



PERSONAL PROTECTIVE EQUIPMENT



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Presentation Overview



PPE

- ⦿ What is it? Why do we need it? When do we need it?
- ⦿ What standards apply?
- ⦿ How do we select PPE?
- ⦿ PPE Resources
- ⦿ NIOSH HHE Program

What is PPE and Why do We Need it?

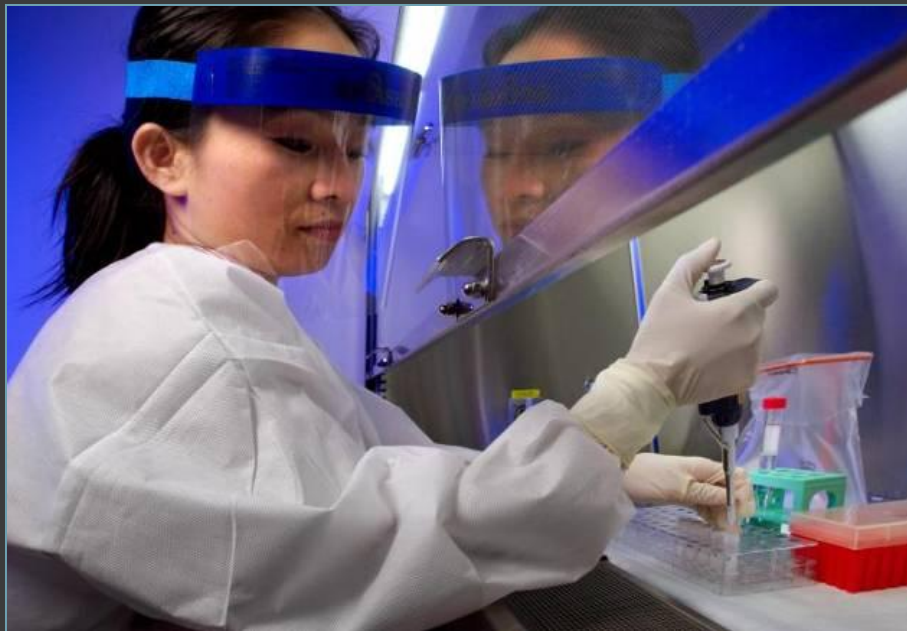


- PPE can include: faceshields, goggles, safety glasses, safety shoes, hard hats, respirators, coveralls, gloves, earplugs, and much more
- It provides employee protection from chemical, physical, biological, radiological, electrical, mechanical, or other workplace hazards

PPE-related violations are frequent OSHA citations

Why Do We Need PPE?

- PPE use is often essential but is generally considered the last line of defense



Hierarchy of Controls

Eliminate the **Hazard**



Use Engineering Controls



Implement Administrative Controls



Provide Personal Protective Equipment

Employer Responsibilities

- Follow applicable OSHA standards for your workplace
- Conduct a hazard assessment
- Provide PPE when other controls are not feasible or not sufficiently protective
- Pay for PPE, with some exceptions
- Provide employee training



Standards and Guidelines

- ◎ OSHA General Industry
 - 29 CFR 1910.132 (general requirements)
 - 29 CFR 1910.133 (eye and face)
 - 29 CFR 1910.134 (respiratory protection)
 - 29 CFR 1910.135 (head protection)
 - 29 CFR 1910.136 (foot protection)
 - 29 CFR 1910.137 (electrical power equipment)
 - 29 CFR 1910.138 (hand protection)
 - Other substance/hazard specific standards
- ◎ OSHA Construction and Maritime standards
- ◎ Consensus Standards: NFPA, ANSI



The Hazard Assessment



Conduct a walk-through survey

- Consider all potential hazards
- Identify sources
- Review injury and Illness records
- Compile and analyze data
- Select PPE
- Reassess hazards

Document the process!

Hazard Assessment: Examples

Hazard Type	Sources	Tasks
Impact	Flying objects such as large chips, fragments, particles, sand and dirt	Chipping, sandblasting, grinding, machining, masonry, wood working, sawing, drilling, sanding, etc.
Penetration	Sharp objects, tools	Surgery, collecting blood specimens, tool use, etc., construction
Heat	Ovens and other sources emitting extreme heat, high levels of PPE, outdoor work, firefighting	Furnace operations, pouring, casting, hot dipping, welding, firefighting, etc.
Chemicals	Splashes, fumes, gases, vapors, and mists	Acid and chemical handling, degreasing, plating, cleaning, various manufacturing processes, pesticide application, etc.
Dust	Nuisance and toxic dusts, nanoparticles, pharmaceuticals	Woodworking, buffing, grinding, drilling, sanding, manufacturing, etc.
Optical Radiation	Radiant energy, glare, intense light, ultraviolet germicidal irradiation	Welding, torch cutting, brazing, soldering, heat treating, healthcare services, laser work
Biological	Infectious persons and animals, contaminated metal working fluids, bioterrorism agents	Healthcare services, decontamination, emergency response

Eye and Face Protection

- ⦿ Required when employees exposed to:
 - flying particles;
 - hazardous liquids, gases, or vapors; and
 - potentially injurious light (optical) radiation
- ⦿ Includes safety glasses, goggles, and faceshields
- ⦿ Faceshields are considered secondary protectors



Selecting Eye and Face Protection

- ⦿ Consider routine and emergency activities
- ⦿ Incorporate prescription lenses into design or wear over lenses
- ⦿ Consider comfort, fit, coverage, ease of cleaning, durability
- ⦿ Compatibility with other PPE
- ⦿ Presence of multiple hazards
- ⦿ Physical stresses, duration, frequency of contact/exposure

Include employees in PPE selection

Optical Radiation Protection

- ⦿ Wear correct filter shades
- ⦿ Welding helmets are considered secondary protectors
- ⦿ Select laser safety goggles specific for wavelength of laser
- ⦿ Glare – Use filter or lenses to prevent eye strain



Head Protection

Must protect from impact and penetration hazards, absorb shock, be water resistant and slow burning



- ⦿ Consider other gear (muffs, glasses, faceshields, communication devices)
- ⦿ Fit is important
- ⦿ Periodic cleaning and inspection, remove defective hats
- ⦿ Replace if sustains impact, even if not visibly damaged
- ⦿ Must meet ANSI standard
- ⦿ Some can protection from electric shock and burns

Foot Protection

To provide impact and compression protection when objects might fall or roll onto the feet (rolls, pipes, material handling)



- ⦿ Safety shoes and boots must meet ANSI standard
- ⦿ Special considerations – electrical hazards
- ⦿ Can also provide puncture protection as needed (nails, wire, etc.)
- ⦿ Clean and maintain as per manufacturer recommendations

Hand Protection

Required When:


- Skin absorption of harmful substances
- Severe cuts or lacerations
- Severe abrasions
- Punctures
- Chemical or thermal burns
- Harmful temperature extremes



Hand Protection


- Protection dependent on chemical challenge agent(s), time worn
- Breakthrough time dependent on penetration, degradation, and permeation
- Can request documentation from manufacturer
- For mixtures of chemicals and formulated products, ideally test with specific products to determine penetration times or select based on the chemical with the shortest breakthrough time
- Prevent skin contamination when removing

Selecting Hand Protection



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Recommendations for Chemical Protective Clothing: A Companion to the NIOSH Pocket Guide to Chemical Hazards: Database

Disclaimer and Additional Information


The *Recommendations for Chemical Protective Clothing* database is a contractor's product procured by the National Institute for Occupational Safety and Health (NIOSH). Thus, the recommendations contained in this database do not necessarily reflect NIOSH policy.

There are many chemicals which can cause adverse effects on unprotected skin ranging from contact dermatitis to permeation of the skin and systemic toxic effects. In addition, some chemicals (mostly solids) can present a contamination problem where inadvertent ingestion (e.g., lead) could occur or re-entrainment in the airstream (e.g., asbestos) could lead to inhalation. Chemical protective clothing (CPC), comprising gloves, boots, suits and other related components, can prevent direct skin contact and contamination. CPC can also prevent physical injury to the unprotected skin from thermal hazards such as from rapidly evaporating liquidified gases freezing the skin (e.g., LPG).

This report provides CPC recommendations for the chemicals listed in the *NIOSH Pocket Guide to Chemical Hazards, June 1997 Edition* (Publication No. 97-140). These recommendations are based on another published work, *Quick Selection Guide to Chemical Protective Clothing, Third Edition*, by Krister Forsberg and S.Z. Mansdorf (1997).

The *Pocket Guide* provides general recommendations for skin protection according to the following designations:

- Prevent skin contact
- Frostbite
- N.R.

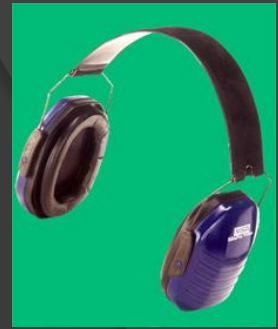


Hearing Protection

Provide if exposures exceed occupational exposure limits and feasible engineering and administrative controls have already been implemented

- Make hearing protectors available to all employees whose daily average noise exposures are 85 dBA or above
- Allow employees to select from a variety of appropriate protectors
- Train employees at least once per year

Hearing Protection



- ⦿ Check regularly for wear or defects
- ⦿ Evaluate employees for ear infections or irritations
- ⦿ Consider over and under protection
- ⦿ Ear plugs vs. earmuffs vs. dual protection
- ⦿ Uniform attenuation earplugs/muffs – musician's earplugs for speech clarity

Using Noise Reduction Ratings (NRRs)

- Apply a derating to the NRR value to account for lab attenuation vs. real world differences in protection
- Example: for a foam plug with labeled NRR=30 and average workplace exposure Level of 98 dBA

$$\text{ENL} = \text{dBA} - (\text{derated NRR} - 7) = 90 \text{ dBA}$$

ENL=exposed noise level (at ear)

To obtain derating for foam ear plugs subtract 50%

Subtract an additional 7 when comparing with workplace levels in dBA

Respiratory Protection

Provide if airborne exposures exceed occupational exposure limits and feasible engineering and administrative controls have already been implemented or until they are implemented



- Conduct an exposure assessment to determine the concentration of the hazardous airborne exposure
- Take into account jobsite and worker characteristics
- Understand the assigned protection factors of the different respirators
- Know the various kinds of respirators and their relevant characteristics

Assigned Protection Factors*

Respirator Type	APF
Filtering Facepiece (disposable N95)	10
Elastomeric Half-mask	10
Full-facepiece	50
Loose-fitting Powered Air-purifying Respirator	25
Self-contained Breathing Apparatus (positive pressure mode)	10,000

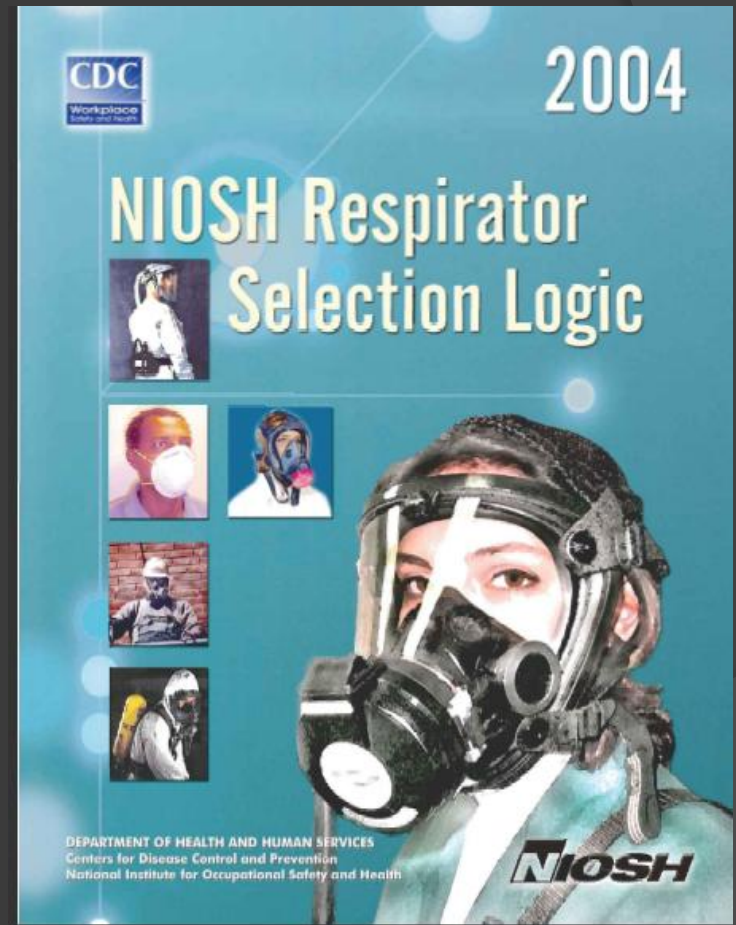
*OSHA and NIOSH APFs

Respirator Selection Assistance



The screenshot shows the OSHA website's Respiratory Protection eTool. The header includes the United States Department of Labor logo and navigation links like 'All DOL' and 'OSHA'. The main content area features a navigation menu on the left with items such as 'Home', 'Scope and Application', and 'Respirator Selection'. The central text reads 'The Advisor Genius: Selecting an Appropriate Respirator' next to a portrait of an elderly man. Below this, it says 'Before You Begin' and '1. The Advisor Genius may ask you for the following information. Be prepared.'

http://www.osha.gov/SLTC/etools/respiratory/respirator_selection_advisorgenius.html



The cover of the 'NIOSH Respirator Selection Logic' manual from 2004. It features the CDC logo and the year '2004' in the top right. The title 'NIOSH Respirator Selection Logic' is prominently displayed. The cover includes several small images of workers wearing different types of respirators. At the bottom, it lists the 'DEPARTMENT OF HEALTH AND HUMAN SERVICES', 'Centers for Disease Control and Prevention', and 'National Institute for Occupational Safety and Health'. The NIOSH logo is also present in the bottom right corner.

<http://www.cdc.gov/niosh/docs/2005-100/>

OSHA Respirator Standard Requirements

- Written program
- Medical clearance
- Annual fit testing
- Annual training
- Selection, care, and maintenance
- Respirator change schedules

Voluntary Use of Respirators

- Employers may allow employees to wear respirators on a voluntary basis when not required by OSHA
- If only a filtering facepiece respirator is worn, give employees a copy of App D
- For all other voluntary uses, a written respirator program that covers medical fitness and proper maintenance procedures must be implemented



Additional Resources

- NIOSH/National Personal Protective Technology Laboratory (NPPTL) websites, specific topic pages
- OSHA – Consultation Program, eTools, topic pages, small business guidance
- Ohio Bureau of Workers Compensation

NIOSH Health Hazard Evaluation (HHE) Program

An HHE is a study of a workplace to learn whether workers are exposed to hazardous materials or harmful conditions.


- ⦿ NIOSH may respond in writing with information or refer requestor to a more appropriate agency
- ⦿ NIOSH staff visits the workplace to meet with the employer and the employee representatives to
 - Discuss the issues
 - Tour the workplace
 - Review records
 - Interview or survey employees
 - Measure exposures
 - Conduct medical testing


When Can a NIOSH HHE Help

- ⦿ New/modified exposures, processes, hazards
- ⦿ Illnesses of unknown cause
- ⦿ Unregulated agents/exposures
- ⦿ Adverse health effects at exposures below current standards
- ⦿ Old problem in a new setting
- ⦿ New/novel application of material or process



Requesting an HHE


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Health Hazard Evaluations

Do you think a health hazard exists in your workplace? Do any of the following stories resemble situations at your workplace?

- A factory worker was feeling numbness and tingling in her fingers. She learned that three coworkers had the same problem, and two had headaches while at work but not over the weekend. Some workers said the air at work smelled bad. Their supervisor noticed the smell but didn't think it was anything to worry about.
- A manager noticed that employees in one work area had more skin rashes in the past year than the year before. He wanted to know why, but didn't know what to do.
- A work crew was putting cement tiles on a roof. They were working outside, but the air seemed dusty. The saws used to cut the tiles were noisy. Someone told them that this work was dangerous.



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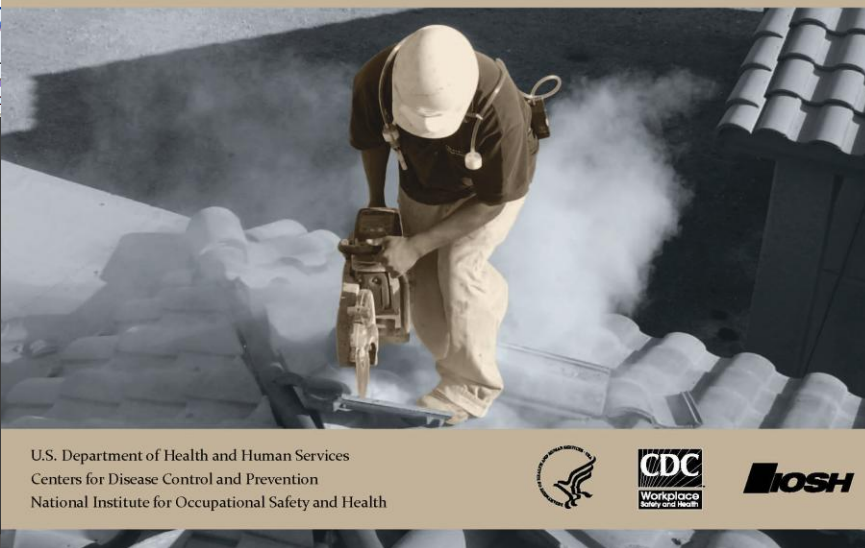
[Request HHE on Facebook](#)

At no cost to employers, the NIOSH HHE program may be requested to evaluate a workplace and how to address the hazard by NIOSH.

Two New

- The NIOSH HHE program has increased the number of cancer cases and whether the

Health Hazard Evaluation Program



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
U.S. Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Form Approved
OMB No. 0920-0260
Expires January 31, 2012

(also available at: www.cdc.gov/niosh/hheform.html)

Request for Health Hazard Evaluation (HHE)

Establishment Where Possible Hazard Exists

- Company Name: _____
- Address: _____
City: _____ State: _____ Zip Code: _____
- What product or service is provided at this workplace? _____
- Specify the particular work area, such as building or department, where the possible hazard exists: _____
- How many employees are exposed? _____ 6 Duration of exposure (hrs/day)? _____
- What are the occupations of the exposed employees; what is the process/task?
a) Occupations: _____
b) Process/task: _____
- To your knowledge, has NIOSH, OSHA, MSHA, or any other government agency previously evaluated this workplace? YES NO
- Is a similar request currently being filed with, or is the problem under investigation by, any other local, state, or federal agency? YES NO
- If either question 8 or 9 is answered yes, give the name and location of each agency. _____
- Which company official is responsible for employee health and safety?
Name: _____ Title: _____ Phone: _____
- How did you learn about the NIOSH HHE program? Company representative Co-worker
 Union Other employee representative NIOSH Website CDC 800 Number (CDC-INFO)
 News media (TV, radio, newspaper, magazine) Other (please list) _____

Description of the Possible Hazard or Problem

- Please list all substances, agents, or work conditions that you believe may contribute to the possible health hazard. (Include chemical names, trade names, manufacturer, or other identifying information, as appropriate.) _____
- In what physical form(s) do(es) the substance exist? Dust Gas Liquid Mist Other _____
- How are the affected employees exposed? (route of exposure) Breathing Skin contact
 Swallowing Other (please list) _____

[Send completed form to address listed on the reverse side]


This form is provided to assist in requesting a health hazard evaluation from the U.S. Department of Health and Human Services. Public reporting burden for this collection of information is estimated to average 12 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering, and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to: DHHS Reports Clearance Team, Paperwork Reduction Project (0920-0102), Room 5531, Hubert H. Humphrey Building, 200 Independence Ave., SW, Washington, DC 20201. (See Statement of Authority on reverse.)

<http://www.cdc.gov/niosh/hhe/>

Summary

- ⦿ PPE as the “last line of defense”
- ⦿ PPE use is regulated in the workplace under many different standards
- ⦿ Consider the environment, tasks, and other PPE worn in selection
- ⦿ Don't create additional health or safety problems
- ⦿ PPE selection can be challenging but there are many resources available

Questions?



The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health