29 CFR 1910.176-.184, Subpart N

Materials Handling and Storage

Preparation

1. Read Applicable Background information and related Company Policy Chapter.
2. Make _____ Copies of this Lesson Plan for Personnel
3. Make Transparency, procure transparency pens, etc.
4. Coffee, tea, snacks

Material

1. Personal Protective Equipment the employee is expected to wear
2.

Objective

By the end of this session, personnel shall be able to:

1. Identify different materials handling techniques
2. Demonstrate how to manually lift materials properly
3. Describe Drum handling Techniques
4. Describe Safety Tips when handling hazardous materials with:
   - Non-powered hand trucks
   - Powered hand trucks
   - Fork lift trucks
   - Overhead cranes
5. Identify truck hazards
6. Materials Storage
7. Describe the hazards of solvents
8. Describe the proper storage of chemicals

Background

Material handling accounts for about one quarter of all occupational injuries; the most common injuries being strains, sprains and contusions. The principal causes of the injuries are the mishaps resulting from improper lifting, failing to use available equipment and unsafe work practices. According to the National Safety Council, 20-25% of all disabling occupational injuries results from materials handling.

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Lesson

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Material Handling Techniques

Materials handling is the lifting, moving and placing of anything used by people. It may be done manually or with some type of lifting equipment, such as hand trucks and fork trucks. Materials' handling is one of the leading causes of disabling occupational injuries. The majority of materials at the Company will be handled:

- Manually.
- Using nonpowered or powered hand trucks.
- Using powered industrial trucks. (i.e., a fork truck).
- Overhead cranes.

Manual materials handling involve the moving of materials by lifting the material by hand and carrying it to a desired location.

Manual materials handling accidents result in a variety of injuries.

- Objects and loads may fall and injure hands, feet and legs.
- Lifting may cause muscle strains and joint injuries.

Back injuries, often from poor lifting techniques, are the most common type of occupational injury. The reason back injuries are so common is **that we lift things all the tim**e, at home and on the job, and we don't always use proper lifting techniques. Safe lifting is a commitment to lifting correctly, every time you pick up or move something.

Your Back-

The fact is, your back supports your whole body. Your spinal column, an S-shaped stack of bones called vertebrae, literally holds you up. Ligaments connect the vertebrae, and between the vertebrae are soft discs that cushion and protect the bones. Nerves run through the spine and go to the rest of your body. Your back is supported by muscles that run along the spinal column, working closely with the muscles in the stomach. Someone who is overweight may have more back problems because the extra weight around the stomach puts a lot of extra strain on the back muscles.

Plan Your Lift-
Safe lifting starts before you even pick up the load. That is, you should always plan your lift.

· Choose the flattest, straightest, and clearest route, even if it's a little farther.
· Move any objects that may be in your way and cause you to trip, prior to making the lift.
· Identify places where you can stop and rest.
· Make sure that the unloading area is clear.

Carrying the Load-
After you plan your lift, your next step is to properly lift the load to be moved and move the load.

· Check and make sure that the weight of the load is stable and distributed evenly and that you are able to lift it yourself. If not, GET HELP!
· When picking up the load, bend your knees not your back and grip the load firmly with your hands, not just your fingers.
· Bring the load close to your body, keeping your arms and elbows tucked in for more power. Keep the weight centered.
· USE YOUR LEGS, not your back. Lift your head and shoulders first, then let your legs push your body up slowly. Remember, your back is only meant to hold your body and if you use your back instead of your legs, you'll get hurt sooner or later.
· Make sure you can see were you are walking. Take small steps and move slowly.
Don't twist your body!! If you have to change direction, move your feet first.
· When unloading the object, use the same steps as you did to lift the load. Bend your knees, slowly lowering the object. Keep your fingers from the bottom of the load and place the load on the edge of the surface, then slide it to the desired location.

Drum Handling Techniques

Improper handling of drums and barrels can result in severe injuries. These include painful back sprains, smashed toes and fingers, or exposure to hazardous chemicals if the contents are leaking. Proper work practices can minimize your risk of injury, so consider the following tips.

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- Prior to handling the drum, read the label on the drum and look for symbols, words or other marks, which indicate if its contents are hazardous, corrosive, toxic or flammable. If the drum isn't labeled, consider the contents hazardous until they are positively identified.
- Look around the drum to see if it is leaking. Before cleaning up any spill, make sure the substance has been identified. Make sure that you've been trained in the hazards of the chemical, and have the correct materials for cleaning it up. Find and review the appropriate MSDS.
- Before moving the drum or barrel, replace missing bungs and/or lids and secure as necessary.
- Depending upon the contents of the drum, estimate its weight. Determine whether you can move it yourself or if you need assistance. *A 55-gallon drum can weigh 400-800 pounds.*
- If you decide to move it yourself, use a forklift if one is available, a hand truck or a drum cart that is designed specifically for drums handling.
- If the drum can be rolled, stand in front of it and place both hands on the far side of the chime. Pull the drum forward until it balances on the bottom chime. You can now roll the drum on its chime, being careful to keep your hands from crossing over one another. You can also lower the drum to the ground for rolling by shifting your hands to the bottom side of the chime (not where they will be crushed). Then slowly lower the drum to the floor. Keep your back straight and bend at your knees. Then roll the drum with both hands. Don't use your feet or grasp the ends.
- To upend a barrel or drum, a drum lifter bar is preferable. If one is not available, crouch in front of the drum, knees apart and firmly grasp the chime on each side. Keep your back straight and use your leg muscles to lift. Balance the drum on the lower chime, shift your hands to the far edge, and ease the drum into the upended position.
- Protect your hands, feet, back and face during this work. Safety shoes should be required when moving heavy drums. Gloves, eye protection, aprons, and other personal protective equipment may be needed, depending upon the contents of the drum.
- Most importantly, use material handling equipment whenever possible, and get help when you need it!

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Nonpowered Hand Trucks

Drums, barrels, and cylinders present special problems because they are too heavy to lift manually. In these cases, we use such things as hand trucks or dollies.

General Rules for Nonpowered Hand Trucks

When using a hand truck, dolly, or other non-powered material handling equipment, follow these simple tips:
Although hand trucks appear to be fairly simple devices, users must remember a few basic safety procedures:

- Use a hand truck that is appropriate for the job and the load to be carried.
- When stacking items on the truck, keep the heaviest load on the bottom to lower the center of gravity.
- Balance the load forward on the axle of the hand truck, so the handle will not carry the weight.
- Never stack items so high that you can't see where you're going.
- When carrying multiple boxes side by side, attempt to stagger them to "lock in" the boxes.
- Be sure the items to be transported on the hand truck are sturdy enough to be moved in this manner. Secure any bulky, awkward or delicate objects to the truck.
- Plan your route. Be aware of potential hazards to be encountered during the path of travel.
- As a rule, avoid walking backwards with a hand truck. Remember the back care rule: It is safer to *push* than to pull.
- Hand truck injuries typically occur by getting your hand pinched between the handles and a nearby stationary object, so take care when working your way through tight spaces. The use of gloves can provide extra protection.
- Always maintain a safe speed and keep the hand truck under control.
- Always park the trucks in a designated area, never in aisles or other places where they may cause a trip hazard or traffic obstruction. Two wheeled trucks should be stored on the chisel with handles leaning against a wall.
- When you use a hand truck properly, it does the job and reduces the chance you'll strain a muscle or be injured. Let the truck do the work for you!

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- Properly secure the load on the hand truck. This may mean using a strap to hold it in place.
- Push the load, don't pull. You can get twice the power by pushing and there is less chance of the load falling on you.
- Make sure you have a firm grip on the hand truck.
- Keep your knees bent, back straight, and lean in the direction of the movement of the load.
- Let your legs and body weight do the work.

If you are moving a gas cylinder, ensure that the cap is in place. Drums should not be moved without the bung caps in place.

Powered Hand Trucks

Electric powered hand trucks, which allow the operator to walk behind, are being used more and more. Some of the hazards associated with these vehicles include catching the operator between the truck and another object, and collisions with other objects or people.

General Rules for Powered Hand Trucks

Anyone who operates a powered hand truck should be properly trained and the training should include the manufacturer's operating instructions. Some general operating procedures may include:
· Do not operate the truck with wet or greasy hands.
· Never operate the truck faster than normal walking pace.
· Always face the direction the truck is moving and always have at least one hand on the handle of the truck.
· Give pedestrians the right of way.
· Observe and stop at all blind corners, doorways, and intersections to prevent collisions.
· Ensure chemicals you are transporting are in proper containers.
· Make sure the load is stable before you move it.
· Never ride on the truck, unless it is specifically designed for a driver to ride. Never permit others to ride on the truck.

Forklift Trucks

Operators who handle any type of powered materials handling equipment including industrial fork trucks should follow these general rules.

There are many different powered vehicles for materials handling. Many are included in the term industrial trucks with the most common being forklift trucks.

Notes

Industrial fork trucks are either electrically powered or combustion powered. Combustion powered fork trucks emit gaseous by-products such as carbon monoxide. Caution should be taken when using these types of trucks in enclosed spaces, to prevent carbon monoxide poisoning. Ensure there is adequate ventilation in the work area.

Fork trucks should have safety belts. It is safer for the operator to be sitting in the seat if the truck tips over than attempting to jump clear. A driver jumping clear could be struck by some part of the truck body or overhead guard and be seriously injured or killed.

In order to comply with OSHA, anyone who operates a powered fork truck must be properly trained and the training must be documented. The training shall include safe driving practices and hands-on driving supervised by an experienced fork truck driver. The training should also be specific to the chemicals or materials that will be handled.

General Rules for Fork Trucks

Some of the general rules for driving a fork truck include:

· Follow the Operator's and Owner's Manual Procedures
· Obey Company facility speed limits and Operation Procedures.
· Maintain a safe distance between moving trucks, at least three truck lengths, to allow time to stop.
· Drivers are required to slow down at intersections and crosswalks and sound the horn to notify other drivers and pedestrians.
· Only stable or safely balanced loads should be handled and the load should not exceed the specifications of the fork truck.
· Whenever fork trucks are parked the forks should be lowered to the ground and the parking brake should be set.
· A fork truck should never be used to elevate employees unless a safety platform, meeting OSHA requirements, with standard railing and toe boards, is fastened securely to the forks.
· Workers should not be permitted to pass beneath an elevated load.

Overhead Cranes

The Company has overhead cranes located at .
Anyone working at the Company that needs to use a crane must complete an extensive training program prior to using a crane. This program includes a training class, hands-on operation of an overhead crane while under the direct supervision of an experienced crane operator, and a written examination. Workers will only be qualified to operate a crane after successfully completing this three-step process.

Notes

Materials Storage

Both temporary and permanent storage of all materials must be neat and orderly. Materials piled haphazardly or strewn about increase the possibility of accidents. Properly planning material storage areas will reduce the time the material must be handled when bringing it into production and will remove hazardous chemicals from areas where they are not used.

Materials storage is facilitated and hazards are reduced by using bins and racks. Materials stored on racks, pallets, or skids can be moved easily and quickly from one workstation to another. Additionally, cross-tying materials on skid will make them more secured during handling.

Materials Storage Areas

Here are some general safety tips you should keep in mind when planning a materials storage area:

· Flammable and combustible materials should be stored in labeled flammable storage cabinets. These cabinets are usually suitable for storage of 5-gallon capacity containers.

· Flammable and combustible materials should not be stored near oxygen or oxidizing materials (materials that give up oxygen). When oxidizers are mixed with flammable, the fire danger is greatly increased. If a fire does occur, it is much more rapid and violent because the needed oxygen is more readily available.

· All hazardous materials must be properly labeled, even when hazardous liquids are placed in portable containers.

· Compressed gas cylinders should be stored upright on a smooth floor. All cylinders should be chained and fastened firmly against a wall, post, or other solid object. The protective cap should be kept on the cylinder when not in use. Cylinders should be moved using a cylinder cart.

Hazards of Solvents

We use solvents practically every day in our lives. At work, we may use or be exposed to solvents when we come in contact with paints, coatings, while using dip tanks, thinners, degreasers, cleaners, glues or mastics. As a result of this widespread usage, it is important to know some of the hazards that are associated with the group of chemicals, generally called "solvents."

Notes

A solvent is simply a liquid capable of dissolving specific solids or liquids. There are solvents that we use daily that are hazardous. Petroleum based solvents are the most common type used in industry. Therefore, as part of your job, it's important for you to understand the hazards of working with or around solvents.

Exposure and over-exposure to a solvent can come from various methods. The routes of entry may include:

- **Absorption** by direct contact on the skin. If there are no "barriers" between the solvent and your skin, the solvent can be absorbed through your skin.
- **Inhalation** by breathing solvent vapors. Breathing in the solvent vapors can quickly result in the chemical getting into your body and bloodstream via your lungs.
- **Ingestion** from literally eating the chemical by not practicing good hygiene after handling solvents. Direct contact with your hands and mouth through eating or smoking may result in unexpected ingestion of solvents.
- **Puncture** of the skin by a tool or other object, which has a coating of solvent. Punctures can result in the direct introduction of toxic chemicals into your body.

Overexposure to solvents can cause a variety of ailments. Depending on the type of solvent you are exposed to, the body will react in different ways. Skin contact may result in minor skin rashes or an allergic reaction resulting in "chloracne." Some workers can develop a sensitization to a particular product or chemical. Sensitization results in the entire body being "overly" sensitive to a particular chemical or product. After sensitization has occurred, even a very slight exposure can result in adverse or serious reactions. Serious overexposures can lead to illnesses resulting in organ or tissue damage.

As with any chemical or product, important information is contained in the product's **Material Safety Data Sheet (MSDS)**. The MSDS provides information on safe use, handling, disposal and protection methods among other information.

If you are unsure of the solvent or product that you are using, ask questions or check the MSDS.

Notes

Proper Storage of Chemicals

A mixture of any of the compounds in Group A with those in Group B could have disastrous effects. For this reason these groups should be separated in storage areas. Always store chemicals by compatibility, never by alphabetical order.

A-1 (Oxidizers)

- Nitric acid
- nitrates
- Chlorine
- fluorine
- peroxide
- chlorates
- perchloric acid
- chlorites
- hypochlorites
- chromic acid
- permanganates
- persulfates, (per- prefix)

B-1 (Flammables, Acids)

- Acetic acid
- Sulfuric acid
- Hydrochloric acid
- oils
- flammable solvents
- greases
- petroleum products
- sodium
- potassium
- lithium
- aluminum
- calcium
- aldehydes
- ketones
- wood
- paper, cloth, anything flammable

Potential consequences: Fire, explosion, or violent reaction

A-2

- Cyanides
- Cyanates
- Sulfides
- Sulfates

B-2

- Acids

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide gas

A-3

- Air
- Oxygen
- Oxidizers

B-3

- Lithium hydride
- sodium
- sodium hydride
- aluminum
- aluminum chlorate
- zinc
- titanium
- diethyl zinc
- white phosphorus
- dust and powders of magnesium

Potential consequences: Fire, violent reaction

Closure

Think ahead. Every lift should be planned before it is made. Good planning is the best method of preventing material handling injuries. Proper lifting uses your leg muscles more than your back. So get a good footing - falling while carrying a load or under a load can compound any injury that occurs. Material handling is made more difficult, when water, snow, mud or grease is permitted to accumulate. Keep work areas and floors clean, dry and free of debris.

Trucks used for scrap disposal will not be overloaded, and scrap will not extend beyond the ends or sides of trucks.

When materials are of a weight or size that makes manual lifting hazardous, mechanical handling equipment will be used.

What questions do you have?

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