

Respiratory Safety and PPE

Module 7

Special Warehouse
Worker Hazards
in Structural Steel
Fabricating and
Supply Companies



Drawing from OSHA 3384-09 2011

Respiratory Safety and PPE

Module 7

OSHA Grant Information

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Respiratory Safety and PPE

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Program Development

This program was developed by faculty and students in the School of Planning Design and Construction, Michigan State University in conjunction with the American Institute of Steel Construction, Safety Committee and the the University of Pureto Rico

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MICHIGAN STATE
UNIVERSITY

 **SPDC**
School of Planning, Design
and Construction



Respiratory Safety and PPE

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Learning Outcomes: Participants shall be able to:

- Demonstrate understanding of respiratory risks
- Know when respiratory protection should be worn
- Know the types of respiratory protection
- Know how a respirator should fit
- Know how to maintain, clean and store a respirator
- Know inspection requirements
- Demonstrate understanding of requirements for PPE

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Background on Safety and Respirator

- Certain operations within your shop may require the use of a respirator
- OSHA Standard 1910.134 Respiratory Protection, establishes requirements
- 1910.134 requires employers to have a Respiratory Protection Program that is worksite specific
- Always comply with your employer's program

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Respiratory Protection Plan

- The plan must be worksite specific and address:
 - Selecting respirators
 - Medical evaluations
 - Fit testing
 - Emergency respiratory use
 - Schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding and maintaining

Checklist from OSHA 3384-09 2011

CHECKLIST FOR RESPIRATORY PROTECTION PROGRAMS

✓ Does your program contain written procedures for (check all that apply):

- Your specific workplace
- Selecting respirators
- Medical evaluations of employees required to wear respirators
- Fit testing
- Routine and emergency respirator use
- Schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and maintaining respirators
- Ensuring adequate air quality for supplied-air respirators
- Training in respiratory hazards
- Training in proper use and maintenance of respirators
- Program evaluation
- Ensuring that employees who voluntarily wear respirators (excluding filtering facemasks) comply with the medical evaluation and cleaning, storing

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Respiratory Protection Plan Continued

- Ensure adequate air quality
- Training in respiratory hazards
- Train in proper use and maintenance of respirators
- Program evaluation
- Ensure employees comply with medical evaluations, cleaning, storing and maintenance requirements
- Have a designated program administrator
- Update the program periodically
- Provide equipment, training and medical evaluations at no cost to employees

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Typical shop operation examples that should be addressed by the plan may include:

- Welding
- Solvents
- Metalworking Fluids (MWFs)
- Shop Paint & Chemicals
- Abrasive Blasting
- Diesel fumes
- Others?

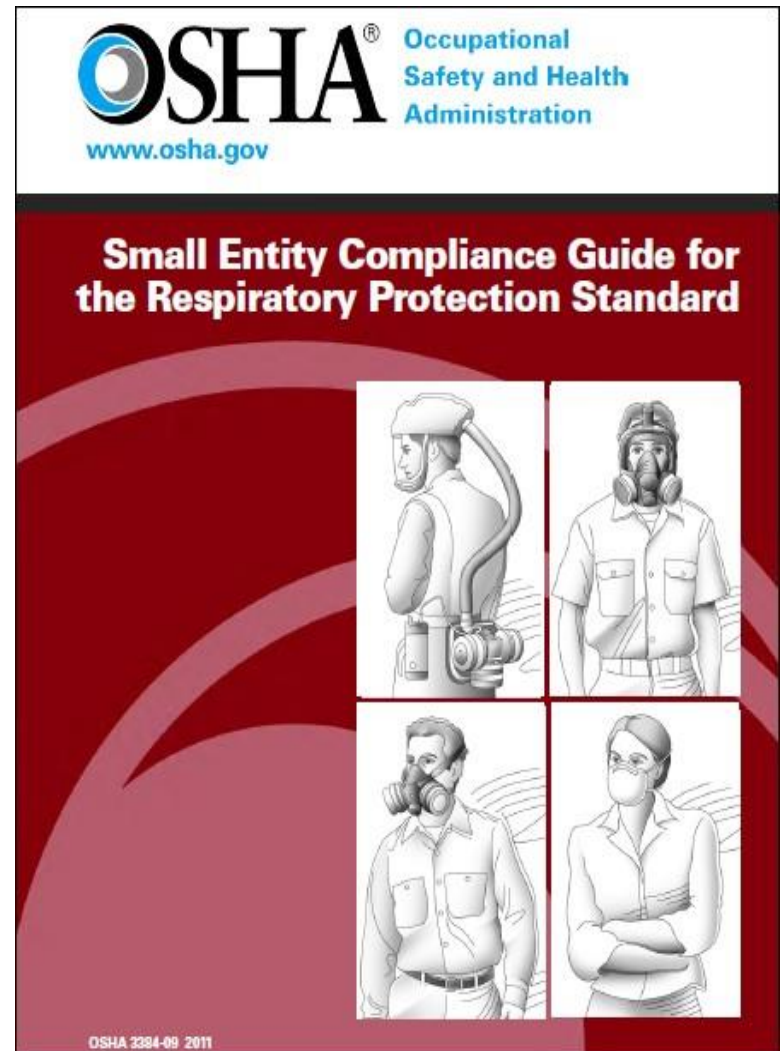
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Background on Safety and Respirator

- ❑ OSHA has developed a useful Small Entity Compliance Guide for the Respiratory Protection Standard which is available for free download

Source: OSHA 3384-09 2011



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An employer may reduce respiratory risks by using:

- Engineering controls, such as: local or general dilution ventilation, change of the work process, isolation or enclosure, or substitution
- Administrative controls, such as: employee rotation, or scheduling major maintenance for weekends or times when few employees are present

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Assessing the workplace:

- Fumes, vapors and aerosols may cause damage and may require protection
- Periodic air monitoring should be done to determine where and when respiratory protection is required
- Where the monitoring indicates protection is required, respiratory PPE or engineering controls will be determined

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When should a respirator be worn?

Checklist for permissible practice

- Check all that apply

CHECKLIST FOR PERMISSIBLE PRACTICE

✓ Check all that apply:

Hazard Determination

Is there a hazardous atmosphere in your workplace, which has (check all that apply):

- Insufficient oxygen
- Harmful levels of chemical, biological, or radiological contaminants
- Known and reasonably foreseeable emergencies related to...
- Unknown exposure levels or exposures to substances without an OSHA PEL

If you did not check any of the boxes above, the Respiratory Protection standard **does not** apply to your workplace.

If you checked any of the boxes above, the Respiratory Protection standard **may** apply to your workplace.

OSHA requires use of the following methods to control the hazardous atmosphere(s) in your workplace:

- Engineering controls, such as ventilation, isolation or enclosure of the work process, or substitution of non-hazardous materials for the materials that pose respiratory hazards; and
- Administrative controls, such as worker rotation, or scheduling major maintenance for weekends or times when few workers are present.

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When should a respirator be worn?

Employees should be supplied with respirators “when all preferred methods such as engineering controls and administrative controls for protecting them from breathing contaminated air have been determined to be insufficient to reduce the contamination to non-hazardous levels”

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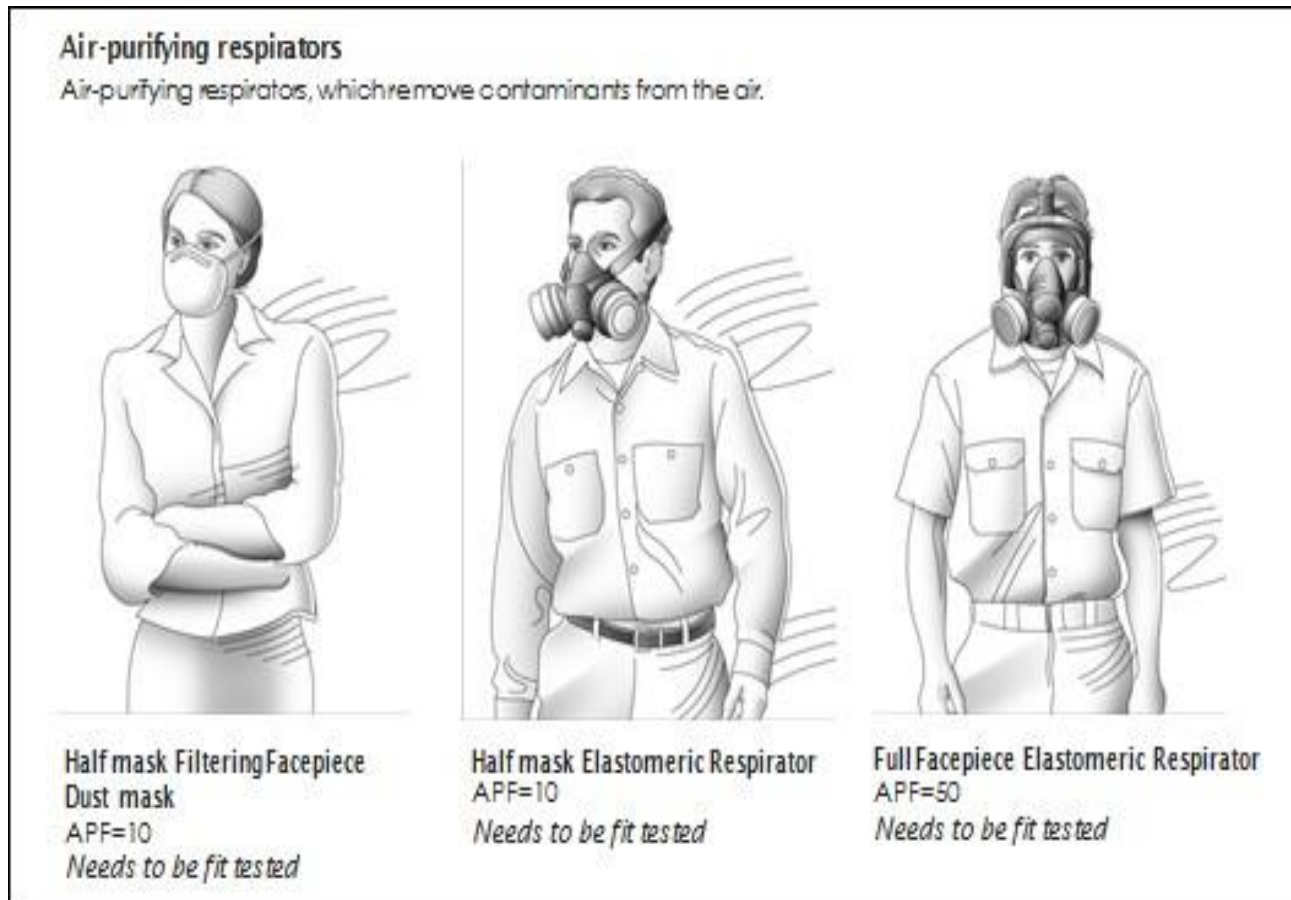
When should a respirator be worn?

- Where oxygen level is insufficient or potentially insufficient
- If “exposed to harmful levels of hazardous gases or vapors”
- If “exposed to other potential respiratory hazards, such as dust, airborne biological hazards, mists, fumes, sprays, and other airborne particles”

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Types of respirators:

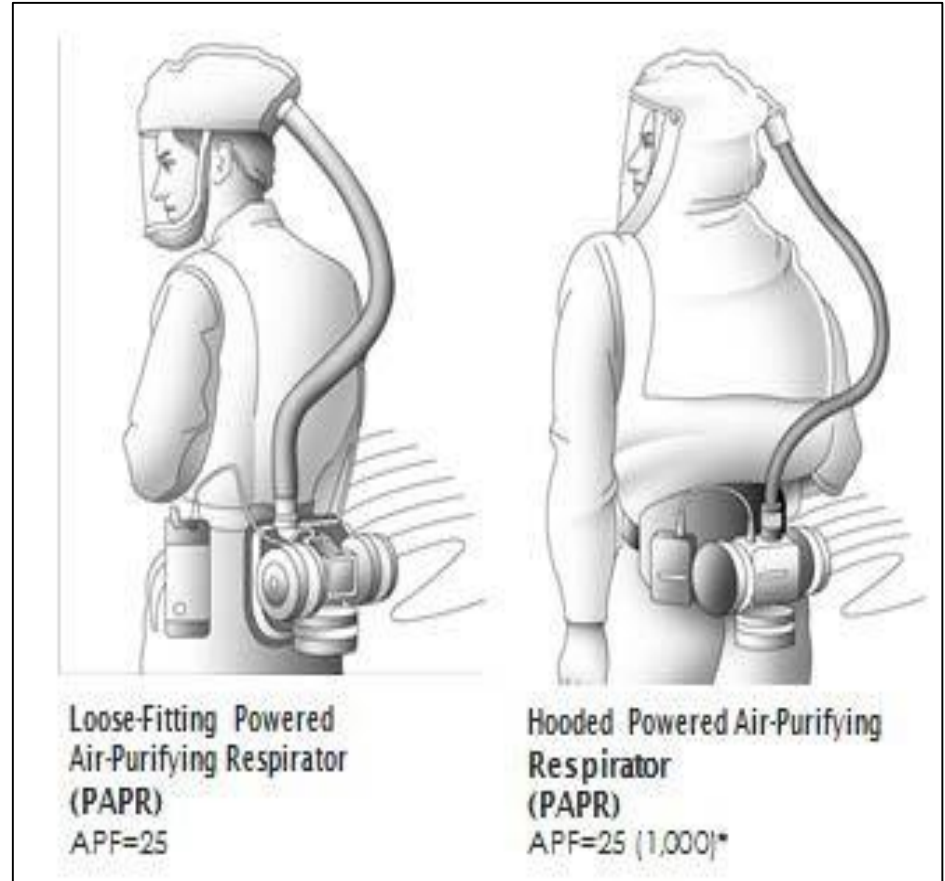


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Types of respirators:

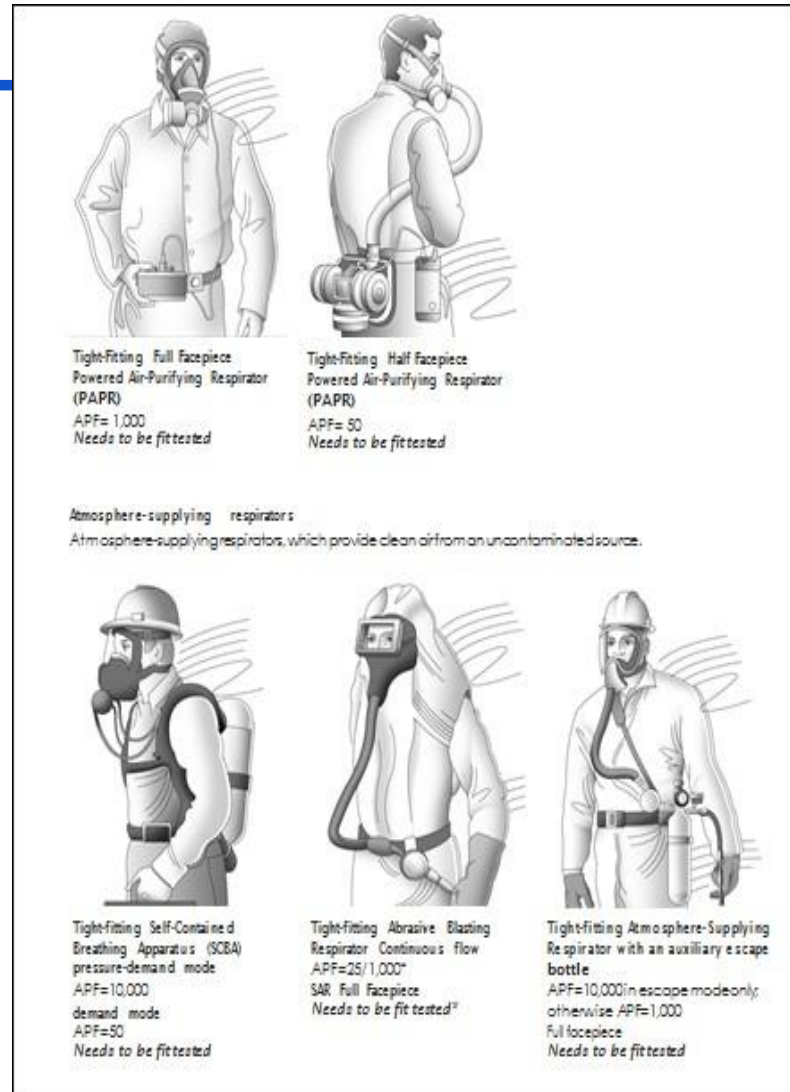
- ❑ These types of respirators do not need to be fit tested



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Types of respirators:



Drawing from OSHA 3384-09 2011

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What protection is required for each task?

The employer will determine the type of respiratory protection based on the following criteria:

- The company Respiratory Plan
- Safety data sheets
- Permissible exposure levels (PELS) listed in 1910.1000
- Action Level (AL) $\frac{1}{2}$ of the PEL*
- Assigned Protection Factors (APF)
- Maximum use concentrations (MUC)
- Protection appropriate for the chemical state and physical form of the contaminate

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What protection is required for each task?

CHECKLIST FOR RESPIRATOR SELECTION

✓ Check that the following has been done at your facility:

- Respiratory hazards in your workplace have been identified and evaluated.
- Employee exposures that have not been, or cannot be, evaluated must be considered IDLH.
- Respirators are NIOSH-certified, and used under the conditions of certification.
- Respirators are selected based on the workplace hazards evaluated and workplace and user factors affecting respirator performance and reliability.
- Respirators are selected based on the APFs and calculated MUCs.
- A sufficient number of respirator sizes and models are provided for selection purposes.

For IDLH atmospheres:

- Full facepiece pressure demand SARs with auxiliary SCBA unit or full facepiece pressure demand SCBAs, with a minimum service life of 30 minutes, are provided.
- Respirators used for escape only are NIOSH-certified for the atmosphere in which they will be used.
- Oxygen deficient atmospheres must be considered IDLH (d)(2)(B)(iii).

For Non-IDLH atmospheres:


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How should a respirator fit?

Fit Testing

Air-purifying respirators
Air-purifying respirators, which remove contaminants from the air.



**Half mask Filtering Facepiece
Dust mask**
APF=10
Needs to be fit tested

Half mask Elastomeric Respirator
APF=10
Needs to be fit tested

Full Facepiece Elastomeric Respirator
APF=50
Needs to be fit tested

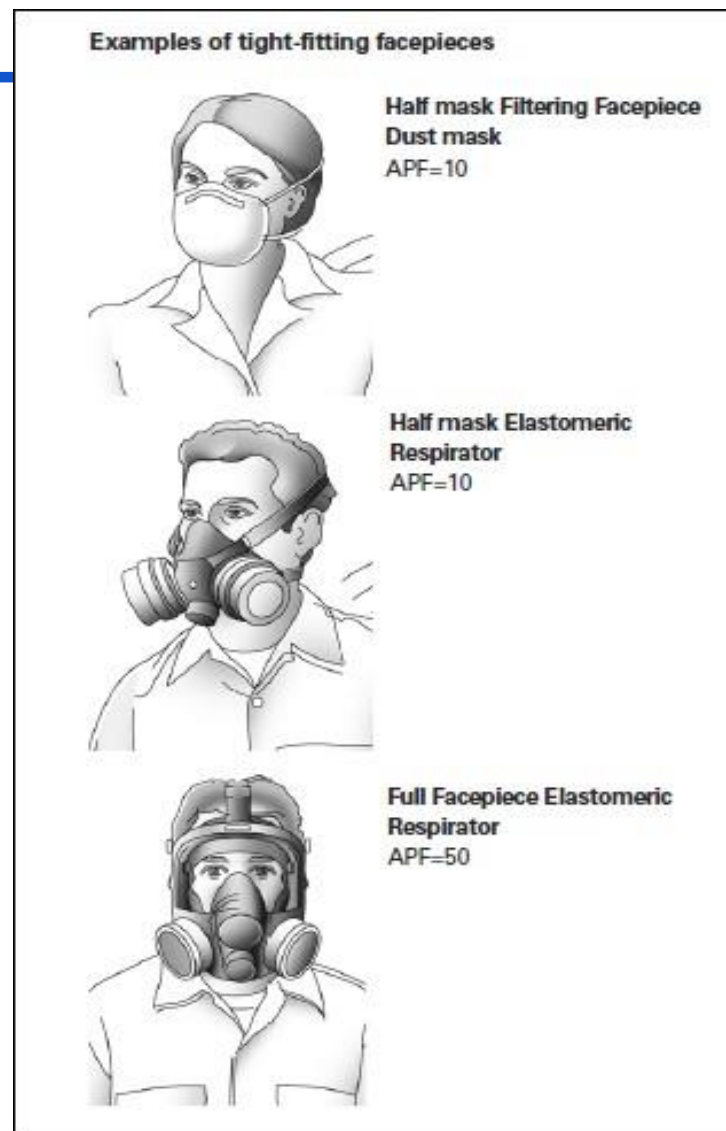
Original illustrations created by Attilis & Associates

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How should a respirator fit?

- ❑ Tight fit – forms a complete seal with wearer's face
- ❑ Loose fit-forms a partial seal



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Fit testing

- ❑ Should be conducted by a qualified person



Drawing and Table from OSHA 3384-09 2011

Acceptable Fit Testing Methods

Respirator	QNFT	QLFT
Half Face, Negative Pressure, APR (<100 fit factor)	Yes	Yes
Full face, Negative Pressure, APR (<100 fit factor) used in atmospheres up to 10 times the PEL	Yes	Yes
Full face, Negative Pressure, APR (>100 fit factor)	Yes	No
PAPR	Yes	Yes
Supplied-Air Respirators (SAR), or SCBA used in Negative Pressure (Demand Mode) (>100 fit factor)	Yes	No
SCBA - Structural Fire Fighting, Positive Pressure	Yes	Yes
SCBA/SAR - IDLH, Positive Pressure	Yes	Yes
Mouthbit Respirators	Fit Testing Not Required	
Loose-fitting Respirators (e.g., hoods, helmets)	Fit Testing Not Required	

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Use of a Respirator

- ❑ Respirators are an effective method of protection against designated hazards when properly selected and worn
- ❑ Respirator use should be encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers
- ❑ Follow instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings

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Improper Use of a Respirator

- ❑ If a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker
- ❑ Do not wear a respirator that fits improperly
- ❑ Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against:
 - ❑ For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke



Dust mask does not protect against vapors

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Preventing Leaks

- ❑ Facepiece seals and valves are important in tight-fitting respirators
- ❑ Tight-fitting respirators should provide a complete seal to the face
- ❑ If there is a leak then the respirator cannot effectively reduce the exposures to respiratory hazards
- ❑ Be sure that nothing interferes with the respirator seal to your face
- ❑ Conduct a user seal check each time you put on a respirator



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Preventing Leaks-Conditions that can interfere with the seal or valve include:

- “Facial hair
- Facial scars
- Jewelry or headgear that projects under the face- piece seal
- Missing dentures
- Corrective glasses or goggles or other protective equipment:
 - Face shields
 - Protective clothing
 - Helmets
 - Eyeglass insert or spectacle kits”

Source: OSHA 3384-09 2011

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Seal Checks-

Workers should perform a negative or positive pressure seal check.

For the negative pressure check:

- Cover the respirator inlets (cartridges, canisters, or seals) gently inhale, and hold breath for 10 seconds.
- The facepiece should collapse on your face and remain collapsed

For the positive pressure check:

- Covers the respirator exhalation valve(s), and exhale

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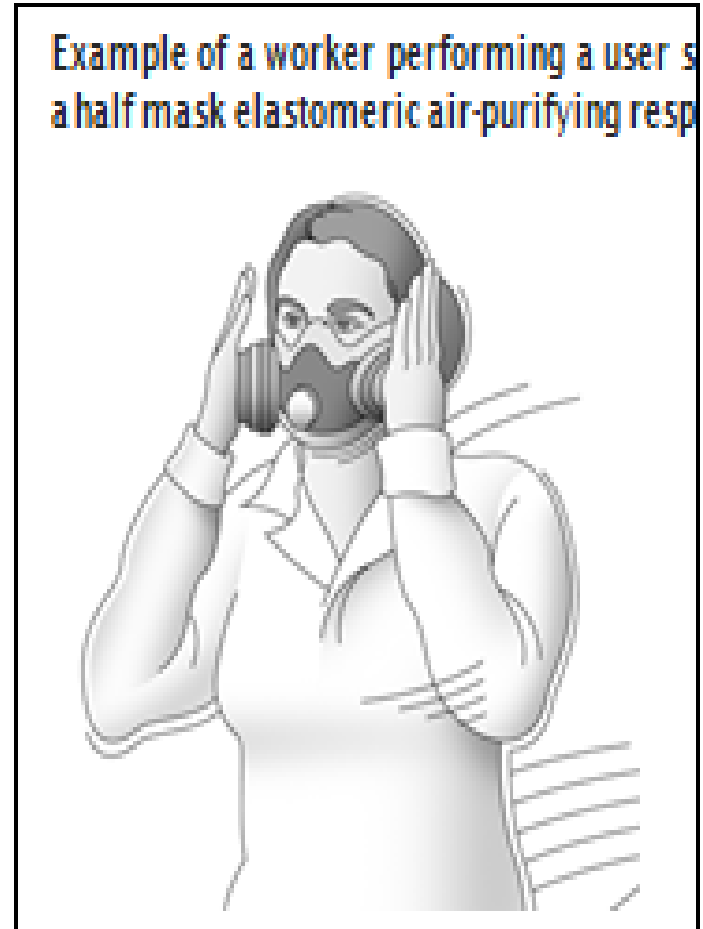
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Seal Checks

- ❑ “The facepiece should hold the positive pressure for a few seconds
- ❑ During this time, the employee should not hear or feel the air leaking out of the face-to-face-piece seal”

- ❑ Instructor to demonstrate in class – select a volunteer
Demonstrate seal check and proper cleaning

Example of a worker performing a user seal check on a half mask elastomeric air-purifying respirator.



Drawing from OSHA 3384-09 2011

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How should a respirator be cleaned and maintained?

CHECKLIST FOR RESPIRATOR MAINTENANCE AND CARE

✓ Check to make sure that your facility has met the following requirements:

Cleaning and disinfecting:

- Respirators are provided that are clean, sanitary, and in good working order.
- Respirators are cleaned and disinfected using the procedures specified in Appendix B-2 of the standard.

Respirators are cleaned and disinfected:

- As often as necessary when issued for the exclusive use of one employee.
- Before being worn by different individuals.
- After each use for emergency use respirators.
- After each use for respirators used for fit testing and training.

Storage:

- Respirators are stored to protect them from damage from the elements, and from becoming deformed.

Emergency respirators are stored:

- To be accessible to the work area.
- In compartments marked as such.
- In accord with manufacturer's instructions.

Inspections:

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Cleaning and disinfecting

- ❑ Only wear respirators that are clean, sanitary, and in good working order
- ❑ *Appendix B-2 of the standard* covers cleaning and disinfecting procedures

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When to clean and disinfect

- ❑ Clean as often as necessary when issued for the exclusive use of one employee
- ❑ Clean and disinfect before being worn by different individuals
- ❑ Clean and disinfect after each use for emergency use respirators
- ❑ Clean after each use for respirators used for fit testing and training

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Storage

- ❑ “Respirators should be stored to protect them from damage from the elements, and from becoming deformed”

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Emergency use respirators

- “Should be accessible to the work area
- Should be stored in compartments marked as such
- Store in accordance with manufacturer’s instructions”
- Cartridges on respirators absorb fumes and therefore should be stored in air tight containers

Emergency use respirators

- Should be certified and documented by inspection, “and by tagging the information either to the respirator or its compartment, or storing it with inspection reports”

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Inspections

- ❑ “Routine-use respirators should be inspected before each use and during cleaning
- ❑ SCBAs and emergency respirators should be inspected monthly and checked for proper functioning before and after each use
- ❑ Emergency escape-only respirators are inspected before being carried into the workplace for use”

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Inspections should include

- “Check of respirator function
- Tightness of connections
- Condition of the facepiece, head straps, valves, cartridges, and other parts
- Condition of elastomeric parts”

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Repairs

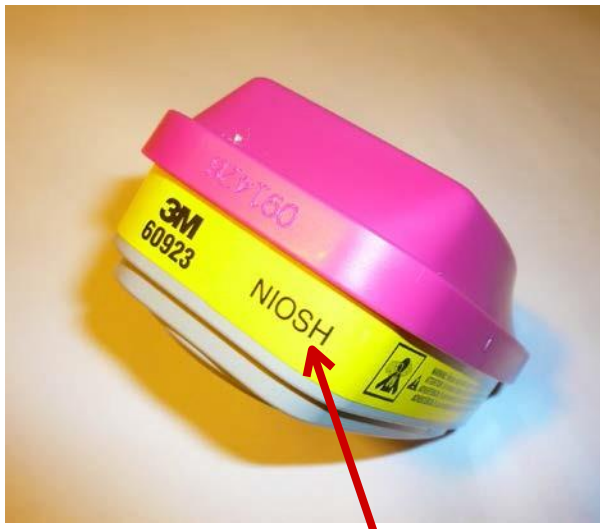
- “Respirators that have failed inspection should be taken out of service
- Repairs should only be made by trained personnel
- Only NIOSH-certified parts should be used
- Reducing and admission valves, regulators and alarms should only be adjusted or repaired by the manufacturer or a technician trained by the manufacturer”

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Filters and cartridges

- ❑ Use only filters, cartridges and canisters that are labeled and color coded with the NIOSH approval label
- ❑ Do not remove labels and be sure to keep them legible



NIOSH Label



Cartridge Uses

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- Along with respiratory protection other forms (PPE) should be used



PPE Used during grinding
Photo from CIANBRO

Source OSHA Quick Card 3260-09N-05

OSHA QUICK CARD™

Protect Yourself Construction Personal Protective Equipment (PPE)

Eye and Face Protection

- Safety glasses or face shields are worn any time work operations can cause foreign objects to get in the eye. For example, during welding, cutting, grinding, nailing (or when working with concrete and/or harmful chemicals or when exposed to flying particles). Wear when exposed to any electrical hazards, including working on energized electrical systems.
- Eye and face protectors – select based on anticipated hazards.

Foot Protection

- Construction workers should wear work shoes or boots with slip-resistant and puncture-resistant soles.
- Safety-toed footwear is worn to prevent crushed toes when working around heavy equipment or falling objects.

Hand Protection

- Gloves should fit snugly.
- Workers should wear the right gloves for the job (examples: heavy-duty rubber gloves for concrete work; welding gloves for welding; insulated gloves and sleeves when exposed to electrical hazards).

Head Protection

- Wear hard hats where there is a potential for objects falling from above, bumps to the head from fixed objects, or of accidental head contact with electrical hazards.
- Hard hats – routinely inspect them for dents, cracks or deterioration; replace after a heavy blow or electrical shock; maintain in good condition.

Hearing Protection

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Eye and Face Protection

- ❑ “Safety glasses or face shields are worn any time work operations can cause foreign objects to get in the eye”
- ❑ During welding, cutting, grinding using harmful chemicals or when exposed to flying particles)
- ❑ “Wear when exposed to any electrical hazards, including working on energized electrical systems”
- ❑ Eye and face protectors – select based on anticipated hazards

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Eye Protection

- ❑ Always wear safety glasses!
- ❑ Glasses should be ANSI Z87.1 compliant



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Foot Protection

- ❑ “Workers should wear work shoes or boots with slip-resistant and puncture-resistant soles
- ❑ Safety-toed foot wear is worn to prevent crushed toes when working around heavy equipment or falling objects”

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Hand Protection

- ❑ “Gloves should fit snugly”
- ❑ “Workers should wear the right gloves for the job”
- ❑ Examples:
 - ❑ Welding gloves for welding
 - ❑ Strong cut resistant gloves when handling steel
 - ❑ Gloves cushioned for anti-vibration when grinding
 - ❑ Insulated gloves and sleeves when exposed to electrical hazards)



Always use gloves for material handling

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Head Protection

- ❑ “Wear hard hats where there is a potential for objects falling from above, bumps to the head from fixed objects, or head contact with electrical hazards
- ❑ Hard hats – routinely inspect them for dents, cracks or deterioration; replace after a heavy blow or electrical shock; maintain in good condition”
- ❑ An important part of hard hat protection is the suspension system. Inspect regularly and replace if defective.

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Head Protection



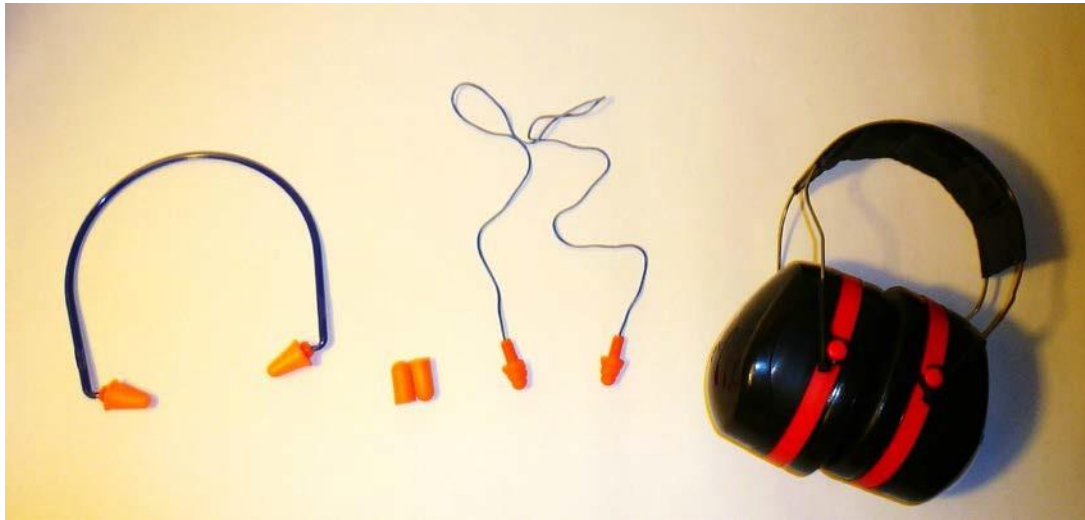
Hard hat and suspension system

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Hearing Protection

- ❑ Use earplugs or earmuffs in high noise work areas
- ❑ Clean or replace ear plugs regularly
- ❑ Select hearing protection with sufficient decibel reduction
- ❑ The higher the NRR the more protection is provided



Hearing protection options

Source OSHA Quick Card 3260-09N-05

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Hearing Protection ear plug installation

- Roll plug into a tight crease free cylinder
- Pull up on ear with opposite arm over your head
- Insert into ear canal
- Properly fit so it is not visible from the front



Ear plug installation

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Learning Activity

Questions?



Photo from OSHA 3686-09 2010