INTRO TO QUANTITATIVE FIT TESTING

RESFT 101

Part 1:
- Basics of Respirator Fit Testing
- What is it? Who does it? And Why?

Part 2:
- Defining QUANTITATIVE Fit Testing
- Quantitative Fit Testing Protocol
WHAT is Respirator Fit Testing?

Respiratory Protection Program (RPP)

One of many critical components to a successful program
WHAT is Respirator Fit Testing?

+ Practice of determining if a specific mask (respirator) fits to a person's face
WHY should we fit test?

**Safety**
- Confirm a satisfactory seal or barrier between wearer and environment

**Comfort**
- Verify comfort, and that wearer can perform their work duties

**Training**
- Ensure wearer knows how to properly **don/doff** and use the respirator
**WHY should we fit test?**

The challenge for fit testers...

<table>
<thead>
<tr>
<th></th>
<th>Donned Correctly</th>
<th>Donned Incorrectly</th>
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</thead>
<tbody>
<tr>
<td><strong>Good Fit</strong></td>
<td>Fits</td>
<td>Does Not Fit</td>
</tr>
<tr>
<td><strong>Bad Fit</strong></td>
<td>Does Not Fit</td>
<td>Does Not Fit</td>
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</tbody>
</table>
Did you know?

**Employee comfort takes precedence**

“...the employee shall be given reasonable opportunity to select a different respirator...”

*OSHA 29CFR1910.134 (f)(4), refer to CSA Z94.4-11 sections 9.1.3 for comparative statement*
WHO needs to be Fit Tested?

“...before an employee may be required to use any respirator with a... tight-fitting facepiece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used.”

*OSHA 29CFR1910.134 (f), refer to CSA Z94.4-11 sections 9.1.2 & 9.1.3 for comparative statements
WHO needs to be Fit Tested?
WHEN do we fit test?

*OSHA 29CFR1910.134 (f)(2 & 3), refer to CSA Z94.4-11 sections 9.1.6 for comparative statement

Prior to initial use of the respirator, and annually (biennially for CSA)

If a different respirator is used

• Size, style, model or make

If there are changes in the employee’s physical condition that could effect respirator fit

• Facial scarring
• Dental changes
• Cosmetic Surgery
• Obvious change in weight, etc.
HOW do we fit test?

Qualitative QLFT

Subjective

Quantitative QNFT

Objective
Quantitative Fit Testing (QNFT)

“...an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.”

OSHA 29CFR1910.134 (b), refer to CSA Z94.4-11 Annex C section C.4.1 for comparative statement
What is a Fit Factor?

Fit Factor = $\frac{C_{\text{out}}}{C_{\text{in}}}$

- $C_{\text{in}}$: Mask Particle Concentration
- $C_{\text{out}}$: Ambient Particle Concentration
### Minimum Fit Factors

<table>
<thead>
<tr>
<th>OSHA Approved Minimum Fit Factors</th>
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</thead>
<tbody>
<tr>
<td>Full Face Respirators</td>
</tr>
<tr>
<td>Half Face Respirators</td>
</tr>
<tr>
<td>Filtering Facepieces</td>
</tr>
</tbody>
</table>
  - *N95, N99, P100, etc.*                     |
  - *P1, P2, P3, etc.*                         |

Your Minimum Fit Factors may be different... refer to your governing protocol for more information
Did you know?

If the Minimum Fit Factor is >100
you **must** use *quantitative* fit testing

*OSHA 29CFR1910.134 (f)(6,7), refer to CSA Z94.4-11 sections 9.4 for comparative statement*

Full face respirators have a minimum Fit Factor of ≥ 500

* Pictures from Draeger, MSA, 3M, Honeywell, and Sundstrom websites
Fit Factor vs. Assigned Protection Factor (APF)

Two separate functions of the same respirator...

Fit Factor: Determined when the Respirator is used in APR (Air Purifying) mode

Assigned Protection Factor: Determined by mode of operation in the workplace, i.e. SCBA, PAPR, CCBA, etc.
OSHA

Fit Testing Procedure

Same logic as other protocols...

OSHA

Occupational Safety and Health Administration

ANSI

American National Standards Institute

HSE

Health & Safety Executive

CSA

CANADIAN STANDARDS ASSOCIATION

* Logos from OSHA, ANSI, HSE, and CSA websites
OSHA

Fit Testing Procedures

1. Choose a respirator

2. Show how to properly don and doff the respirator

3. Ask if the respirator is comfortable and feels like it fits

4. Hold different respirators up to subjects face to see if there is a better fitting option

5. Don respirator for 5 min, User Assessment Comfort Period
OSHA

Fit Testing Procedures

6. Assess Comfort

<table>
<thead>
<tr>
<th>• Position of mask on the nose</th>
<th>• Room to talk</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Room for eye protection</td>
<td>• Position of mask on face and cheeks</td>
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</table>

7. Assess Fit

| • Chin properly placed        | • Adequate strap tension, not overly tightened |
| • Respirator proper size to span distance from nose to chin | • Self-observation in mirror to evaluate fit and position |
| • Tendency of respirator to slip | • Fit across nose bridge |

8. Conduct User Seal Check
9. Confirm there is no hair growth, clothing or jewelry that would interfere with a proper fit
OSHA

Fit Testing Procedures

9. Confirm there is no hair growth, clothing or jewelry that would interfere with a proper fit
10. If the test subject exhibits difficulty breathing, stop fit test and refer them to a healthcare professional.

11. If the employee find the fit unacceptable they may choose a different respirator.


13. Don any applicable safety equipment that may be worn during actual respirator use.

14. Perform fit test...
OSHA QNFT Protocol

8 exercises...

to simulate common workplace motions

1. Normal breathing
2. Deep breathing
3. Turning head side to side
4. Moving head up and down
5. Talking
6. *Grimace*
7. Bending over
8. Normal breathing

OSHA is only concerned with the Overall Fit Factor
(weighted average of each exercise)
GRIMACE

Task: Attempt to momentarily break the seal of the respirator to the face.
*Only takes 15 seconds*

Goal: Verify the respirator re-seats properly for the last two exercises

NOT factored into the overall fit factor...

“The fit factor shall be determined... for each test exercise except the grimace exercise”

*OSHA 29CFR1910.134 Appendix A (C)(b)(8)(i)*
CSA, HSE (UK), & ANSI QNFT Protocols

7 exercises...

*to simulate common workplace motions*

1. Normal breathing
2. Deep breathing
3. Turning head side to side
4. Moving head up and down
5. Talking
6. Bending over
7. Normal breathing

CSA & ANSI are only concerned with the Overall Fit Factor
(weighted average of each exercise)

*HSE requires a passing fit factor for each exercise*
Summary

+ **What**
  - Determining how well a mask fits to a facial profile

+ **Why**
  - Safety, Comfort & Training

+ **Who**
  - Anyone required to, even potentially, wear a tight fitting respirator

+ **When**
  - Before entering hazardous environment and often annually

+ **How**
  - Quantitative Fit Testing (QNFT)
  - Minimum Fit Factor Pass Levels & Assigned Protection Factors
  - OSHA QNFT Protocol
Additional Training Material

Online Training Center

• Available at the PortaCount Academy website; [www.tsi.com/PCacademy](http://www.tsi.com/PCacademy)

Answers

• Available at [www.tsi.com/PCacademy](http://www.tsi.com/PCacademy) and [www.tsi.com/portacount](http://www.tsi.com/portacount)