

# CleanSpace™

wearable protective masks



FIT TEST INSTRUCTIONS WITH

[www.cleanspacetechnology.com](http://www.cleanspacetechnology.com)

TSI PORTACOUNT EQUIPMENT - FULL FACE MASK

These Instructions describe the procedure for fit testing the CleanSpace Respirator with Full Face 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 PortaCount Fit Test should be conducted by specialist / trained mask fitting personnel only.** 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. Read all instructions and warnings before using this device. Keep these user instructions for reference. If you have questions regarding this device contact PAFtec Customer Service on +612 8436 4000 or e-mail [support@paftec.com](mailto:support@paftec.com).

**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](mailto:support@paftec.com).

Equipment and tools required to complete testing:

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

## 1. References

- 1.1. PORTACOUNT® PRO – Operation and Service Manual
- 1.2. AS / NZS 1716:2012 Respiratory Protective Devices

## 2. Equipment

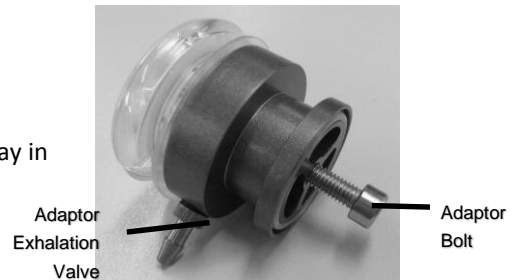
NAME	MODEL #
CleanSpace Respirator Notes 1 & 2	PAF-0060 or PAF-0070
CleanSpace Half Mask Note 3.	PAF-1014
CleanSpace Quantitative Fit Portacount Adaptor for Full Face Mask	PAF-1015
TSI PORTACOUNT® Respirator fit tester	TSI Model: 8020 or 8030

### Notes:

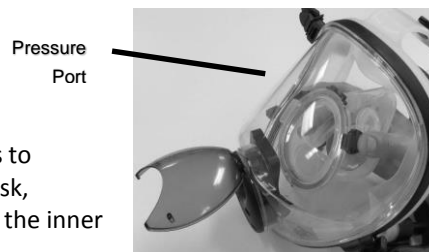
1. These instructions apply to CleanSpace Ultra and CleanSpace EX Respirators.
2. **IMPORTANT:** Ensure a CleanSpace filter is in place.
3. CleanSpace Half Masks come in three (3) sizes: small, medium and large.

## 3. Fitting the Adaptor to the Full Face Mask

1. Open exhalation valve cover by pivoting it upwards. It should stay in the raised position while you work.



2. Remove the inner mask assembly to improve internal access to exhalation valve leaf (see diagram). To remove the inner mask, squeeze the two tabs towards each other as shown and pull the inner mask backwards out of the mask



3. Remove the exhalation valve leaf from the front of exhalation valve module.



- 4.
5. Insert the Adaptor into the exhalation valve module in place of the exhalation valve leaf. Fasten by inserting M5 Screw through internal face of central boss and gently



- Connect the tube from the PortaCount to the adaptor's pressure port (see diagram)



- Refit the inner mask. Insert the bottom of the inner mask first, engaging the two ribs that protrude from the bottom of the inner mask into the matching slots in the main frame. Once the ribs are engaged, push the top of the inner mask forward until it snaps into place.



#### 4. Donning the CleanSpace Full Face Mask and Respirator

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- Loosen all five straps on the mask harness to their fullest extent
- Hold the mask in one hand and use the other hand to pull the harness back and away from the mask
- Place your chin in the cup of the mask face seal
- Pull the harness over your head



- Settle your face into the mask face seal. Gently tighten each harness strap in turn, starting with the bottom straps. As you pull each strap, use your other hand to steady the mask on your face.

Continue to adjust the straps, loosening and tightening as necessary, until the mask face seal presses evenly on your face around its entire length. **DO NOT OVER TIGHTEN.**



## 5. Carry out a negative pressure seal check

Using your finger or thumb, cover the air inlet (on the left hand mask air clip). Breathe in sharply. You should not be able to draw any air into the mask. The mask should be sucked in towards your face as you inhale. Listen for squeaking or whistling noises which indicate air is leaking past the seal.

Hold your breath for 10 seconds. The mask should stay collapsed against your face. If the mask seal slowly recovers (mask moves away from your face) there is a leak. Readjust the mask fit and repeat the negative pressure seal check.



**IF A SATISFACTORY FIT CANNOT BE ACHIEVED, A SATISFACTORY RESULT TO THE QUANTITATIVE FIT TEST IS UNLIKELY**

CleanSpace Full Face Mask can only be compatible with a CleanSpace Ultra or CleanSpace EX to the Full Face Mask

Before attaching the respirator, press the ON button. The Respirator GREEN battery lights should come on and the system should be in Standby Mode.

**Attach the respirator to the full face mask and start to breathe. Breathe normally. CleanSpace airflow will start.**

*NOTE: If the airflow does not start, check the unit is in Standby Mode and the lights are ON.*

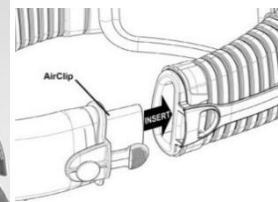
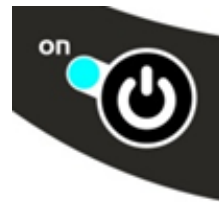
Place the respirator behind your head, resting on your shoulders. **Note that the hoop on the filter cover must be facing upwards.**

Grasp the left-hand mask AirClip in one hand and the left-hand respirator AirClip in the other. Join them. Pulling down on the mask AirClip to move it away from the harness makes this process easier. Join the AirClips on the right hand side

Finally, reach behind your head and find the harness rear strap. Locate the hook on the bottom end of the strap. Snap the hook onto the hoop on the filter cover of CleanSpace ULTRA so that the rear strap supports the weight of the respirator.

**Adjust the respirator vertical position**

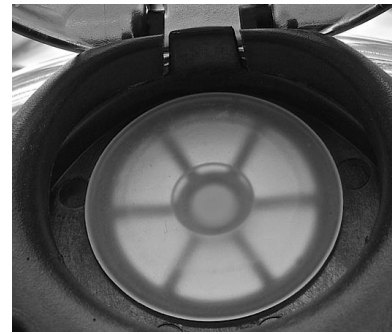
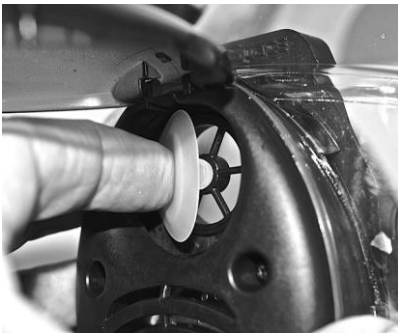
Adjust the rear strap to set the height of the respirator. **DO NOT OVER TIGHTEN THE STRAPS**



## 6. After the Fit Test and Before Use Remove Adaptor from Mask and Replace Exhalation Valve

**IMPORTANT:** After the fit test and before use remove adaptor from mask and replace exhalation valve

1. Remove the Adaptor from the mask and store the Adaptor, Bolt and Hex Key for later use.
2. To replace silicone exhalation valve leaf in the mask:
  - Place the valve in position, with its centre stalk inserted in the tube in the centre of the valve
  - Press the valve with your finger so that the stalk is driven through the tube
  - There is a barb moulded on the centre stalk that must pass right through the tube and emerge on the inside of the mask. This barb holds the valve in place.
  - On the inside of the mask, reach in and grasp the stem of the valve and pull it firmly to ensure the valve is seated.
  - Working on the outside of the mask again, inspect the valve leaf and check that it is sitting flat against its seat without any sign of distortion or damage



***Be very careful not to damage or displace the exhalation valve leaf (the soft silicone flap).***

***Damage to the exhalation valve may cause it to leak, resulting in overexposure to contaminants and lead to sickness or death.***

## 7. Check Exhalation Valve Operation

Finally you must check that the exhalation valve is sealing. To do this, repeat the negative pressure seal check performed earlier, as described below.

Using your finger or thumb, cover the air inlet (on the left hand mask air clip).

Breathe in sharply. Hold your breath for 10 seconds. The mask should stay collapsed against your face. If the mask seal slowly recovers (mask moves away from your face) there is a leak.

If the mask seals, the quantitative fit test is complete and the mask is ready for use.

If a satisfactory seal cannot be achieved, clean the valve as described in the user instructions or replace it with a new one.



***IF A SATISFACTORY SEAL CANNOT BE ACHIEVED DUE TO VALVE DAMAGE OR CONTAMINATION THE MASK MUST NOT BE USED!***

## TEST PROCEDURE

### 8. INITIAL SETUP

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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

## 8. Set Up the TSI Portacount and Perform A Room Count

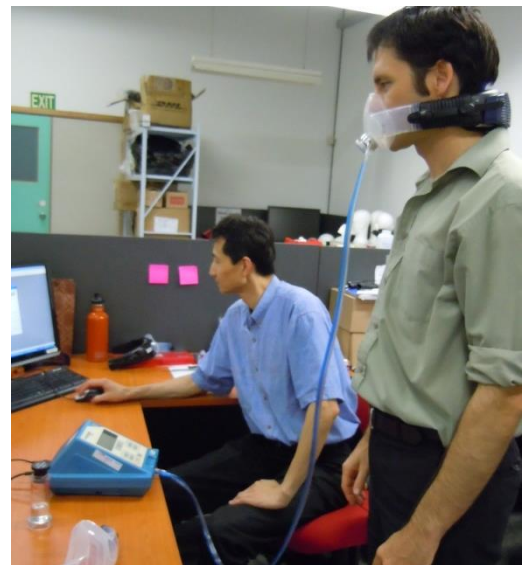
1. Connect twin Tube Assembly into "SAMPLE" and "AMBIENT" ports onto PORTACOUNT Respirator fit tester as outlined below.

**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/cm<sup>3</sup>. 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

## 9. 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/cm<sup>3</sup>. 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.



## 10. 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
<b>Normal breathing</b>	Remain still and breathe as usual without moving or talking (exercise duration 1 min)
<b>Deep breathing</b>	Take long deep breaths as if working hard. Do not overdo it (exercise duration 1 min)
<b>Head side to side</b>	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)
<b>Head up and down</b>	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)



<b>Talking out loud</b>	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.'
<b>Grimace</b>	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. <i><b>Notes:</b> 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.</i>
<b>Bend and touch toes</b>	Bend at the waist as if you were touching your toes while breathing normally. (exercise duration 1 min)
<b>Normal breathing</b>	Remain still and breathe as usual without moving or talking (exercise duration 1 min)

## 11. 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

## 12. 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.

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

Fit factor is actually calculated by:

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<sub>x</sub> = 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.