



MODULE 13

Personal Protective Equipment



Introduction

- Protective equipment = tools to do the job.
- Nearly 2 million disabling work-related injuries expected this year.
- More than $\frac{1}{4}$ will involve head, eyes, hands, feet





PPE Statistics from BLS

- Hard hats were worn by only 16% of those workers who sustained head injuries
- Only 1% of approx 770 workers suffering face injuries were wearing face protection
- Only 23% of the workers with foot injuries wore safety shoes or boots
- About 40% of the workers with eye injuries wore eye protection



Personal Protective Equipment in Oil and Gas

- What PPE is used in oil and gas?
- What injuries or illnesses does it protect against?
- Does it always succeed in protecting against these injuries or illnesses?
- Why or why not?



1910.132 General Requirements

(a) Protective equipment, including personal protective equipment for:

- Eyes,
- Face,
- Head, and extremities,
- Protective clothing,
- Respiratory devices, and
- Protective shields and barriers,

Shall be

- provided,
- used, and
- maintained in a sanitary and reliable condition
- wherever it is necessary by reason of **hazards of processes or environment**





1910.132 General Requirements

Hazards of processes or environment include :

- Chemical hazards,
- Radiological hazards, or
- Mechanical irritants
- Encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.



1910.132(d) Hazard Assessment

- Assess workplace to determine if hazards are likely to necessitate the use of personal protective equipment (PPE)
- If hazards are present the employer shall:
 - Select and have each affected employee use appropriate PPE for identified hazards
 - Communicate selection decisions
 - Select PPE that fits each employee



1910 Subpart I Appendix B

- Compliance guidelines for hazard assessment & personal protective equipment selection (non-mandatory)



1910.132(d) Hazard Assessment

- Written certification of hazard assessment identifies:
 - Workplace evaluated
 - Person certifying that the evaluation has been performed
 - Date(s) of the hazard assessment
 - Identification of document as a certification of hazard assessment



1910.132(f) Training

1. Employer must train employees before issuing PPE in at least these things:
 - i. When PPE is necessary
 - ii. What PPE is necessary
 - iii. How to properly don, doff, adjust, and wear PPE
 - iv. Limitations of the PPE
 - v. Proper care, maintenance, useful life and disposal of the PPE



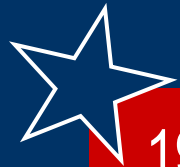
1910.132(f) Training

2. Workers must **demonstrate an understanding** of the training and the ability to use PPE properly
 - before being allowed to perform work requiring the use of PPE
4. Written certification, to verify that each employee has received and understood the required training, contains:
 - Name of each employee trained
 - Date(s) of training
 - Subject of the certification



1910.132(f) Training

3. Retraining necessary for employees without required understanding and skill:
 - Changes in the workplace
 - Changes in PPE used
 - Inadequate knowledge or use of PPE



1910.133

Eye and Face Protection



1910.133 Eye and face protection

- Employer assures that employee **uses** eye or face protection from hazards:
 - Flying particles
 - Molten metal
 - Liquid chemicals, acids or caustic liquids
 - Chemical gases or vapors
 - Potentially injurious light radiation



1910.133 Eye and face protection

- Side protection for flying objects
 - Detachable side shields OK





1910.133 Eye and face protection

- Employees with prescription lenses:
 - Incorporate prescription in eye protection or
 - Wear eye protection over prescription lenses
 - Without disturbing proper position of prescription lenses or the protective lenses



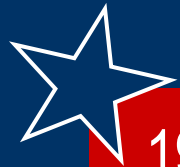
1910.133 Eye and face protection

- Each **affected** employee must wear appropriately shaded filter lenses for protection from injurious light radiation
- Tables in (a)(5)



Protective eye and face devices shall comply with ANSI Z87.1-1989





1910.134

Respiratory Protection



1910.134(a)(1) Permissible practice

- Primary objective: Prevent atmospheric contamination
 - Respiratory hazards: dusts, mists, fogs, fumes, sprays, smokes or vapors
- 1st Priority: Engineering controls:
 - Enclosure or confinement of the operation,
 - General and local ventilation, and
 - Substitution of less toxic materials
- Only where engineering controls are not feasible should respirators be used



1910.134(c)(1) Respiratory protection program

- Where respirators are required, you need:
 - Written program
 - Worksite-specific procedures
- Required elements:
 - Training
 - Fit testing
 - Medical evaluations
 - Care and maintenance
 - Procedures for respirator selection
 - Procedures for routine & emergency use



1910.134(c)(2) Where respirator use is not required

- If employer permits voluntary use:
 - Provide information in Appendix D
 - Implement elements of written program necessary to ensure
 - Medical ability to use
 - Cleaned, stored, maintained to not cause health hazard
 - Exception: Voluntary use of dust masks



1910.134(d) Selection of respirators

- Respirators must be NIOSH-certified
- Provide enough variety so user can find the right fit
- Cartridge change schedule for gases and vapors
- IDLH atmosphere = immediately dangerous to life and health
 - Specific supplied-air respirators necessary for IDLH use



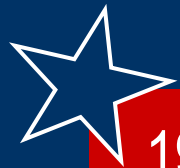
1910.134(e) Medical evaluation

- Respirator use causes physiological burden, varying with
 - Type of respirator
 - Job and workplace conditions
 - Medical status of employee
- Medical evaluation provided before:
 - Fit testing
 - Worker respirator use



1910.134(e) Medical evaluation

- Conducted by physician or other licensed health care professional (PLHCP)
- Additional evaluations if:
 - Employee reports related symptoms
 - PLHCP, supervisor, administrator recommends
 - Program information shows need
 - Change in workplace conditions increases physiological burden



1910.135

Head Protection



1910.135(a) General requirements

- a. Ensure that each affected employee wears a protective helmet where there is a potential for head injury from falling objects





Classes and Types of Hard Hats

- Type I hard hats - reduce force of impact from a blow to the top of the head
- Type II hard hats - provide protection against both side impact (lateral) and blows to the top of the head



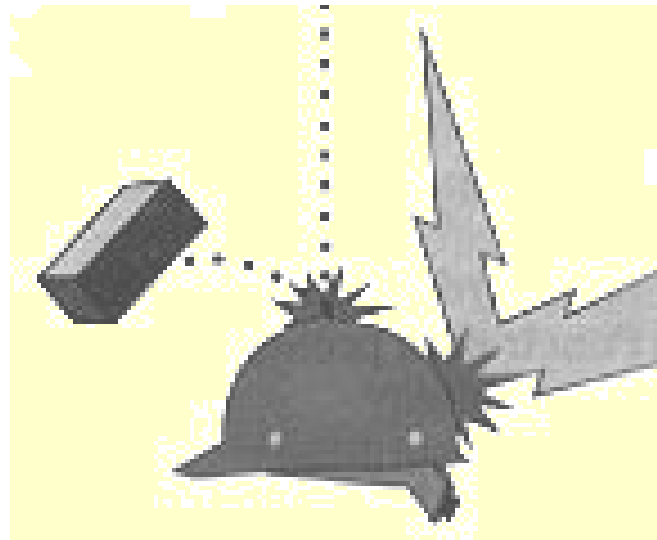
Classes and Types of Hard Hats

- Class G (old A) – General
 - Tested to withstand 2200 volts
- Class E (old B) – Electrical
 - Tested to withstand 20,000 volts
- Class C (old C) – Conductive
 - No electrical protection



1910.135(a) General requirements

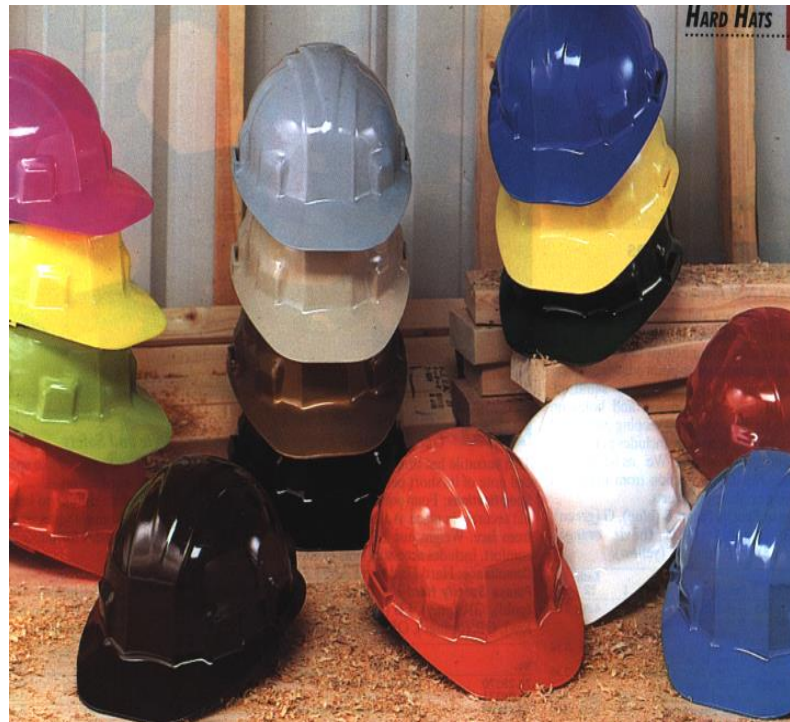
- b. Ensure that each affected employee wears a protective helmet designed to reduce electrical shock hazard when near exposed electrical conductors which could contact the head

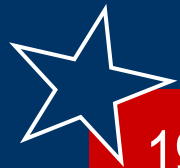




1910.135(b) Criteria for protective helmets

- Protective helmets shall comply with ANSI Z89.1-1986





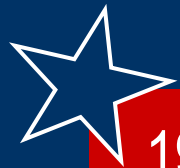
1910.136

Foot Protection



1910.136(a) General requirements

- Each affected employee must use protective footwear where there is danger of:
 - Falling or rolling objects
 - Objects piercing sole
 - Feet exposed to electrical hazards
- Protective footwear shall comply with ANSI Z41-1991



1910.138

Hand Protection



1910.138(a) General requirements

- a. Appropriate hand protection required for employee hand exposure to hazards such as:
 - Skin absorption of harmful substances
 - Severe cuts or lacerations
 - Severe abrasions
 - Punctures
 - Chemical burns
 - Thermal burns
 - Harmful temperature extremes



1910.138(b) Selection

- Employer selects based on:
 - Performance characteristics of the hand protection relative to the task(s) to be performed
 - Conditions present
 - Duration of use
 - Hazards and potential hazards identified



Common Types of Gloves

- **Disposable:** light-weight plastic; can help guard against mild irritants.
- **Fabric:** cotton or fabric blend; improve grip or insulate from heat or cold.
- **Leather:** guard against injuries from sparks or scraping against rough surfaces. Combine with an insulated liner when working with electricity.
- **Chemical Resistance:** nitrile, neoprene, vinyl, etc; protect hands from chemical exposure
- **Metal Mesh:** protect hands from cuts and scratches; used commonly with sharp instruments.
- **Aluminized Fabric:** insulate hands from intense heat; commonly used with molten materials



1910.95

Hearing Protection



1910.95 Occupational Noise Exposure

- OSHA measures noise in decibels in A scale (dBA) – calculation of one number for multiple frequencies
- TWA calculation, but nonlinear scale
- Permissible TWA: 90 dBA for 8 hours
- Table G-16: higher exposure, shorter time allowable



1910.95(c) Hearing conservation program

- Required for any employees exceeding 8-hour TWA of 85 dBA or 50% dose
 - Action level
- Monitoring, employee notification
- Audiometric testing
 - Baseline and annual
 - Evaluated for **standard threshold shift (STS)** (change in hearing sensitivity)



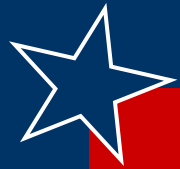
1910.95(i) Hearing protectors

- Available to all employees exposed over 85 dBA
- Replaced as necessary
- Must be worn by workers exposed >90 dBA, or before baseline or with STS
- Employees choose from variety
- Training, supervision of correct use
- Proper initial fitting



1910.95(j) Hearing protector attenuation

- Calculations in Appendix B
 - Cannot simply subtract Noise Reduction Rating (NRR) from dBA
 - Poor fit decreases attenuation
- Must attenuate to 90 dBA
- If STS has occurred, attenuate to 85 dBA
- Re-evaluate when noise levels increase



Other Regulations



Other Regulations

- 29 CFR 1926 Subpart E: Personal Protective and Life Saving Equipment
 - Construction operations only
 - If employees supply their own, employer assures adequacy and maintenance
 - Includes safety belts, lifelines, lanyards



Other Regulations

- API RP 54 section 5
 - Includes fall protection
 - Hearing protection includes 12-hour shift
 - No loose or poorly fitted clothing
 - Do not work in clothing saturated in hazardous substance – wash and/or treat skin and change clothes