



Personal Protective Equipment

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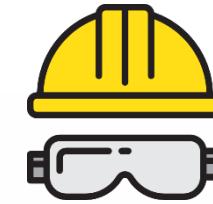
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Naryn, Kyrgyzstan, 04:21pm, April 6, 2023



Lessons learnt last time

- Introduction
- Example of hazardous materials
- Exposure to hazardous materials
- Hazards of hazardous materials
- Controlling physical hazards
- Controlling health hazards
- Hazardous materials worksheet



What we gonna discuss today?



- Introduction
- Hierarchy of controls and its relationship to PPE
- Types of PPE utilized in general industry
- PPE training requirements
- The employer responsibilities regarding PPE
- The employee responsibilities regarding PPE

Introduction



- Top 10 Computer Science Jobs:

- Software Developer
- Database Administrator
- Computer Hardware Engineer
- Computer Systems Analyst
- Computer Network Architect
- Web Developer
- Information Security Analyst
- Computer and Information Research Scientists
- Computer and Information Systems Managers
- IT Project Manager

<https://www.thebalancecareers.com/top-jobs-for-computer-science-majors-2059634>

- Computer scientists/engineers also need PPE inside&outside of their offices!

Introduction

https://www.youtube.com/watch?v=_hdhsQdwan4

- PPE (Personal Protective Equipment) detection using Deep Learning (CNN)



Introduction

- Personal Protective Equipment

<https://www.youtube.com/watch?v=q2yAHDkC6Nw>



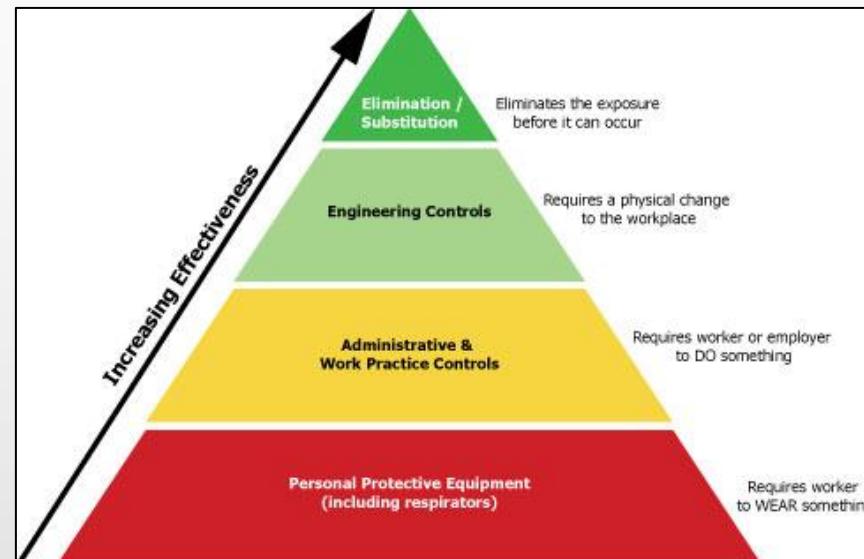
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Introduction

- Employers must protect employees:
 - Assess the workplace
 - Eliminate and reduce the hazards found using engineering and administrative controls
 - Then use appropriate PPE
 - **Remember, Personal Protective Equipment is the last level of control**

Hierarchy of Controls



Introduction

- Hierarchy of Controls

https://www.youtube.com/watch?v=O8e0_RzDxQU

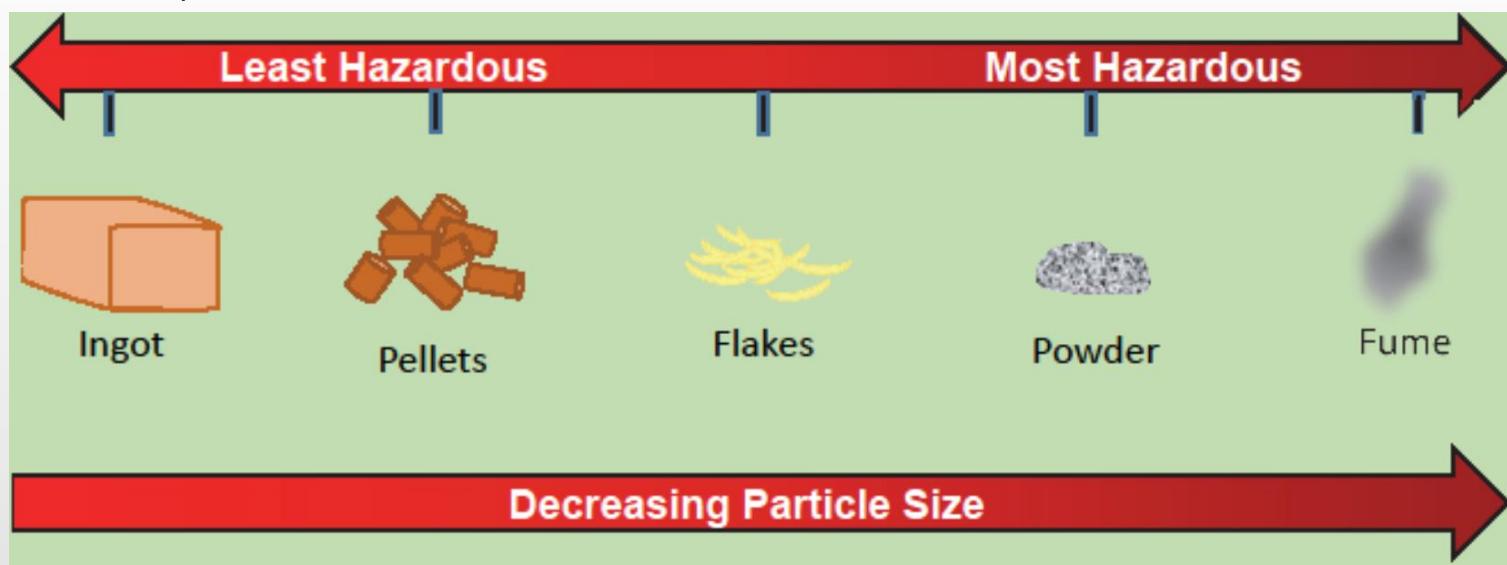


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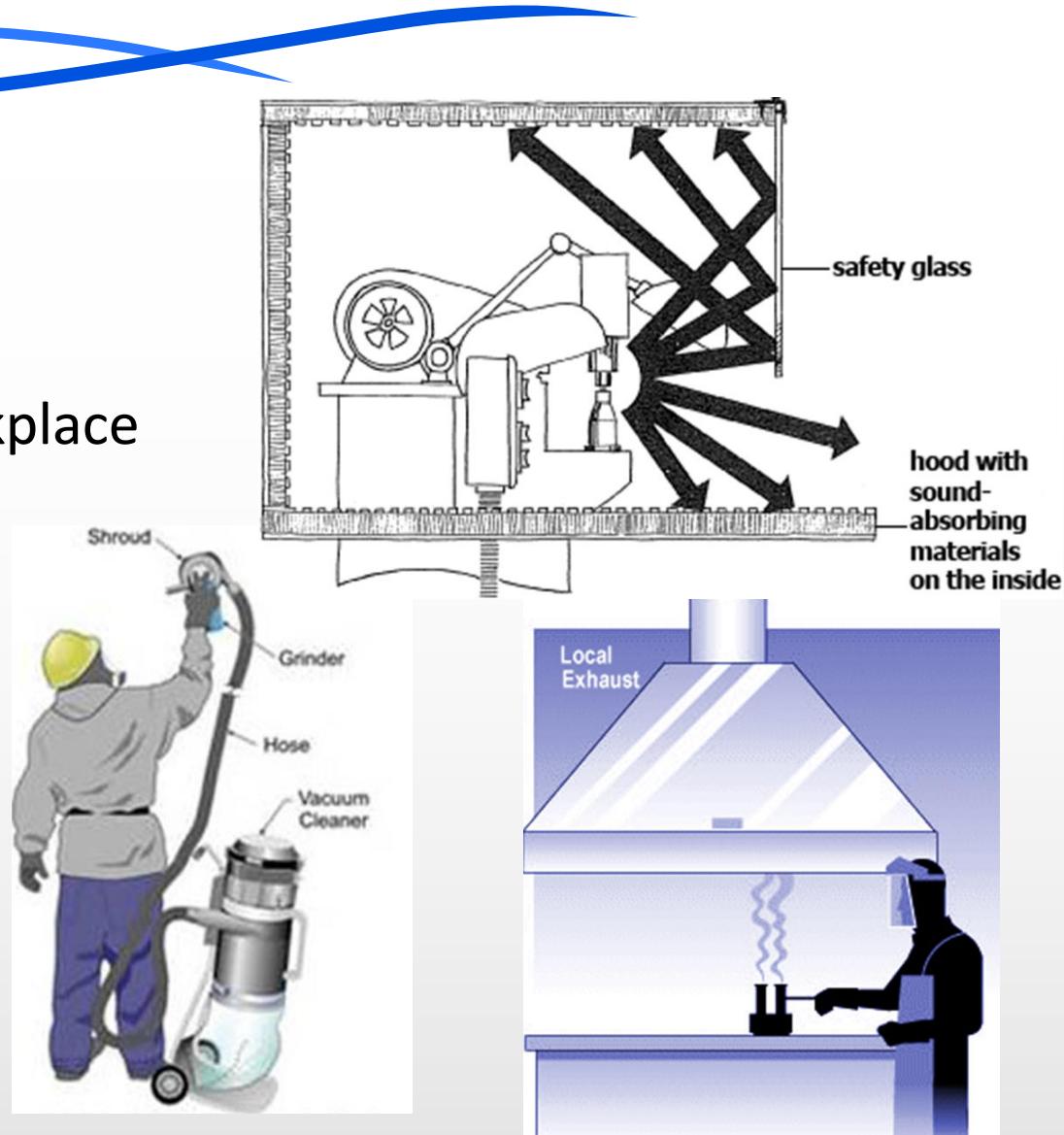
Hierarchy of Controls

- Elimination/substitution:
 - Highest level of protection
 - Eliminate hazard from the workplace
 - Substitute
 - Use safer item/substance
 - Use same chemical but in a different form; as particle size of a substance decreases, hazard level increases



Hierarchy of Controls

- Engineering controls:
 - Physical changes to workplace
 - Examples:
 - Isolation
 - Ventilation
 - Equipment modification
 - Others



Hierarchy of Controls



- **Administrative controls/work practice control:**
 - Requires worker or employer to do something
 - Examples
 - Written proper operating procedures, work permits and safe work practices
 - Inspection and maintenance
 - Housekeeping
 - Monitoring the use of highly hazardous materials
 - Supervision
 - Training
 - Alarms, signs and warnings
 - Regulated areas
 - Limit exposure by time or distance

Hierarchy of Controls

- PPE controls:

- Requires worker to wear something
- Examples:



An example of PPE: Eye Protection

<https://www.youtube.com/watch?v=WTBxoZmAqlc>



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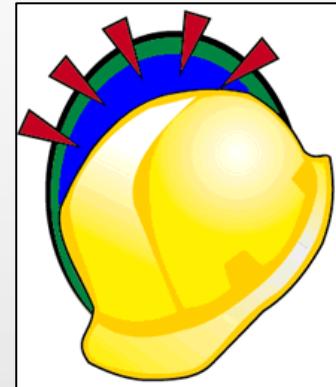
Computer Glasses vs Blue Light Glasses (Which Do You Need?)

<https://www.youtube.com/watch?v=s0ly1zM3q14>



Types of PPE

- Head protection:
 - Frequent causes of head injuries
 - Falling objects from above striking on the head
 - Bump head against fixed objects, such as exposed pipes or beams
 - Accidental head contact with electrical hazards



Types of PPE (cont.)

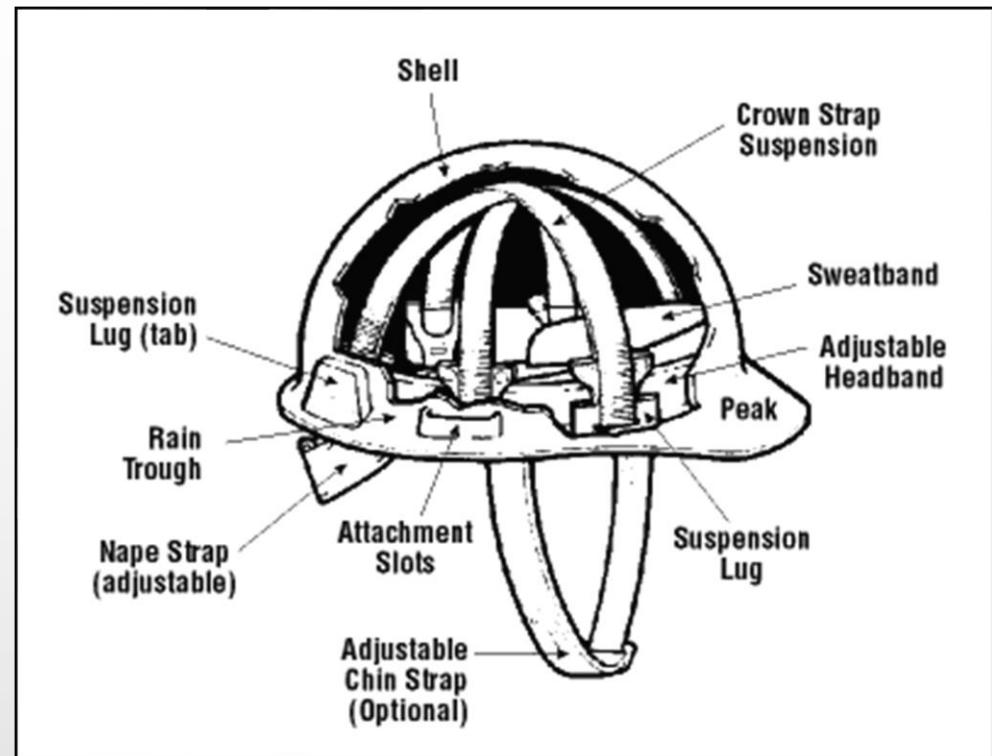
- When Does OSHA Require Hard Hats?

- OSHA has two standards that govern hard hat requirements:
 - 29 CFR 1910.135 governs hard hat requirements for general industry workers
 - 29 CFR 1926.100 refers to head protection requirements for construction, demolition, and renovation workers
- Both standards require workers to wear hard hats when there is a potential for head injury from “impacts, falling or flying objects, or electrical shock.”



Types of PPE (cont.)

- Classes of hard hats: CLASS G (General)
 - Protect against impact, penetration
 - Low-voltage electrical protection (proof-tested to 2,200 volts)



Types of PPE (cont.)



- Classes of hard hats: CLASS E (Electrical)
 - Designed for electrical/utility work
 - Protect against falling objects, impact
 - Electrical protection against high-voltage (proof-tested to 20,000 volts)



Types of PPE (cont.)



- Classes of hard hats: CLASS C (Conductive)
 - Designed for comfort; offers limited protection
 - Protects heads that may bump against fixed objects
 - Does not protect against falling objects or electrical hazards



Types of PPE (cont.)

- ANSI Z89.1, 1997

- **Type I:** provides protection from objects falling directly on top of the helmet, but not from objects that strike the side, front, or back of the head
- **Type II:** provides protection from strikes to the top of the head and also provides protection from blows to the sides, front, and back of the head. More suitable for workers who are not always in a standing position



Types of PPE (cont.)

- Eye and face protection:



Safety glasses

Safety goggles



Face shield Welding face shield

Types of PPE (cont.)

- Common causes of eye injuries
 - Chemical splashes
 - Blood or OPIM (Other Potentially Infectious Material) splashes or sprays
 - Intense light
 - Dust and other flying particles
 - Molten metal splashes



Types of PPE (cont.)

- Eye and face protection – must comply with
 - ANSI Z87.1-2015
 - or ANSI Z87.1-2010, ANSI Z87.1-2003, ANSI Z87.1-1989 (R-1998), ANSI Z87.1-1989



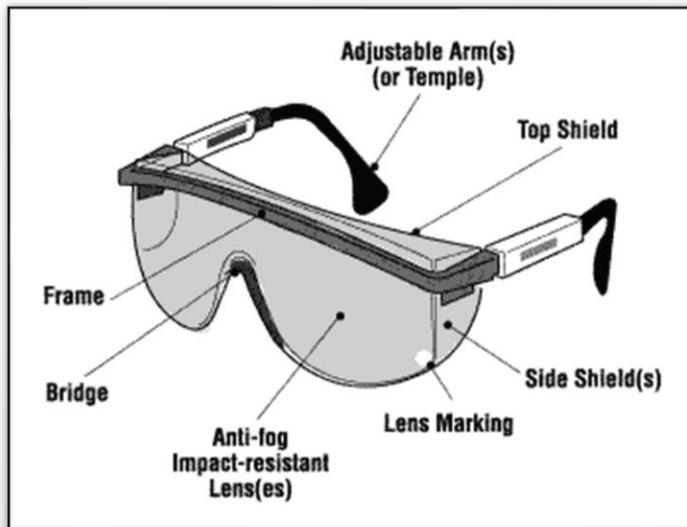
Types of PPE (cont.)



- Selecting eye and face protection – elements to consider:
 - Ability to protect against workplace hazards
 - Should fit properly
 - Should provide unrestricted vision and movement
 - Durable and cleanable
 - Allow unrestricted functioning of other PPE

Types of PPE (cont.)

- Safety glasses:
 - Used to protect against moderate impacts from particles

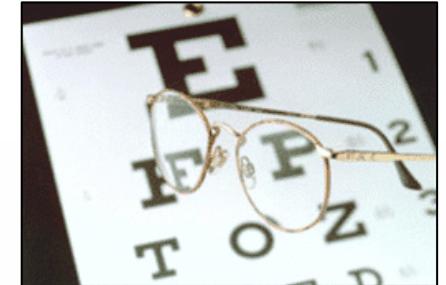


Types of PPE (cont.)

- Prescription glasses

- Employees who use prescription glasses while performing operations with potential eye hazards must use eye protection that:

- Incorporates the prescription in its design
 - Can be used over your prescription glasses without interfering with the proper positioning of the prescription glasses or goggles



Types of PPE (cont.)

- Goggles

- Protect eyes, and the facial area immediately surrounding the eyes from impact, dust, splashes
- Some can be used over corrective lenses, if they fit them

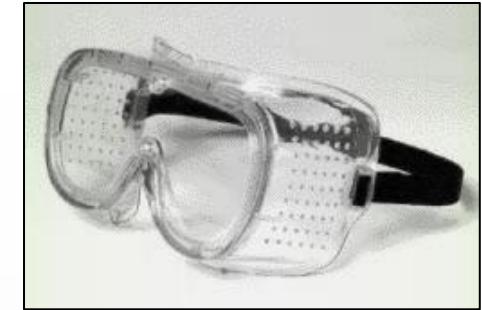


Types of PPE (cont.)

- Goggle types:

- Direct-ventilated:

- Resist direct passage of large particles into the goggle
 - Prevents fogging by allowing air circulation



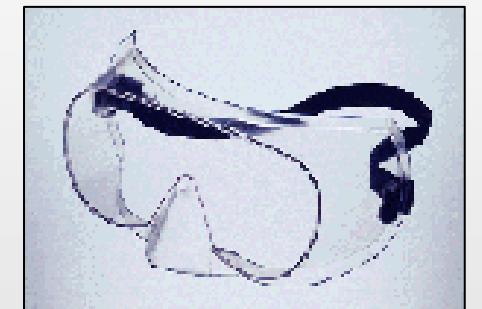
- Indirect-ventilated

- Prevents fogging by allowing air circulation
 - Protects against liquid or chemical splash entry



- Non-ventilated

- Does not allow the passage of air into the goggle
 - Prevents splash entry
 - May fog and require frequent lens cleaning



Types of PPE (cont.)

- Face shields



- Welding shields



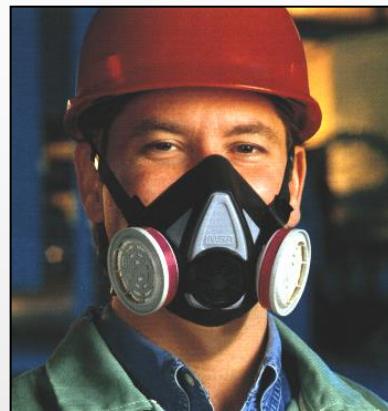
Types of PPE (cont.)

- Laser safety goggles
 - Provide protection from hazards:
 - physical contact such as flying particles
 - ultraviolet light, laser, and welding



Types of PPE (cont.)

- Respiratory protection



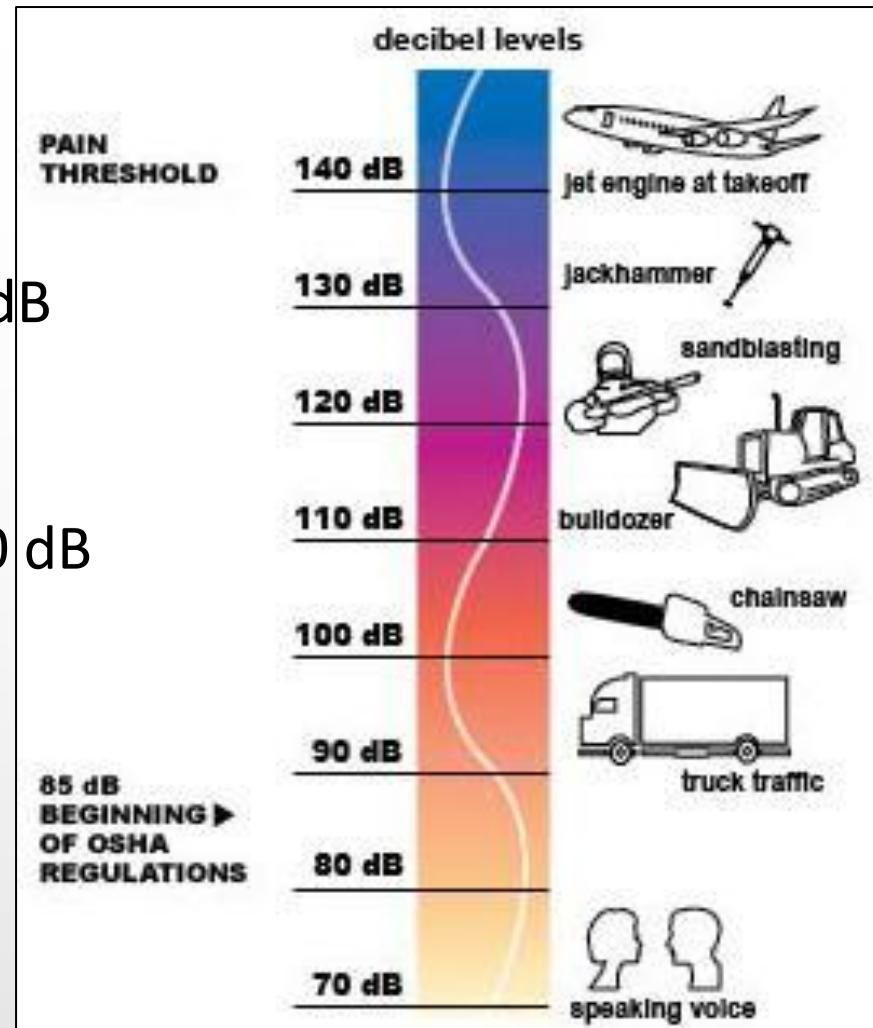
Types of PPE (cont.)

- Hearing protection



Types of PPE (cont.)

- Hearing protection
 - Exposure to noise levels over 85 dB can cause hearing loss
 - Hearing protection required at 90 dB
 - Implement effective Hearing Conservation Program



Types of PPE (cont.)

- Hearing protection

- The employer must provide ear protection when the noise level in the work area is greater than indicated in this table



Permissible Noise Exposure 29 CFR 1910.95(b)(1)	
Duration per Day (hours)	Sound Level (dBA)
8	90
6	92
4	95
3	97
2	100
1	105
1/2	110
1/4	115

Impact noise should not exceed 140 dB

Types of PPE (cont.)

- Hand protection:

- Potential hazards for hands:
 - Skin absorption of hazardous substances
 - Lacerations or severe cuts
 - Punctures
 - Chemical burns
 - Thermal burns
 - Extreme temperatures



Types of PPE (cont.)

- Types of gloves:



Anti-vibration



Chemical-resistant



Leather Palm



Permeation-resistant



Heat-resistant



Cut-resistant

Types of PPE (cont.)

- Foot and leg protection:

- Causes of foot injuries:

- Falling or rolling of heavy objects
 - Crushing or penetrating materials
 - Sharp objects that can penetrate the sole
 - Exposure to molten metal
 - Working on, or around, hot, wet, or slippery surfaces
 - Working when electrical hazards are present



Types of PPE (cont.)

- Protective footwear must comply with any of the following consensus standards:
 - ANSI Z41.1 – 1991 - "American National Standard for Personal Protection - Protective Footwear,"
 - ASTM F-2412 – 2005 – “ Standard Test Methods for Foot Protection”
 - ASTM F-2413 – 2005 – “Standard Specification for Performance Requirements for Protective Footwear”



Types of PPE (cont.)

- Body protection – protective clothing:



PPE training requirements



- PPE training requirements:
 - Each employee who is required to use PPE must be trained to know:
 - What PPE is necessary
 - How to properly put on, take off, adjust, and wear the PPE
 - The limitation of the PPE
 - Proper care, maintenance, useful life, and disposal of PPE

The employer responsibilities regarding PPE



- The employer is required to:
 - Perform hazard assessment
 - Provide appropriate PPE
 - Train employees
 - Maintain/replace PPE
 - Review/update/evaluate PPE Program
 - **The employer is required to pay for PPE used to comply with OSHA standards**

The employee responsibilities regarding PPE

- The employee is required to:
 - Properly wear PPE
 - Attend PPE training
 - Care for, clean, and maintain PPE
 - Inform supervisor of needs for repair/replacement of PPE



Risk Assessment

<https://www.youtube.com/watch?v=xnVomQcRux8>

- Making safety a priority doesn't have to be complicated, expensive or time-consuming. A simple risk assessment can simplify the selection of PPEs.



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One more example of PPE: Ear Protection

<https://www.youtube.com/watch?v=GrC5-s4CI64>



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