

Respirator Fit-Test Training

Environmental Health & Safety

San Diego State University

CSL 106

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Why do you need a respirator?

- ◆ Remove dust/particulates from air you are breathing
- ◆ Remove chemical inhalation when working with or near chemicals
- ◆ Filters the air so that no chemical or particulates will be inhaled and potentially cause harm, either immediate or progressive

Summary

- ◆ Respiratory Requirements
- ◆ Respiratory Hazards
- ◆ Types of Respirators
- ◆ Respirator Cartridges
- ◆ Limitations
- ◆ Respirator Parts, Inspection, Seal Check
- ◆ Maintenance and Care

Respirator Requirements

- ◆ Physical Exam to deduce fitness for use of respirator
- ◆ Training on proper use and abilities of the respirator
- ◆ Fit Test to determine proper size respirator
- ◆ Determine cartridge appropriate to hazards in work area

Respiratory Hazards

Dusts

- ◆ Created when solid material are broken down into fine particles that float in the air before settling under gravity.

Fumes

- ◆ Created when solid material vaporize under high heat and then condense. EX. Metal vapor cools and condenses into extremely small particles from welding, smelting, and pouring molten metal
- ◆ Vapors condense into small particles that are light enough to be breathable

Respiratory Hazards

Mists

- ◆ Tiny liquid drops formed from liquid materials by atomisation and condensation processes
- ◆ Ex. Spraying operations, plating operations, mixing and cleaning operations

Gases

- ◆ Substances that are similar to air in their ability to diffuse or spread freely throughout a container or air
- ◆ Ex. Oxygen, carbon dioxide, carbon monoxide, nitrogen, and helium

Respiratory Hazards

Vapors

- ◆ The gaseous state of substances that are either liquids or solids at room temperature. They are formed when solids or liquids evaporate.
- ◆ Ex. Petroleum, paint thinners, degreasing solvents

Oxygen Deficiency

- ◆ Occurs when the percentage of oxygen in the air falls below 19.5%.
- ◆ Deficiency can be caused by a chemical reaction, fire, or when other chemicals displace oxygen from the air.

Types of Respirators

- ◆ Air-Filtering Respirator (particulates)
 - Disposable dust mask
- ◆ Air-Purifying Respirator (organic vapors, acid gases, particulates)
 - Half mask
 - Full face mask
 - Powered Air Purifying Respirator (PAPR)
- ◆ Air-Supplying Respirator (oxygen deficiency, organic vapors, acid gases, particulates)
 - Self-contained breathing apparatus (SCBA)

Respirator Cartridges

There are three common cartridges used

- ◆ Particulate

- Removes particles from air like dust

- ◆ Organic Vapor

- Removes chemicals from air when using solvents

- ◆ Acid Gas

- Removes acid based gases from air

Respirator Cartridges

- ◆ Other cartridges available
 - Ammonia, Methylamine
 - Mercury Vapor, Chlorine
 - Sulfur Dioxide
 - Hydrogen Fluoride
 - Formaldehyde
 - Chlorine, Chlorine Dioxide, Hydrogen Chlorine

Particulates

- ◆ Dusts
- ◆ Small particles capable of entering the respiratory tract
- ◆ Can use disposable dust mask to remove particulates from air
- ◆ Can cause respiratory issues, like wheezing and coughing

Organic Vapors

- ◆ Solvents and pesticides off-gas volatile organic compounds like formaldehyde
 - Ex. Acetone, benzene, carbon tetrachloride, chloroform, ethanol, ethyl ether
- ◆ Organic solvents are used as:
 - cleaners, degreaser, refrigerants, coolants, paint, ink, glue, varnishes

Health Effect

- ◆ Immediate Symptoms
 - Eye, nose, lung irritation, headache dizziness, visual disorders, and memory impairment
- ◆ Toxic Solvents
 - Affect central nervous system, interfere with memory, loss of coordination, weakness, nausea
- ◆ Long Term Effect
 - Liver or kidney damage, cancer

Acid Gases

- ◆ Found in laboratories, pools, confined spaces
 - Ex. Hydrogen sulfide, hydrogen chloride, hydrogen fluoride, chlorine, chlorine dioxide
- ◆ Can affect body through respiratory tract, skin contact or vapor contact with eyes

Health Effects

- ◆ Immediate Symptoms
 - Eye irritation, choking, skin burns, wheezing
- ◆ Long Term Exposure Effects
 - Apnea, coma, eye pain, dermatitis, pulmonary edema, bronchitis, rhinorrhea, bronchoconstriction

Limitations of Air Purifying

- ◆ Does not protect against oxygen deficiency, high/low temperatures
- ◆ Only filters air based on type of cartridge
- ◆ Do not use when:
 - ◆ Performing abrasive blasting
 - ◆ In atmospheres with toxic concentrations of contaminant
 - ◆ For firefighting

Chemical Limitations

The following is a partial list of gaseous materials for which Air-purifying respirators should not be used for respiratory protection regardless of concentration or time of exposure

Acrolein	Hydrazine	Methyl chloride	Nitroglycerin	Stibine
Arsine	Hydrogen cyanide	Methyl isocyanate	Nitromethane	Sulfur chloride
Bromine	Hydrogen fluoride	Methylene bisphenyl	Ozone	Toluene diisocyanate
Carbon Monoxide	Hydrogen selenide	Methylene chloride	Phosgene	Vinyl chloride
Dimethylaniline	Hydrogen sulfide	Nickel carbonyl	Phosphine	Vinylidene chloride
Dimethyl sulfate	Isocyanate	Nitrobenzene	Phosphorus oxychloride	
Ethylene oxide	Methyl bromide	Nitrogen oxide	Phosphorus trichloride	

Respirator Emergency

If you feel any of the following conditions, leave the area, remove face mask, call for help

- ◆ Breathing becomes difficult
- ◆ Dizziness or other distress
- ◆ Smell, taste, or sense irritation
- ◆ Respirator becomes damaged

Seal Check Conditions

Some conditions prevent a good face-piece to face seal

- Facial hair, sideburns
- Glasses
- Major weight loss, weight gain
- Dental surgery, dentures, or removal of teeth
- Warped respirator face-piece (due to heat or from cramming into lockers)

Respirator Parts

- ◆ Head harness
- ◆ Inhalation/exhalation flap
- ◆ Inhalation/exhalation connectors
- ◆ Cartridges
- ◆ Face-piece



Before Use Inspection

- ◆ Inspect all parts before donning respirator
- ◆ Look for:
 - Cracks, dents in face-piece
 - Punctured or torn mask
 - Loss of elasticity in head harness
 - In/ex flaps hard, warped
 - In/ex connector broken, cracked
 - Cartridge filter dirty or cracked

Go to EH&S for replacements parts

Before use Inspection

Before entering a respirator worthy work space

– Positive Pressure Test

- ◆ Cover exhalation guard with hand and exhale slightly. Mask shall bulge, but face seal should remain

– Negative Pressure Test

- ◆ Cover inhalation cartridges with hands and inhale slightly. Mask shall collapse, but face seal should remain

If tests fail, readjust respirator to face using the head piece straps and try again

Maintenance and Care

- ◆ After each use
 - Remove cartridges
 - Wash respirator with warm water and soap
 - Scrub with a brush (not wire)
 - Blot dry with a paper towel
 - Disinfect with provided disinfection wipes
- ◆ Store in bag provided when not in use
- ◆ Do not share respirators

Respirator Needs?

Contact

EH&S

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