
Respiratory Protection

 Fermilab ES&H- Construction Safety *Respiratory Protection*

Overview

- Learning Objectives
- Hazard Communication Review
- Respiratory Protection Practice
- Elements of Respirator Protection Program
- Responsibilities
- Help/Assistance

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Learning Objectives

- Hazard Identification
- Learn various methods of preventing exposure to the hazards
- Learn respirator types and cartridge types
- Discuss the importance of the assigned protection factors
- Maintenance (Storage, Cleaning and Inspection)
- The three requirements before donning a respirator

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Hazard Communication Review

- Inventory
- Written Program
- Labels (Pictograms)
- Safety Data Sheets (SDS)
- Training



ROUTES OF ENTRY

- LUNGS (INHALATION)
- MOUTH (INGESTION)
- SKIN (ABSORPTION, INJECTION)
- EYES

Air Contaminants

- Aerosols
 - Dust
 - Fume
 - Mist
- Gaseous Phase
 - Gas
 - Vapor



DUST

- Tiny particles produced by the mechanical breakdown of a solid

- i.e. crushing
grinding
sanding

MIST

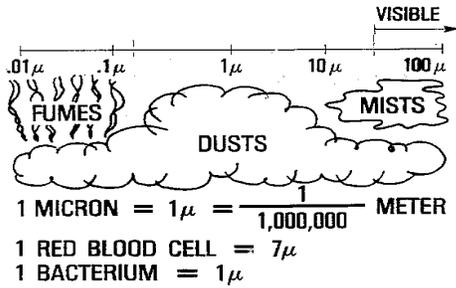
- Fine droplets of liquid in the air.

- i.e. Fog
Liquids Sprayed into Air

FUME

- ...is a solid that has been raised to temperature where it becomes a vapor and then condenses as it cools

Particle Diameters

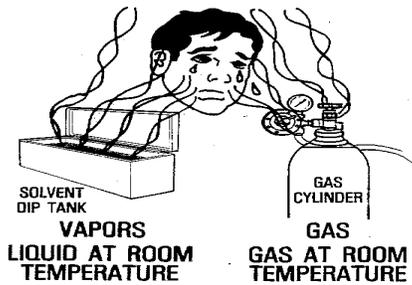


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Gases and Vapors



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Respiratory Protection Practice

- Use only when Engineering Controls
 - Not Feasible
 - Being Instituted

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Respiratory Protection Program

- Program administration
- Worksite-specific procedures
- Respirator selection
- Medical evaluation
- Fit-testing
- Training
- Maintenance (Storage, Cleaning and Inspection)
- Program evaluation



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Respirator Selection

- Selection will be based on:
 - respiratory hazards
(gases/vapors/particulates)
 - workplace and user factors
 - NIOSH certification



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Respirator Cartridges

<u>Atmospheric Contaminants</u>	<u>Colors Assigned</u>
• Organic Vapor	Black
• Acid Gases	White
• Ammonia Gas	Green
• Acid Gases/Organic Vapors	Yellow
• HEPA	Purple
• Organic Vapors/HEPA	Purple & Black



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Filter Categories

Particulate respirators are classified into the categories as follows:

Filter	Filter Type	Efficiency
N (No Oil)	N 100	99.97
	N 99	99
	N 95	95
R (Oil Resistant)	R100	99.97
	R99	99
	R95	95
P (Oil Proof)	P100	99.97
	P99	99
	P95	95



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Respirator Types

- Air Purifying Respirator (APR)
 - Filtering Facepiece (dust mask)
 - Half-Mask
 - Full-Face
 - Powered Air Purifying Respirator (PAPR)
- Supplied Air Respirator (SAR)
 - Self-Contained Breathing Apparatus (SCBA)
 - Air Line



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Assigned Protection Factors

- The number of times above the exposure limit for which a given respirator provides protection.
 - Filtering Facepiece (dust mask) 5
 - Half-Mask 10
 - Full-Face 50
 - PAPR-full facepiece 1,000
 - SAR-full facepiece, pressure demand 1,000
 - SCBA-full facepiece, pressure demand 10,000



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APF Calculation I

Example: Lead PEL=0.05mg/m³

For a half mask with P-100 filters the APF is 10,

The respirator may be used up to concentrations of

0.5mg/m³



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APF Calculation II

Example: Lead PEL=0.05mg/m³

For a loose-fitting PAPR with P-100 filters the APF is 25,

The respirator may be used up to concentrations of

1.25mg/m³



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Filtering Facepiece

Voluntarily worn filtering facepiece (dust mask) do not require the implementation of a written program. However, voluntary use of tight-fitting respirators do have medical evaluation and respirator care requirements.



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Limitations

- For Air Purifying Respirators (APR):
 - Cannot be used in oxygen deficient atmospheres
 - Cannot be used for concentrations beyond its rated protection factor
 - Cannot be used for unknown concentrations
 - Cannot be used for chemicals with poor warning properties

Special Problems

- Facial Hair
- Eye Glasses
- Facial Deformities
- Communications

Medical evaluation

- Prior to fit-testing or respirator use.
- Performed by a physician or other licensed health care professional (PLHCP).
- Obtain through an initial medical examination or by using a medical questionnaire.

Fit-testing

- prior to assignment and after medical evaluation
- positive as well as negative, tight-fitting respirator
- same make, model, style and size
- **quantitative** or **qualitative**
- annual fit-testing requirement
- noted change in employee physical conditions
- User seal check procedures
 - Appendix B-1 of the OSHA Respiratory Protection Standard 29 CFR Parts 1910 and 1926.

Training and information

- Conducted in a manner that is understandable
- Training prior to assignment
- Training must be conducted annually; or
 - changes in the workplace or type of respirator
 - inadequacies in the employee's knowledge are noted
 - any other situation arises in which retraining appears necessary to ensure safe respirator use
 - provide appendix D for voluntary respirator users

Maintenance (Storage, Cleaning and Inspection)

- Storage
- Cleaning
 - Appendix B-2 of the OSHA Respiratory Protection Standard 29 CFR Parts 1910 and 1926.
- Respirator Inspection Checklist

Responsibilities

- Check that contracted employees received **medical clearance** to wear respiratory protection.
- Check that contracted employees received respirator **fit-testing** with the identical respirator they intend to use.
- Check that each employee using respiratory protection has been **trained**.

Help/Assistance

- Contract
- Hazard Analysis Form
- ES&H Group
- ES&H Section WEB Page: www.esh.fnal.gov
 - FESHM Chapters 5103 & 5064
- ES&H Section

Respirator Concern Contact Numbers

- **Accelerator Division**
 - Richard Rebstock (3499)
- **ESH Section & WDR Section**
 - Dave Baird (3945)
- **Particle Physics Division**
 - Rob Bushek (2399)
- **FES Section**
 - Mike Bonkalski (8448)
- **Technical Division**
 - Richard Ruthe (5424)
- **Computing Division**
 - Amy Pavnica (8493)

Summary

- The importance of Hazard Communication with respect to Selection of Respirator Protection
- When Respirator Protection is necessary
- Elements of Respirator Protection Program
- Discussed Roles and Responsibilities
- Where to turn for help and assistance
