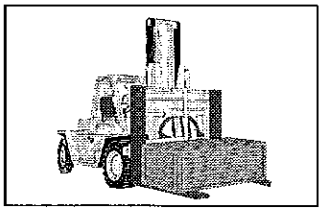


Materials Handling & Storage—An Overview

Overview of Topic

Handling and storing materials involves many different activities such as hoisting steel beams, driving a truck loaded with concrete blocks, manually carrying bags or materials, and stacking supplies.

Movement and storage of materials—providing a continuous flow of raw materials and parts—is vital to your project. However, your employees can be injured by: improperly lifting materials (manually and by machine), falling objects, and improperly stacked supplies. It is critical that you make safe materials storage and handling a priority for your company.

Materials handling and storage can be applied to a number of construction operations such as:

- Lifting and other physical labor associated with moving materials (see Toolbox Talk—Back Safety & Lifting).
- Heavy equipment such as forklifts and cranes (See Toolbox Talks—Heavy Equipment...).
- Rigging and slings (see Toolbox Talk—Rigging Methods).
- Movement and storage of materials and supplies.

This Toolbox Talk focuses on the last bullet—movement and storage of materials and supplies.

The OSHA regulations—

Materials handling rules can be found throughout the construction regulations, i.e., how far back the removed dirt (spoil pile) needs to be in an excavation, or, no materials or equipment except masonry and mortar shall be stored within 4 feet of the working edge (fall protection rule), but the general materials and handling rules are found in Subpart H of 29 CFR 1926.

Let's take a closer look at (a sample of) those regulations.

General requirements

Stored materials must be stacked, racked, blocked, interlocked, or some other way secured to prevent falling, sliding, or collapse.

All storage areas higher than floor or slab on grade, must have maximum safe load limits posted (in pounds per square foot).

Maximum safe load limits must not be exceeded.

Aisles and passageways must be kept clear providing for free and safe movement of material handling equipment or employees.

Material storage

Materials stored in buildings under construction must not be placed within six feet of any hoistway or inside floor opening, nor within ten feet of an exterior wall which does not extend above the top of the material stored.

Masonry blocks that are stacked higher than six feet must be tapered back one-half block per tier above the six-foot level.

Lumber

Used lumber must have all nails withdrawn before stacking.

Structural steel, poles, pipe, bar stock, and other cylindrical materials, unless racked, must be stacked and blocked so as to prevent spreading or tilting.

Housekeeping

Storage areas must be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Vegetation control must be exercised when necessary.

Employee Training

There are no specific training requirements for materials handling and storage. However, you must train your employees to recognize and avoid unsafe conditions and the regulations applicable to their work environment to control or eliminate the hazards. The best, and perhaps the only way to accomplish that is to train your employees on these materials handling and storage requirements.

Training Tips

Use jobsite examples of good and not-so-good storage. Do a walk around pointing out properly arranged materials and do a cleaning up/restacking of those that are not properly stored.

Where To Go For More Information

29 CFR 1926, Subpart H—Materials handling, storage, use, and disposal (for construction sites).

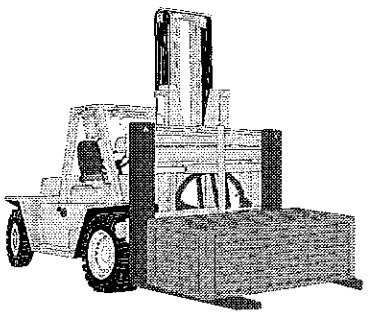
29 CFR 1910, Subpart N—Materials handling and storage, (for storage facilities, and warehouse operations).

KELLER'S CONSTRUCTION TOOLBOX TALKS

Materials Handling & Storage—An Overview

Handling and storing materials involves many different activities such as hoisting steel beams, driving a truck loaded with concrete blocks, manually carrying bags or materials, and stacking supplies.

Movement and storage of materials—providing a continuous flow of raw materials and parts—is vital to your project. However, these activities can be dangerous. You can be injured by: improperly lifting materials (both manually and by machine), falling objects, and improperly stacked supplies. This handout gives you and overview of what OSHA expects your job site to look like and what you should do when storing and handling materials and supplies.



The OSHA regulations—

Materials handling requirements can be found throughout the construction rules. For example: the excavation rules tell you how far back the removed dirt needs to be from an excavation, or the fall protection rule tells you that no materials or equipment, except masonry and mortar, shall be stored within 4 feet of the working edge (fall protection rule). But the general materials and handling rules are found in Subpart H of 29 CFR 1926. Let's take a closer look at a sample of those regulations.

General requirements

Stored materials must be stacked, racked, blocked, interlocked, or secured some other way to prevent falling, sliding, or collapse.

All storage areas, higher than floor or slab on grade, must have maximum safe load limits posted (in pounds per square foot). Maximum safe load limits must not be exceeded.

Aisles and passageways must be kept clear providing for free and safe movement of material handling equipment or employees.

Material storage

Don't store any materials within six feet of any hoistway or inside floor opening, nor within ten feet of an exterior wall which does not extend above the top of the material stored.

Masonry blocks that are stacked higher than six feet, must be tapered back one-half block per tier above the six-foot level.

Lumber

Used lumber must have all nails withdrawn before stacking.

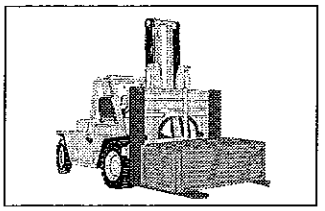
Structural steel, poles, pipe, bar stock, and other cylindrical materials, unless racked, must be stacked and blocked so as to prevent spreading or tilting.

Housekeeping

Storage areas must be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when necessary.

Cutting down on materials handling & storage accidents make safe materials storage and handling a priority for your company.

KELLER'S CONSTRUCTION TOOLBOX TALKS



Materials Handling & Storage—An Overview Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Materials Handling & Storage—An Overview at _____.
(company name)

The session covered:

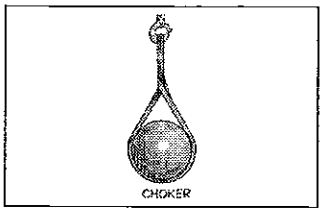
- Storing materials at jobsites.
- Lumber storage.
- Housekeeping.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	**Print Name Here**

_____
Supervisor's Signature



Materials Handling & Storage—Chain & Wire Rope Slings

Overview Of Topic

Because cranes, derricks, and hoists rely upon slings to hold their suspended loads, slings are the most commonly used material handling device.

The dominant characteristics of a sling are determined by the components of that sling. For example, the strengths and weaknesses of a chain are essentially the same as the strengths and weaknesses of the chain links.

Chain slings

Chains are commonly used on jobsites because of their strength and ability to adapt to the shape of the load. Care should be taken when using alloy chain slings because sudden shock (as from dropping a load) will damage them.

Chain slings are the best choice for lifting very hot materials. They can be heated to temperatures of up to 1000 degrees F. However, when alloy chain slings are consistently exposed to temperatures above 600 degrees F., operators must reduce the working load limits according to the manufacturer's recommendations.

Wire rope slings

Wire rope slings are made of individual wires that have been twisted to form strands. Stands are then twisted to form a wire rope. Wire rope with a fiber core is usually more flexible but less resistant to environmental damage. Conversely, a core that is made of a wire rope strand tends to have greater strength and is more resistant to heat damage.

Wire rope is defined by the "lay." The lay of the wire rope describes the direction the wires and strands are twisted during the construction of the rope. Lang lay wire rope (where the wires are twisted in the same direction as the strands) is recommended for many excavating, construction, and mining applications, including draglines, hoist lines, dredgelines, and other similar lines.

Lang lay lines are more flexible and have greater wearing surface per wire than regular lay ropes. In addition, since the outside wires in lang lay rope lie at an angle to the rope axis, internal stress due to bending over sheaves and drums is reduced, causing lang lay ropes to be more resistant to bending fatigue.

Wire rope sling selection

There are four characteristics to consider when selecting a wire rope sling:

- Strength. This is a function of the rope's size, grade, and construction. As a sling suffers from the rigors of continued service, the sling's design factor and ultimate strength are proportionately reduced.
- Fatigue. A wire rope must have the ability to withstand repeated bending without the wires failing from fatigue.
- Abrasive wear. The ability of a rope to withstand abrasion is determined by the size, number of wires, and construction of the rope.
- Abuse. All other factors being equal, misuse or abuse of wire rope will cause a wire rope sling to become unsafe long before any other factor.

Employee Training

Instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to their work environment to control or eliminate any hazards or other exposure to injury.

Training Tips

Bring in some representative types of slings that you use. Demonstrate how to inspect these slings. Show examples of damaged slings. Explain who the trainees should talk to if they find damaged slings.

Where To Go For More Information

29 CFR 1926.21—Safety training and education.

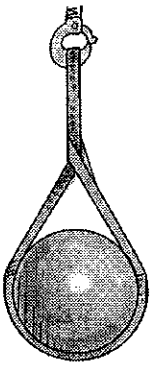
29 CFR 1910.184—Slings.

ASME B30.9—Slings.

KELLER'S CONSTRUCTION TOOLBOX TALKS

Materials Handling & Storage—Chain & Wire Rope Slings

Because cranes, derricks, and hoists rely upon slings to hold their suspended loads, slings are the most commonly used material handling device. The safety characteristics of a sling are determined by the components of that sling. For example, the strengths and weaknesses of a chain are essentially the same as the strengths and weaknesses of the chain links.



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Chain slings

Chain slings are commonly used on jobsites because of their strength and ability to adapt to the shape of the load. When using alloy chain slings use extreme care because a sudden shock (as from dropping a load) will damage them.

Chain slings are the best choice for lifting very hot materials. They can be heated to temperatures of up to 1000 degrees F. However, when alloy chain slings are consistently exposed to temperatures above 600 degrees F., operators must reduce the working load limits according to the manufacturer's recommendations.

Wire rope slings

Wire rope slings are made of individual wires that have been twisted to form strands. Stands are then twisted to form a wire rope. Wire rope with a fiber core is usually more flexible but less resistant to environmental damage. Conversely, a core that is made of a wire rope strand tends to have greater strength and is more resistant to heat damage.

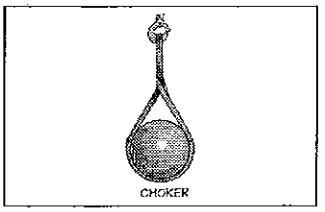
Wire rope is defined by the "lay." The lay of the wire rope describes the direction the wires and strands are twisted during the construction of the rope. Lang lay wire rope (where the wires are twisted in the same direction as the strands) is recommended for many excavating, construction, and mining applications, including draglines, hoist lines, dredgelines, and other similar lines.

Lang lay lines are more flexible and have greater wearing surface per wire than regular lay ropes. In addition, since the outside wires in lang lay rope lie at an angle to the rope axis, internal stress due to bending over sheaves and drums is reduced causing lang lay ropes to be more resistant to bending fatigue.

Wire rope sling selection

There are four characteristics workers need to consider when selecting a wire rope sling:

- Strength. This is a function of the rope's size, grade, and construction. As a sling suffers from the rigors of continued service, the sling's design factor and ultimate strength are proportionately reduced.
- Fatigue. A wire rope must have the ability to withstand repeated bending without the wires failing from fatigue.
- Abrasive wear. The ability of a rope to withstand abrasion is determined by the size, number of wires, and construction of the rope.
- Abuse. All other factors being equal, misuse or abuse of wire rope will cause a wire rope sling to become unsafe long before any other factor.



Materials Handling & Storage—Chain & Wire Rope Slings Sign-Off Sheet

This sign-off sheet documents the employees at this company, _____, who have taken part in a training session on Materials Handling & Storage—Chain & Wire Rope Slings. The session covered:

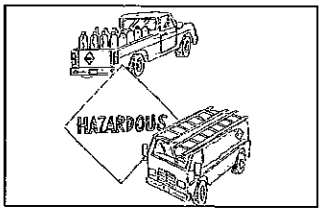
- Chain slings.
- Wire rope slings.
- The benefits of using lang lay wire rope.
- The four characteristics workers need to consider when selecting a wire rope sling.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	Print Name Here

_____
Supervisor's Signature



Materials Handling & Storage—Hazardous Materials Transportation

Overview Of Topic

The Hazardous Materials Regulations (HMR) (49 CFR Parts 106-180) define hazardous materials (hazmat) as materials capable of posing an unreasonable risk to health, safety, and property, when transported in commerce (a business).

Commercial motor vehicles (CMVs)

One definition of a CMV is any sized vehicle that is used to transport hazmat of a type and quantity that require placarding. Carrying a Class 1 explosive would be an example of a material requiring placarding of your construction vehicle. Therefore, no matter what the size of the vehicle, the driver would require a commercial drivers license.

Other than commercial motor vehicles

If you are not required to placard your vehicle under the HMR, do you still have requirements? The answer is maybe.

If you are operating a company vehicle and you are carrying hazmat, it may be subject to some or all rules and regulations both of the Federal Motor Carrier Safety Regulations (FMCSRs) and the HMR. See the HMR.

What is an unreasonable risk?

The Department of Transportation has identified ten classifications of materials that pose "unreasonable risks" to health and safety or property when transported in commerce. They are: Class 1-Explosives; 2-Gases; 3-Flammable Liquids; 4-Flammable Solids; 5-Oxidizing and Organic Peroxide Materials; 6-Poisons; 7-Radioactive Materials; 8-Corrosives; 9-Miscellaneous Materials; and ORM-D-(Other Related Materials-Consumer Commodities).

The requirements

Commercial service vehicles are often involved in transporting small quantities of hazmat. Most of these small quantities may be transported as materials of trade. And, although sometimes minimal, there are requirements that must be met.

Some limited quantity materials, meeting the definition of a consumer commodity, and can be reclassified as ORM-D materials, can be further exempted. Materials in this category that are not "hazardous substances," "hazardous wastes" or "marine pollutants" are not required to be listed on shipping papers except when transported by air.

Hazardous materials on service vehicles

Think about your service vehicles. Do any carry aerosol cans of products such as paint, lubricants, pesticides, starting fluid, etc., or small quantities of flammable liquids such as solvents, or power device cartridges? How about gasoline for the operation of auxiliary equipment such as power saws and portable generators or oxygen and acetylene for welding? All are hazardous materials. Again, most of these may be transported as materials of trade.

Employee Training

Hazmat transportation requires extensive training. Besides the requirements for a Commercial Drivers License with a hazardous materials endorsement, there is also a need for:

- Hazmat employees training to ensure familiarity with the regulations and an ability to recognize and identify hazardous materials, has knowledge of emergency response information, self-protection measures and accident prevention methods (49 CFR 172.700-.704).
- The FMCSRs govern driving and parking during the transportation of hazmat (49 CFR Part 397).

Training Tips

This Toolbox Talk can serve as a reminder of the importance of hazmat transportation. Stress that this is just a refresher because hazmat drivers need specific, formal training meeting the requirements of both the Department of Transportation and the Federal Highway Administration.

Where To Go For More Information

49 CFR Parts 106-180—Hazardous materials regulations.

49 CFR Parts 385 and 397—Federal motor carrier safety regulations.

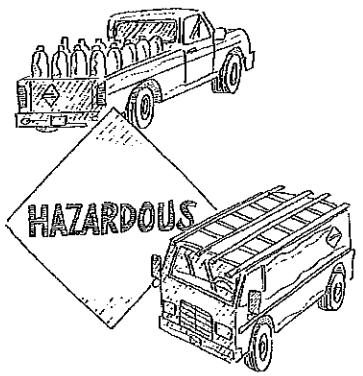
KELLER'S CONSTRUCTION TOOLBOX TALKS

Hazardous Materials Transportation

As a construction company employee you may be involved in transporting hazardous materials (hazmat). This could be anything from explosives to small or limited quantities of some material declared hazardous by the Department of Transportation.

Being a hazmat driver requires lots of training including:

- Commercial motor vehicle driver training if the material you are carrying requires the vehicle to be placarded under the Hazardous Materials Regulations. (49 CFR Part 172).
- Federal Motor Carrier Safety Administration's Federal Motor Carrier Safety Regulations governing driving and parking during the transportation of hazardous materials (49 CFR Part 397).



- Hazmat employee training to ensure familiarity with the regulations and an ability to recognize and identify hazardous materials. This includes knowledge of emergency response information, self-protection measures, and accident prevention methods (49 CFR 172.700-.704).
- Any State requirements.

Classification of materials

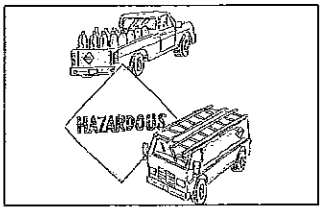
The Department of Transportation has identified ten classifications of materials that pose unreasonable risk to health and safety/property when transported in a business. They are: Class 1-Explosives; 2-Gases; 3-Flammable Liquids; 4-Flammable Solids; 5-Oxidizing and Organic Peroxide Materials; 6-Poisons; 7-Radioactive Materials; 8-Corrosives; 9-Miscellaneous Materials; and ORM-D-(Other Related Materials-Consumer Commodities).

Successful compliance with the Hazardous Materials Regulations is based on following a step by step procedure to ensure all the bases are covered. This begins with determining the proper hazard classification, correctly marking packages, preparing shipping papers, placarding vehicles, and being prepared for any situations while transporting the materials to a worksite.

Commercial service vehicles

Commercial service vehicles are often involved in transporting small quantities of hazardous materials. Most of these small quantities may be transported as materials of trade. And, although the requirements may be minimal, there are requirements that must be met.

Think about your service vehicles. Do any of them carry aerosol cans of products such as paint, lubricants, pesticides, starting fluid, etc., or small quantities of flammable liquids such as solvents, or "fuses" or "power device cartridges?" How about gasoline for the operation of auxiliary equipment such as power saws and portable generators or oxygen and acetylene for welding? All are hazardous materials subject to the regulations. Again, most of these may be transported as materials of trade.



Materials Handling & Storage—Hazardous Materials Transportation Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Materials Handling & Storage—Hazardous Materials Transportation at _____.
(company name)

The session covered:

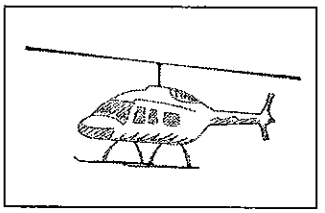
- Overview of hazardous materials transportation.
- Training requirements for hazardous materials drivers including: (1) commercial motor vehicle driver training, (2) Federal Highway Administration's Federal Motor Carrier Safety Regulations governing driving and parking during the transportation of hazardous material, and (3) hazmat employee training to ensure familiarity with the regulations and an ability to recognize and identify hazardous materials.
- Classification of hazardous materials.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	**Print Name Here**

_____
Supervisor's Signature



Materials Handling & Storage—Helicopters

Overview Of Topic

Helicopters are used for many different construction applications, including sling operations, equipment transport, concrete pouring, pole setting, and heavy construction. Helicopters themselves, are inherently dangerous. This danger multiplies when people do not understand the potential hazards of working on or near helicopters. Workers must stay alert and aware of the main rotor and the tail rotor blades. The greatest threat is working when the rotor blades are turning.

OSHA regulates helicopters at 29 CFR, Sections 1926.551 and .958. Here's a summary of those sections:

- Ensure that all helicopter cranes comply with applicable Federal Aviation Administration (FAA) regulations.
- Conduct a briefing for the pilot and ground personnel prior to each day's operation.
- Ensure that helicopter loads are properly slung, and that tag lines are of such length that they cannot be drawn up into the rotors.
- Ensure that all electrically operated cargo hooks have an electrical activating device so designed and installed to prevent inadvertent operation.
- Provide personal protective equipment (PPE), consisting of eye protection and hard hats, for employees involved with cargo loading and unloading.
- Prohibit employees from wearing loose-fitting clothing while working near helicopters.
- Take all necessary precautions to protect employees from flying objects in the rotor downwash.
- Ensure good housekeeping practices in all helicopter loading and unloading areas.
- Consistently check the size and weight of loads, and the manner in which loads are connected to the helicopter.

- Provide a safe access for employees to reach the hoist line and hook, and to hook and engage, or disengage, cargo slings under hovering craft.
- Ensure that workers exercise special care to stay clear of main and stabilizing rotors when visibility is reduced due to dust or other conditions.
- Instruct air and ground crews of the signaling systems to be used when hoisting loads.

Employee Training

Ensure that all pilot and ground personnel are trained in the following:

- Slings and tag lines
- Cargo hooks
- Personal protective equipment
- Loose gear and objects
- Housekeeping
- Load safety
- Hooking and unhooking loads
- Static charge
- Weight limitation
- Ground lines
- Visibility
- Signal systems
- Approach distance
- Approaching the helicopter
- Personnel duties
- Communications
- Fires

Training Tips

Actual inspection checklists should be used as a supplement for training. If you can, videotape a helicopter lift to show trainees. Point out proper techniques used on the video.

Where To Go For More Information

29 CFR 1926.551—Helicopters.

29 CFR 1910.183—Helicopters.

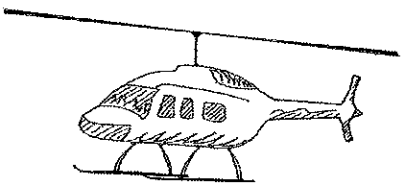
KELLER'S CONSTRUCTION TOOLBOX TALKS

Helicopters: Inherently dangerous

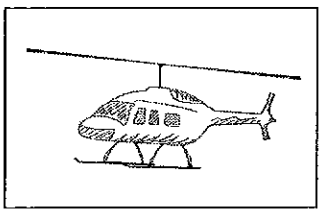
Helicopters are used for many different construction applications, including sling operations, equipment transport, concrete pouring, pole setting, and heavy construction. Yet themselves, are inherently dangerous. This danger multiplies when people don't under stand the potential hazards of working on or near helicopters. Hazards include: falling loads, flying dust and debris, static charge, electrical lines, blind spots, spreading fires, moving blades, and caught-in-between sling hazards.

With so many hazards, in-depth training for helicopter operators and ground crews is essential. Your training will be site-specific, even lift-specific; however, here are some general precautions you can take:

- Stay alert and aware of the main rotor and the tail rotor blades. Pay attention to warning signs and markings.
- Maintain good housekeeping in all loading and unloading areas.



- Properly load (don't overload) and hook/secure loads. Use pressed sleeve, swedged eyes, or equivalent means for all freely suspended loads to prevent hand splices from spinning open, or cable clamps from loosening.
- Ensure that electrically operated cargo hooks are tested prior to each day's operation by a competent person.
- Use proper personal protective equipment (i.e., eye protection and hard hat with chinstrap) when receiving a load. Do not wear loose-fitting clothing.
- Secure or remove all loose gear within 100 feet of the loading and unloading areas.
- As a helicopter operator, do not attempt the lift if you believe it can't be made safely.
- Do not perform work under hovering helicopters except when necessary to hook or unhook loads. Find alternative and safe ways to reach hoist line hooks and engage or disengage cargo slings.
- Do not touch a suspended load unless you are wearing protective rubber gloves or the load static charge has been dissipated with a grounding device.
- Do not allow a load to exceed the helicopter manufacturer's rating.
- Know the signal system used and review the system before hoisting the load.
- Do not approach the helicopter within 50 feet when the rotor blades are turning, unless your duties require your presence.
- Always remain in full view of the pilot and keep a crouched position whenever approaching or leaving a helicopter which has blades rotating.
- Maintain constant reliable communication between the helicopter operator and a designated ground crew signalman during loading and unloading.
- Do not set fires in areas where they could be spread by the rotor downwash.



Materials Handling & Storage—Helicopters Sign-Off Sheet

This sign-off sheet documents the employees at this company, _____, who have taken part in a training session on Materials Handling & Storage—Helicopters. The session covered:

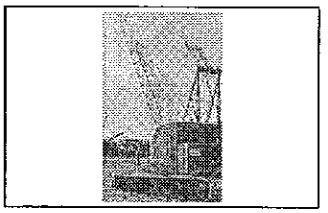
- Slings and tag lines
- Cargo hooks
- Personal protective equipment
- Loose gear and objects
- Housekeeping
- Load safety
- Hooking and unhooking loads
- Static charge
- Weight limitation
- Ground lines
- Visibility
- Signal systems
- Approach distance
- Approaching the helicopter
- Personnel duties
- Communications
- Fires

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	**Print Name Here**

_____
Supervisor's Signature



Materials Handling & Storage—Rigging Methods

Overview of Topic

The OSHA rules for construction rigging equipment (1926.251) apply to slings used in conjunction with cranes, derricks, hoists, and other properly rigged equipment to move materials at jobsites.

The rules cover slings made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope, and synthetic web (nylon, polyester, or polypropylene).

The regulations discuss inspection before use, general use, and inspection and specification requirements for each type of sling.

Inspection before use requirements

Your competent person must visually inspect all slings, fastenings, and attachments, for damage or defects:

- Prior to use on each shift.
- As necessary during operations to ensure continued integrity of the sling, especially if the sling is subjected to heavy stresses.

Damaged or defective slings must be immediately removed from service.

Use requirements

Rigging equipment must never be loaded in excess of its recommended safe working load. Safe working load charts are available in the construction regulations (1926.251, Tables H—1 through H—20) for each type of sling.

Slings, when not in use, should be removed from the immediate work area so as: (1) not to be a trip or swinging hazard, and (2) to protect the sling from jobsite hazards such as dirt, oil, grease, and not being walked on or run over by construction traffic.

Custom lifting equipment (grabs, hooks, clamps, etc.) designed for specific functions such as lifting modular panels, prefabricated structures, and similar materials, must be marked to indicate its safe working loads. Such equipment must be proof-tested prior to use to 125 percent of its rated load.

General industry rules that apply to construction

OSHA has determined that the following general industry rules (1910.184) also apply to construction applications.

- Slings must not be shortened with knots or bolts or other makeshift devices.
- Sling legs that have been kinked must not be used.
- Slings used in a basket hitch must have the loads balanced to prevent slippage.
- Slings must be padded or protected from load sharp edges.
- Hands or fingers must not be placed between the sling and its load while the sling is being tightened around the load.

Other safety rules

Suspended loads must be kept clear of all obstructions.

Crane operators should avoid sudden starts and stops when moving suspended loads.

Employees must remain clear of loads about to be lifted and suspended. Tag lines should be used when appropriate.

All shock loading is prohibited.

Specific sling application

The rest of the applicable regulations for each sling type are found at 29 CFR 1926.251(b) for alloy steel chains; .251(c) for wire rope; .251(d) for natural rope, and synthetic fiber; .251(e) for synthetic webbing (nylon, polyester, and polypropylene); and .251(f) for shackles and hooks.

Employee Training

There are no specific training requirements for slings. The general OSHA rule for training construction employees at 29 CFR 1926.21(b)(2) applies.

Training Tips

Using the OSHA regulations at 29 CFR 1926.251, prepare checklists for each type of sling and attachments your company uses. Go over the checklists with your employees.

Where To Go For More Information

29 CFR 1926.251—Rigging equipment for material handling.

29 CFR 1910.184—Slings.

KELLER'S CONSTRUCTION TOOLBOX TALKS

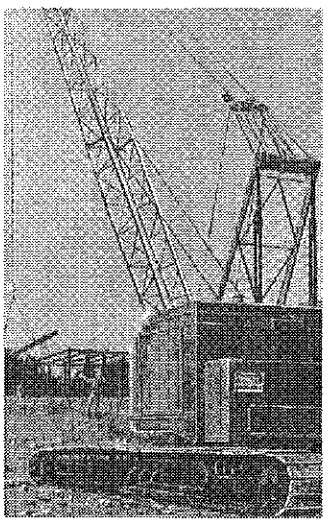
Materials Handling & Storage—Rigging Methods

Your company's rigging equipment, used in conjunction with cranes, derricks, hoists, and other properly rigged equipment to move materials at jobsites, must comply with specific OSHA rules. Those rules are found in 29 CFR 1926.251.

The rules cover slings made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope, and synthetic web (nylon, polyester, or polypropylene).

Inspection before you use a sling

Before each shift, and as necessary during operations, your competent person must visually inspect all slings, fastenings, and attachments, for damage or defects. Damaged or defective slings must not be used.



Use requirements

Rigging equipment must never be loaded in excess of its recommended safe working load.

Slings, when not in use, should be removed from the immediate area to: (1) not be a trip or swinging hazard, and (2) protect the sling from jobsite hazards such as dirt, oil, grease, and not being walked on or run over by construction traffic.

Other jobsite safety rules

Slings must not be shortened with knots or bolts or other makeshift devices.

Sling legs that have been kinked must not be used.

Slings used in a basket hitch must have the loads balanced to prevent slippage.

Slings must be padded or protected from load sharp edges.

Hands or fingers must not be placed between the sling and its load while the sling is being tightened around the load.

Suspended loads must be kept clear of all obstructions.

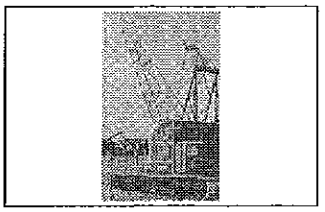
Crane operators should avoid sudden starts and stops when moving suspended loads.

Employees must remain clear of loads about to be lifted and suspended. Tag lines should be used when appropriate.

All shock loading is prohibited.

Slings are important pieces of equipment. They can also be deadly if overloaded, allowed to deteriorate, or not inspected regularly. Your company should have a quality inspection and testing program for all slings. You should be trained on the use of slings, and the recognition of dangerous slings. Don't use them.

KELLER'S CONSTRUCTION TOOLBOX TALKS



Materials Handling & Storage—Rigging Methods Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Materials Handling & Storage—Rigging Methods at _____ .
(company name)

The session covered:

- Overview of topic.
- Inspection before use.
- Using slings.
- Safety rules.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	**Print Name Here**

Materials Handling & Storage—Storing Flammable Liquids in Containers and Cabinets

Overview Of Topic

The improper use and storage of flammable liquids can cause explosions or fires, resulting in serious injury (including death) and facility damage. That is why it is so important to store flammable liquids safely.

This toolbox talk will cover storing chemicals in:

- Containers and portable tanks,
- Storage cabinets, and
- Storage inside buildings and storage rooms.

Container and portable tank storage

A common way to store flammable or combustible liquids, including flammable aerosols, is in containers and portable tanks. The OSHA regulations indicate that container size can't exceed 60 gallons and portable tanks can't exceed 660 gallons. There are some exceptions, but almost all storage of liquids must comply with these size limitations.

The container design requirements for storage of flammable or combustible liquids are:

- Use only DOT approved containers and portable tanks, and
- Make sure these containers and tanks have emergency venting capacity built-in.

Storage cabinets

Storage cabinets are often used to store containers of liquids. They can be locked to prevent unauthorized use of chemicals and can be made of wood or metal. If you are going to store combustible liquids in a storage cabinet, you must limit the amount to 60 gallons of Class II liquids (those with a flashpoint at or above 100 degrees F. and below 140 degrees F.). For Class III liquids (those with a flashpoint at or above 140 degrees F.) the limit is 120 gallons per storage cabinet.

Storage rooms

If your facility uses inside storage rooms to store flammable chemicals, make sure the rooms are constructed to meet the required fire-resistive rating for their use. The test specifications that must be followed are set forth in the Standard Methods of Fire Tests of Building Construction and Materials, NFPA 251-1969.

Storage inside buildings

There are specific restrictions for storing flammable or combustible liquids inside buildings. In all buildings don't allow storage to block or limit use of exits, stairways, or areas normally used for the safe egress of people. In office buildings prohibit storage except for the amount needed for maintenance and operation of the building and of equipment. Keep this minimum amount in:

- Closed metal containers stored in a storage cabinet,
- Safety cans, or
- An inside storage room that does not have a door that opens into that portion of the building used by the public.

Employee Training

Employees required to handle or use poisons, caustics, and other harmful substances must be instructed regarding their safe handling and use. They must be made aware of the potential hazards, personal hygiene, and personal protective measures required.

Training Tips

Cover the types of storage containers that employees will encounter on your jobsite. Demonstrate how to safely dispense flammable liquids from the containers. Discuss how to store flammable liquids in storage cabinets and where these cabinets are located.

Where To Go For More Information

29 CFR 1910.106—Flammable and combustible liquids.

29 CFR 1926.21—Safety training and education.

KELLER'S CONSTRUCTION TOOLBOX TALKS

Materials Handling & Storage—Storing Flammable Liquids in Containers & Cabinets

Flammable liquids pose a risk to workers. Not only are they dangerous to use, flammable liquids are hazardous when stored incorrectly.

Container and portable tank storage

A common way to store flammable or combustible liquids, including flammable aerosols, is in containers and portable tanks. The OSHA regulations indicate that container size can't exceed 60 gallons and portable tanks can't exceed 660 gallons. There are some exceptions, but almost all storage of liquids must comply with these size limitations.

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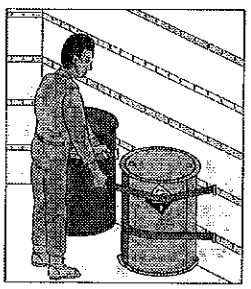

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In all buildings don't allow storage to block or limit use of exits, stairways, or areas normally used for the safe egress of people.

In office buildings prohibit storage except for the amount needed for maintenance and operation of the building and of equipment. Keep this minimum amount in:

- Closed metal containers stored in a storage cabinet,
- Safety cans, or
- An inside storage room that does not have a door that opens into that portion of the building used by the public.

Talk to your supervisor if you have any questions about the proper way to store flammable liquids.

Materials Handling & Storage—Storing Flammable Liquids in Containers and Cabinets Sign-Off Sheet

This sign-off sheet documents the employees at this company, _____, who have taken part in a training session on Materials Handling & Storage—Storing Flammable Liquids in Containers and Cabinets. The session covered:

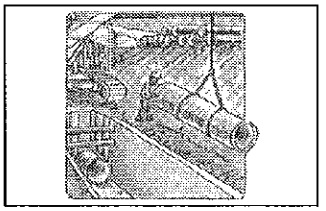
- Container size limits and design requirements for storing flammable liquids.
- Using storage cabinets to store containers of flammable liquids.
- Using inside storage rooms to store flammable chemicals.
- Storing flammable chemicals inside buildings.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	Print Name Here

_____
Supervisor's Signature



Materials Handling & Storage—Wire Rope Inspection, Maintenance, & Storage

Overview Of Topic

Many operating conditions affect wire rope life: Bending, stresses, loading conditions, speed of load application (jerking), abrasion, corrosion, sling design, materials handled, environmental conditions, and history of previous usage.

In addition to the above operating conditions, the weight, size, and shape of the loads to be handled also affect the service life of a wire rope sling. Flexibility is also a factor, with more flexible ropes selected when smaller radius bending is required. Less flexible ropes should be used when the rope must move through or over abrasive materials.

Wire rope sling inspection. Visually inspect wire rope slings before each use. The operator should check the twists or lay of the sling. If ten randomly distributed wires in one lay are broken, or five wires in one strand of a rope lay are damaged, the sling must not be used. It is not enough to check only the condition of the wire rope. Inspect end fittings and other components for any damage that could make the sling unsafe.

Field lubrication. Although every rope sling is lubricated during manufacture, to lengthen its useful service life it must also be lubricated "in the field." There is no set rule on how much or how often this should be done. It depends on the conditions under which the sling is used. The heavier the loads, the greater the number of bends, or the more adverse the conditions under which the sling operates, the more frequently lubrication will be required.

Storage. Store wire rope slings in a well-ventilated, dry building or shed. Never store them on the ground or allow them to be continuously exposed to the elements because this will make them vulnerable to corrosion and rust.

Usage. Using the sling several times a week, even at a light load, is a good practice. Records show that slings that are used frequently or continuously give useful service far longer than those that are idle.

Discarding slings. Wire rope slings can often provide a margin of safety by showing early signs of failure. Factors requiring that a wire sling be discarded include the following:

- Severe corrosion;
- Localized wear (shiny worn spots) on the outside;
- A one-third reduction in outer wire diameter;
- Damage or displacement of end fittings — hooks, rings, links, or collars — by overload or misapplication; or
- Distortion, kinking, bird caging, or other evidence of damage to the wire rope structure or excessive broken wires.

Employee Training

There are no specific training requirements for inspecting slings. The general OSHA standard for training construction employees at 29 CFR 1926.21(b)(2) applies.

OSHA state-plan-states: Remember that certain states have more stringent regulations that go above and beyond the OSHA standards.

Training Tips

Discuss the ways your trainees may use wire rope and how this could lead to wear and damage. Demonstrate how to inspect wire rope and who to contact if they find wire rope that needs to be taken out-of-service. Cover any company specific inspection requirements.

Where To Go For More Information

29 CFR 1926.21(b)(1)—Employer responsibility.

29 CFR 1926.251—Rigging equipment for material handling.

29 CFR 1910.184—Slings.

KELLER'S CONSTRUCTION TOOLBOX TALKS

Materials Handling & Storage—Wire Rope Inspection, Maintenance, & Storage

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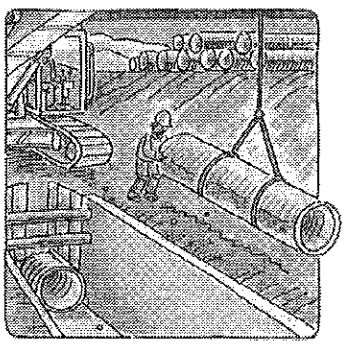

Storage. Store wire rope slings in a well-ventilated, dry building or shed. Never store them on the ground or allow them to be continuously exposed to the elements; this will make them vulnerable to corrosion and rust.

Usage. Using the sling several times a week, even at a light load, is a good practice. Records show that slings that are used frequently or continuously give useful service far longer than those that are idle.

Discarding slings. Wire rope slings can often provide a margin of safety by showing early signs of failure. Some factors requiring that a wire sling be discarded include the following:

- Severe corrosion;
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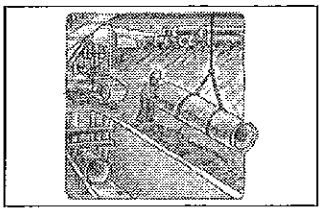
- A one-third reduction in outer wire diameter;
- Damage or displacement of end fittings — hooks, rings, links, or collars — by overload or misapplication; or
- Distortion, kinking, bird caging, or other evidence of damage to the wire rope structure or excessive broken wires.

Talk to your supervisor if you have any questions on how to inspect wire rope.



Materials Handling & Storage—Wire Rope Inspection, Maintenance, & Storage Sign-Off Sheet

This sign-off sheet documents the employees at this company, _____, who have taken part in a training session on Materials Handling & Storage—Wire Rope Inspection, Maintenance, & Storage. The session covered:

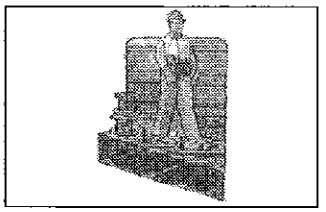
- What to look for when inspecting a wire rope sling.
- How and when to lubricate wire rope.
- The proper way to use and store wire rope.
- When to discard wire rope.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	Print Name Here

Supervisor's Signature



Materials Handling & Storage—Working with Overhead Hoists

Overview Of Topic

Hoists are used in the construction industry to move material and equipment. Hoists can be portable (truck-mounted or freestanding) or permanent (like the kind installed in a warehouse or maintenance shop).

Here are some requirements for working with hoists:

Safe working load

- The safe working load of the overhead hoist, as determined by the manufacturer, must be indicated on the hoist.
- The rated load marking must contain at least the following information: name and address of the manufacturer; manufacturer's model or serial number; and voltage of AC or DC power supply and phase and frequency of AC power supply. If this information is not on the hoist let your supervisor know.
- Don't exceed this safe working load. A hoist's load rate capacity is based on new equipment. When rating a load to be lifted, consider the age of the hoist and daily wear, both of which reduce the operating capacity of the crane.

Lifting with multiple hoists

- Never use two pieces of equipment to lift a load greater than the rated capacity of a single piece of equipment.
- If a gantry hoist or crane is used with an electric hoist or other electrical accessories, make sure the electrical ground wires are installed according to the National Electrical Code and all wires are connected when the equipment is used.

Supporting structure

- Make sure the supporting structure to which the hoist is attached has a safe working load equal to that of the hoist.
- Arrange the support so it provides for free movement of the hoist and doesn't restrict the hoist from lining itself up with the load.

- According to OSHA, the minimum clearance for obstructions must be three inches overhead and two inches laterally between the crane and all obstructions.
- Install the hoist only in locations that permit the operator to stand clear of the load at all times.

Air-powered hoists

Connect air hoists to an air supply of sufficient capacity and pressure to safely operate the hoist. All air hoses supplying air must be positively connected to prevent them from becoming disconnected during use.

Double check

Verify that all overhead hoists in use meet the applicable requirements for construction, design, installation, testing, inspection, maintenance, and operation, as prescribed by the manufacturer.

Employee Training

29 CFR 1926.20(b)(4) states, "The employer shall permit only those employees qualified by training or experience to operate equipment and machinery." So, make sure employees that operate hoists are properly trained.

OSHA state-plan-states: Certain states have more stringent regulations than Federal OSHA. If you operate in a state-plan-state, check with your local OSHA office to determine if there are regulations that go above and beyond Federal OSHA.

Training Tips

Talk about the various types of hoists you have on your jobsites and/or at your maintenance facilities. If possible, demonstrate how to properly use one.

Where To Go For More Information

29 CFR 1926.550—Cranes and derricks

ASME B30.2—Overhead and Gantry Cranes

KELLER'S CONSTRUCTION TOOLBOX TALKS

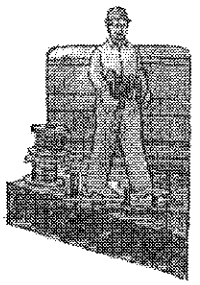
Materials Handling & Storage—Working with Overhead Hoists

Hoists are used in the construction industry to move material and equipment. Hoists can be portable (truck-mounted or freestanding) or permanent (like the kind installed in a warehouse or maintenance shop).

Here are some requirements for working with hoists:

Safe working load

- The safe working load of the overhead hoist, as determined by the manufacturer, must be indicated on the hoist. The rated load marking must contain at least the following information: name and address of the manufacturer; manufacturer's model or serial number; and voltage of AC or DC power supply and phase and frequency of AC power supply. If this information is not on the hoist let your supervisor know.



- Don't exceed this safe working load. A hoist's load rate capacity is based on new equipment. When rating a load to be lifted, consider the age of the hoist and daily wear, both of which reduce the operating capacity of the crane.

Lifting with multiple hoists

- Never use two pieces of equipment to lift a load greater than the rated capacity of a single piece of equipment.
- If a gantry hoist or crane is used with an electric hoist or other electrical accessories, make sure the electrical ground wires are installed according to the National Electrical Code and all wires are connected when the equipment is used.

Supporting structure

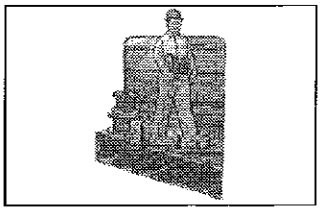
- Make sure the supporting structure to which the hoist is attached has a safe working load equal to that of the hoist.
- Arrange the support so it provides for free movement of the hoist and doesn't restrict the hoist from lining itself up with the load.
- According to OSHA, the minimum clearance for obstructions must be three inches overhead and two inches laterally between the crane and all obstructions.
- Install the hoist only in locations that permit the operator to stand clear of the load at all times.

Air-powered hoists

Connect air hoists to an air supply of sufficient capacity and pressure to safely operate the hoist. All air hoses supplying air must be positively connected to prevent them from becoming disconnected during use.

Double check

Verify that all overhead hoists in use meet the applicable requirements for construction, design, installation, testing, inspection, maintenance, and operation, as prescribed by the manufacturer.



Materials Handling & Storage—Working with Overhead Hoists Sign-Off Sheet

This sign-off sheet documents the employees at this company, _____, who have taken part in a training session on Materials Handling & Storage—Working with Overhead Hoists. The session covered:

- The hoist's safe working load.
- Lifting with multiple hoists.
- Strength of the supporting structure.
- Using air-powered hoists.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	**Print Name Here**

_____
Supervisor's Signature