Enhancing Workplace Safety: Exploring the Benefits of Respirator Fit Testing and Controlled Negative Pressure

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What is a Respirator Fit Test?

Use of a protocol to evaluate the fit of a respirator on an individual

Verifies training and identifies the specific make, model, style, and size of respirator best suited for each employee

Why Fit Test?

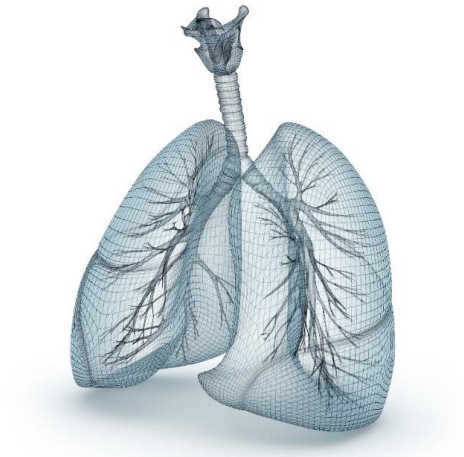
- Protect the health of employees
- Ensure employees are trained on their mask and their risk
- Provide employees peace of mind

Required by:

- OSHA 29 CFR 1910.134
- ANSI Z88.10 – 2010
- ISO 16975 – 2017
- HSE INDG479
- INRS ED 6273
- AS/NZS 1715

Fit Testing – A critical part of a RPP

1. Appointment of program administrator
2. Selection of RPE
3. Medical Screening of users of RPE
4. Training
5. Issue of RPE
6. Fitting of equipment
7. Wearing of RPE
8. Maintenance of RPE
9. Disposal of Equipment
10. Record Keeping
11. Program evaluation



Importance of Competent Fit Testers

Competent person's abilities (ISO 16975-3:2017)

- ✓ Purpose of a fit test
- ✓ Quantitative vs qualitative
- ✓ Capabilities and limitations
- ✓ How to perform fit test
- ✓ Diagnostic checks
- ✓ Interpret results
- ✓ RPE selection
- ✓ Inspect a facepiece
- ✓ Preparation of facepiece
- ✓ Pre-use checks
- ✓ Correctly fit facepiece
- ✓ Recognise poor fit
- ✓ FF / APF / RMPF

Could be an internal person or external service provider

RESP-FIT

- A Respirator Fit Testing Training and Accreditation Program

- Objective: to improve worker health protection of those wearing tight-fitting respiratory protective equipment, through reliable respirator fit testing by competent fit testers in Australia by:
  - Provision of a standardised training syllabus to improve respirator fit tester knowledge and skills
  - Provision of an accreditation process to demonstrate competence (ISO 16975-3 Section 5)

- RESP-FIT provides guidance and information for workplaces to make an informed decision on RPE fit testing that is appropriate and suitable for their working environment and controls.

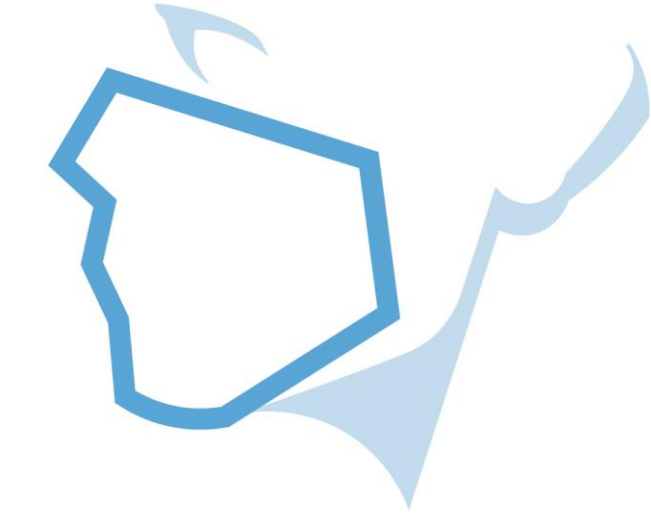
FIT TEST TO FIT RIGHT

RESP-FIT
RESPIRATOR FIT TESTING TRAINING & ACCREDITATION
AN AIOH PROGRAM

https://respfit.org.au/

Logos for Airmet /OHD

RESP-FIT
RESPIRATOR FIT TESTING TRAINING & ACCREDITATION | AN AIOH PROGRAM



AIOH AUSTRALIAN INSTITUTE OF OCCUPATIONAL HYGIENISTS 40 YEARS
CELEBRATING OVER 40 YEARS OF PROTECTING AUSTRALIAN WORKER'S HEALTH

RESP-FIT

Qualitative Fit Testing (QLFT)

- Relies on the wearer to detect leakage
- Pass/Fail Test
- Typically limited to half mask respirators

Quantitative Fit Testing (QNFT)

- Uses a machine to measure leakage
- Provides a fit factor
- Can be used on any respirator

Two Most Common Methods of QNFT

Controlled Negative Pressure (CNP)

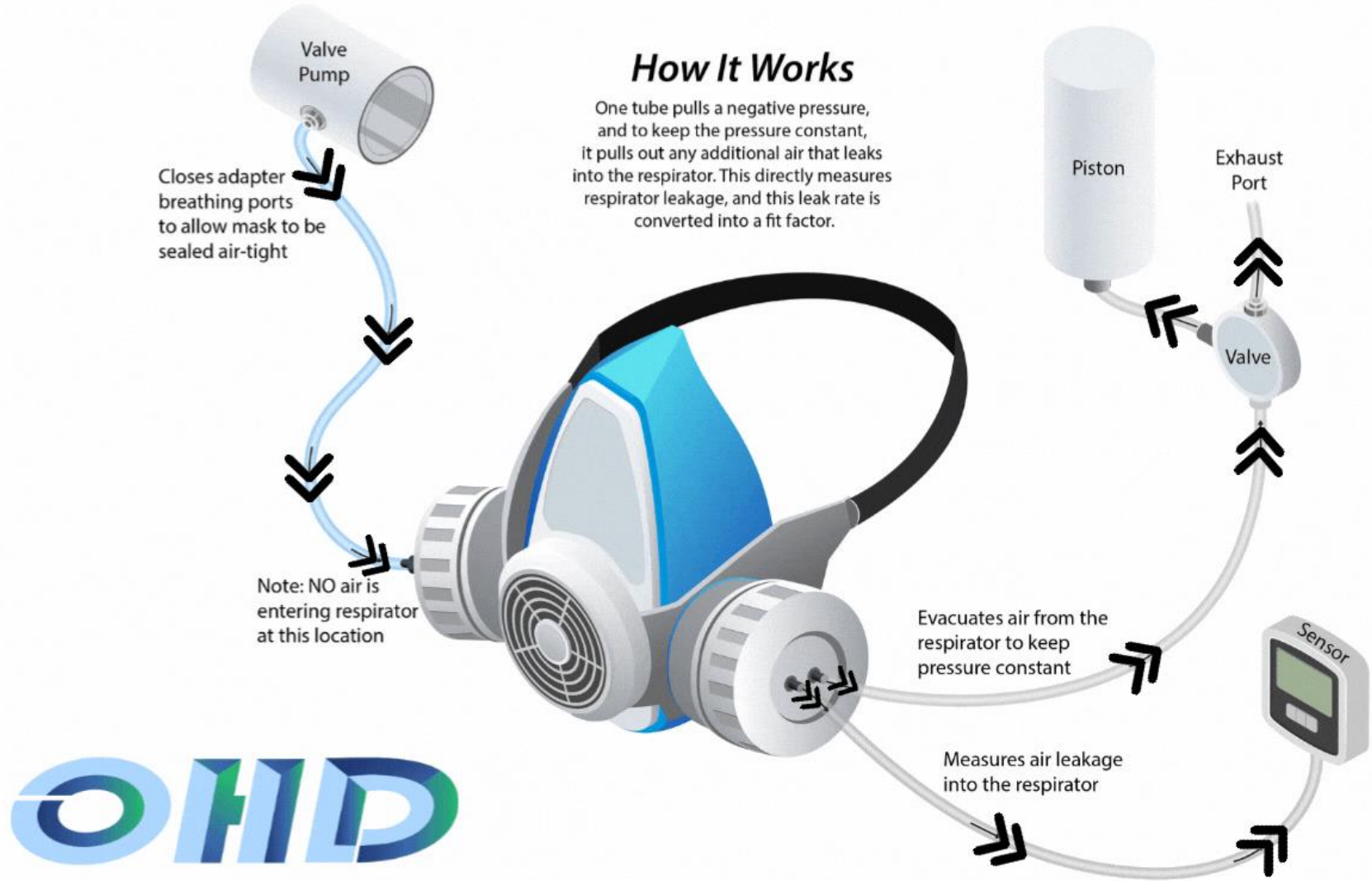
- OHD Quantifit & QuantiFit2
- Air is the challenge agent
- Carried out by creating a Controlled Negative Pressure in the facepiece
- Cannot test Filtering Facepiece

Ambient Aerosol (Condensation Nuclei Counter - CNC)

- TSI PortaCount or Accutec AccuFIT 9000
- Aerosols are the challenge agent
- Carried out by probing the facepiece and calculating the ratio of external particles to the particles inside the respirator
- Aerosol can be artificially created for testing if natural particle counts are too low

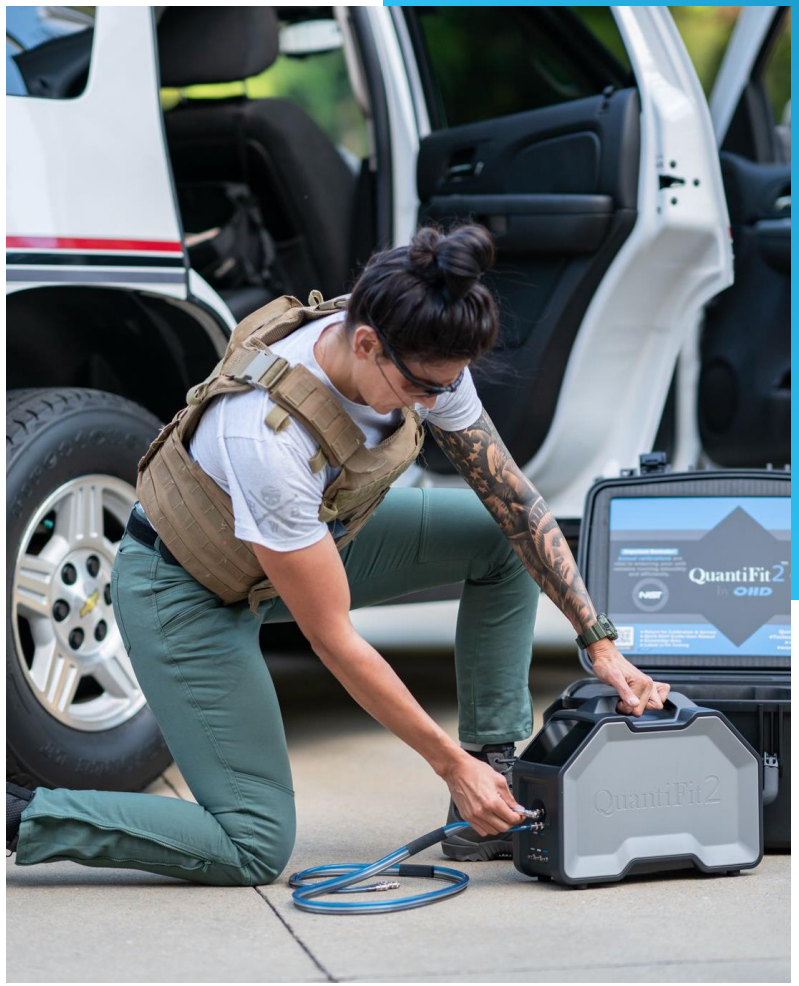
CNP
Background

- The OHD QuantiFit2® instrument.
- Uses a Controlled Negative Pressure to directly measure respirator leakage.
- Developed in response to issues found with Ambient Aerosol Fit Testing
- The negative pressure created mimics a sustained inhale of the wearer


Valve
Pump
How It Works
One tube pulls a negative pressure, and to keep the pressure constant, it pulls out any additional air that leaks into the respirator. This directly measures respirator leakage, and this leak rate is converted into a fit factor.
Piston
Exhaust Port
Closes adapter breathing ports to allow mask to be sealed air-tight
Valve
Note: NO air is entering respirator at this location
Evacuates air from the respirator to keep pressure constant
Sensor
Measures air leakage into the respirator

CNP Benefits

- Fastest Fit Test
- Test Anywhere, Inside or Out – No Aerosol Required
- Scientifically Validated



Quantifit2
Experience

- Battery Power
- Bluetooth Capability
- Color Touch Screen Display
- AutoStart
- On Screen Signature Capture
- OHD Logic
- Perform Multiple Tests Simultaneously

Quantifit2

Battery

- Rechargeable (Quantifit2 or Charging Cable)
- Four Plus Hour Run Time
- Unlocking all Respirator Fit Testing Environmental Restrictions

LED Touchscreen
+
Animation Guidance

CNP Fit Factor
= BR/LR

Where:

- BR = inspiratory flow rate associated with CNP challenge pressure (modeled breathing rate)
- LR = mean leakage flow rate (leak rate) measured with the head held still after each test exercise

Breathing Rate (BR) is expressed in liters/min.

DIVIDED BY

Leak Rate (LR) expressed in cubic centimeter/min

1 cc/min = 0.001 L/min,
So, 53.8 L/min = 53,800 cc/min

53,800 cc/min BR / 53.8 cc/min LR = 1,000 Fit Factor

Where:

- Cout = number concentration of particles in an aerosol sample outside of the respirator in the surrounding ambient air;
- Cin = number concentration of particles in an aerosol sample inside the respirator

Where:

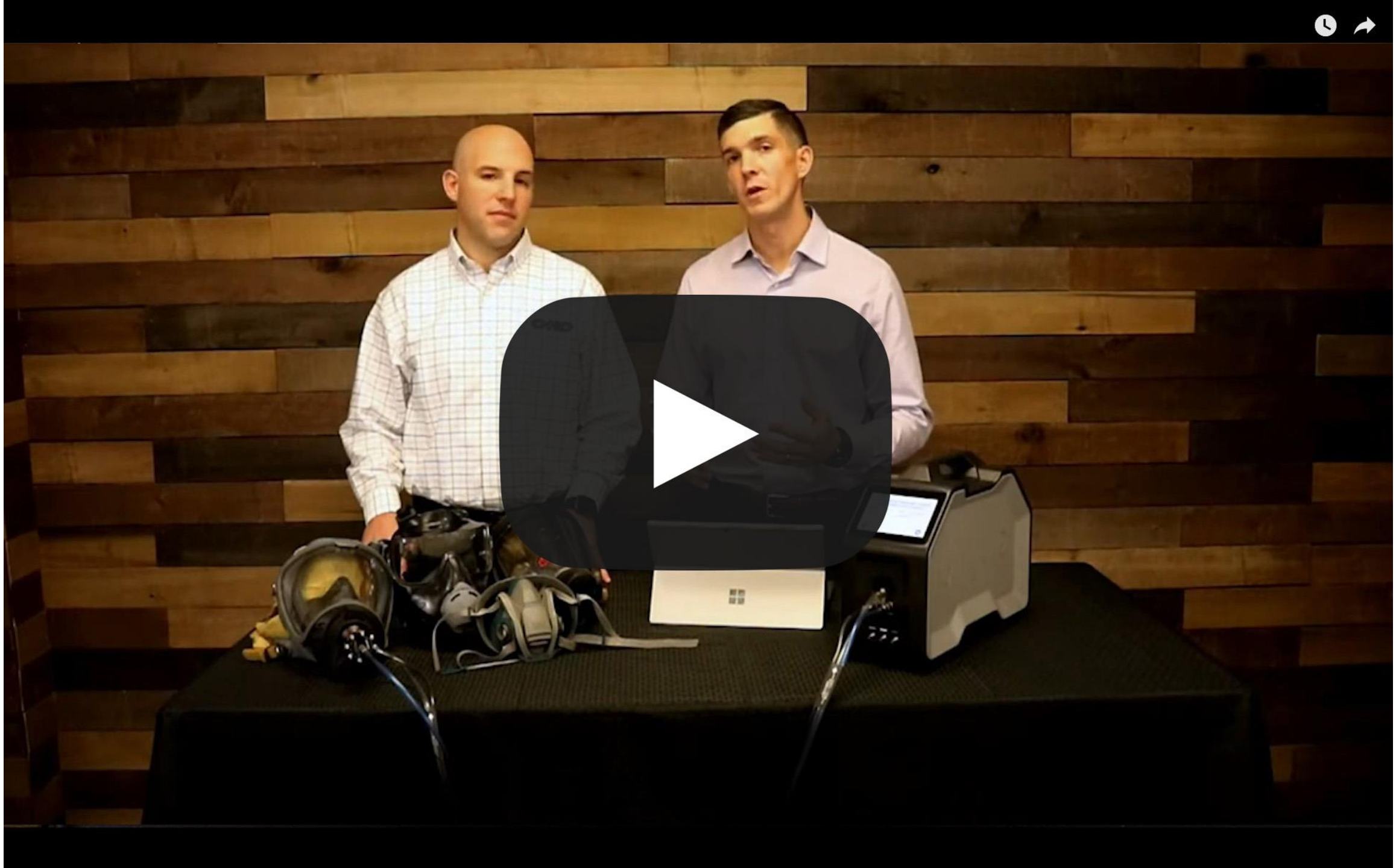
N = The number of exercises;
FF1 = The fit factor for the first exercise;
FF2 = The fit factor of the second exercise;
FFN = The fit factor of the Nth Exercise.

Harmonic Mean

- A kind of average
- It is appropriate for situations when the average of rates is desired
- Tends strongly toward the lowest rates of the list
- Lessens the impact of large outliers
- Worsens the impact of small outliers

Overall Fit Factor Example

- FF = 1000, 500, 750, 1250, 1500
- Formula = N / [1/FF1 + 1/FF2+... 1/FFN]
- 5/[(1/1000)+(1/500)+(1/750)+(1/1250)+(1/1500)]
- Overall fit factor = 862



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