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Respirator Safety

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Goals

- To understand the OSHA requirements for respiratory protection
- To understand the different types of respirators
- To learn how to select the proper respirator
- To understand safe respirator use
- To demonstrate proper respirator inspection techniques

Hazard Elimination

- Before requiring employees to utilize respirators, efforts should be made to eliminate the atmospheric hazard
- Elimination of the hazard is the preferred method to maintain employee safety
- This can be accomplished by:
 - adding or changing ventilation
 - enclosing operations that emit hazards
 - substituting materials with less toxic ones
 - changing manufacturing processes

Employer Requirements

- Employers are required to:
 - provide respirators to employees when they are necessary to protect employee health
 - develop and make available a written company respirator protection program
 - identify and evaluate respirator hazards in the workplace
 - select and provide appropriate respirators based on the workplace hazards
 - provide training on proper respirator selection, use, and maintenance

Written Respirator Program

- Employers must develop a written respiratory protection program that includes:
 - procedures for selecting respirators
 - employee medical evaluations
 - respirator fit testing procedures
 - respirator use procedures
 - cleaning and maintenance procedures
 - procedures for proper air quality for atmosphere-supplying respirators
 - employee training
 - procedures for program evaluation

Types of Respirators

- Atmosphere-providing
 - these respirators supply a safe atmosphere to the user
- Air purifying
 - these can filter out gas, vapors, and particulates

It is important to understand that air purifying respirators do not provide oxygen. They will not protect employees in low-oxygen environments

Respirator Selection

- Must be National Institute for Occupational Safety and Health (NIOSH)-certified
- Must be selected to protect against the specific hazards of the work environment
- Various sizes and models must be available so that all employees have respirators with proper fit
- Immediately dangerous to life and health (IDLH) atmosphere
 - for IDLH areas, one of the following respirator types must be used:
 - a full facepiece pressure demand self-contained breathing apparatus
 - a full facepiece pressure demand supplied-air respirator with auxiliary self-contained air supply
- Environments with low-oxygen content or unknown contaminants are assumed to be IDLH

Respirator Selection

- Assigned protection factors (APF)
 - respirators are rated by their APF
 - a respirator with an APF of 10 will reduce the airborne particulates by a factor of 10
 - if an air contaminant has a permissible exposure limit of 5 mg/m^3 , and the respirator has an APF of 10, the maximum concentration that an employee can work in is 50 mg/m^3

Cartridge Types

- Air purifying respirators have different types of cartridges for different hazards
- The proper cartridge must be selected in order to provide protection from the existing atmospheric hazards
- Cartridges are colored by the types of contaminants they filter
 - black cartridges protect employees from organic vapors
 - purple cartridges protect employees from particulates
 - some are combo filters that protect from more than one type of contaminant
- If a respirator cartridge does not have an “end-of-life” indicator, a set cartridge change out schedule must be used

Medical Evaluations

- Use of respirators can limit the effectiveness of an employee
- Employees must be evaluated by a physician to determine their ability to wear a respirator
- All employees must complete a medical screening questionnaire, which must be reviewed by a licensed healthcare professional
- The healthcare professional will review the questionnaire, and conduct follow-up exams as necessary
- Employees may not use respirators until they are cleared by a medical professional

Voluntary Respirator Usage

- If exposure levels do not require respirator use, employers may still provide respirators, or employees may provide their own
- If an employee decides to use a respirator, they must:
 - read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations
 - choose respirators certified for use to protect against the contaminant of concern
 - do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against
 - a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke

Voluntary Respirator Usage

- If an employee decides to use a respirator, they must:
 - keep track of your respirator so that you do not mistakenly use someone else's respirator

All employees who voluntarily use respirators must be provided with a copy of the OSHA standard that covers voluntary respirator use

Fit Testing

- Employees must be fit tested with the same make, model, style, and size of respirator that they will use in the workplace
- Employees must pass the appropriate qualitative or quantitative fit test, as required by the type of respirator

Types of Fit Tests

- Qualitative
 - irritant smoke
 - aerosols
 - isoamyl acetate
 - Quantitative
 - DOP/corn oil
 - negative pressure
 - ambient atmosphere
- OSHA 1910.134 describes the specific requirements for fit testing
- DOP: Protected Designation of Origin

Repeating Fit Tests

- Fit tests must be repeated when:
 - a different type or size of respirator is used
 - there are changes in an employee's physical condition that affect fit
 - atmospheric hazards change
 - a year has passed since the last fit test

Respirator Seal Checks

- Every time a respirator is put on, a seal check must be performed
- **Positive-pressure check**
 - close off the exhalation valve and exhale gently into the facepiece
 - the face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal
 - for most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test

Respirator Seal Checks

- **Negative-pressure check**
 - close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds
 - the design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand
 - the test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove
 - if the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory

Importance of Maintaining Seals

- For proper respiratory protection, the seals on the facepiece must be maintained
- Employees may not have facial hair under the sealing surfaces of the facepiece
- Facial hair cannot interfere with valve function
- If an employee wears glasses or PPE while using respirators, it must be worn in a manner that does not affect the maintaining of the seals

Monitoring Respiratory Protection

- The employer must monitor the work area for changing conditions and degree of employee exposure or stress
- If there is a change in conditions, the employer must reevaluate the effectiveness of the respirator and the respiratory protection plan for that workspace

When To Leave The Work Area

- Employees must leave the respirator work area:
 - to wash their faces and respirators as necessary
 - if they detect vapor or gas breakthrough, changes in breathing resistance, or facepiece leakage
 - to replace cartridges or filters

Respirator Cleaning Requirements

- Respirators must be cleaned and disinfected as often as necessary to maintain sanitation
- Respirators must be cleaned prior to use by another employee
- Emergency respirators must be cleaned after each use
- Respirators used in fit testing or training must be cleaned and disinfected after each use

Respirator Cleaning

- Remove cartridges, filters, and canisters
- Disassemble facepiece by removing the diaphragm, valves, and other components
- Wash in warm water with a disinfecting cleaner
 - use a stiff bristle brush to remove dirt
- Rinse in warm water

Respirator Storage

- Respirators must be stored in a way that protects them from:
 - damage
 - contamination
 - excessive moisture
 - damaging chemicals
- They must be stored to prevent deformation of the facepiece or valves

Respirator Inspections

- All respirators must be inspected before each use and during cleaning
- Emergency respirators must be inspected monthly and after each use
- Respirators must be inspected for:
 - proper function
 - tightness of connections
 - proper condition of components
 - signs of deterioration on elastomeric parts

Respirator Maintenance

- Respirator repairs may only be performed by appropriately trained persons
- All repair parts must be NIOSH approved
- Valves, regulators, and alarms should only be repaired by the manufacturer

Respirator Training

- Employees must be trained on respirator safety prior to using a respirator
- Employees must be retrained at least annually
- Employees should also be retrained when workplace hazards change, the type of respirator is changed, or when an employee demonstrates poor understanding of safe work practices

Summary

- Before requiring respirators, the employer must make a reasonable effort to eliminate the atmospheric hazards from the work area
- Employers must have a written respiratory protection program
- All respirators and associated equipment must be NIOSH-certified
- Employees must be screened and approved by a medical professional before they are allowed to use respirators
- Employees must be fit tested on the size and type of respirator that they will be using
- Respirators must be inspected prior to each use
- Only trained employees may use respirators

Respirator Safety

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