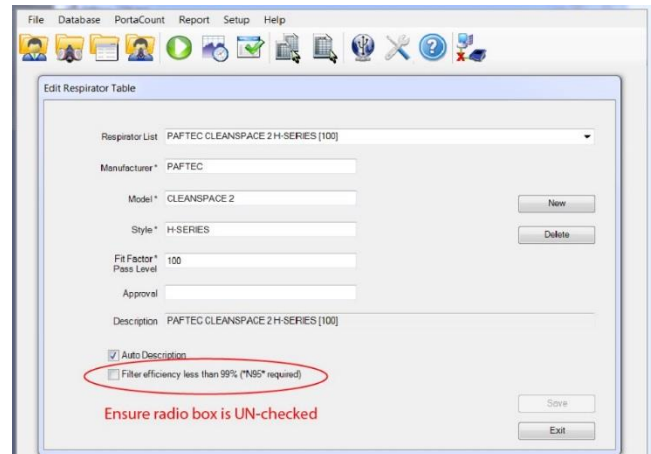
Half Mask - adaptor installed



Half Mask with adaptor installed

3.4 PERFORMING THE FIT TEST

1. Make sure the PortaCount Respirator Fit Tester is turned on.
2. Prior to connecting "SAMPLE" hose to another device, press "COUNT" to verify if surrounding environment is suitable for conducting the test.
Note: *Fit testing should not be completed if particle concentration is less than 1000 particles/cm³. USE a count 6000 to 50000 range.*
3. If 'FitPlus Fit Test Software' (for 8020 model) or 'FITPRO™ Fit Test Software' (for 8030 model) is being used: Open the program and select: PortaCount->Fit Test. Input the test details as per program fields. And ensure that the radio box is Un-Checked for the N95 test.
4. If manually collecting data: Record the test details.
5. Typically select the OSHA 29 CFR1910.134 Protocol for type and duration of exercise to be completed. *Details of exercises are outlined in table on the next page.*
6. Connect Clear 'sample' tube from PORTACOUNT® Respirator fit tester onto fitting on Quantitative Fit Testing Adaptor PAF-0025
7. Make sure CleanSpace Respirator Unit is turned on.
8. Ask the subject to don the mask without assistance, wearing it for 5 minutes before fit test starts. This will purge particles trapped in respirator.
9. Ask the subject to tilt his or her head up and down, turn side to side, and bend over to see if the tubing pulls the mask away from their face. If it does, re-adjust the neck strap or the tubing and repeat check the fit again.



3.5 EXERCISES TO BE PERFORMED FOR THE FIT TEST

1. Brief subject to the exercises which they will embark on whilst wearing the mask for the test. Ask the test subject if they are ready to begin the exercise protocol.
2. The exercises proceed one after another without pause. Each exercise takes approximately 60 seconds to complete. Have the test subject follow the exercises one after another when prompted by the instrument. The PORTACOUNT® fit tester beeps to alert the person when to stop and begin the next exercise.
3. Take a reading on the PORTACOUNT® PRO fit tester as outlined below.

Exercise Name	Description
Normal breathing	Remain still and breathe as usual without moving or talking (exercise duration 1 min)
Deep breathing	Take long deep breaths as if working hard. Do not overdo it (exercise duration 1 min)
Head side to side	Breathe normally while slowly turning the head from side to side. Turn far enough to each side to stretch the neck muscles. Each cycle from left to right should take several seconds, pausing momentarily at each side to take a breath. (complete approx 15 times – NB: exercise duration 1 min)
Head up and down	Breathe normally while slowly alternating between looking up at the ceiling and down at the floor. Each up and down cycle should take several seconds (complete approx 15 times – NB: exercise duration 1 min)
Talking out loud	Read a prepared paragraph (as below) or count out loud to simulate the workplace. (exercise duration 1 min) Sample 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 colours. 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	Grimace by smiling and/or frowning to create a leak in the respirator face seal. This exercise will often result in a failed fit factor, which is why the OSHA standard allows you to exclude that fit factor when computing the overall fit factor. When performing the grimace, you are intentionally creating a break in the face seal in order to see if the mask re-seals itself afterwards. Successful re-sealing is proven by achieving a passing fit factor on the next exercise. Notes: The OSHA protocol includes special provisions for the grimace exercise. It is allowed to be 15 seconds long and the resulting fit factor may be discarded (excluded) before calculating the overall fit factor. This is allowed because the grimace exercise is done to intentionally break the face seal in order to make sure the mask reseals itself before the next exercise.
Bend and touch toes	Bend at the waist as if you were touching your toes while breathing normally. (exercise duration 1 min)
Normal breathing	Remain still and breathe as usual without moving or talking (exercise duration 1 min)

3.6 RECORD KEEPING

The following information should be recorded for EACH TEST SUBJECT:

1. Test Subjects details:
 - Name and ID number of test subject
 - Company
 - Location of test
 - Date and time test conducted
2. Respirator Details
 - Type of Respirator and mask being worn and tested
 - Size of mask worn by subject for test
3. Environment conditions (prior to testing), baseline and Test Results:
 - Mask concentration prior to commencing test whilst normal breathing
 - Fit factor exercise 1 (Normal breathing)
 - Fit factor exercise 2 (Deep breathing)
 - Fit factor exercise 3 (Head side-to-side)
 - Fit factor exercise 4 (Head up and down)
 - Fit factor exercise 5 (Talking out loud)
 - Fit factor exercise 6 (Grimace) NB: not required in AS/NZS 1716:2003
 - Fit factor exercise 7 (Bend and touch toes)
 - Fit factor exercise 8 (Normal breathing)
 - Overall fit factor AND Pass or Fail

PASS/FAIL CRITERIA

TEST IS A PASS:

The fit test is complete. Keep a record of the test on file and issue the correct size and model respirator to the test subject.

TEST IS A FAIL:

Determine the reason for fail (ie incorrect mask size, poor adjustment, See the Appendix for a detailed list). Correct and repeat the test.

The *overall* fit factor is the most important data item. It is the overall result of the fit test and usually the only fit factor value that must be retained as part of your record keeping. The fit factors for the individual exercises are not as important. It is possible to have a passing overall fit factor even though one of the exercises resulted in a failing fit factor. The overall fit factor is not simply an average of all the exercise fit factors. It is a weighted average related to the amount of airborne hazard that the person might have inhaled if he or she were in the workplace. One breath at a fit factor of 100 and then another at a fit factor of 1000 is not the same as two breaths at a fit factor near 550, it is the same as two breaths at a fit factor of about 180. This is because the breath at a fit factor of 100 contains 10 times the amount of hypothetical hazard as the breath at a fit factor of 1000. **Note:** In the USA, OSHA requires a minimum fit factor of 100 for half masks.

Disclaimer

Fit Tester is an assessment of respirator fit during a fit test only. Respirator fit at other times will vary. The fit factor value is not intended for use in calculating an individual's actual exposure to hazardous substances.

APPENDIX

Calculating Fit Factor

Fit factor is defined as the particle concentration outside the respirator divided by the particle concentration inside the respirator. Because ambient concentration can vary over time, the PORTACOUNT® PRO Respirator Fit Tester calculates the fit factor by taking the average of the ambient concentrations measured before and after the respirator sample and then dividing by the concentration measured in the respirator. This is why the first test cycle (exercise) is longer than additional test cycles in Fit Test Mode. It is necessary to measure the required additional ambient concentration sample before the first fit factor can be calculated. Both the ambient and respirator concentrations are determined by integration. The integrated concentrations are determined by the total number of particles counted during the sample periods.

Fit factor is actually calculated by:

$$FF = \frac{C_B + C_A}{2C_R}$$

FF = fit factor

CB: particle concentration in the ambient sample before the respirator sample

CA: particle concentration in the ambient sample after the respirator sample

CR: particle concentration in the respirator sample.

If no particles are counted in the respirator sample, the PORTACOUNT® PRO fit tester automatically adds one particle. This prevents dividing the ambient concentration by zero. At the end of a fit test, the overall fit factor is calculated based on the individual fit factors for each test cycle.

The following equation is used to calculate the overall fit factor in the PORTACOUNT® PRO fit tester:

$$\text{Overall FF} = \frac{n}{\frac{1}{FF_1} + \frac{1}{FF_2} + \frac{1}{FF_3} + \dots + \frac{1}{FF_{n-1}} + \frac{1}{FF_n}}$$

where: FF_x = fit factor for test cycle

n = number of test cycles (exercises).

Common Problems causing Low Fit Factors

Assuming the PORTACOUNT® PRO fit tester passes the Daily Checks:

- Poorly fitted mask (size or set up)
- The Subject has smoked within 24hours of testing
- The ambient air in the test room has a low particle count
- Adaptor is not fitted correctly
- Hair interfering with face seal. Make sure there is no hair between the respirator face seal and the individual's skin.
- Hair or foreign material in exhalation valve. Check the mask exhalation valve is clear
- Alcohol cartridges is not tightly inserted or an O-ring is missing. Make sure the alcohol cartridge is installed properly and all O-rings are in position.
- Starting fit test too soon after mask is donned.
- When the mask is first donned, ambient air particles are trapped inside. These particles clear out as the person breathes. Half mask respirators clear very quickly; full-face masks can take over one minute. Do not start the fit test too soon.
- Sample tubes too long. No more than the few inches should be added to the Sample tube (use a Tube Adapter). Longer sample tubes prevent proper purging between the ambient and mask sample.
- PORTACOUNT® PRO fit tester sample tube leaks where attached to probe or adapter due to wear.
- Cut a short piece off the end of the tube to expose a fresh end.