

Personal Protective Equipment



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Course Outline

- Control Hierarchy
- Definition of PPE
- OSHA Standard Requirements
- Types of Protective Equipment & Selection Criteria
- Written Hazard Assessment/Documentation
- Training Requirements/Documentation

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Control Hierarchy

1. Eliminate the Hazard
2. Engineer Out the Hazard
3. Use Administrative Controls
4. Use Personal Protective Equipment



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Control Hierarchy

Why is PPE considered a last resort?



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DEFINITION OF PPE

- Devices worn by employees to protect themselves from unsafe working environments.
- PPE does nothing to reduce or eliminate the hazard, they simply interpose a barrier between the worker and the hazard.
- If the barrier fails immediate exposure is the result.

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Where do you need PPE?



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STANDARD REQUIREMENTS 1910.132



- Application
- -PPE shall be provided, used, maintained in sanitary and reliable condition
- -used to prevent injury or illness

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STANDARD REQUIREMENTS



- Application (cont.)
- Includes
 - Eye, Face, Head, Extremities
 - Protective Clothing
 - Respiratory Devices
 - Protective Shields/Barriers

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Requirements - Employee Owned Equipment

- **EMPLOYER RESPONSIBILITIES**
 - Assure adequacy, proper maintenance, sanitation of equipment
 - Appendix D of 1910.134 mandatory: Information for employees using respirators when not required under standard.



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Requirements - Design



- Safe Design
- Constructed for work to be performed
- No damaged or defective equipment may be used

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Eye & Face Protection 1910.133

- **Must be used when exposed to hazards from:**
 - Flying Particles
 - Molten Metals
 - Liquid Chemicals
 - Acids/caustic liquids
 - Chemical vapors/gases
 - Light/UV/IR Radiation



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Eye & Face Protection 1910.133

- Side protection for Safety Glasses
 - Required for hazards from flying objects
 - Detachable side protectors permitted if meet requirements of standard



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Eye and Face Protection 1910.133



- Prescription Glasses
 - prescription must be incorporated into the design
 - -OR- eye protection must be designed to be worn over glasses w/o disturbing protective or prescriptive lenses

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Eye Protection

**not all-inclusive*

- OSHA “...occupations for which eye protection should be routinely considered are:”
- carpenters, electricians, sanders
- machinists, mechanics/repairers, welders
- millwrights, plumbers/pipe fitters, laborers
- sheet metal workers, tinsmiths, assemblers
- grinding/lathe/milling, machine operators
- chemical process operators/handlers

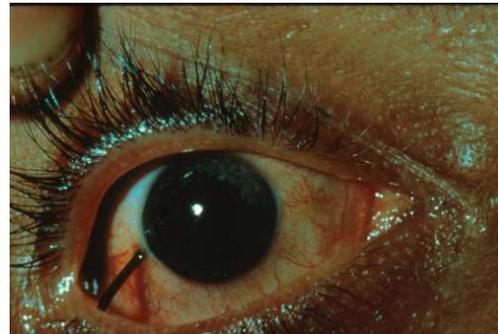
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Head Protection 1910.135

- Must be worn in areas with a potential for injury from falling objects.
- Helmets designed to reduce electrical shock hazards must be worn near exposed electrical conductors that could contact the head.
- (Prior to 7/5/94 comply with ANSI Z89.1-1969, after 7/5/94 comply with ANSI Z89.1-1986)

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Foot Protection 1910.136



- Must be worn when there is a danger of foot injuries due to falling or rolling objects
- Must be worn when there is a danger of objects piercing the sole
- Must be worn when there is a danger of electrical hazards
- ANSI Z41-1967 (purchase prior to 7/5/94)
- ANSI Z41-1991 (purchase after 7/5/94)

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Foot Protection

*not all-inclusive

- OSHA "...occupations for which foot protection should be routinely considered are:"
- carpenters, electricians, mechanics/repairers
- plumbers/pipe fitters, assemblers, drywall installers, welders, laborers, warehouse laborers
- stock handlers, gardeners, machinists, grounds keepers, structural metal workers
- shipping/receiving/stock clerks

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Foot Protection

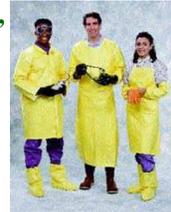


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Chemical Protective Clothing

- May include gloves, aprons, boots, coveralls, and other items made of impervious materials that should be worn to eliminate prolonged or repeated contact with solvents, chemicals, etc.



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Chemical Protective Clothing

- **Four Levels of Protection:**
- **Level A** -highest level respiratory/skin protection
- **Level B** - highest level respiratory/lesser degree skin
- **Level C** - airborne substances known-criteria for APR's met
- **Level D** - basic work uniform

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Level
A
Suites



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More Level A Suits

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Level B

Level C

Level C

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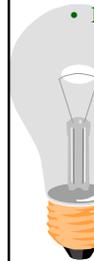
Electrical Protective Equipment 1910.137(a)



- Specific requirements for design manufacture and marking of:
 - Blankets
 - Matting
 - Covers
 - Line Hose
 - Gloves and Sleeves

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Electrical Protective Equipment 1910.137(a) cont.



- In service care and use requirements:
 - Maximum use voltages conform with Table I-5
 - Equipment must be inspected before each day's use & following incident(s) that may have caused damage - may NOT be used if any defects
 - Must be cleaned and stored properly
 - Specific requirements for protector gloves over insulating gloves
- Periodic testing of equipment is required, Table I-6 Reference 1910.137 (b)

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Hand Protection 1910.138



- Use when employees are exposed to:
 - Skin absorption
 - Severe cuts
 - Severe abrasions
 - Punctures
 - Chemical burns
 - Thermal burns /Temperature Ext.

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Gloves

Performance based selection criteria

- | Type | Color | Protection for: |
|------------|----------------|--|
| • PVA | red | aromatics, ketones, chlorinated solvents |
| • BUTYL | black | vapors/acids, alcohol |
| • NEOPRENE | various | oils/grease, alkalis, etc |
| • PVC | black | acids, fats, petroleum |
| • NITRILE | green/
blue | punctures, cut resistance |

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Gloves

Performance based selection criteria

- | Type | Color | Protection for: |
|----------------------------------|--------------|---|
| LATEX | various | most acids/alkalis |
| VINYL | clear | inorganic acids, alkalis, corrosives, inorganic materials |
| CANVAS | yellow/brown | abrasions |
| KEVLAR | various | heat, abrasions, common cuts |
| ALL DETAILS VARY BY MANUFACTURER | | |



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More Gloves...



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When should you NOT use gloves?

- When working with machinery with moving parts that could pull gloves and therefore hands also in to crushing/pinch points.

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Hearing Protection

1910.95 Hearing Conservation

What is Noise?

– Unwanted Sound

- Gunshots
- Power Tools
- Music
- Air Craft
- Nagging



- Noise causes Hearing Loss
- Noise interferes with Communication
- Noise can be Annoying

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How do we measure noise?

- The Decibel (Ten - Alexander G. Bell)

$$\text{Decibel} = 10 \log \frac{\text{Measured Level}}{\text{Reference Level}}$$

Reference level = level where we start to hear sound. (20 micropascals)

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Typical Industrial Noise Levels

Sound Level (dBA)	
Turbo Jet ----->	140 <-----Threshold of Pain (Rock Concerts)
	130
Steam Leak ----->	120 <-----Hydro-blasting
Steam Lance ----->	110 <-----Air Arcing
Compressor ----->	100 <-----Pneumatic Chipping
Diesel Truck ----->	90 <-----OSHA PEL _{8hour}
Hearing Protection Req. ----->	85 <-----MIG Welding
Heavy Traffic ----->	80 <-----Stick Welding
TIG Welding ----->	70
Control Rooms ----->	60 <-----Speaking Voice
	50
	40
	30 <-----Library
	20 <-----Whisper
Threshold of Hearing----->	10
	0

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Is Noise Exposure Harmful?

- Causes Temporary Threshold Shift (TTS)
- May cause Permanent Threshold Shift (PTS)
- Types of Hearing Loss
 - Conductive
 - Sensori-neural
 - Mixed
 - Central
 - Psychogenic

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Is Noise Exposure Harmful?

- Most common industrial hearing loss is Sensori-neural.
- It is PERMANENT!!

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OSHA Noise Standard 29 CFR 1910.95

Duration (hours)	Decibel Level
16	85
12	87
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

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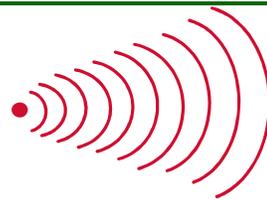
How do I protect myself?

- Avoid exposure
- Utilize engineering controls
- Wear personal protective equipment



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Reduce the Hazard



Inverse Square Law:

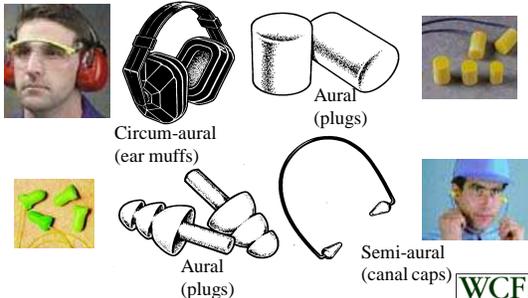
$$I_1(d_1)^2 = I_2(d_2)^2$$

NOTE: Twice distance = 1/4 intensity

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Types of Hearing Protection

Required when noise exposure is above OSHA Action limit of 85dBA TWA

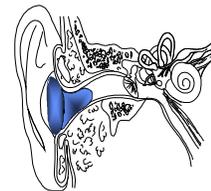


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Hearing Conservation Program

Required when noise exposure is above OSHA Action limit of 85dBA TWA

- Exposure Monitoring
- Audiometric Testing
- Hearing Protection
- Employee Training
- Recordkeeping



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Respiratory Protection (29 CFR 1910.134)

- **Purpose:** To ensure employees have the appropriate respirators, and they understand proper respirator use.
- **Application:** Any employee wearing a respirator in the workplace.



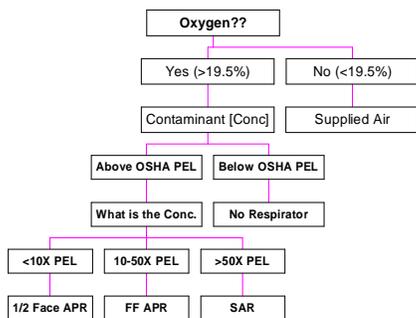
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Program Requirements:

- Written standard operating procedures governing the selection and use of respirators
- Respirator selection criteria
 - based on exposure type and concentration

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Respirator Selection Guide:



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Program Requirements: (cont)

- Workplace surveillance (IH monitoring etc.)
- Program review
- Employee medical evaluation prior to use
- Respirator "Fit Testing"
- Use only NIOSH approved respirators
- Training requirements (use & limitations)
- Respirator care and maintenance
 - cleaning & storage
- Respirator inspection



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Fall Protection 1926.500-503 Subpart M



- Employers have duty to provide protection when employees exposed to falls of 6 feet or more
- Employees working on surfaces (horizontal or vertical) with unprotected sides and edges 6 ft above lower level shall be protected by guardrail systems, safety net systems, or personal fall arrest systems

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Fall Protection cont.

- A *personal fall arrest system* is used to arrest an employee in a fall from a working level
- Consists of anchorage, connectors, body harness and may include a lanyard, deceleration device, lifeline, or suitable combination of these
- Rigging limits fall to 2 feet
- Anchorage to be independent of anchorage used for other purposes and shall be capable of supporting 5000 lbs per employee attached.

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Hazard Assessment



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Hazard Assessment

(Guidelines found in Appendix B to 1910 Subpart I).

- Must be performed by employer to determine if hazards exist or are likely to exist which require PPE
- Select the type of PPE and assure employees use it
- Assure PPE properly fits each affected employee
- Communicate the selection decisions to employees

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Hazard Assessment

(Appendix B to 1910 Subpart I).

- **Basic Hazard Categories:**
 - Source of *motion*
 - Sources of *high temperature*
 - Types of *chemical exposures*
 - Sources of *harmful dusts*
 - Sources of *light radiation*
 - Sources of *potential dropped/falling objects*

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Hazard Assessment

(Appendix B to 1910 Subpart I).

- **Basic Hazard Categories cont.:**
 - Source of *sharp objects* (might cut hands or pierce feet)
 - Sources of *rolling or pinching objects*
 - **Workplace layout - employee location**
 - Sources of *electrical hazards*

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Hazard Assessment Certification

- Certification must be written to show that an assessment has been performed
- Document must state it is a certification
- Must identify workplace evaluated
- Must identify person who did assessment
- Must include the date of assessment

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Hazard Assessment Exercise

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Training



- When required
- When necessary
- Appropriate use
- Limitations
- Proper care, maintenance, useful life, and disposal

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Training (cont.)

- Employee must demonstrate abilities prior to work with PPE
- Must be retrained if employee lacks skills or understanding



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Re-training

- **Required when:**
- **Change in workplace renders training obsolete**
- **Change in PPE renders training obsolete**
- **Inadequate use or employee knowledge is lacking**
- **When accident occurs**

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Training Verification/Documentation

- **Written certification of training requires:**
 - **Verification that each employee has received and understood the training**
 - **Name of each employee trained**
 - **Date of training**
 - **Subject matter of training given**

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Summary:

- **Employers must evaluate the workplace for hazards and provide means by which employees are protected from those hazards.**
- **PPE is “last resort” after other controls have not provided adequate protection.**
- **Employees must be trained in use, care, limitations, etc.**

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Thank You

Questions?

**Contact your safety representative
or call 1-800-446-COMP ext 8103.**

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