



# Respirators and Dust Hazards

# Introduction

What types of Dust are there?  
Why is Dust Control necessary?  
What are the Health Hazards of Dust?  
How can Dust be controlled?

# What is Dust ?

Dust is – 1 Micron In Size!



—100 Microns \_Average Human Hair

— —25 Microns \_Lint, Particles Visible to the Naked Eye

● — —10 Microns \_Heavy Dust, Lint, Fertilizer, Pollen

● — —5 to 10 Microns \_Average Dust, Plant Spores, Mold

• — —1 to 5 Microns \_Bacteria, Light Dust, Animal Dander

• — —0.3 - 1 Microns \_Bacteria, Tobacco and Cooking Smoke, Metallic Fumes

— —0.001 -0.01 Microns \_Viruses

# How is Fresh Dust Generated?

Fresh dust is generated by one or multiple of the following:

- Impact
- Abrasions
- Crushing
- Grinding



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# How is Dust Recirculated?

- Release of previously generated dust during such processing operations as:
  - Loading
  - Dumping
  - Transferring
  - Wind
- Movement of equipment and workers



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# Dust Classification

## 1. Fibrogenic Dust ( Disease Causing )

- Crystalline silica (Quartz)
- Asbestos
- Beryllium

## 2. Nuisance Dust

- Dust that does not contain harmful quantities of asbestos and less than 1% quartz

# Dust Classification by Size

Dust is Classified into TWO size categories

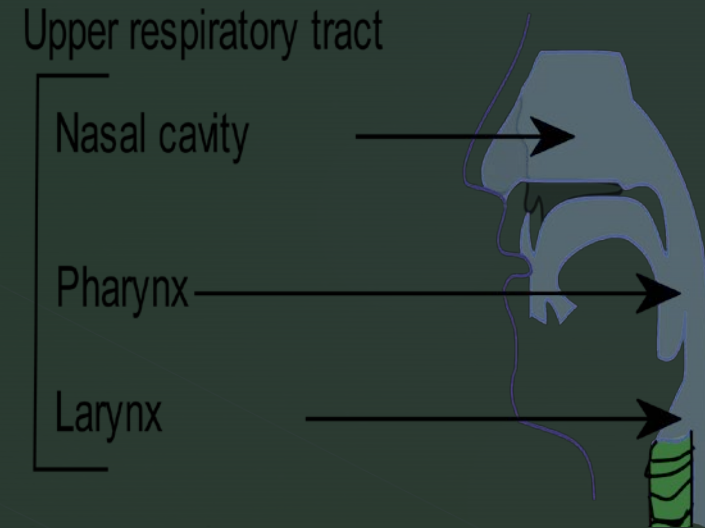
- Respirable Dust
- Inhalable Dust



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# Inhalable Dust

- Dust that enters the body, but is trapped in the nose, throat and upper respiratory tract.

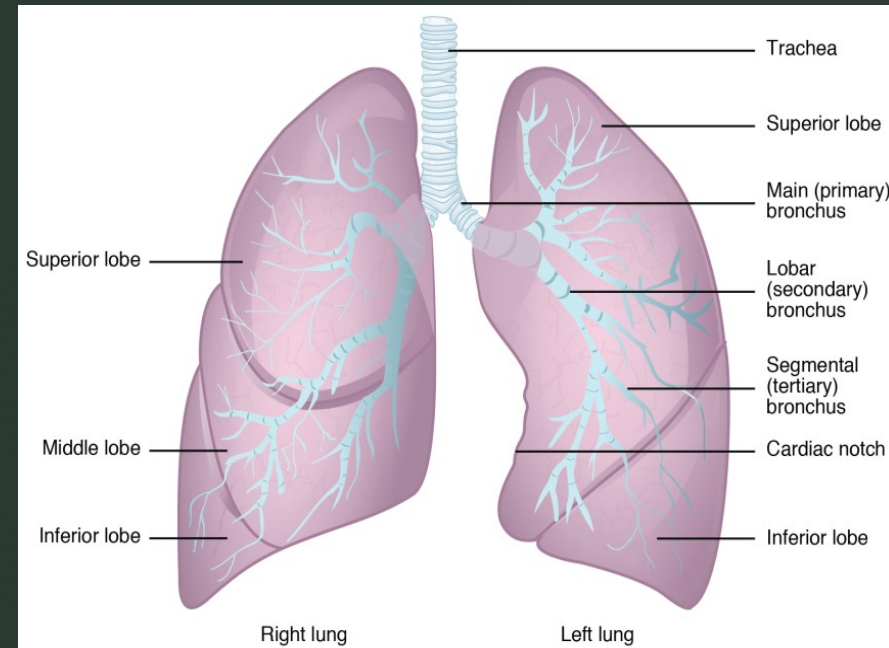


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# Respirable Dust

Dust particles small enough ( less than 10 microns) to penetrate past the upper respiratory tract and deep into the lungs.



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# Why Control Dust

- Occupational respiratory diseases
- Irritation to eyes, nose, and throat
- Skin irritation
- Damage to Equipment
- Impaired Visibility
- Community Relation
- Explosions



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# Health Hazards

The harm dust can cause depends on the following:

- Dust composition
- Dust concentration
- Amount of exposure time
- Particle size and shape

Excessive exposure to harmful dusts can cause pneumoconiosis- a dust related lung disease.

# Dust Related Lung Diseases

## 1. Silicosis

- Caused by Silica Dust

## 2. Black Lung

- Caused by Coal Dust

## 3. Asbestosis

- Caused by Asbestos Dust

Damage from these diseases is **Irreversible!**



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## ■ Controlling Dust Exposure- Safer Machinery and Tools

- Fully enclosing dusty processes.
- Local exhaust ventilation/dust collection equipment.
- Tools with dust extraction (vacuum) devices.
- Using water to suppress dust.
- Operator enclosures with an air filtration system.
- Use abrasives other than sand for abrasive blasting

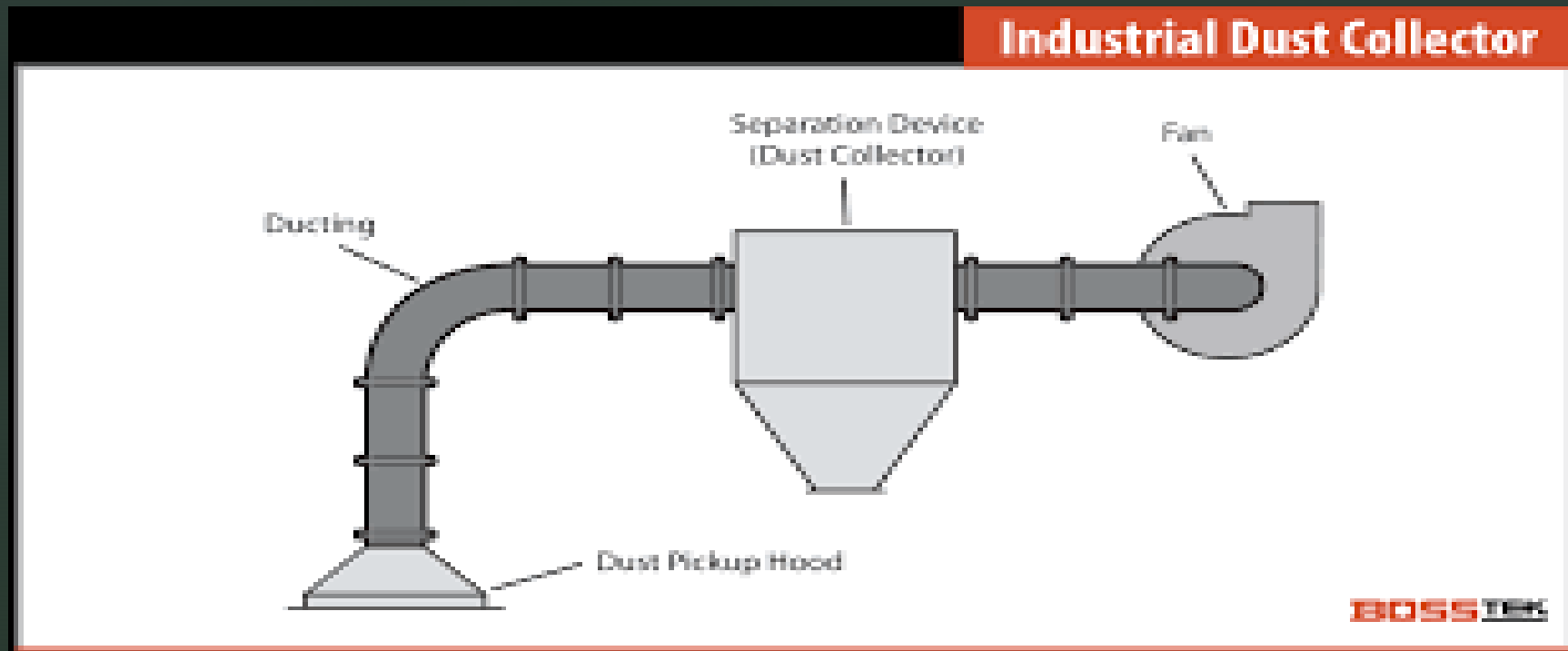


# Wet Dust Control System



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# Additional Dust Control System



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## Controlling Dust Exposure- Safe Work Procedures

- Wetting down dusty work areas or processes prior to work.
- Working upwind of dust sources where possible.
- Posting warning Signs where necessary.
- Limiting Exposure time.
- Training all employees on appropriate work procedures.
- Good housekeeping practices.

# Controlling Dust Exposure - Respiratory Protection

- Fit testing of all employees required to wear respiratory devices.
- Training employees in the proper use of respiratory devices.
- Making sure employees understand the hazards of dust and the importance of respirator use.
- Regular checking and cleaning of non-disposable respirators.

# Reasons for Respirators?

1. Certain Breathing conditions are hazardous to life and lung.
2. The air can be contaminated with: Dusts, Mists, Fumes
3. Toxic Vapors
4. The air can have too little oxygen

**4 Reasons**

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## **How do we control these Airborne Hazards?**

First - Use Engineering Controls to eliminate the hazard.

Second - Use Administrative Controls to reduce exposure to the hazard.

Last - Use Respirators as a temporary protective measure until Engineering and Administrative Controls are in place.

# 2 Basic Types of Respirators

## Air Purifying Respirators

- Used to filter out or neutralize contaminants
- Examples: Dust; Organic Vapor

## Air Supply Respirators

- Used when there is a lack of oxygen, when the hazard is unknown or is undetectable by smell or taste.
- Examples: Compressor & Hose; SCBA

# Filtering Respirators

1. Particulates - Dusts, Mists & Fumes
  - New Classes; N, R, P; 95, 99, 100
2. Non-Resistant(Oil), Resistant(Oil), (Oil) Proof
  - Toxins - Organics, Acids, etc.
  - Neutralizing or Absorbing

Filtering Respirators are Hazard Specific  
Don't expect one respirator to protect you from all hazards!

# How long do Respirators last?

- Particulate (Dust) Filtering Respirators
- Change them when the breathing resistance gets high.
- Toxin Filtering Respirators
- Change when you first smell or taste a contaminant (Break-through)

# Health Conditions that Interfere with Respirator Use

- Heart Conditions
- Asthma or other breathing problem
- Claustrophobia (fear of enclosed space)
- Fast Growth Facial Hair



## Other Conditions that can Interfere with Respirator Use

- Contact Lenses
- Eyeglass Temples (certain types)
- Skullcaps (Beanies)

# Respirators Used at Your Workplace

- How to don your respirator.
- Look at the manufacturer's instructions.
- How to clean & Maintain your respirator.
- How to Self-Fit Test your respirator.
- Not possible with Filter-Face Types
- Positive, Negative Test

# Sampling Methods

**Total Dust-** is analyzed using a NIOSH 0500 Method on a Gravimetric 37PVC 5.0 PW or 25PVC 5.0 PW media cassette for any dust that is able to be inhaled into the upper respiratory system

**OSHA PEL for Total dust is 15 mg/m<sup>3</sup>; ACGIH: 10 mg/m<sup>3</sup>, total dust less than 1% quartz**

**Respirable Dust-** is analyzed using a NIOSH 0600 method on a gravimetric 37PVC 5.0 PW media cassette for any dust that is able to be inhaled into the lower reparatory system and enter the lungs

**OSHA PEL for Respirable Dust is 5 mg/m<sup>3</sup>; ACGIH: 3 mg/m<sup>3</sup>**



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