Personal Protective Equipment

Some Images are very graphic

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Personal Protective Equipment

- Employer
  - Assess workplace for hazards
  - Provide PPE
  - Determine when to use
  - Provide PPE training for employees and instruction in proper use
- Employee
  - Use PPE in accordance with training received and other instructions
  - Inspect daily and maintain in a clean and reliable condition

Protecting Employees from Workplace Hazards

- Employers must protect employees from hazards such as falling objects, harmful substances, and noise exposures that can cause injury
- Employers must:
  - Use all feasible engineering and work practice controls to eliminate and reduce hazards
  - Use personal protective equipment (PPE) if the controls don’t eliminate the hazards.
Personal Protective Equipment Standard
29 CFR 1910.132

- Use personal protective equipment (PPE) if the controls don’t eliminate the hazards.
- PPE is the last level of control!

Hazard Control

- If...
  - The work environment can be physically changed to prevent employee exposure to the potential hazard,
- Then...
  - Engineering Controls
  - Administrative Controls
  - Work Practice Controls
  - PPE

Engineering Controls

- Assess the work area for Hazards
- Identify potential risks
- Research methods within an industry to find best practices and modify work space
- Add machine/equipment guarding if needed
- Make sure any new changes do not interfere with work processes and meet ANSI and OSHA standards

Administrative Controls

- Changing schedules
  - Examples
    - Starting earlier in the day to reduce heat exposure
    - Starting later in the day in cold weather
- Job rotation
  - Some tasks are more strenuous than others
    - Reduce weight of items or require assistance
  - Some tasks are tedious causing complacency
    - Mowing, plowing, sorting, driving...

Work Practice Controls

- Develop new procedures
  - Train employees on safer procedures
    - Adding water to Cutting and milling concrete
    - Requiring long pants when working outdoors
- Personal Hygiene
  - Maintaining clean uniforms/clothing
    - Wash reflective vests and other outer wear properly
  - Hand washing and keeping the skin clean
    - Remove oils and chemicals that get on the skin properly

Personal Protective Equipment

YOUR LAST LINE OF DEFENSE

70th Annual School for Highway Superintendents
PPE Program Development

This list of tasks requiring PPE is a “living document”, meaning new tasks or forgotten tasks should be added whenever identified.

Tasks that do not require PPE may also be added to show that they have been considered and PPE is not needed or may be recommended but not required.

PPE Basics

<table>
<thead>
<tr>
<th>Body Part</th>
<th>Example PPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye</td>
<td>safety glasses, goggles</td>
</tr>
<tr>
<td>Face</td>
<td>face shields</td>
</tr>
<tr>
<td>Head</td>
<td>hard hats, respirators</td>
</tr>
<tr>
<td>Feet</td>
<td>safety shoes</td>
</tr>
<tr>
<td>Hands and arms</td>
<td>gloves</td>
</tr>
<tr>
<td>Bodies</td>
<td>vests</td>
</tr>
<tr>
<td>Hearing</td>
<td>earplugs, earmuffs</td>
</tr>
</tbody>
</table>

Head Protection

1926.100(a)

Employees working in areas where there is a possible danger of head injury from impact, or from falling or flying objects, or from electrical shock and burns, shall be protected by protective helmets.

1926.100(b)(1)

The employer must provide each employee with head protection...

WARNING

This gallery contains graphic images that some viewers may find disturbing
Causes of Traumatic Head Injuries

- Falling objects such as tools
- Bumping head against objects, such as pipes or beams
- Contact with exposed electrical wiring or components

Head Protection


- This man’s injuries occurred on a construction site in England. No details were given. The note did say that his friends say he is “not the same man” that went to work that day.
- I think that is the understatement of the year!

Head Protection

- Class A
  - General service (building construction, shipbuilding, lumbering)
  - Good impact protection but limited voltage protection
- Class B
  - Electrical/Utility work
  - Protects against falling objects and high-voltage shock and burns
- Class C
  - Designed for comfort, offers limited protection
  - Protects against bumps from fixed objects, but does not protect against falling objects or electrical shock

Eye Protection

- I’ll get you next time, my pretty!

Eye & Face Protection

29 CFR 1910.133

- It sure is nice being able to see this sign!
When must protective Eye Wear be provided?

When any of these hazards are present:
• Dust and other flying particles, such as metal shavings or sawdust
• Corrosive gases, vapors, and liquids
• Molten metal that may splash
• Potentially infectious materials such as blood or hazardous liquid chemicals that may splash
• Intense light from welding and lasers

Criteria for selection:
• Protects against specific hazard(s)
• Comfortable to wear
• Does not restrict vision or movement
• Durable and easy to clean and disinfect
• Does not interfere with the function of other required PPE

Eye Protection - Goggles

• Protects eyes and area around the eyes from impact, dust, and splashes
• Some goggles fit over corrective lenses

Employees that wear prescription glasses:
• Ordinary glasses Do Not Provide Protection!
Proper choices include:
• Prescription glasses with side shields and protective lenses
• Goggles that fit comfortably over corrective glasses without disturbing the glasses
• Goggles that incorporate corrective lenses mounted behind protective lenses
• Over the Glasses- glasses

Face Shields

Full face protection:
Protects face from dusts and splashes or sprays of hazardous liquids
May not protect from impact hazards
Wear safety glasses or goggles underneath

Safety Glasses?

CAUTION
WEAR GOGGLES OR SAFETY GLASSES WITH FACE SHIELD WHEN USING GRINDER
Safety Third!

3 of these things belong together
3 of these things are kind of the same
If you guess which thing doesn’t belong here.
That’s the one that is going to be safe!

Face Shield

She was wearing her face shield. Too bad it was flipped up instead of down!

Welding Shields

Protects eyes against burns from radiant light
Protects face and eyes from flying sparks, metal spatter, & slag chips produced during welding, brazing, soldering, and cutting

Welding safety

Hearing Protection

1926.101(a)
Wherever it is not feasible to reduce the noise levels or duration of exposures to those specified in Table D-2, Permissible Noise Exposures, in 1926.52, ear protective devices shall be provided and used.

<table>
<thead>
<tr>
<th>Duration per day, hours</th>
<th>Sound level dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>1-1/2</td>
<td>102</td>
</tr>
<tr>
<td>1</td>
<td>105</td>
</tr>
<tr>
<td>1/2</td>
<td>110</td>
</tr>
<tr>
<td>1/4 or less</td>
<td>115</td>
</tr>
</tbody>
</table>

Table 1. Some typical noise levels found in construction sites
Hearing Protection

Graph 1: Average dB(A) for Some Construction Trades / Activities

Voluntary Hearing Protection

Most DPW employees are not exposed to noise that exceeds the time weighted allowance.

Thus, in most cases employers are not required to have a hearing protection program.

Therefore, employees must protect themselves when noise levels exceed dangerous levels.

Employers only need to make the hearing protection devices available for employees to use as needed.

Foot Protection

When any of these are present:
- Heavy objects such as barrels or tools that might roll onto or fall on employees’ feet
- Sharp objects such as nails or spikes that might pierce ordinary shoes
- Molten metal that might splash on feet
- Hot, wet or slippery surfaces

Foot Protection

Impact-resistant toes and heat-resistant soles protect against hot surfaces common in roofing and paving.
- Some have metal or Kevlar insoles to protect against puncture wounds
- May be electrically conductive for use in explosive atmospheres, or nonconductive to protect from workplace electrical hazards

Foot Protection

Working on a county road crew this employee had on a leather work boot. He recently purchased them for just under $200.00 just a few weeks before the incident. He and two other men were clearing debris from the roadside. They pulled out a large branch and a piece of concrete (about 250 pounds) that had been dislodged by plowing rolled down onto his foot. Had he been wearing steel toes you would not be looking at this picture.

Hand Protection

*Employee was reaching down to pick up something while using an edger.*
Hand Protection
Hand protection must be used to prevent:
• Burns
• Bruises
• Abrasions
• Cuts
• Punctures
• Fractures
• Amputations
• Chemical Exposures

Various types of hand protection must be available for various hazards.

Hand Injuries
Vehicle Roll Over hand went outside the cab.

Incident occurred on an excavation/trenching job.

What Kinds of Protective Gloves are Available?
• Durable gloves made of metal mesh, leather, or canvas
  — Protects from cuts, burns, heat
• Fabric and coated fabric gloves
  — Protects from dirt and abrasion
• Chemical and liquid resistant gloves
  — Protects from burns, irritation, and dermatitis
• Rubber gloves
  — Protects from cuts, lacerations, and abrasions

Some types of Gloves

Butyrl provides the highest permeation resistance to gas or water vapors.

Nitrile protects against solvents, harsh chemicals, fats and petroleum products and also provides excellent resistance to cuts and abrasions.

More Types of Gloves

Kevlar protects against cuts, slashes, and abrasion.

Stainless steel mesh protects against cuts and lacerations.
PROTECT YOUR HANDS!

Leg Protection
Criteria for Selection

• Provide protective clothing for parts of the body exposed to possible injury
• Types of hazards:
  – Hot Surfaces
  – Insects and Vermin
  – Brush and limbs
  – Tools
  – Chemicals

Leg Protection
Criteria for Selection

Work Pants

Leg Protection
Injuries

The DPW employee stepped out from behind a vehicle as another vehicle was passing. Part of the vehicle caught the skin on his leg and ripped it open.

Accident investigators determined that if he had been wearing pants most likely the pants would have been ripped and not the skin.

Leg Protection
Injuries

Insect Bites

Leg Protection
Injuries

This employee was working sanitation and scraped his ankle while wearing shorts.

He did not treat it and keep it clean. A week later he was admitted to the hospital for IV antibiotics and nearly lost his foot to the infection.

Body Protection

70th Annual School for Highway Superintendents
Major Causes of Body Injuries

- Intense heat
- Splashes of hot metals and other hot liquids
- Impacts from tools, machinery, and materials
- Cuts
- Hazardous chemicals
- Radiation
- Insect bites and stings

Body Protection

Criteria for Selection

- Provide protective clothing for parts of the body exposed to possible injury
- Types of body protection:
  - Vests
  - Aprons
  - Jackets
  - Coveralls
  - Full body suits

Body Protection

Sun Burn

Well tanned people can still burn!

Body Protection

Chain Saw Injury

- This DPW employee was clearing downed limbs from a roadway during a storm event.
- His chaps were wet from a previous call so this time he chose not to wear them.
- There was only one limb across the roadway and he only needed to make one cut to be able to pull it clear.

Body Protection

Fall Protection

"You weren't listening. I said, 'Don't fall.'"
Fall Protection

Falls are a leading cause of death for municipal employees.

Only Motor vehicle accidents cause more deaths than falls for Municipal employees.

Falls from ladders, scaffolds, roofs and vehicles are some of the most common causes of injury and death for Highway workers.

Anatomy of a Fall

- It takes most people about 1/3 of a second to become aware.
- It takes another 1/3 of a second for the body to react.
- A body can fall up to 7 feet in 2/3 of a second.

When must Fall protection be used?

Construction industry regulations (paraphrased)
Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side, edge, or hole which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.

Who is responsible?

**Competent Person** means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

When Is Fall Protection Required?

- No fall protection is required for portable extension ladders
- Your safety is your responsibility when working from a ladder

Fall Protection

Beside all the known hazards, roof edges, open holes, railings there may be times when fall protection is needed in your day.

You should be prepared and know how to use it if the need arises.

Fall Protection in a bucket can be an easy, safe way to keep protection on hand, in case it is needed. The bucket keeps it clean and in good condition.

Each job is different, knowing proper anchoring methods is essential, but just putting on the harness can be tricky.

VOLUNTEER???
 Anyone??
 Buehler???
Respiratory Protection

When effective engineering controls are not feasible in the control of occupational diseases caused by breathing contaminated air, appropriate respirators shall be used.

Contaminants requiring respirators may include:
- Harmful Dusts, Particulates (silica)
- Fumes (welding)
- Mists, Vapors, Fogs, Sprays (gasoline, spray painting)
- Gases (confined spaces – O2, H2S, CO2)

Respiratory Protection Program

Respiratory Program Administrators are responsible for:
- Determining which tasks require respiratory protection.
- Selecting the proper respirator for a specific application.
- Conducting employee training and conducting fit testing.
- Ensuring that employees clean, maintain and properly store respirators.
- Conducting periodic evaluations of the respiratory program to ensure that it is achieving its desired goal.

Respiratory Protection Program

Supervisors are responsible for:
- Ensuring that appropriate, approved type respirators are available for use.
- Ensuring that employees wear the required respirators.
- Conducting periodic inspections to ensure employees are maintaining their respirators, which would include cleaning, sanitizing, and proper storage.

Respiratory Protection Program

Employees are responsible for:
- Using the respiratory protection in accordance with the training received.
- Inspecting, cleaning, sanitizing, and proper storage of their respirator.

Respiratory Protection Program

The type of respirator chosen is based on:
- The type(s) and concentrations of airborne contaminant(s).
- The characteristics and location of the hazardous area.
- The worker activities in the hazardous area.
- The capabilities and limitations of the respirators.
- Duration of respirator use.
- Selection will be made according to Practices for Respiratory Protection® American National Standards Institute (ANSI) Z88.2-1980.
- Only respirators having NIOSH approval will be used.

Respiratory Protection

Silica Dust – 1926.55 – Silica Exposure Activities
- Sand/abrasive blasting
- Tuck-pointing
- Jack hammering concrete
- Brick/block cutting
- Concrete cutting & drilling
- Demolition
- Stone cutting
- Foundry work
- Tunneling
- Rock drilling
- Quarrying
What is Silicosis
A disabling and often fatal lung disease caused by breathing very small “respirable” particles of crystalline silica.

- 14,000 deaths since 1968
- 200 deaths a year in the U.S.

Diseased and healthy lung
Compare these sections cut from a diseased lung with large cavities (left) and a pink, healthy lung (right). The diseased lung shows a case of miner’s phthisis (also known as silicosis) which has led to tuberculosis. Quartz dust is inhaled by miners, and trapped in the lungs causes silicosis making the victim more susceptible to diseases such as tuberculosis and pneumonia.

A Case for Respiratory Protection
Concrete Cutting (Dry) Example

- 6 % silica
- 2.27 mg/M³ PEL
- 16.3 mg/M³ (68 min)
- 2.31 mg/M³ 8 hr TWA
- Gas saw dry cuts hole in concrete masonry
- 7/10 % of PEL for 68 minute sample time
- EXCEEDED PEL

Respiratory Protection Program
Employers must assess the workplace and determine if there are exposures present that require the use of respirators. (Example - respirators required)

This employee was carrying a crow bar and tripped. He was impaled 10 inches. The iron bar lacerated his stomach and liver. The bar is visible on the left.

Distraction is a Primary Cause of Most Accidents!
He said he was carrying the bar back to the truck, heard a friend and turned to look and the next thing he knew, he fell. He started to get up but realized he was in a lot of pain. That is when he noticed the bar impaled him.

Safety may not be fashionable
Yes, that is Posh Spice in the middle.
Summary

Employers must implement a PPE program where they:

- Assess the workplace for hazards
- Use engineering and work practice controls to eliminate or reduce hazards before using PPE
- Select appropriate PPE to protect employees from hazards that cannot be eliminated
- Inform employees why the PPE is necessary, how and when it must be worn
- Train employees how to use and care for their PPE, including how to recognize deterioration and failure
- Require employees to wear selected PPE
- REMIND EMPLOYEES PPE IS THE LAST LINE OF DEFENSE!

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