CCSD
CLARK COUNTY
SCHOOL DISTRICT

PARTICULATE MASKS
PROTECTION & LIMITATIONS

Particulates

- When we think about particulates, its not just dust. It is made up of a vast array of materials
- Most of the materials are not wholesome, such as; soot, dander, sand, smoke, fibers, insects, hair, not to mention chemical fumes.
- The US Weather Service estimates that one cubic inch of air could contain as much as 100,000 particles of dust. Worse yet, each piece of dust can contain thousands of germs.

Particulate Dust

- Dust and airborne particulates can be irritating to the upper respiratory system and will adversely affect individuals with existing allergies, asthma, and respiratory diseases
- Chronic exposure to high levels of dust and airborne particulate may also pose a risk for people not currently experiencing any respiratory symptoms.

Particulate Dust

- **Factors determining health effects of particulates**
  - Length of exposure (how long the person breathed in the particulates)
  - Type and toxicity
  - Concentration (amount of particulates in the breathing zone)
  - Size of particulates (affects how deep within the respiratory system the matter can go and how long the dust will remain in the air)
  - Activity level and breathing rate
  - Age and overall health

Hazards of Particulate Dust

- Health hazards
  - Occupational respiratory diseases
  - Irritation to eyes, ears, nose, and throat
  - Irritation to skin
- Impaired visibility
- Unpleasant odors
- Risk of dust explosions and fire
- Damage to equipment

Particulate Dust Categories

- From an occupational health point of view, dust is classified by size into three primary categories:
  - Respirable
  - Inhalable
  - Total

Dust is generally measured in micrometers (commonly known as microns, µm). Some common objects and their size in microns are: Red blood corpuscles 8 µm, Cotton fiber 15-30 µm, Human hair 50-75 µm

Humans can see particles about 75 µm in size

OSHA Classification

- 29 CFR 1910.1000 Subpart Z – Toxic and Hazardous Substances, Air Contaminants

  (c) Table Z-3 Exposure limits for Mineral Dust:
  - Respirable fraction:
    - 15 mppcf (millions of particles per cubic foot
    - 5 mg/m3 (milligram/cubic meter)
  - Total dust
    - 50 mmpcf
    - 15 mg/m3

Table Z-3 – Limits For Air Contaminants		
Substance	**mmpcf**	**mg/m3**
Inert or Nuisance Dust		
Respirable fraction	**15**	**5**
Total dust	**50**	**15**

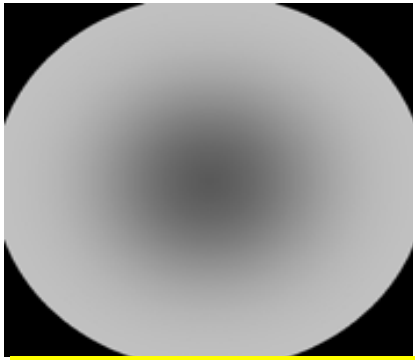
Particulate Dust Category

- Respirable Dust
  - Particles (< = 10 µm) and are small enough to penetrate the nose and upper respiratory system and deep into the lungs.
  - Generally beyond the body's natural clearance mechanisms of cilia and mucous and are more likely to be retained, (>10 µm)

A Micron-Size Dust Particle on a Pin Head

Particulate Dust Category

- Inhalable Dust
  - Size of dust which enters the body, but is trapped in the nose, throat, and upper respiratory tract
  - The median diameter is about 10 µm
- Total Dust
  - Total dust includes all airborne particles, regardless of their size or composition



Cross section of human hair = 60 µm

Consider Dust Mites

- **They're invisible to the naked eye, but not to your health**
  - Found in most every home or business
  - Live in the fine layer of dust that continually settles on any surface
  - Are nearly impossible to see
  - Astoundingly, up to 500 dust mites can be found in a single gram of particulate dust.

Protection from Particulates

- Engineering Controls
  - Controlling particulates using filtration systems and other mechanical methods
- Administration Controls
  - Controlling particulate exposure using time-of-exposure methods
- Personal Protective Equipment
  - Filtering out the particulates we breathe using respirators

Respirator Selection

- **OSHA Standard 29 CFR 1910.134**
- **Chemical cartridge respirator**
  - Used for filtering chemical fumes and mists
  - Only employees that are medically approved and fit tested may wear chemical cartridge respirators
- **Filtering face-piece respirator (dust mask)**
  - Used to trap solid particles large enough to capture the particle size according to NIOSH rating
  - May be used on a voluntary basis by the employee if it is not a requirement of their job to wear a respirator

All employees must be trained to wear any type of respirator

Respirator Training

Why Is This Training Required?

Training is required for anyone who wears a respirator

Training is provided so know how to protect your health and select the proper type of respirator

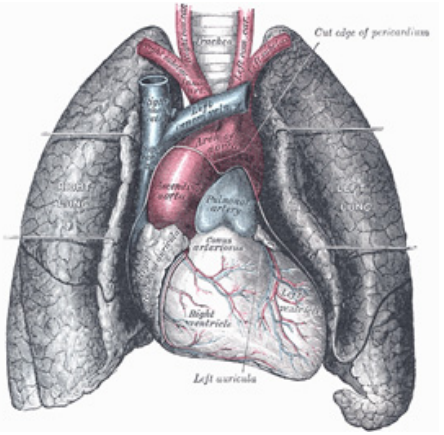
If you don't know how to select or use a respirator properly, you can get a false sense of protection

Respirator Selection

- Filtering facepiece respirators (dust masks) shall be used and made available to all CCSD employees exposed to particulate respirable dust
  - Know and understand your respiratory hazards and protect yourself

How Filtering Facepieces Work

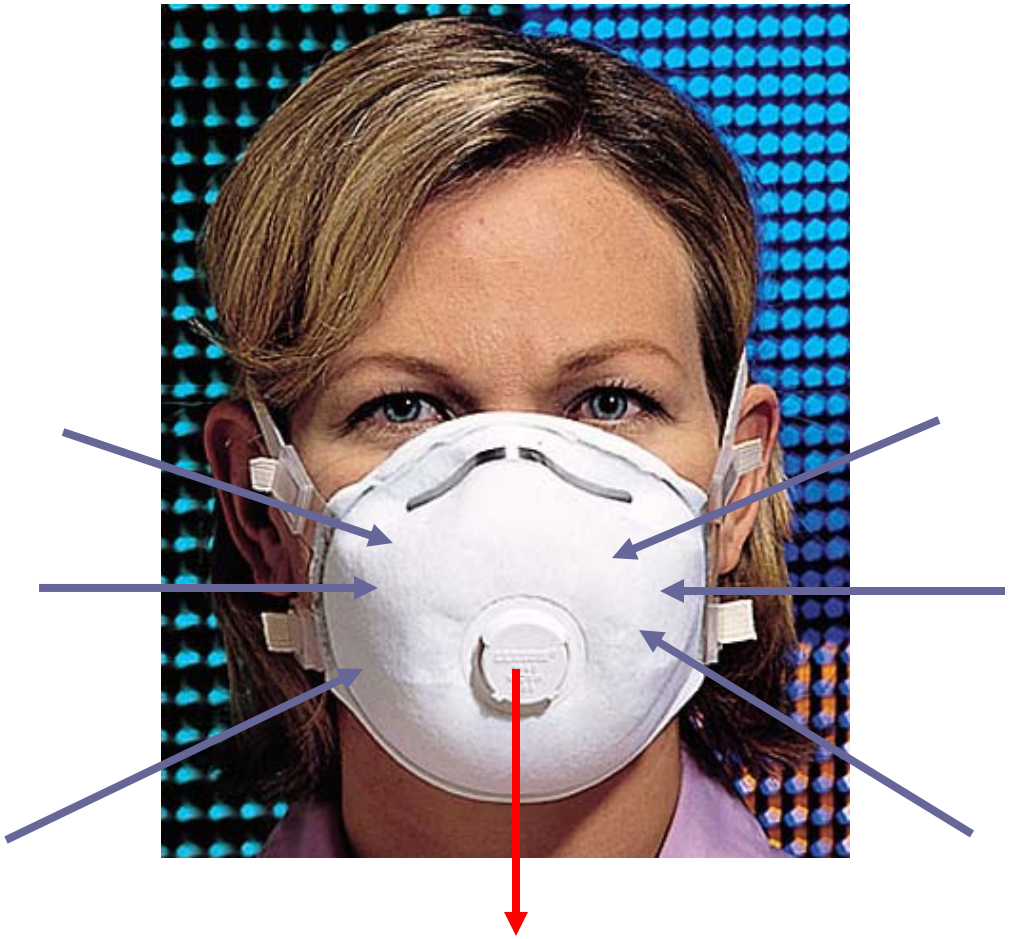
How Do Dust Masks Protect You?



When used properly, dust masks prevent the inhalation of dust in the air and protects the lungs.

When you inhale, air is pulled through the dust mask and dust is captured on the outside of the mask.

How Filtering Facepieces Work



Using Filtering Facepieces

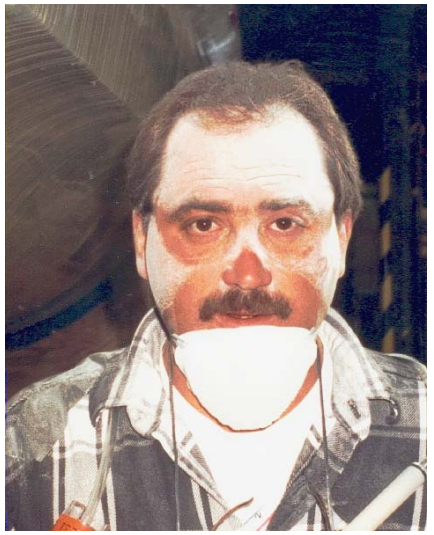
Limits of Dust Masks

Dust masks will leak if they don't fit your face properly.

Dust masks don't filter out chemical vapors.

Dust masks are not adequate for heavy amounts of dust.

Dust masks may not be suitable for highly toxic dusts.



Dust Mask Protection Factor

How much protection does a dust mask give?

Dust masks only provide protection to levels 10 times above the chemical or dust permissible exposure limit (PEL).

Example

Wood dust permissible limit – 5 mg/cu. meter ⟷ Dust mask protects up to 50 mg/cu. meter

mg/cu. meter = milligrams per cubic meter

NIOSH–Approved Dust Masks

Dust masks come in variety of styles and brands.

Not all dust masks provide adequate protection for workplace dust.

Only NIOSH-approved dust masks can be used for protection against dust levels that exceed the PEL.

Not NIOSH-approved

NIOSH-approved

Types of Dust Masks

Some masks are more protective than others

N95/R95/P95 masks filter out 95% of dust particles

N99/R95/P99 masks filter out 99% of dust particles

N100/R100/P100 masks filter out 99.7% of dust particles

N99 or N100 masks are recommended for very fine dust or dangerous dusts such as asbestos or silica.

Where Dust Masks Can't Be Used

Dust masks will not provide adequate protection in the following situations:

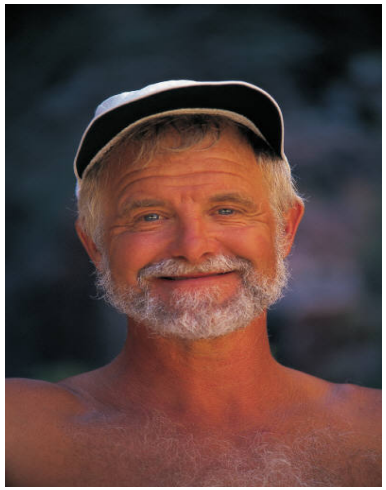
- ✓ Exposure to chemical gases or vapors
- ✓ Dust levels more than 10 times the permissible exposure limit (PEL)
- ✓ Oxygen deficiency

Dust Mask Fit

Dust Masks Must Fit Properly

Dust masks must fit properly to prevent leaks around the edges.

Beards do not allow a good fit when wearing a dust mask



Instructions for Fitting a Respirator

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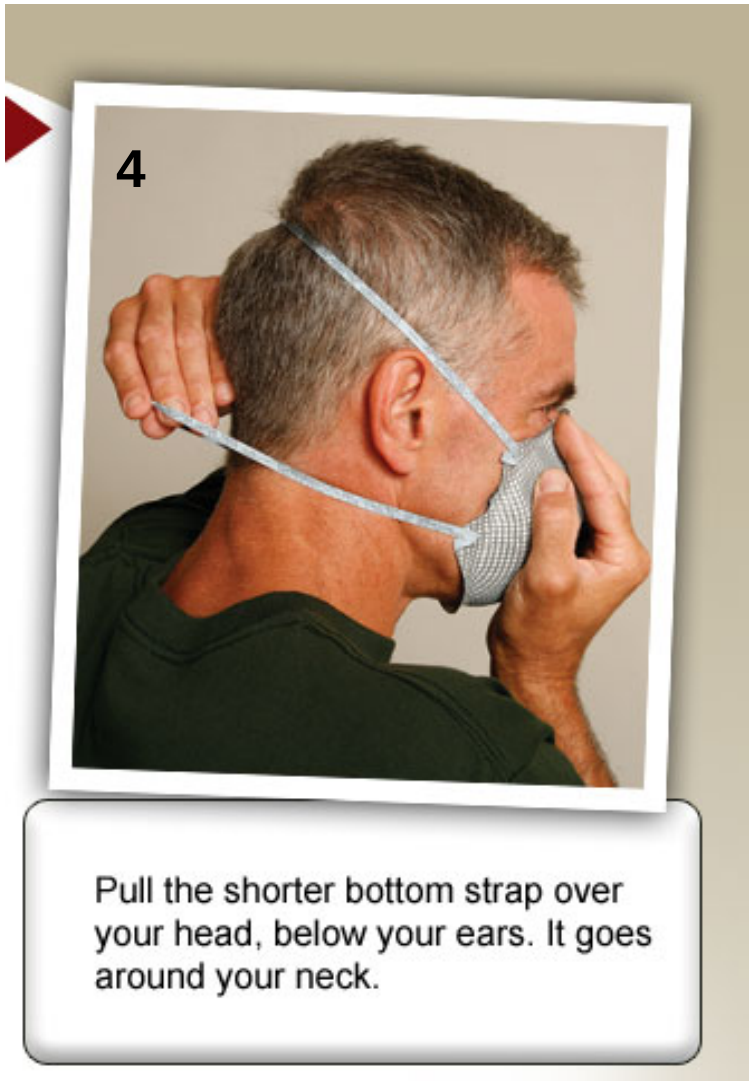

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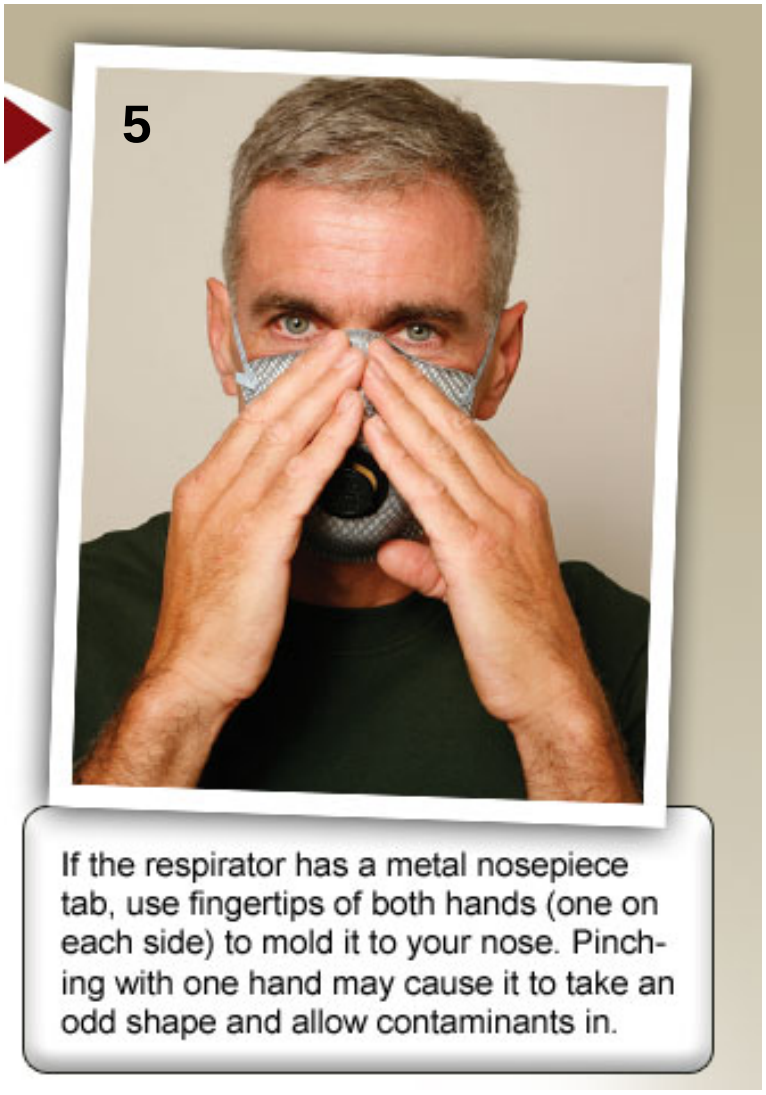

Dust Mask Fit

- Fit-testing must be done each time you wear a dust mask
- Place both hands over the respirator and exhale. If air leaks around the nose or the edges, adjust the nosepiece and/or headbands until a good fit is achieved

Replacing Dust Masks

Replace dust masks at least daily

Dust masks cannot be cleaned or repaired if soiled or damaged

Replace dust masks if breathing becomes difficult, if they are damaged or soiled on the inside

Dispose of dust masks at the end of the day or shift

Torn mask

Dust Mask Problems

When it Smells Bad or You Feel Sick

If you notice an odor, find dust inside the mask, feel ill, or you think your respirator leaks, notify your supervisor.

Leave the area if you know your mask is leaking.

Quiz

Question 1

What do filtering facepieces protect you from?

a) solvents and dust

b) only dust and particles

c) nothing much

d) only pollen

Quiz

Question 2

Why can't you wear a dust mask over a beard?

a) The beard will interfere with your breathing

b) It will cause the respirator to leak

c) It will cause skin irritation

d) It will look stupid

Quiz

Question 3

What does it mean if you smell a chemical while wearing your dust mask?

a) You may need a different kind of respirator

b) The dust mask doesn't fit properly

c) You have a very sensitive nose

d) All of the above