

Personal Protective Equipment

Hazard Assessment and Selection



Slide Show Notes

- Welcome to the training session about protective clothing. This session is designed for supervisors and facility managers to help you conduct hazard assessments and to select the appropriate personal protective equipment (PPE) for your employees on the basis of the hazard assessments.

Session Objectives

You will be able to:

- Understand the PPE hazard assessment process
- Select appropriate PPE for the job
- Show employees how to properly wear and care for PPE

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By the end of the training session, you will be able to:

- Understand how a PPE hazard assessment is conducted, which involves evaluating the workplace and job functions for any potential hazards that can be controlled through the use of PPE.
- Select the proper PPE to protect against the hazards found during the hazard assessment.
- Show employees how to properly wear and care for their PPE.

Hazard Assessment

- Evaluate every job function in every department
- Determine if hazards are present
- Check for hazards to eyes, respiratory system, head, feet, hands
- Determine what PPE will protect against hazards



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Before you can select PPE, you must know what hazards your employees may be exposed to. Information about hazards is collected through a hazard assessment. Here's an overview of how the assessment is conducted:

- Evaluate every job function in every department for potential hazards.
- The purpose of a hazard assessment is to evaluate the workplace and job functions to see if employees are exposed, or potentially exposed, to hazards that might cause injury. A simple checklist can be used to determine if hazards are present.
- The checklist will cover hazards to the eyes, respiratory system, head, feet, and hands.
- Next, determine what type of PPE will protect against the specific hazards found. For example, determine if safety glasses are adequate or whether the worker will need goggles.

Develop a simple checklist that includes the items listed on the following slides for each part of the body. Use the checklist to evaluate each job to determine if potential hazards are present.

Eye and Face Assessment

- Flying particles
- Molten metal
- Liquid chemicals



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Hazard assessments are conducted to protect each part of the body. We'll start with the eyes and face.

- Evaluate the workplace to determine if employees are exposed to flying particles such as dusts from grinding, metal chips from machine shop equipment, and wood chips from a cabinet shop. Flying particles cause the majority of eye-related injuries.
- Determine if your employees are exposed to any molten metal that might splash up and damage the eyes or burn the face.
- Liquid chemicals are also a very common eye and face hazard. Aerosol cans, cleaning solutions, solvents for cleaning metal parts, and spray adhesives or paints are all examples of liquid chemicals that might be sprayed or splashed on a worker's face or eyes.

Eye and Face Assessment

(cont.)

- Acid or caustic liquids
- Chemical gases or vapors
- Potentially injurious light radiation

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- Acid and caustic liquids are especially dangerous because of the extreme damage they can do to the eyes and face. Acids are often used for etching metals, and caustic liquids are used in a number of cleaning processes. Battery acid from electric forklifts is another common eye hazard.
- Chemical gases and vapors can also damage the eyes. Propane, used to power many forklifts, is very cold and could cause severe eye damage. Vapors or gases can cause eye redness or irritation.
- Potentially injurious light radiation refers to the bright light during welding and cutting operations as well as laser operations. Eyes can be severely damaged when an employee looks directly into welding or laser operations.

Modify this slide to describe the specific hazards in your workplace.

Ask trainees to think of other potential eye and face hazards specific to the workplace that are not listed on this slide.

Respiratory Protection Hazard Assessment

Assess the workplace:

- Inhalation of airborne dusts or particulates
- Inhalation of chemical vapors or fumes
- Lack of adequate oxygen



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For respiratory hazards, assess the workplace for the following conditions.

- Evaluate the workplace for the potential inhalation of airborne dusts or particulates. These dusts might be from grinding, cutting, sanding, or welding operations. Other dusts are from grains, wood chips, or other solid granular materials.
- Assess for chemical vapors or fumes, which can come from any type of chemical handling operations. Using solvents, spraying with aerosol cans, painting operations, bulk loading or unloading of chemicals, and handling drums of chemicals are just a few examples of jobs that could result in inhalation of chemical vapors or fumes.
- Lack of oxygen typically refers to jobs that require confined space entry in which there may be insufficient oxygen for a worker to enter without respiratory protection.

These are the primary types and causes of respiratory injuries. Can you think of any other potential respiratory hazards specific to your workplace that are not listed on this slide?

Modify or delete this slide and the next slide as they apply or do not apply to your workplace.

Respiratory Protection Hazard Assessment (cont.)

- Identify the specific source(s) of respiratory hazard
- Review the work processes to determine the hazard source and magnitude
- Monitor the exposure

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Once the assessment has identified the potential for exposure to dusts, chemical vapors, or a lack of oxygen, it must go deeper and include:

- Identification of the hazardous substance(s) that may be the source of the respiratory hazard(s).
- Review of work processes to determine where hazardous exposures occur as well as the magnitude of the exposure(s).
- Exposure monitoring to measure potential hazardous exposures.

Modify or delete this slide as it applies to your workplace.

Head Hazard Assessment

- Falling objects
- Exposed electrical conductors
- Low-hanging obstructions



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- Determine if the job exposes workers to objects that could potentially fall from above. If employees work in an area where other workers are above them on catwalks or mezzanines, there is potential for falling objects.
- If employees are potentially exposed to electrical conductors, they need to protect their heads with appropriate hard hats.
- Low-hanging obstructions present another head hazard—as when an employee needs to walk or crawl under equipment for cleaning or maintenance.

These are the primary causes of head injuries. Can you think of any other potential head hazards specific to your workplace that are not listed on this slide?

Foot Hazard Assessment

- Falling, rolling, or sharp objects
- Electrical hazards
- Slippery walking surfaces
- Hazardous chemicals
- Cold weather conditions



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- Employees who handle heavy metal parts or tools might accidentally drop a heavy object on their foot. Some workplaces expose employees to heavy rolling objects such as large rolls of paper and forklift tires. Both falling objects and rolling objects could crush a worker's foot. Some workplaces expose workers to objects that might pierce the sole of their shoe and foot.
- Employees working with or around electrical systems or equipment need to wear well-insulated, nonmetal footwear.
- Slippery walking surfaces may result in falls. Although the injury is not likely to occur to the foot itself, it is still considered a foot hazard because better footwear could prevent that type of incident.
- Employees who work with hazardous chemicals may be subject to splashing or other events that could result in hazardous chemicals contacting the feet.
- Employees who are working in cold weather conditions need to protect your feet from the obvious hazard of frostbite.

These are the primary types and causes of foot injuries. Can you think of any other potential foot hazards specific to your workplace that are not listed on this slide?

Hand Hazard Assessment

- Skin absorption of harmful substances
- Severe cuts or lacerations
- Severe abrasions



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- Evaluate the workplace to determine if employees' hands are exposed to harmful substances that might be absorbed through or damage the skin. Harmful substances might include liquid and solid chemicals such as solvents, oils, fertilizers, paints, and cleaners.
- Machines or equipment could cause severe cuts or lacerations. These machines should have appropriate guarding to protect against cuts or lacerations. However, employees still need to be made aware of the hazards of this equipment to their hands. Cutting equipment such as saws or drills can cause severe injury if a hand is placed in the point of operation. Hand tools such as box knives can also cause cuts. Straps or wires used in packaging boxes can cause lacerations if handled improperly.
- Abrasions include mild skin scrapes, severe skin scrapes, tearing of the skin, and removal of the skin (called de-gloving). Sanders, grinders, conveyor belts, rotating shafts (cams, flywheels), scrap metal, or broken glass can cause severe abrasions or cuts if the equipment is not guarded or if items are handled with unprotected hands.

Hand Hazard Assessment

(cont.)

- Punctures
- Chemical burns
- Thermal burns

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- Punctures can be caused by many tools or machines. Drills, nail guns, and screwdrivers are examples of tools that can cause punctures. Even metal and wood splinters can cause deep punctures and infection. Be sure to wear protective gloves when handling wood or metal.
- Chemical burns can be caused by handling acids, caustics, and many cleaning chemicals. The severity of the burn depends on the concentration of the corrosive chemical.
- Thermal burns can result from welding, cutting, and brazing operations. Steam equipment, such as boilers, has many hot tanks and pipes that could cause burns. Some industries use ovens for baking, drying, or annealing, and these are obvious burn hazards.

Ask trainees to think of any other potential hand hazards specific to your workplace that are not listed on this slide. Other hazards might include repetitive motion or exposure to vibration.

Clothing Assessment

- Hot or cold materials or objects
- Chemicals
- Welding hazards
- Heavy, sharp, or rough materials
- Moving machinery



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- Employees who work around hot or cold materials or objects are subject to skin damage. Employees who work around steam lines or in refrigerated environments may need protective equipment or clothing.
- Employees who work with chemicals may need to wear protective clothing in addition to protective gloves, boots, and eyewear.
- Welders often need to wear fire-resistant clothing to prevent being burned by the sparks created by welding.
- Employees who work with heavy, sharp, or rough materials or objects are subject to cuts or abrasions on the body, arms, or legs.
- Workers around moving machinery may get loose clothing caught in the machinery and need to avoid wearing loose clothing.

Hazard Assessment—Any Questions?

- Any questions about conducting a PPE hazard assessment?

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- Are there any questions about conducting a PPE hazard assessment?

Selecting Eye and Face Protection

- Safety glasses
- Goggles
- Face shields
- Shaded filter lenses
- Prescription eyewear
- Must comply with ANSI Z87 specifications



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- Safety glasses with side protection are designed to protect against flying objects such as metal or wood chips.
- Goggles are designed to protect the eyes from floating dusts, liquid materials, and chemical gases and vapors.
- Face shields are designed to protect workers from chemical splashes, hot slag, flying debris, and molten metals. Make sure the face shield selected is appropriate for the hazard.
- Shaded filter lenses are worn to protect workers exposed to potentially injurious light radiation such as from welding operations or when working around certain laser equipment.
- Workers should be discouraged from wearing contact lenses when exposed to hazards such as dust, chemicals, and high temperatures. Consider purchasing prescription safety glasses.
- All eye and face protection approved for use in the workplace will be marked “Z87,” which means that it is designed according to the American National Standards Institute (ANSI) standard for eye PPE.

Bring examples of the different types of eye protection that have been selected for each hazard identified in your company’s hazard assessment.

Wear and Care of Eye Protection

- Fits comfortably
- Does not distort or block vision
- Put on before exposure to the hazard
- Clean with soap and water
- Dispose when scratched or damaged

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- Eye and face protection should fit comfortably. Eyewear should not pinch your nose or put pressure on your head. If it is not comfortable, employees are less likely to wear it.
- Eyewear should not distort or block your vision. If employees are experiencing dizziness or headaches from wearing eye protection, try another style or brand of eye protection.
- Just remember to put on eye protection before exposure to the hazard. This seems like an obvious statement, but many eye injuries occur each year because the worker forgot to put on the eye protection before starting the task that put them at risk.
- Keep eye and face protection clean so your vision is not blurred or blocked. Soap and water is the most common way to clean eye and face protection. Special cleaning products can be purchased that contain antifog chemicals. If exposed to dust or liquid chemicals when wearing goggles, be sure to clean the top rim of the goggles before removing them so that any accumulations of dust or chemicals do not drip or fall into your eyes when the goggles are removed.
- Dispose of eye and face protection when they become scratched and distort your vision or become otherwise damaged so they do not fit correctly or adequately protect against the hazard.

Selecting Respiratory Protection

- Filtering facepiece (dust mask) for dust only
- Air purifying respirator is most common type
- Choose cartridges carefully

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- A filtering facepiece, commonly called a dust mask, is worn when employees are exposed to dusts. Employees exposed to low levels of dust may voluntarily wear a dust mask. Employees exposed to high levels of dust that exceed permissible exposure limits (PELs) must wear a filtering facepiece.
- Both full-face and half-face air-purifying respirators utilize a cartridge or filter to purify the air breathed by workers, and provide protection from chemical vapors or fumes. Air-purifying respirators must be worn by employees when monitoring shows that the PEL has been exceeded. Employees exposed below the PEL may voluntarily wear a respirator.
- Air-purifying respirators use a number of different types of cartridges. One cartridge will not filter out all types of chemical contaminants, so it is important to select the appropriate cartridge for the contaminant. In addition, employers need to determine how long it may take for the chemical to “break through” the cartridge and therefore determine how often cartridges must be changed..

Selecting Respiratory Protection (cont.)

- Air-supplied respirator for high chemical concentrations
- Self Contained Breathing Apparatus (SCBA)
- All respirators must be NIOSH-approved

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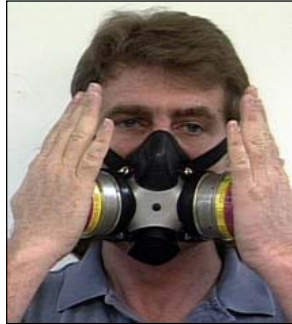
Slide Show Notes

- Air-supplied respirators are used for exposures to high concentrations of chemicals or in atmospheres that do not have adequate oxygen.
- SCBAs are used in conditions that are considered immediately dangerous to life and health (IDLH), such as an emergency response to chemical spills.
- All respirators and filtering facepieces used in the workplace must be certified by the National Institute for Occupational Safety and Health (NIOSH).

Bring examples of the different types of respiratory protection that have been selected for each of the hazards identified in your company's hazard assessment

Wear and Care of Respiratory Protection

- Medical approval required
- Conduct a fit test
- Inspect before each use



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- Workers who wear respirators must be medically approved. Our company's Respiratory Protection Program has more details concerning medical approval.
- Workers who wear respirators must be fit tested annually. Fit testing involves the use of smoke or saccharin to see if the respirator seals to the worker's face properly.
- Employees must inspect the respirator before each use and look at elements such as the seal, head straps, valves, and cartridges for signs of cracking, wear, or other damage. Any damaged parts should be discarded and replaced.

Wear and Care of Respiratory Protection (cont.)

- Check the seal
- Clean regularly
- Store properly

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- Each time a worker puts on a respirator, a seal check should be conducted to make sure the respirator seals to their face properly. The positive seal check involves exhaling while blocking the exhalation valve to see if air escapes from the face seal of the respirator. The negative seal check involves covering the inhalation valves while inhaling. The respirator should stay caved in. If it doesn't, the seal leaks.
- Respirators must be cleaned regularly. Daily cleaning might involve using an alcohol wipe. A thorough cleaning involves taking the respirator apart and cleaning it in soap and water and allowing the parts to air dry.
- Respirators must be stored properly to protect them from dust and other contaminants. Put the respirator in a sealed plastic bag and store it so that the natural shape is retained.

Selecting Head Protection

- Hard hats protect from impact or penetration
- Use electrical insulation hard hats around electricity
- Use bump caps around low-hanging objects
- Must comply with ANSI Z89 standard



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- Hard hats are commonly made of high-density polyethylene so they are lightweight and yet strong enough to protect from the impact and penetration of falling objects.
- Some hard hats are specifically designed to reduce electrical shock and will protect against electrical hazards such as power lines. Do not assume that your hard hat will protect against electrical hazard just because it is made of nonconducting materials.
- Bump caps are intended to protect from injury against low-hanging objects, such as pipes, steel structures, or machinery components. Bump caps are not intended to protect against falling objects or electrical hazards.
- Hard hats used in the workplace must be designed according to ANSI standards and be marked with “Z89” to show that they meet these standards.

When discussing the selection of head protection, bring examples of the different types of head protection that have been selected for each of the hazards identified in your company’s hazard assessment.

If possible, have your safety supply vendor let you borrow a variety of different types of head protection for demonstration so employees can pick out the equipment that works best for them and meets the requirements of their jobs.

Wear and Care of Head Protection

- Fit comfortably
- Inspect before each use
- Clean regularly
- Used only to protect the head

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- Head protection should fit comfortably. There are many different types of suspension systems for hard hats. Employees should be trained how to adjust the suspension so it fits properly.
- Inspect hard hats before every use. Check for cracks or any other signs of damage that could reduce the integrity of the hard hat. Inspect the suspension system for cracks, worn straps, or any other damage. Make sure the suspension system is installed properly in the hard hat and not put on backwards.
- Clean regularly with soap and water.
- Use hard hats for their intended purpose—to protect your head. Using hard hats as a seat, step stool, etc., may reduce their integrity so they do not adequately protect your head if you are struck by a falling object.

Selecting Foot Protection

- Steel toes
- Metatarsal protection
- Puncture or slip-resistant soles
- Chemical resistance
- Waterproof and cold weather footwear
- ANSI Z41



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- Steel-toed work boots or shoes will protect against hazards such as falling or rolling objects that might otherwise crush a worker's toes.
- Footwear is available to protect the metatarsal against falling or rolling objects. Some footwear has steel in the heel and along the ankle to protect the ankle from being twisted or otherwise damaged.
- Footwear is also available with soles to protect against puncture hazards. Boots with slip-resistant soles should be worn on wet or slippery floors. Water requires a different type of sole than a surface that is covered with an oily product.
- If exposed to liquid chemicals, acids, or caustics that could splash feet, workers will need appropriate chemical-resistant boots.
- Workers in wet or muddy conditions should have rain boots made of PVC or rubber to keep their feet dry. Employees who work outside in winter or in refrigerated environments should have footwear with special liners that insulate against the cold.
- Protective footwear should be marked "Z41" to show it complies with ANSI standards.

Bring examples of the different types of foot protection that have been selected for each of the hazards identified in your company's hazard assessment.

Wear and Care of Foot Protection

- Should be comfortable
- Inspected before each use
- No cracks or holes in chemical or waterproof boots
- Soles checked for excessive wear
- Kept clean

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Slide Show Notes

- Just like everyday shoes, work footwear must be comfortable.
- Inspect your footwear before each use.
- Chemical-resistant and waterproof footwear should be checked for holes or cracks.
- Soles, especially slip-resistant or puncture-resistant soles, should be checked daily for excessive wear.
- Keep your work footwear clean and dry. Spray off mud, dirt, or chemicals after each use to keep the footwear in good condition.

Selecting Hand Protection

- Chemical-resistant gloves
- Kevlar, metal mesh, cut-resistant gloves
- Leather work gloves
- Extreme temperature gloves
- Electrical work gloves



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- Ensure that the appropriate chemical-resistant glove will protect against the chemical being used. Gloves can be made of rubber, latex, viton, butyl, nitrile, neoprene, or PVC, and are graded by the manufacturer for degradation, breakthrough time, and permeation rate.
- Employees working with saws, using knives, or handling glass should wear cut- or puncture-resistant gloves. When working with sharp blades, steel mesh gloves are effective.
- The most common gloves used to protect hands from cuts and scrapes are typically made of leather or canvas and can also be coated with materials that improve grip.
- For burn protection, wear gloves made of terry cloth, leather, or pigskin. Welders may need sleeves or other clothing to protect from burns. When exposed to cold conditions, wear gloves with liners. Consider other features such as grip or cut resistance.
- Electricians need lineman's gloves designed for different levels of voltage. High-voltage gloves are black rubber with a red interior so any cuts or damage to the outside layer can be easily seen. Liners are also worn under the gloves to absorb perspiration.

Bring examples of the different types of hand protection that have been selected for each of the hazards identified in your hazard assessment.

Wear and Care of Hand Protection

- Comfortable fit
- Inspect gloves before each use
- Keep clean and dry
- Discard if damaged or contaminated

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- Hand protection should fit comfortably and should not be so tight that it limits hand movement or so loose that it presents a hazard of being snagged or reducing the worker's dexterity.
- Inspect your gloves before each use. Check chemical gloves for cracks, holes, cuts, or other signs of damage. Cut-resistant gloves should be checked for cuts or wear. Check normal work gloves for unusual wear or other damage. Electrician's gloves should be checked for any cuts or scrapes. Aluminized heat-resistant gloves should be checked for abrasions to the outside surface and damage to inner linings.
- Keep gloves clean and dry. Decontaminate chemical-resistant gloves after every use.
- Discard gloves if they are damaged or contaminated.

Selecting General Work Clothing

- Long-sleeve shirts and long pants
- Flame-retardant clothing
- No loose clothing or jewelry
- Chemical-resistant clothing



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- Long-sleeve shirts and long pants will protect against skin damage from contact with hot or cold objects. Workers in cold environments will also need to wear coats and pants that are made for cold weather conditions. Long-sleeve shirts and long pants will also protect against sharp or rough materials, such as wood or metal, that could cause cuts or abrasions.
- Flame-retardant clothing should be worn by welders and grinders exposed to hot sparks.
- Loose clothing and jewelry are prohibited for workers exposed to moving machinery because the machinery might grab loose sleeves, ties, lapels, cuffs, watches, bracelets, or rings, and pull workers into machines.
- Workers using chemicals need the appropriate type of chemical-resistant clothing that protects against the specific chemicals they work with.

Clarify what clothing is and is not required to protect workers against the specific hazards in your workplace.

Selecting PPE—Any Questions?

- Any questions about selecting the proper PPE?
- Questions about how to wear and care for the PPE?

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- Are there any questions about selecting the proper PPE to protect against the hazards that were identified during the hazard assessment?
- Are there questions about how to wear and care for the PPE?

Key Things to Remember

- Conduct a hazard assessment to ensure all parts of the body are protected
- Conduct and certify the assessment for each job
- Select the appropriate PPE for the hazard(s) identified
- Train employees how to wear and care for the PPE

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Here are some key things to remember about personal protective equipment:

- Conduct hazard assessments that ensure all parts of the body are protected.
- Conduct and certify the assessment for each job.
- Select the appropriate PPE for the hazard(s) identified.
- Train employees how to wear and care for the PPE.