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SAFETY TALKS

Infrastructure Health & Safety Association™
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Page

What is a Safety Talk?

A safety talk is a hands-on way to remind workers that health and safety are important on the job.

Safety talks deal with specific problems on site. They do not replace formal training.

Through safety talks you can tell workers about health and safety requirements for the tools, equipment, materials, and procedures they use every day or for particular jobs.

Each safety talk in this book will take about five minutes to present.

Why give a Safety Talk?

Your objective is to help workers **RECOGNIZE** and **CONTROL** hazards on the project.

You may be a supervisor, a health and safety representative, the member of a joint health and safety committee, a safety officer, or someone with similar duties.

You give safety talks because you are responsible for advising workers about any existing or possible danger to their health and safety.

Safety talks demonstrate the commitment of employers and workers to health and safety.

What makes a Safety Talk work?

- Choose a talk suited to site and work conditions. Don't give a talk on quick-cut saws when none are being used on the job.
- Deliver the talk where it will be most appropriate. That could be the job office, out on the site, or near the tools and equipment you are talking about.
- Introduce the subject clearly. Let workers know exactly what you are going to talk about and why it's important to them.
- Refer to the safety talk for information. But wherever possible use your own words.
- Connect key points to things your crew is familiar with on the project.
- Pinpoint hazards. Talk about what may happen. Use information from the safety talk to explain how to control or prevent these hazards.
- Wherever possible, use real tools, equipment, material, and jobsite situations to demonstrate key points.
- Ask for questions. Answer to the best of your knowledge. Get more information where necessary.
- Ask workers to demonstrate what they have learned.
- Keep a record of each talk delivered. Include date, topic, and names of attendees. Photocopy the Report Form at the back of this manual and use it to keep a record of each session.

Remember

The information you present in a Safety Talk may be the only information workers receive about a particular tool, piece of equipment, type of material, or work procedure on the project.

In choosing and presenting your talk, do everything you can to help workers remember and act on the message you deliver.

Explain dangers

Construction can be dangerous business if people don't fulfill their responsibilities for onsite health and safety.

Learning your responsibilities is the first step. You should also be aware of other people's responsibilities so you know who to talk to if you see a hazard.

Identify controls

Health and safety hazards can be controlled if everyone knows his or her own responsibilities and acts on them.

The *Occupational Health and Safety Act* and the Construction Regulation (Ontario Regulation 213/91) define the responsibilities of workplace parties such as constructor, employer, supervisor, and worker. You can get a copy of the *Act* and regulations from IHSA, or online at www.ihsa.ca.

Here are some examples of responsibilities of workplace parties.

CONSTRUCTOR (See Section 23 of the *Act*)

- Ensure that everyone and all work processes comply with the law. This includes all employers (subcontractors) and their workers.
- Ensure that all workers' health and safety are protected.
- Provide notification of project to the Ministry of Labour.

EMPLOYER (See Section 25 of the *Act*)

- Provide equipment, materials, and protective devices, and maintain them.
- Ensure that everyone and all processes comply with the requirements of the law.
- Provide information and instruction to protect workers' health and safety.
- Provide competent supervision.
- Acquaint workers with hazards.
- Take every precaution reasonable to protect workers.
- Ensure that all workers are at least 16 years old.

SUPERVISOR (See Section 27 of the *Act*)

- Ensure that the health and safety of workers are never in danger.
- Ensure that workers work safely, according to the law.
- Ensure that workers use and wear any protective equipment or clothing required by the law or the employer.
- Advise workers of any possible danger to their health and safety on the job.

WORKER (See Section 28 of the *Act*)

- Work safely at all times.
- Wear any protective equipment or clothing that your employer requires you to wear.
- Never remove a safety guard or any protective equipment.
- Report to your employer or supervisor any protective device that is missing or not working properly.
- Report to your employer or supervisor any hazard in the workplace.
- Report any violations of the law.

Demonstrate

Hold up the "green book" (*Occupational Health and Safety Act and Regulations for Construction Projects*) and ask your crew what they know about it.

Ask your crew to name

- two responsibilities of employers
- two responsibilities of supervisors.

Explain dangers

Employers have the right to determine and control the work, so long as everything is legal. Workers, however, have the power to protect their health and safety.

Identify controls

Ontario law spells out the three rights that give workers this power: the right to know, the right to participate, and the right to refuse.

RIGHT TO KNOW

Workers have the right to know about workplace health and safety hazards.

The *Occupational Health and Safety Act* says that employers must provide a wide range of information about workplace hazards to workers and joint health and safety committees. Joint committees have a duty to communicate with workers.

WHMIS, the Workplace Hazardous Materials Information System, is one example of the right to know. WHMIS is a Canada-wide system designed to protect workers by providing information about hazardous materials on the job. WHMIS has three main parts:

- labels
- material safety data sheets (MSDSs)
- worker education and training.

RIGHT TO PARTICIPATE

Workers have the right to make recommendations about health and safety.

Employers must recognize this right to participate. They must consult with joint health and safety committees (JHSCs) about methods of testing equipment, substances, or other workplace factors, and about health and safety training programs. A worker on the JHSC has the right to be present at the beginning of testing, to participate in Ministry of Labour inspections and investigations, to investigate serious accidents, and to inspect the jobsite regularly.

JHSCs have the right to make recommendations to employers about health and safety improvements. Employers must reply in writing within 21 days. Certified worker members have the right to investigate complaints dealing with dangerous circumstances.

Who are the members of the joint health and safety committee on this project?

RIGHT TO REFUSE

Workers have the right to refuse work if they believe it endangers their health and safety.

The *Occupational Health and Safety Act* sets out specific procedures. It's a two-stage process.

You can refuse based on your subjective belief that the work is dangerous. You must inform the supervisor or employer.

Once a supervisor has investigated, you may still have reasonable grounds for believing that the work is dangerous. In this case, you may continue to refuse work. A Ministry of Labour inspector must be called to investigate.

Demonstrate

Ask your crew: What rights do construction workers have on the job?

Eye Protection

List eye hazards on site

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Explain dangers

In construction we do too many jobs without protecting our eyes.

Just think of the eye hazards in our work:

- flying dust and grit
- welding arcs
- sparks and slag from welding and cutting
- abrasives from sandblasting
- chemical splash
- pipe and wire sticking out of walls
- ties and wire hanging from ceilings
- sun and wind.

We've all had dust and dirt in our eyes. Some of us have been hit in the eye by chips of wood, concrete, and stone.

A little bigger, a little faster—these particles could leave us with limited sight or none at all.

Identify controls

You've only got one pair of eyes. Make them last a lifetime.

Wearing the right protection can prevent most eye injuries.

Basic protection is safety glasses with sideshields. Look for the CSA logo on the frames, whether the glasses are prescription or non-prescription. For welding, eye protection must also be marked with the shade number.

- Don't wear contact lenses on site. Dust and other particles can get under the lens. If you must wear contact lenses for medical reasons, wear appropriate eye protection as well.
- Keep your safety glasses on when you wear other protection such as a welding helmet or faceshield. Why? Because when you lift up the visor or shield you may still be exposed to flying chips, dust, or other hazards.
- Eye protection must be matched to the hazard. Goggles that protect you from dust may not protect you from splash or radiation.
- Eyewear should fit snugly.
- Clean dirty lenses with water or a lens-cleaning solution to float the dirt away instead of scratching it into the lenses.
- Get your eyes checked every couple of years to make sure that problems haven't developed or gotten worse.

Demonstrate

Take a look at eye protection used by your crew. Point out any cracked or broken frames and scratched or pitted lenses that should be replaced.

Review the company policy on providing and replacing eyewear.

Review any special requirements for welding helmets, sandblasting hoods, faceshields, etc.

List noise hazards on site

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Explain dangers

Many construction trades are overexposed to noise. In time, overexposure can damage your hearing.

Hearing loss prevents you from hearing other hazards on the job. It also causes problems in your personal life.

- It interferes with how you hear normal speech.
- It prevents you from socializing.
- It can cause high blood pressure.
- It is permanent.

Identify controls

Hearing loss is preventable. The best prevention is hearing protection.

Noise is any unwanted sound. There are two types—continuous noise (air-conditioner) and impulse noise (gunshot).

Noise is measured in decibels (dB). For example, a quick-cut saw produces 115 decibels; a jackhammer, 110 decibels; a drill, 100 decibels.

Noise power doubles every time noise increases 3 decibels.

Think about that. When the noise level is 80 decibels and it goes up to 83, the noise is twice as loud.

In the same way, the noise level drops 3 decibels when you double your distance away from it.

Without hearing protection, your safe working limit for an 8-hour day with no other noise exposure is 85 decibels. This is the loudness of a room full of people.

When noise cannot be reduced or controlled, we need to wear hearing protection.

Demonstrate

Identify tasks on site that require hearing protection.

Review company policy and procedures regarding hearing protection.

Show two types of hearing protectors:

- ear plugs
- ear muffs

Show how to insert ear plugs:

Figure 5

Proper Technique for Inserting Earplugs

Reach one hand around back of head, pull ear upwards to straighten S-shaped ear canal, then insert plug with other hand according to manufacturer's instructions.

Respirators

Types

List respiratory hazards on site

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Explain dangers

☑ Construction can involve airborne hazards—for instance, mist from spray-painting, fumes from welding, vapours from adhesives, and dust from concrete cutting.

☑ Airborne hazards can have short-term effects such as sneezing or long-term effects such as lung disease.

Identify controls

Respirators are the last line of defence against airborne hazards.

When we can't isolate the hazard or use a different product, we have to wear a respirator.

There is no all-purpose respirator that can be used in every situation.

Respirators must be matched to particular hazards.

There are two basic types of respirator:

air-purifying and supplied-air.

Air-purifying respirators

- filter contaminants like dust and fibres out of the air
- do NOT supply air or oxygen
- must be matched to specific hazards such as solvent vapours or mist from sprayed form oil
- are specified in material safety data sheets (MSDSs) for controlled products used in construction
- have a limited lifespan based on contaminant levels and filter load (do NOT rely on the stated "expiry date").

Supplied-air respirators

- supply the wearer with breathable air from a compressor, cylinder, or tank
- offer the BEST protection against many hazards
- have limitations (for instance, air tanks are bulky and air lines can get tangled)
- are the only respirators that can be used for confined space rescue or in dangerous atmospheres.

Demonstrate

- Show CSA and NIOSH labels and stress that only CSA and NIOSH approved respirators appropriate for the hazard should be used.
- Show examples of air-purifying and supplied-air respirators.
- Show how to replace filters.
- On MSDS, show where information on respirators can be found.
- Review company rules and procedures on respirators.
- Stress that respirators only work when they are selected, maintained, and used properly.

Respirators *Fit*

List breathing hazards on site

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Explain dangers

With respirators, one size doesn't fit all.

Even with three different sizes of facepieces, for instance, no size from one manufacturer may fit you. A different brand may be necessary.

If a respirator doesn't fit right, it can't protect you.

Even when a respirator fits properly, it may get nudged or bumped out of position while you're working, causing leaks that can be dangerous.

Respirators can also leak if you're not clean-shaven.

Respirators and cartridges must be appropriate for the hazardous substances in the air. Particulate respirators, for example, don't work for acids, solvents, ammonia, or other gaseous mixtures.

Identify controls

You should be clean-shaven to get the best possible seal with your respirator. Facial hair can cause leakage and reduce protection.

Test for fit every time you put the respirator on and throughout your shift.

Two easy tests can show whether most reusable respirators fit right and don't leak:

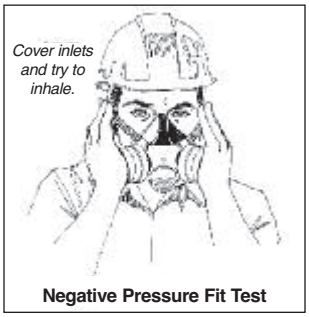
1) negative pressure test

2) positive pressure test.

Demonstrate as you talk

Negative Pressure Test

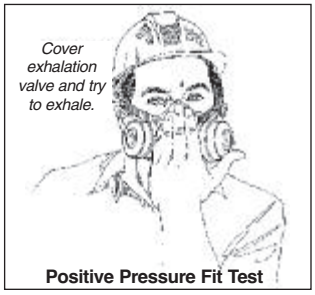
- Put on the facepiece and adjust it to fit comfortably—snug, not overly tight.
- Block the air inlets. These are usually the filter openings on the sides of the facepiece.
- Try to breathe in.
- If there are no leaks, the facepiece should collapse slightly and stay like that while you hold your breath for 10 seconds.



Negative Pressure Fit Test

Positive Pressure Test

- Put on the facepiece and adjust it to fit comfortably—snug, not overly tight.
- Block the exhalation valve. This is usually on the bottom of the respirator.
- Try to breathe out.
- The facepiece should puff slightly away from your face and stay like that while you hold your breath for 10 seconds.



Positive Pressure Fit Test

If you find a leak, adjust the facepiece or straps and repeat the test until you get a good fit.

Test periodically while you wear the respirator. It may get nudged or bumped out of position while you're working.

Respirators

Maintenance

List breathing hazards on site

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Explain dangers

To provide protection, respirators must be maintained.

Dirty, missing, or damaged parts can prevent your respirator from working properly.

For instance, valves that are damaged, missing, or poorly seated can drastically reduce the protection provided by your respirator.

There's also a danger in sharing respirators. Doing so is not hygienic.

Identify controls

Particulate respirator filters are identified by a letter and a number. The letters are

N – not resistant to oil

R – resistant to oil

P – oil-proof.

The numbers are 95, 99, and 100. These indicate efficiency: 95 (95%), 99 (99%), 100 (99.9%).

Filter cartridges for chemicals such as ammonia, organic vapours, solvents or acid gases use different filter technology. Look at the cartridge before selecting a respirator.

With use, filters become harder to breathe through. You're breathing not only through the filter but also through the contaminants that build up on the outside of the filter.

Change filters whenever the filter

- is damaged
- becomes difficult to breathe through.

As gas and organic vapour filters are used, their ability to remove gases and vapours decreases. They must be replaced according to a schedule set by the manufacturer.

Leave a contaminated area and change filters right away if

- you can smell or taste the contaminant through the filter
- your throat or lungs feel irritated.

Demonstrate as you talk

Let's learn what to look for when we inspect a respirator.

Check the inhalation valves for damage, dust and dirt, and proper seating.

Remove filters and make sure the flapper valve (usually a flexible disk) isn't missing or damaged.

Make sure the flapper valve is seated properly in the valve assembly.

To inspect the exhalation valve, remove the cover at the bottom of the respirator. Check the valve for damage, dirt, and proper seating.

Make sure that straps and buckles are free of damage and working properly.

Check the facepiece for holes, cracks, and splits.

(With the crew, inspect two or three respirators in use. Make necessary adjustments and arrange repairs or replacements.)

List hazards to hands on site

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Explain dangers

Construction exposes our hands to many different hazards, from cuts to chemicals, from pinching to crushing, from blisters to burns.

Identify controls

The best tools we have are our hands. We need to protect them on the job.

Leather gloves provide good protection against sharp edges, splinters, and heat.

Cotton or other materials don't stand up well. You should wear them only for light-duty jobs.

Our hands also need protection against chemicals.

Check labels to see whether products must be handled with gloves and what types of gloves are required.

If that information isn't on the label, check the material safety data sheet (MSDS).

Using the right gloves for the job is important. For instance, rubber gloves are no good with solvents and degreasers. The gloves will dissolve on contact.

Demonstrate

Talk about the specific chemicals used on your jobsite and the type of gloves recommended for each.

Guardrails

List fall hazards on site

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Explain dangers

Falls are the number one cause of serious injuries and death from injuries in construction.

Identify controls

Guardrails are often the best and most convenient means of fall protection.

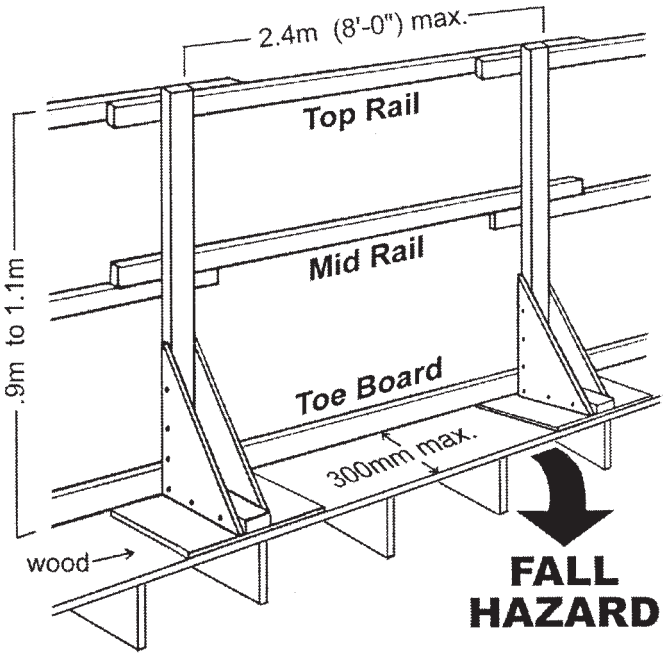
Where possible, guardrails must be installed

- along the open edges of roofs and floors
- on formwork, scaffolds, and other work surfaces
- openings in floors and roofs
- wherever workers are exposed to the risk of falling.

Guardrails must be installed no more than 30 cm (1 foot) from the open edge. They must be able to withstand all loads specified in the construction regulation (Ontario Regulation 213/91).

Posts supporting a wooden guardrail should be no more than 8 feet apart. Guardrails can also be wire rope and manufactured systems of metal frames and wire mesh.

Well-anchored posts are essential. You can use vertical shoring jacks, screw-clamp posts, clamp binding posts, or posts that fit into sleeves cast right in the slab.



Sometimes guardrails have to be removed to land material or make installations along floor or roof edges. The open edge should be roped off and marked with warning signs. Workers inside that area must wear fall protection and be tied off.

All guardrails—especially wood guardrails—should be inspected regularly.

Guardrails are the best method of protecting workers around openings in floors and roofs, but sometimes they're not practical. You may have to use securely fastened covers made of planks, plywood, or steel plate. Covers must be strong enough to support any weight to be reasonably expected.

There's always the danger that someone will pick up the plywood to use somewhere else. Workers have even removed covers from openings and then fallen through.

That's why covers should be clearly marked in bright paint with warning signs. DO NOT REMOVE. DANGER! HOLE IN FLOOR.

Demonstrate

Review types of guardrails used on site. Ask your crew where else guardrails should be installed.

Basic Types

List fall hazards on site

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Explain dangers

Falls are the number-one cause of accidental deaths in construction. And you don't have to fall far to be killed or injured.

Identify controls

On many sites, guardrails are the most common and convenient means of fall protection.

For more information, refer to the Safety Talk "Guardrails."

Where guardrails cannot be installed or are impractical, the two basic types of fall protection are travel restraint and fall arrest. Both involve a full body harness.

Travel-Restraint System

A travel-restraint system keeps you from getting too close to an unprotected edge.

Lifeline and lanyard are adjusted to let you travel only so far. When you get to the open edge of a floor or roof, the system holds you back.

A full body harness should be used with travel-restraint systems. You can attach the harness directly to a rope grab on the lifeline or by a lanyard. The lifeline must be securely anchored.

Fall-Arrest System

Where other fall protection is not in place, you must use a fall-arrest system if you are in danger of falling

- more than 3 metres
- into operating machinery
- into water or another liquid
- into or onto a hazardous substance or object.

A fall-arrest system consists of a full body harness, a lanyard, and a shock absorber.

You can connect the lanyard directly to adequate support OR

- to a rope grab mounted on an adequately anchored lifeline.

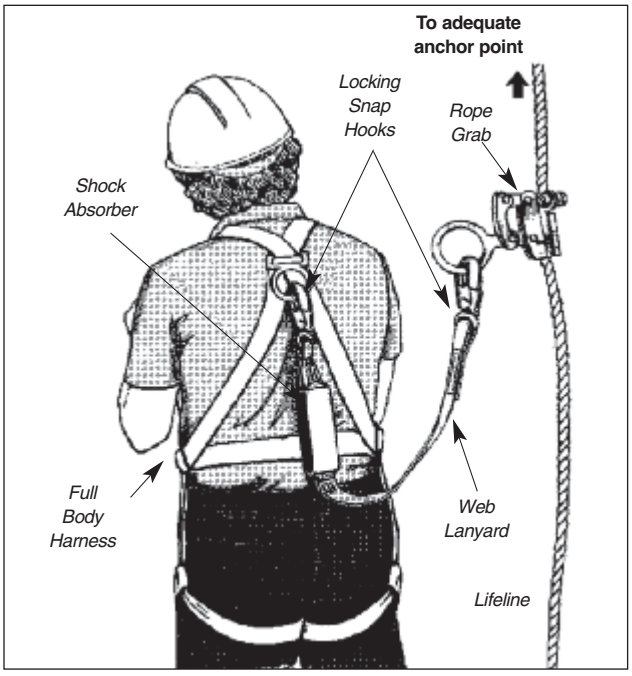
A full body harness must also be worn and tied off when you are

- on a rolling scaffold that is being moved
- getting on, working from, or getting off a suspended platform, suspended scaffold, or bosun's chair.

Lifelines must be adequately anchored. For fall arrest, that means able to support the weight of a small car (about 3,600 pounds). Fall-arrest loads can be high.

Demonstrate

Show how to put on, adjust, and wear a full body harness.



Approvals and Inspection

List fall hazards on site

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Explain dangers

When you're using a travel-restraint or fall-arrest system, your life depends on equipment.

If your equipment is not certified by a recognized authority, or is not properly inspected and maintained, you risk injury and death.

Identify controls

Your fall protection equipment must keep you in construction and out of the hospital. That's why approvals and inspection are important.

Safety harnesses must be approved by the Canadian Standards Association (CSA). Look for the CSA logo.

Also look for the CSA logo on lanyards, shock absorbers, and rope grabs. The label means the equipment has been manufactured to meet high standards.

Any equipment involved in a fall arrest must be discarded or removed from service until the manufacturer certifies that all components are safe for reuse.

Demonstrate as you talk

Inspect the components of a fall-arrest system used on your site.

Harness

Make sure that

- hardware and straps are intact and undamaged
- moving parts move freely through their full range of motion
- webbing is free of burns, cuts, loose or broken stitching, frayed material, and signs of heat or chemical damage.

Lanyard

Make sure the lanyard fastens securely to the D-ring on the harness.

- Inspect the lanyard for fraying, kinking, and loose or broken stitching.
- Check lanyard hardware for rust, cracks, and damage.
- Check shock-absorbing lanyards regularly. Look for torn stitching on tearaway types. Check other types for damage such as cracks and loose parts.

Lifeline

Inspect fibre rope lifelines for fraying, burns, kinking, cuts, and signs of wear and tear.

Check retractable block lifelines for smooth operation. Pull out line and jerk it suddenly. Braking action should be immediate and tight.

Rope grabs

List fall hazards on site

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Explain dangers

With rope grabs, there are three basic hazards:

- attaching them the wrong way
- grabbing hold of them during a fall
- using them with the wrong size or type of rope

A rope grab attached upside down to a lifeline can't work properly. Instead of locking on the line, it will simply slide down.

Don't grab the device if you fall. This can prevent some grabs from working properly. Instead of stopping you'll slide to injury or death below.

Demonstrate as you talk

Rope grabs are technically known as fall arresters and must meet CSA requirements.

- When attaching a rope grab to a lifeline, always make sure the arrow on the grab points along the line to the anchor point.
- After putting the rope grab on the lifeline, give it a firm tug in the direction of a fall to make sure it engages.
- Ensure that lifeline and rope grab match. Rope grabs are designed to work with certain types and diameters of lifelines.
- Remember to tie a knot in your lifeline at the farthest point where you need to travel. The knot ensures that the rope grab will not run off the free end of your line.
- Some grabs have a "parking feature" that locks at a point on the lifeline that won't let you reach a fall hazard.
- On a vertical lifeline, always position the rope grab as high as possible above your D-ring to minimize free fall.

Also make sure you have clearance below. Fall arresters may slide down the lifeline as much as one metre before arresting your fall.

- Inspect rope grabs before use.
- Check for distortion
- rust
- moving parts that don't move easily
- sharp edges.

A rope grab that arrests a fall should be taken out of service and inspected and recertified for use.

Class AD versus Class ADP

Two fall arresters are typically used in construction: Class AD and Class ADP.

- Class AD attaches to the D-ring on the back of your harness. So does Class ADP. But ADP also includes a panic feature. The "P" is for "panic."
- The panic feature keeps the arrester locked on the lifeline, even if you grab hold of it.
- Class AD doesn't have this panic feature. But the CSA standard requires that AD arresters come with integral connectors (that attach to the harness) between 30 and 60 centimetres long (one and two feet). This makes it very difficult for a falling worker to reach around and grab the arrester.

Step Ladders

List stepladder locations on site

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Explain dangers

The stepladder is one of the most familiar things on a construction site. Still, workers get hurt using them.

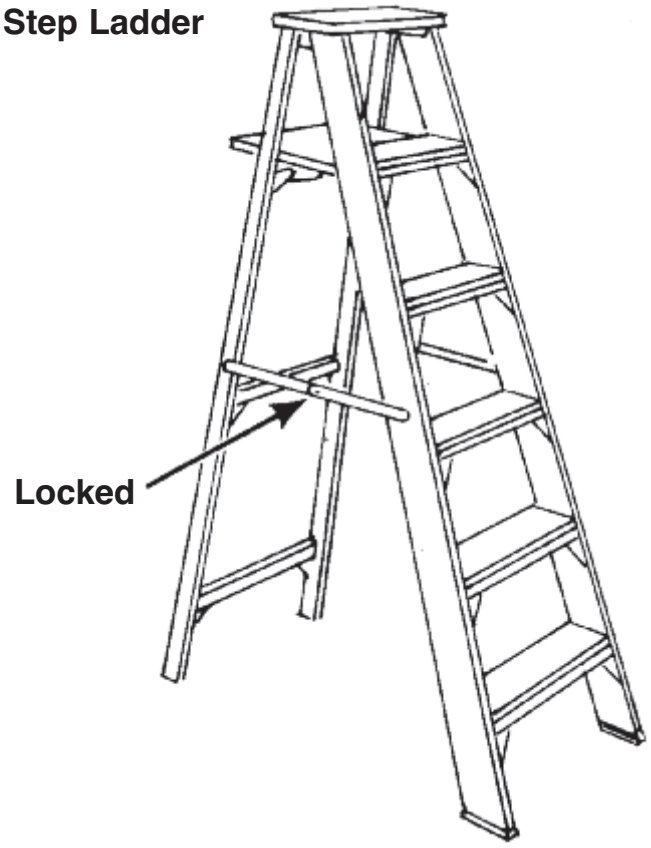
Falls are the biggest risk. Even though you're not very high off the ground, workers have died from falling a short distance and landing the wrong way. Even sprains or strains could mean pain and days off work.

Here's how to use a stepladder right.

Identify controls

[Use a step ladder to demonstrate the following points in your talk.]

- Check the ladder for defects or damage
  - at the start of your shift
  - after it has been used somewhere else by other workers
  - after it has been left in one place for a long time.
- Keep the area at the base of the ladder clear.
- Make sure the spreader arms lock securely in the open position.
- Stand no higher than the second step from the top.



- Never straddle the space between a step ladder and another point.
- When standing on the ladder, avoid leaning forward, backward, or to either side.
- Always open the ladder fully before using it. Don't use an unopened step ladder as a straight or extension ladder. The feet are not designed for this use.
- Never stand on the top step, the top, or the pail shelf of a step ladder.
- When climbing up or down a step ladder, always face the ladder and maintain 3-point contact.

Demonstrate

Inspect step ladders in use on site. Determine whether other equipment would provide safer, more efficient access.

Extension Ladders

List ladder locations on site

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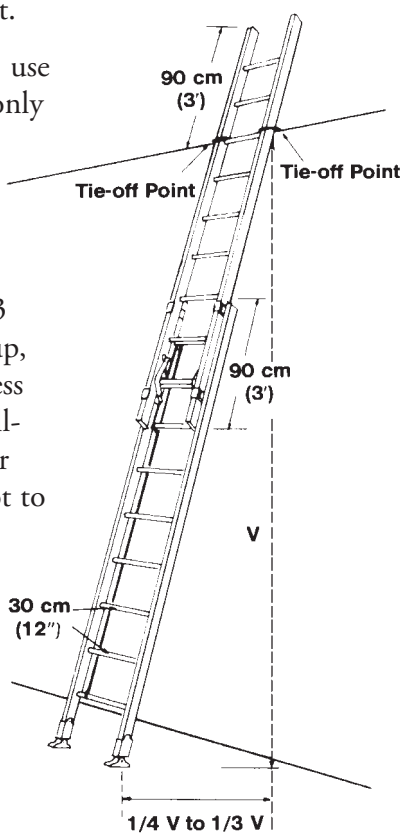
Explain dangers

Extension ladders can be dangerous tools. Workers have been killed and injured from falls and powerline contact. Here's how to protect yourself.

Demonstrate as you talk

- Choose the right ladder for the job. It must be long enough to
  - be set up at a safe angle (see below)
  - extend 90 centimetres (3 feet) beyond the top landing.
- A two-section extension ladder should be no longer than 15 metres (50 feet); a three-section ladder no longer than 20 metres (66 feet).
- Check the ladder for damage or defects
  - before you set it up
  - after it has been used somewhere else by other workers
  - after it has been left somewhere for a long time.
- Set the ladder on a firm level base. If the base is soft, loose, or wet material, clear it away or stand the ladder on a mud sill.
- Never erect extension ladders on boxes, carts, tables, or other unstable objects. Never stand them up against flexible or movable surfaces.
- Set the ladder up at a safe angle – one foot out for every three or four feet up, depending on length.
- When the ladder is set up, there should be a clear space of at least 15 centimetres or 6 inches behind each rung.
- When the ladder is fully extended, sections must overlap at least 90 centimetres (3 feet).
- Tie-off or otherwise secure the top and bottom of the ladder. Keep areas at top and bottom clear of debris, scrap, material, and other obstructions.
- Clean mud, snow, and other slippery substances off your boots before climbing.
- When climbing up or down, always face the ladder and maintain 3-point contact.
- Don't carry tools, equipment, or material in your hands while climbing. Use a hoist line or gin wheel for lifting and lowering.
- Be very careful when erecting extension ladders near live overhead powerlines. Never use metal or metal-reinforced ladders near electrical wires or equipment.
- Wherever possible, use extension ladders only for access—not as work platforms.
- When you must work from a ladder more than 3 metres or 10 feet up, wear a safety harness and tie off to a well-anchored lifeline or other support—not to the ladder.
- Stand no higher than the fourth rung from the top.



3-point contact

Ladders

List ladder locations on site

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Explain dangers

Climbing a ladder is not as easy as it sounds. Many workers have been injured getting on or off a ladder. Workers have died from falls after losing their balance.

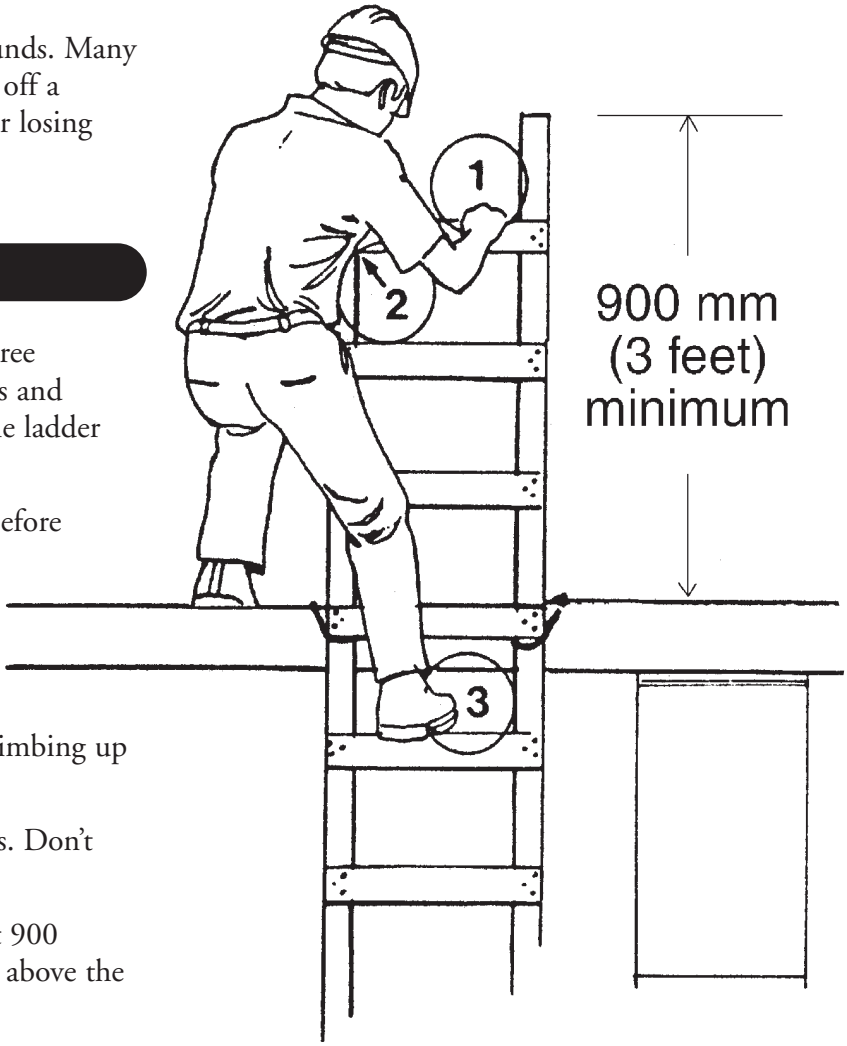
Identify controls

To use ladders safely, always maintain three points of contact. That means two hands and one foot or two feet and one hand on the ladder at all times.

- Put both hands firmly on the rungs before stepping onto a ladder.
- Break 3-point contact only when you reach the ground or a stable platform.
- Always face the ladder when you're climbing up and down.
- Keep your body between the side rails. Don't lean out on either side.
- Make sure that ladders extend at least 900 millimetres (90 centimetres or 3 feet) above the top landing.
- There must be a clear space of at least 150 millimetres (6 inches) behind each rung.

Demonstrate

- Moving quickly often results in only 2-point contact. You often have to make a conscious effort to maintain 3-point contact.
- Don't carry tools, equipment, or material in your hands while climbing. Use a hoist line or gin wheel for lifting and lowering.
- Clean mud, snow, and other slippery substances off your boots before climbing.



Vehicles and equipment

List vehicles & equipment used on site

_____

_____

_____

_____

_____

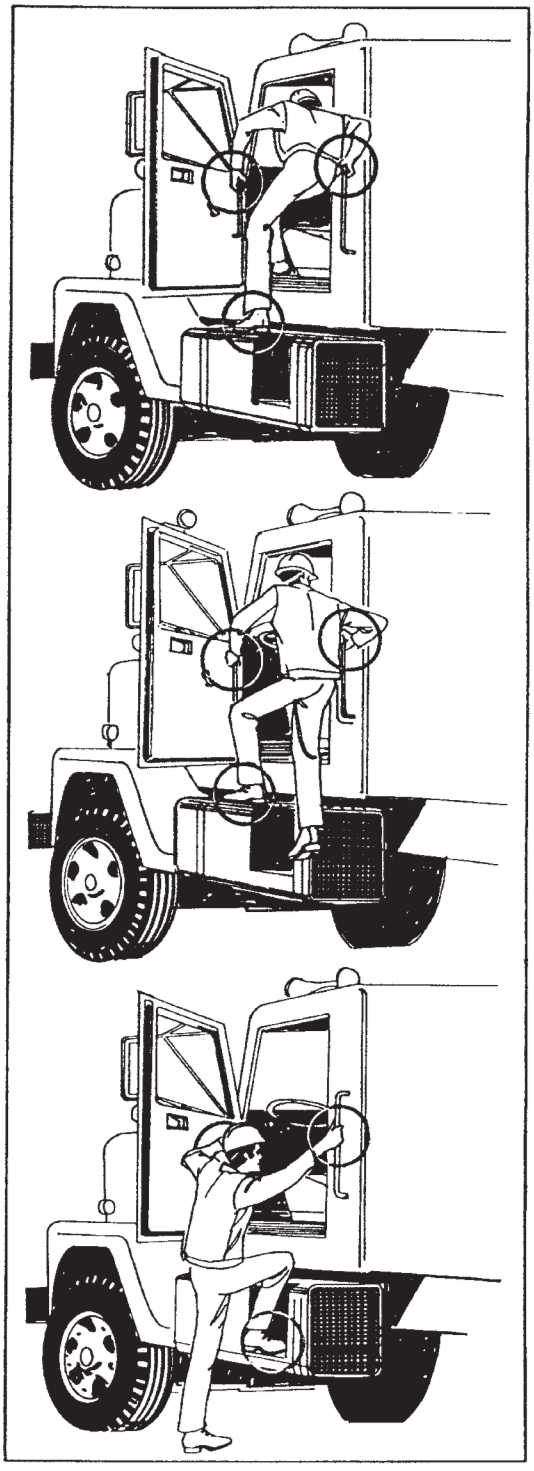
Explain dangers

Getting on and off equipment is not as easy as it sounds. More than one-quarter of all injuries to equipment operators and truck drivers occur during mounting and dismounting.

Identify controls

To climb on and off construction equipment safely, always maintain three points of contact. That means two hands and one foot or two feet and one hand on the equipment at all times.

- Break 3-point contact only when you reach the ground, the cab, or a stable platform.
- Mount and dismount facing the equipment.
- Climb on and off only when the equipment is stationary.
- Use the parts designed by the manufacturer for mounting and dismounting—steps, runningboards, traction strips, footholds, handgrips, etc.
- Keep these parts clear of mud, snow, grease, and other hazards that can cause slips, trips, or falls.
- Don't use wheel hubs, machine tracks, or door handles for mounting and dismounting.



Demonstrate

Demonstrate 3-point contact by mounting and dismounting from a truck, bulldozer, or other piece of heavy equipment on site. Ask your crew to try out 3-point contact as well.

Planks and decks

List scaffolds needing inspection on site

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_____

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Explain dangers

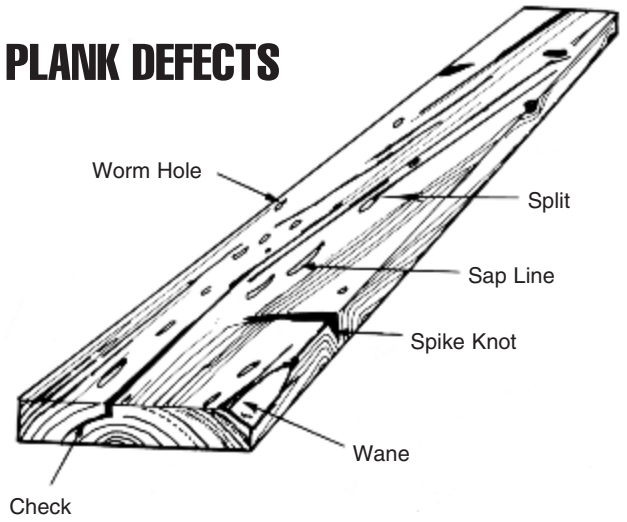
If scaffold planks and decks fail, you could be seriously injured or killed from a fall. You could also be thrown off balance and injure yourself with your tools or equipment.

Identify controls

Scaffold planks and deck material must be inspected regularly. **Here's what to check for.**

Wood planks

- The right length. Planks must overhang the frame no less than 6 and no more than 12 inches (150 - 300 mm).
- Cracks—these can often be detected at the end of the plank. Discard planks with long and deep cracks.
- Cuts on plank edges from saws, tools, sharp objects. Discard planks with many or deep cuts.
- Worm holes, splits, knots knocked out along edges, lots of nail holes—discard planks when they're serious.
- Light weight—this can indicate dry rot that can't be seen.
- Condition of cleats—damaged cleats should be removed and replaced.



Laminated veneer lumber planks

- Separation of laminated layers—usually due to repeated changes in moisture levels as layers soak up rain and dry in sun.
- Cuts of any kind.
- Pressure cracks in the top or bottom layer.
- Warping from wear and weather.
- The condition of cleats.

Aluminum/plywood deck panels

- Cuts in aluminum frames.
- Deformed, cracked, or broken fastening hooks and hardware.
- Cracked or broken plywood.
- Bent, cracked, or broken rungs.
- Sliding or other locking devices in good condition.

As a general rule, you should plank or deck the working levels of a scaffold across their full width for maximum support and stability.

Demonstrate

Demonstrate methods of inspecting planks and panels. Ask crew to inspect sample materials on site.

Structural components

List scaffold locations on site

_____

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_____

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Explain dangers

Scaffold components that are damaged, defective, or wrongly installed can lead to tip-over or collapse.

Demonstrate as you talk

Structural components of all frame scaffolds must be inspected regularly. Inspection should include frames, feet, connecting pins, braces, and guardrails.

Frames

- Uprights and cross-members should not be cracked, rusty, bent or otherwise deformed.
- All connecting components should fit together square and true.

Feet

- Adjustable base plates should work properly.
- Plates should be securely attached to legs to resist uplift as well as compression.
- If mudsills are used, base plates must be nailed to them.

Connecting pins

- Frames must be joined together vertically by connecting pins compatible with the frames.
- Connecting pins must be locked in place to prevent them from loosening and coming out.
- Pins must be free of bends and distortion. If they don't fit, get replacements that do.

Braces

- Cross and horizontal braces should not be cracked, rusty, bent, or otherwise deformed.
- Braces should be compatible with frames and free of distortion.
- Horizontal braces must be installed every third frame vertically and in each bay laterally.
- Scaffolds higher than three frames must be tied into the structure.

Guardrails

- The work platform must have guardrails.
- Guardrails must be compatible with frames. Guardrails can be made of tube-and-clamp components if they're assembled properly.

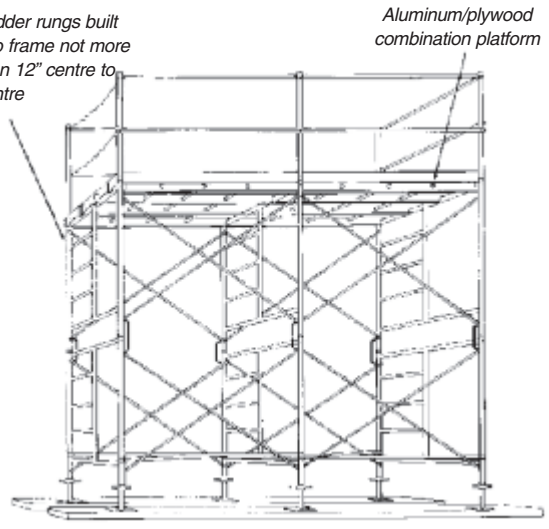


Figure 4.1
STANDARD FRAME SCAFFOLD

Fall protection

Explain dangers

Suspension systems on swingstages, work cages, and bosun's chairs can fail. If you are not using a fall arrest system, you can fall, suffering injury or death.

Identify controls

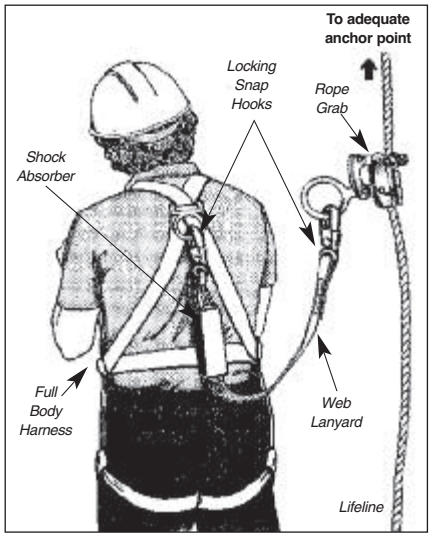
The basic rule is simple: there must be two independent means of support for workers using suspended access equipment.

Two Independent Means of Support

One independent means of support for each worker is the **suspension system** holding up the stage, cage, or chair.

The second independent means of support is the **fall-arrest system**. This consists of

- full body safety harness
- lanyard
- rope grab
- lifeline
- lifeline anchor.



If the suspension system fails, the worker will be saved by the fall-arrest system.

In some cases, the second independent means of support can be another complete suspension system. On a swingstage, for instance, there would be four outrigger beams instead of two, four suspension lines instead of two, and so on. If one suspension system fails, the other will take over. This arrangement is used on a tiered stage.

But even with two complete suspension systems you must still wear a full body harness and lanyard. In this case you would tie off to a stirrup on the stage or to a line secured to both stirrups.

Demonstrate

Fall-Arrest Inspection

[This part of the talk should include hands-on inspection of equipment.]

Fall-arrest equipment is your last line of defence. Make sure it works.

Your **harness** must have a label identifying the CSA (Canadian Standards Association) standard to which it complies.

Check the harness for

- cuts, burns, and signs of chemical damage
- loose or broken stitching
- frayed web material
- D-ring and keeper pads showing signs of distortion, damage, or undue wear
- grommets and buckles showing damage, distortion, and sharp edges

The lanyard must be securely attached to the harness D-ring by a locking snaphook or other approved means.

Your **lanyard** and **shock-absorber** must be free of fraying, kinking, and loose or broken threads. The hardware should not be deformed, rusty, cracked, or unduly worn. All moving parts must move freely and easily through their full range of movement.

Make sure your **rope grab** is working, matches the type of lifeline you are using, and has no damaged parts or sharp edges that could cut the lifeline.

Your lanyard must be attached to the rope grab with a locking snaphook to keep it from accidentally coming out.

Your **lifeline** should be free of damage, wear, and decay. It must be protected from rubbing and scraping where it passes over corners or edges.

Tiebacks

Explain dangers

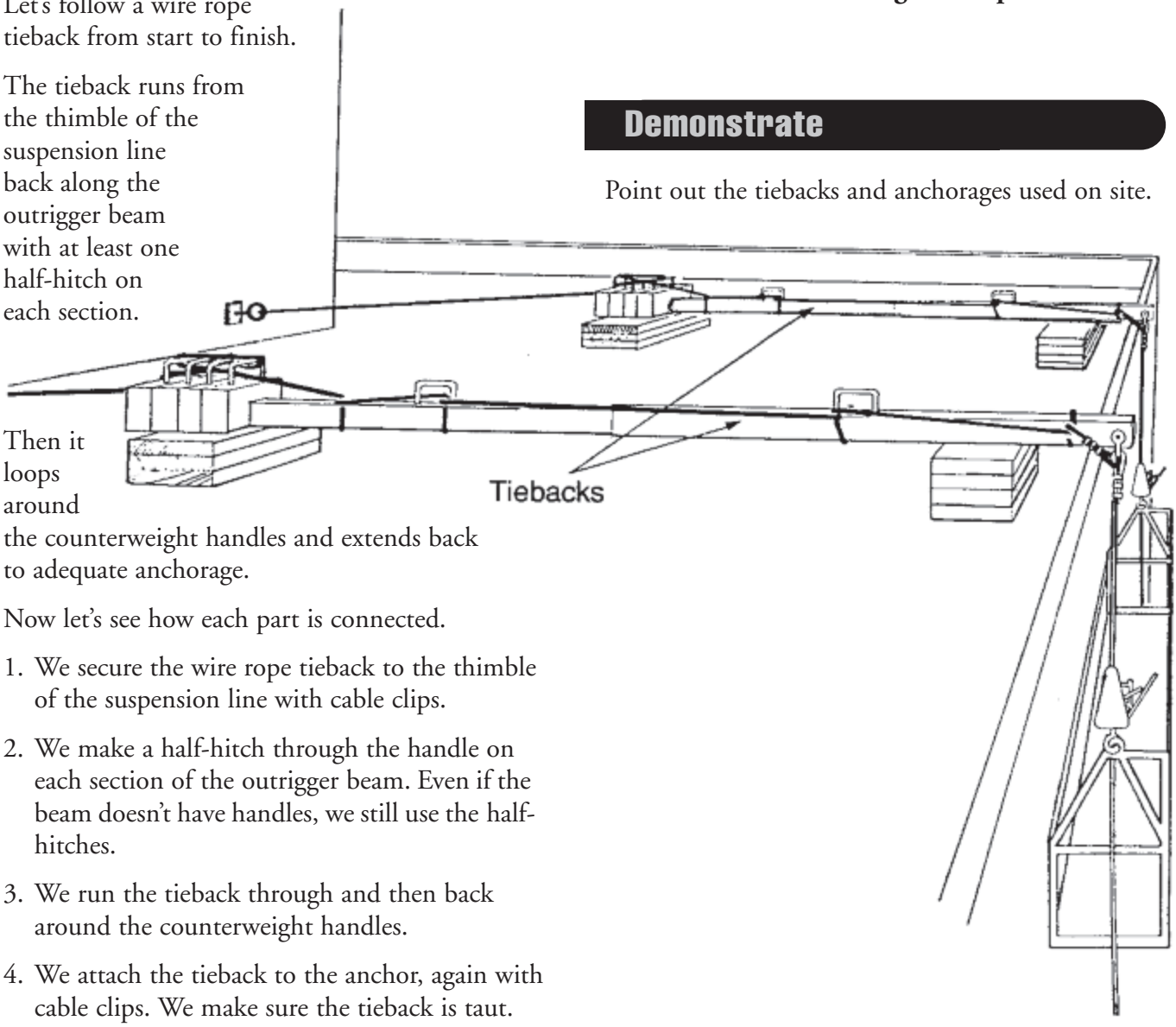
Suspended access equipment can fail if you don't set up all the components properly, including tiebacks. Improper set-up can lead to injury or death from a fall.

Identify controls

Tiebacks are used to secure the outriggers and counterweights of suspended access equipment. The tieback holds the major components of the suspension system together. It keeps them from being loosened or dislodged and secures them back to an adequate anchor point.

Let's follow a wire rope tieback from start to finish.

The tieback runs from the thimble of the suspension line back along the outrigger beam with at least one half-hitch on each section.



Then it loops around the counterweight handles and extends back to adequate anchorage.

Now let's see how each part is connected.

1. We secure the wire rope tieback to the thimble of the suspension line with cable clips.
2. We make a half-hitch through the handle on each section of the outrigger beam. Even if the beam doesn't have handles, we still use the half-hitches.
3. We run the tieback through and then back around the counterweight handles.
4. We attach the tieback to the anchor, again with cable clips. We make sure the tieback is taut.

What's an adequate anchor?

- engineered tieback systems such as eye bolts and rings as identified on an approved roof plan
- the base of large HVAC units
- columns on intermediate building floors or stub columns on roofs
- large pipe anchorage systems (12-inch diameter or bigger)
- roof structures such as mechanical rooms
- parapet clamps attached to reinforced concrete parapet walls **on the other side of the building**
- **If unsure, workers and supervisors must ask for assistance in finding an adequate anchor.**

Demonstrate

Point out the tiebacks and anchorages used on site.

Calculating counterweights

Explain dangers

Without the right number of counterweights, suspended access equipment can fail, leading to injury or death.

Identify controls

Here's how to calculate the number of counterweights you need.

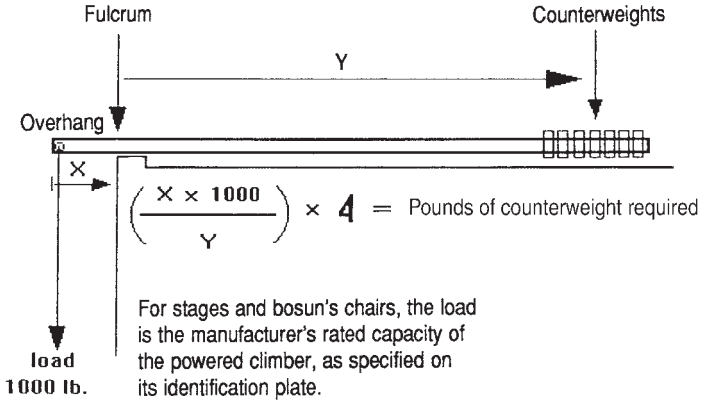
Let's start with the design factor. For beams and weights the design factor must be 4 to 1.

This means that the effect of the counterweights holding the equipment up must be at least 4 times greater than the load pulling the equipment down.

Another way of saying this is that...

- the distance of the outrigger beam from the fulcrum to the centre of the counterweights (Y)...
- multiplied by the load of the counterweights...
- must be at least 4 times greater...
- than the distance of the outrigger beam from the fulcrum to the suspension line (X)...
- multiplied by the capacity of the climber.

Let's look at an example.



Demonstrate

Go over this example with your crew.

The beam is 18 feet long. The counterweights will require at least 2 feet of space at the end of the beam. There is a 1-foot overhang and a supported load of 1000 lb.

X = 1 ft. Climber load = 1000 lb. Therefore 1ft. x 1000 lb. = 1000 ft. lb. pulling down.

The resisting force, including the design factor of 4 that must be provided by the counterweights = 4 x 1000 ft. lb. = 4000 ft. lb.

Y = 18 ft. – 1 ft. (overhang) – 1 ft. (centre of weights) = 16 ft.

The load required by the counterweights = $\frac{4000 \text{ ft. lb.}}{16 \text{ ft.}}$ = 250 lb.

Assuming counterweights are 55 lb. each, number of weights required = $\frac{250 \text{ lb.}}{55 \text{lb.}}$ = **5 counterweights**

If labels on an outrigger beam are missing or not readable, do not use the beam.

Remember—only use counterweights that have been specifically manufactured for the particular outrigger beam you are using.

Rigging hardware

List rigging on site

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Explain dangers

Rigging is only as strong as its weakest link. Workers' lives depend on the strength of that link.

It doesn't matter what safe working load is stamped on a hook if the hook is cracked and twisted or opening up at the throat. It can't deliver its full rated capacity.

Inspection is vital in rigging and hoisting.

Identify controls

Rigging hardware must have enough capacity for the job. Only load-rated hardware of forged alloy steel should be used for hoisting. Load-rated hardware is stamped with its working load limit or WLL.

Adequate capacity is the first thing to look for in rigging hardware. For hoisting, the design factor must be 5 to 1.

Once the right hardware has been chosen for a job, it has to be inspected regularly as long as it's in service.

There are warning signs that hardware has been weakened in use and should be replaced.

Cracks Inspect closely—some cracks are very fine.

Missing parts Make sure that parts such as catches on hooks, nuts on cable clips, and cotter pins in shackle pins are still in place.

Stretching Check hooks, shackles, and chain links for signs of opening up, elongation, and distortion.

Stripped threads Inspect turnbuckles, shackles, and cable clips.

Demonstrate

Using samples of hardware on site, review the following points.

Cable Clips

- Check for wear on saddle.
- Check that original parts are in place and in good condition.
- Check for cracks.
- Check for proper size of the wire rope.

Shackles

- Check for wear and cracks on saddle and pin.
- Check that pin is straight and properly seated.
- Check that legs of shackle are not opening up.

Hooks

- Check for wear, twisting, and cracks.
- Make sure that hook is not opening up.

Turnbuckles

- Check for cracks and bends.
- Check rods for straightness and damage to threads.

With your crew, inspect rigging hardware in use or stored on site. Arrange for repairs or replacement of any damaged or defective items.

Wire rope *Inspection*

List places wire rope is used on site

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_____

_____

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Explain dangers

Damage from wear and tear can reduce rope strength and capacity, endangering workers who depend on the rope.

Identify controls

Wire rope in continuous service should be inspected during operation and at least once a week.

There are warning signs to look for during inspection. Most of these warning signs indicate that the rope should be replaced.

Broken wires

Replace rope if there are

- 6 or more broken wires in one lay
- 3 or more broken wires in one strand in one lay
- 3 or more broken wires in one lay in standing ropes.

Worn/abraded wires

Replace rope if outer wires

- become flat from friction
- become shiny from wear AND
- wear exceeds 1/3 of diameter.

Reduced diameter

Replace rope if wear on individual wires exceeds 1/3 of their diameter.

Stretch

Replace 6-strand rope if stretch reduces diameter by more than 1/16.

Corrosion

Difficult to detect because it's inside the rope. Look for rust, discolouration, and pitting outside.

Cuts/burns

Replace rope if any wires or strands are cut or burned. Damaged ends can be removed and seized. Otherwise rope must be replaced.

Birdcaging

Look for strands opening up in cage-like clusters. Rope must be replaced.

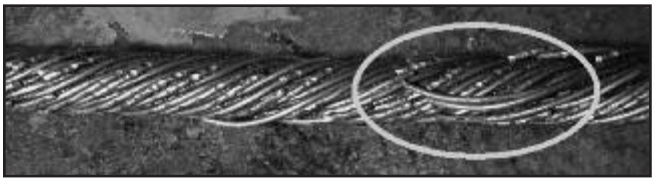
Core protrusion

Replace rope when inner core starts poking through strands.

Kinks

Kinks seriously reduce wire rope strength. Sections with kinks should be cut off. Otherwise rope must be discarded.

*Outside of wire rope. It **appears** to be in good condition. See below.*



Core of same wire rope. You can see many broken wires and notches. This rope should have been replaced long ago.

Demonstrate

Review wire rope in use on site. Ask your crew to inspect samples and arrange for repair or replacement as required.

Wire rope

Cable clips

Explain dangers

There's only one right way to install cable clips when you want to get the maximum efficiency—up to 85%—out of a prepared loop or thimble-eye termination. Otherwise the capacity of the termination can be severely reduced, risking the lives of workers and others nearby.

Identify controls

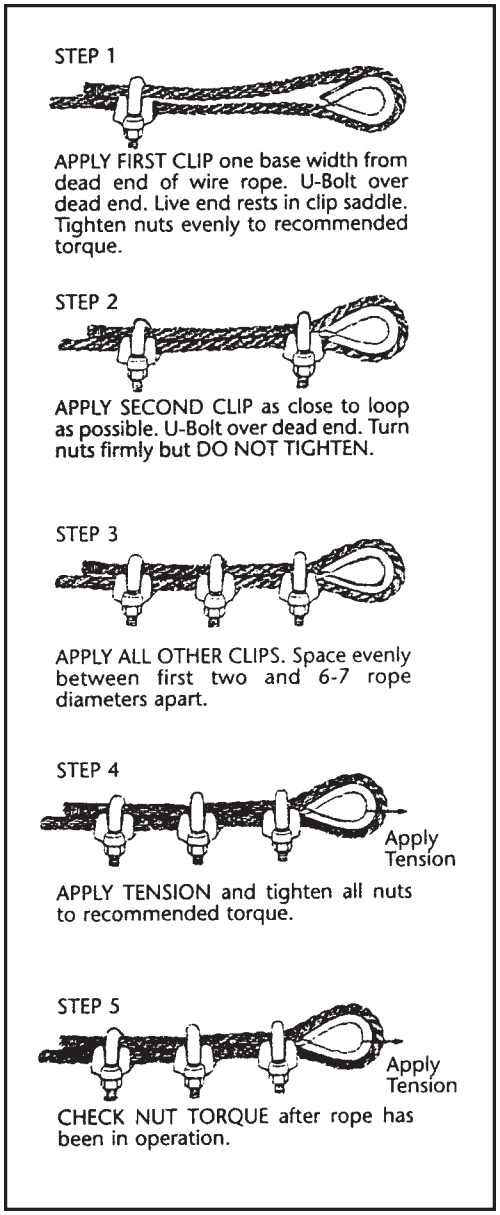
Here's how to install cable clips correctly. [Demonstrate these points with rope and clips as you talk.]

- Most cable clips have two sections. There's a saddle part and a U-shaped part.
- You need the right sized clip for the wire rope diameter.
- You need to know the number of clips required, the amount of rope to turn back from the thimble, and the torque needed to tighten the nuts. There are tables that spell out all of this information. (See sample below)
- At least three clips should be used when making any prepared loop or thimble-eye termination for wire rope, especially for hoisting.
- All three clips must be installed with the saddle part on the live end of the rope. This lets the live end rest in the saddle so it's not crushed by the U part of the clip.

  Here's a way to remember this: "**Never saddle a dead horse**."
- The U goes on the dead end of the rope where crushing will not affect the breaking strength of the hoist line.

Demonstrate

Demonstrate proper installation step-by-step with your crew by following the diagram below.



Rope Diameter (inches)	Minimum Number of Clips	Amount of Rope Turn-back from Thimble (inches)	Torque in Foot-Pounds for Unlubricated Bolts
5/16	2	5½	30
3/8	2	6½	45
7/16	2	7	65
½	3	11½	65
9/16	3	12	95
5/8	3	12	95
¾	4	18	130
7/8	4	19	225

Hoisting signals

Basic rules

List hoisting jobs on site

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Explain dangers

In hoisting operations, miscommunication between signaller and operator can lead to disaster for people or property.

Identify controls

If you're going to rig a load, you also need to know the signals for lifting, moving, and landing it. The operation may be a simple LIFT and LOWER. Or it may require more complicated signals.

On construction sites, signalling is required in the following situations.

1) When the operator cannot see the load.
2) When the operator cannot see the load landing area.
3) When the operator cannot see the path of travel of either the load or the crane.
4) When the operator is too far from the load to judge distance accurately.
5) When the crane or other hoisting device is working close to live powerlines or equipment.

In many cases, hand signals are the most efficient form of communication between riggers and crane operators. Over the years, a system of standard hand signals has evolved that is now international.

There is a signal for each action of the crane from BOOM UP to BOOM DOWN, from TRAVEL FORWARD to STOP.

By using the correct hand signals you can get a crane to do almost anything you want. The operator only needs to clearly see and understand your signals.

In our next talk, we'll run through all the hand signals for hoisting. But first we have to know the ground rules for signalling.

- Only one person should signal the operator. But anyone can give the STOP signal and it must be obeyed immediately. [Demonstrate signal.]

- Signals should be clear and, wherever possible, barehanded.
- The load should be directed so that it never passes over anyone.
- Operators should not make a move until they receive and understand your signal. If contact between you and the operator is broken for any reason, the operation must stop.
- Some situations call for two signallers. For instance, during a concrete pour, one signaller may be needed to direct the lift while the other directs the drop.
- Where a difficult lift demands voice communication, use two-way radios instead of hand signals.

Hand signals have their **limitations**. For example, they should never be used when distance, visibility, or noise prevents accurate communication with the operator.

Demonstrate

Demonstrate the hand signals on the next page.

Demonstration

Demonstrate

Demonstrate the hoisting signals below for your crew. Ask them to repeat after you and practice them so that they become natural.

Then, ask them to show you the signals for "Load Up," "Turn Right," and "Use Main Line."

List electrical hazards on site

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Explain dangers

Using electricity on site can be hazardous, in three areas especially:

- tools

- cords

- panels/generators.

Identify controls

The basic rule is simple: Consider all electrical wires and equipment live until they are tested and proven otherwise.

Tools

- Use only tools that are polarized or double-insulated.
- Make sure the casings of double-insulated tools are not cracked or broken.
- Always use a Type A ground fault circuit interrupter (GFCI) with portable electric tools operated outdoors or in damp or wet locations. GFCIs detect current leaking to ground from a tool or cord and shut off power before damage or injury can occur.
- Any shock or tingle, no matter how small, means that the tool or equipment needs to be checked and repaired.
- Take defective tools out of service.
- Before drilling, nailing, cutting, or sawing into walls, ceilings, and floors, check for electrical wires or equipment.

Cords

- Make sure that tool cords, extension cords, and plugs are in good condition.
- Use only 3-pronged extension cords.
- Make sure that extension cords are the right gauge for the job to prevent overheating, voltage drops, and tool burnout. 12 gauge is ideal.
- Use cords fitted with dead-front plugs. These present less risk of shock and shortcircuit than open-front plugs.
- Do not use cords that are defective or have been improperly repaired.
- Protect cords from traffic.

Panels

- Temporary panel boards must be securely mounted in a lockable enclosure protected from weather and water. The boards must be accessible to workers and kept clear of obstructions.
- Receptacles must be GFCI-protected.
- Use only generators with neutral bonded to frame.

Demonstrate

With your crew,

- inspect sample tools and cords used on the job
- point out labels indicating double insulation
- show how a circuit-tester and GFCI can be used to test cords, tools, and outlets.

List hazardous energy sources on site

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Explain dangers

Serious and fatal accidents have occurred when people assumed that electricity or machinery was turned off but it wasn't. Electric shock, sudden movement of sharp machine parts, release of pressure, falling counterweights—these are just some hazards that can result when energy is unexpectedly released.

Identify controls

- Lockout and tagging ensures that hazardous energy sources are under the control of the workers needing protection.
- **Lockout** often involves workers using a padlock to keep a switch in the "off" position, or to isolate the energy of moving parts.
- **Tagging** is how you tell others that the device is locked out, who locked it out, and why.

There are four basic actions in any lockout.

1) Identify all energy sources connected with the work.
2) De-energize, disable, redirect, or stop all energy from doing what it normally does.
3) Apply restraint devices (e.g., lock, scissors, chain, or block) to keep the system from starting up while you work on it.
4) Confirm that you've reached a zero energy state.

- Forms of energy that you must lock out include electrical, mechanical, potential (stored energy, such as in suspended loads), hydraulic, pneumatic, thermal, and chemical.
- It's not always easy to identify every source of energy. Machines or systems usually contain several forms of energy. A press may be hydraulically powered, for instance, but electrically controlled. Locking out the hydraulic power is not enough. Locking out the electricity is not enough. Gravity can still cause a raised ram to drop. There may also be potential energy stored in pistons or springs.
- To identify energy sources, you may need to trace wiring, lines, and piping in and out of the equipment. Specifications, drawings, operating manuals, and similar information will also help.
- A lock is your personal lock that can only be opened with your key.
- Once you apply the lock or other restraint device, you have to **tag** it. The tag must indicate 1) who you are, 2) who you work for, 3) why the machine or system is locked out, and 4) the date when the lockout was applied.
- Once each energy source has been locked out and tagged, you must test the equipment to verify a zero energy state.
- Many plants or industrial establishments will have specific procedures for lockout and tagging.

Know the law
Section 190 of the Construction Regulation (O. Reg. 213/91) lists the requirements for lockout and tagging.

Demonstrate

Show sample lockout devices and tags. Explain your project's lockout procedures. Identify situations on site where lockout and tagging would be necessary. Review recent applications of lockout and tagging.

Powerline Contact

List powerline hazards on site

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Explain dangers

- ☑ Major cause of fatal accidents in construction.
- ☑ Typical equipment involved—backhoe, dump truck, boom truck, crane, excavator.
- ☑ Beware of contact when moving extension ladders, rolling scaffolds, long lengths of pipe and siding.
- ☑ Beware of the powerline moving (e.g. in the wind).

Identify controls

- The constructor must develop written procedures ahead of time if the equipment or its load can encroach on the the minimum permitted distance to a powerline. The minimum permitted distances are listed in the Construction Regulation, and in the table in the next column.
- Don't store material and equipment below overhead powerlines.
- To determine powerline voltage, check markings on pole or call the utility.
- Use a signaller to direct equipment operators and truck drivers.
- The signaller must warn drivers and operators when any part of their equipment or load approaches the minimum distances set by law.

Voltage rating	Minimum distance
750 to 150,000 volts	3 metres (10 feet)
150,001 to 250,000 volts	4.5 metres (15 feet)
More than 250,000 volts	6 metres (20 feet)

- When erecting or moving a ladder or scaffold, don't let it lean or drift toward overhead powerlines. Always maintain minimum allowable clearances.

Demonstrate

With crew, review procedures in case of contact

- If possible, break contact by driving the equipment clear of the powerline. Otherwise do not leave the equipment until the utility shuts down the power or fire forces you to jump clear.
- Keep everyone away from equipment in contact with powerline.
- Beware of time relays. Even after breakers are tripped by line damage, relays may be triggered to restore power.
- Never touch equipment and ground at the same time.
- Get someone to call the local utility to shut off power.

List temporary lighting locations on site

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Explain dangers

Frequent relocation of circuits can loosen connections, break insulation, and create other shock or electrocution hazards.

Steel door frames can become electrified when doors close on wires.

Ladders, pipe, scaffold frames, and other objects can bump stringers, leading to electrical contact and shock.

Dead, missing, or low-watt bulbs, inadequate power, and blown fuses can leave stairwells, basements, and other areas poorly lit or with no lighting at all, increasing the risk of injury.

Identify controls

Lighting levels should be at least 55 lux (5 foot candles). That means 150-watt bulbs

- suspended 2.4 metres or 8 feet high and
- 7.5 metres or 25 feet apart

OR

- suspended 3 metres or 10 feet high and
- 6 metres or 20 feet apart.

Bulbs lower than 100 watts are not recommended.

Bulbs should be installed to light as large an area as possible.

Bulbs must be protected by cages against accidental damage.

Keep branch lighting circuits that feed temporary lighting entirely separate from power circuits, except for a common supply.

Protect branch lighting circuits by a breaker or fuse with a 15-amp rating. An electrician should hard-wire the circuits directly into a distribution panel.

Don't use temporary lighting circuits as extension cords. If a fuse blows, finding your way to the panel in the dark can be dangerous.

Make sure that wires do not contact steel doors or steel door frames. Ensure that wires cannot be pinched or cut by doors.

Demonstrate

With your crew, review the following checklist.

❑ Are work areas well lit?

❑ Are burned-out bulbs promptly replaced?

❑ Are they replaced with new bulbs or bulbs taken from another location?

❑ Are stringers promptly relocated when bulbs are blocked by the installation of new ceilings, ducts, piping, and other features?

❑ Are lamp holders hard-usage type?

❑ Are electrical feed lines for sockets supported every 1.4 metres (4 feet, 6 inches)?

List hazards with underground utilities on site

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Explain dangers

Buried gas and electrical lines present a serious risk of injury and death.

Utility pipes, conduit, and cable may be damaged by

- digging without locates, or with inaccurate locates
- careless excavation once the utilities have been located and marked
- failure to support exposed utilities once they have been exposed.

Breaks in buried services threaten not only workers but also the general public.

Identify controls

The basic idea is to CALL BEFORE YOU DIG.

We have to ask utilities to locate and mark their underground services. That includes gas, water, electrical, cable TV, telephone, and pipelines.

Utilities generally offer a free service for locating and marking buried services with stakes, flags, or paint.

These markers indicate the approximate centre line of the underground service. Utilities also provide a diagram of the locate information. Keep records of all your locates on the job.

Once the underground service is located, it's our job to uncover it.

This must be done by hand digging. Never use excavating equipment to find the service.

If we use a pressurized water/vacuum system to expose the buried service, we have to check with the utility first to make sure it's safe.

In some cases, the utility may supervise our digging and excavation. This is a requirement with fibre-optic cable.

Once the service has been uncovered and its location determined at several points along its length, then excavating equipment can be used.

Exposed utility pipes, conduit, and cable must be supported to keep them from falling or breaking. When construction contracts don't specify the method of support, ask the utility for its requirements.

ONE CALL

By contacting Ontario One Call Limited we can notify all utilities with underground services in the area where we want to dig.

1-800-400-2255

Fax 1-800-400-8876

www.on1call.com

But not all parts of Ontario are covered by Ontario One Call. We have to find out whether the service is available for a particular project.

If it isn't, we must contact each utility directly for locates. We then post their phone numbers in case of emergency.

Demonstrate

Review information in a locate provided by a utility for an underground service on site.

List areas with backing vehicles on site

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Explain dangers

Every year construction workers are killed and injured by backing vehicles and machinery.

Blind spots are a serious problem. If you're in a blind spot and the operator doesn't know you're there, you could be backed over.

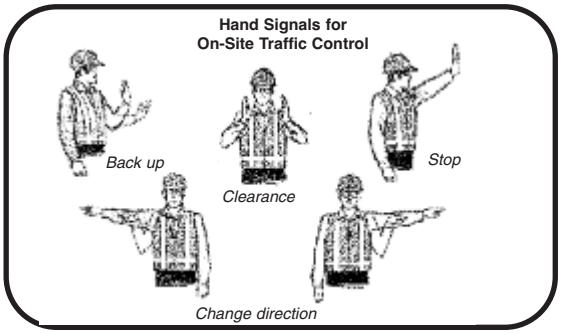
The hazards increase in congested areas where vehicles and heavy equipment are backing up all the time. Noise distracts people and dust makes it difficult to see and be seen.

Identify controls

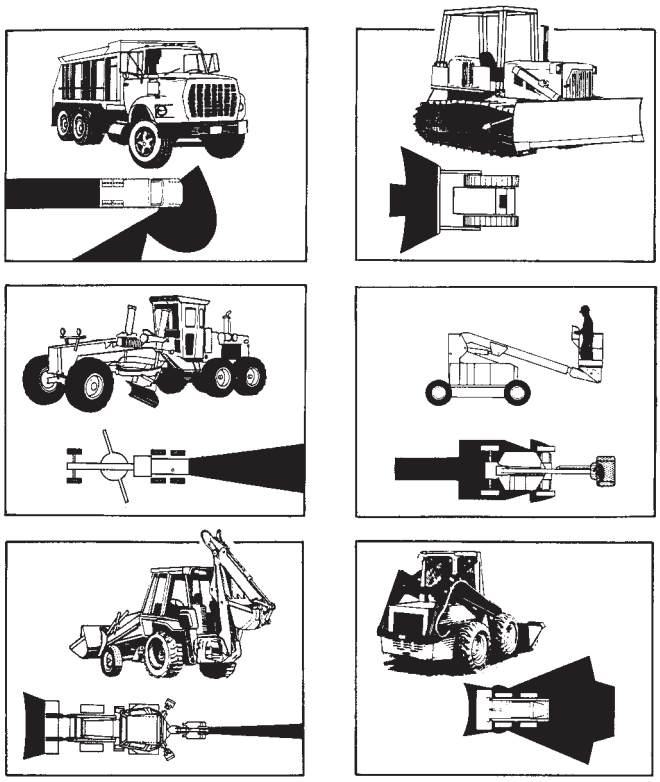
Drive-through sites can be planned to limit the need for backing up. But on most projects trucks and equipment have to operate in reverse at some point. That's when a signaller is necessary.

The **signaller** is another pair of eyes for the driver. If you're asked to work as a signaller,

- use these hand signals [demonstrate them]



- wear high-visibility clothing as required.
- know driver and operator blind spots. [Show your crew this blind spot illustration.]



- Stand where the operator can see you at all times, and where you have a full view of the intended path of travel. You must, however, stay out of the vehicle's path.
- Make eye contact with driver or operator before you signal or change position.
- Signalling requires your full concentration. You must not perform any other duties.

All workers on site must know where blind spots are. And above all, you must remember this:

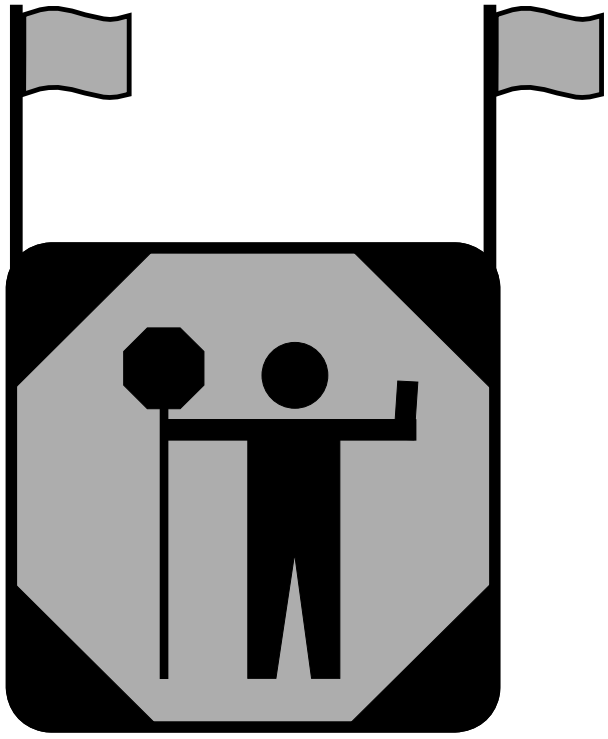
Make eye contact with the operator before approaching equipment.

Demonstrate

Show your crew where the blind spots are on a truck or piece of heavy equipment onsite. Get them to see things from the operator's perspective.

Public roads, part 1

List traffic control needs onsite



Explain dangers

When construction work affects traffic on public roads, there's a risk both to construction workers and to ordinary drivers and passengers. The first priority of a traffic control person is to protect workers and the public from accident and injury.

Identify controls

Traffic control persons protect workers and the public by regulating traffic flow. As long as you're working as a traffic control person, you can't do other work or have additional duties. Directing traffic is a full-time job.

Public traffic has priority over construction equipment. But you'll have to stop traffic when the job requires it. Otherwise, keep traffic moving at normal or reduced speed to avoid tie-ups.

With your help, work will go ahead safely and efficiently. I'm going to give you instructions in writing. But let me go over the main points now.

The most important point is simple: Pay attention.

- Don't be distracted by talking to anybody.
- Always face oncoming traffic.
- Stay alert to work nearby. Don't get backed over by your own equipment.
- Stand where you can see and be seen by approaching traffic for at least 150 metres (500 feet).
- Stand alone. Don't let a group gather around you.
- Stand at your post. Sitting is hazardous because you can't fully see or be seen by drivers.
- Always have a quick escape route ready in case a driver doesn't see you or disregards your signals.

A traffic control person must never be used to direct traffic if more than one active lane of traffic is travelling in one direction, or if the posted speed limit is greater than 90 km/hr.

Demonstrate

Give the worker IHSA's *Handbook for Construction Traffic Control Persons* (B016).

Go over the requirements for a typical arrangement for a two-lane roadway on page 10 of the *Handbook*.

Public roads, part 2

List traffic control equipment locations

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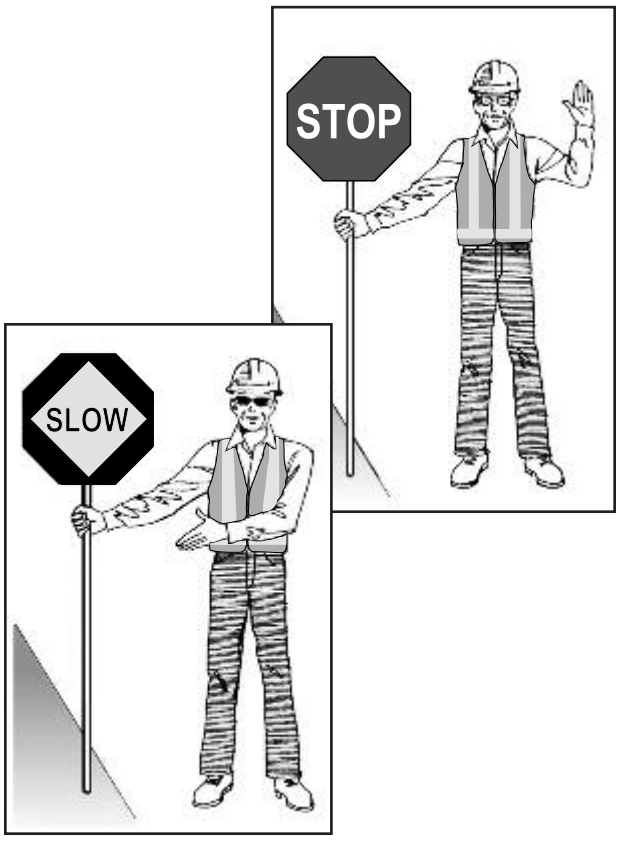

Identify controls

In addition to the hard hats and safety boots you're already wearing, you're going to need some equipment:

- safety vest that meets requirements of the construction regulation (Section 69)
- eye protection—it's dusty and bright out there
- STOP/SLOW sign that meets requirements of the construction regulation (Section 68).

Demonstrate as you talk

Let me show you how to use the sign.

- When you show the STOP side to approaching traffic, hold up your free hand like this.

  [Demonstrate.]

- When you show the SLOW side, motion traffic to keep moving slowly.

  [Demonstrate.]

- Hold the sign firmly in view of oncoming traffic.
- Give motorists plenty of warning. Don't suddenly flash STOP when a driver is too close.
- When you show STOP, clearly indicate where you want traffic to stop. When traffic has stopped, you may move to a point on the road where traffic in that lane can see you.
- When you show SLOW, don't bring traffic to a complete halt. When drivers slow down, use your free hand to signal them to keep moving slowly.
- If you're working along a two-lane road with traffic moving in both directions, you'll have to coordinate your signals with the traffic controller on the other side.
- Where two lanes are reduced to one, make sure you stop traffic in one direction before letting traffic through from the other direction.
- A traffic control person must never be used to direct traffic if more than one active lane of traffic is travelling in one direction or if the posted speed limit is greater than 90 km/hr.
- Remove or cover any traffic control signs at quitting time or when traffic control is suspended. Drivers can be confused by signs still in place when no construction work is going on.

Dump Truck Tipovers

Drivers

List tipover hazards on site

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Explain dangers

Dump trucks have tipped over when their boxes were lifted. The result has been death and injury to drivers and nearby workers.

Just consider some of the dimensions and forces involved.

A 46-foot trailer raised at 45 degrees is about 42 feet high. That's a lot of height and weight to keep balanced.

One small factor can make the truck tip over. All it takes is

- a slight variation in level
- a load that gets stuck
- soft ground under tires.

Identify controls

Let's take a few minutes to review basic operating procedures.

- At the loading point, make sure that the load is distributed evenly in the box. Don't overload.
- Remember that long boxes tip more easily than short boxes.
- Always make sure that trailer and tractor are aligned before dumping.
- Avoid dumping in high winds.
- Dump only on level ground. On slopes, dump downhill rather than up—the box doesn't have to be raised as high.
- Take extra care when dumping sticky material like clay and asphalt. It may stick to one side of the raised box and not to the other. Or it may stick in the upper portion, creating a top-heavy load. Either condition can lead to uneven weight, imbalance, and tipover.
- Don't leave a load in the truck overnight. It will stick to the box, especially in freezing temperatures.
- Keep your truck in good condition. Stability can be affected by poor suspension, uneven tire pressure, and worn or inadequate lifting systems.
- Ensure that the latch on the box works properly.
- Stay in the cab during dumping and keep your seatbelt on. You're less likely to be injured in a rollover. If the truck starts to tip **DON'T TRY TO JUMP OUT.**
- Always lower the box before moving the truck. This lowers the centre of gravity and prevents rocking, swaying, and instability. It also prevents contact with overhead obstructions.
- Keep lift axles down while dumping. Loads will be distributed over more bearing surfaces and the truck will not sink as easily in soft ground.

Demonstrate

Inspect boxes on one or two dump trucks. Check that latch works properly. Point out any defects or damage.

Workers in Vicinity

List tipover hazards on site

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Explain dangers

If possible, deliver this talk where truck operations are visible at a safe distance.

Dump trucks have tipped over when their boxes were lifted. The result has been death and injury to drivers and nearby workers.

Just consider some of the dimensions and forces involved.

A 46-foot trailer raised at 45 degrees is about 42 feet high. That's a lot of height and weight to keep balanced.

One small factor can make the truck tip over. All it takes is :

- a slight variation in level
- a load that gets stuck
- soft ground under tires.

Identify controls

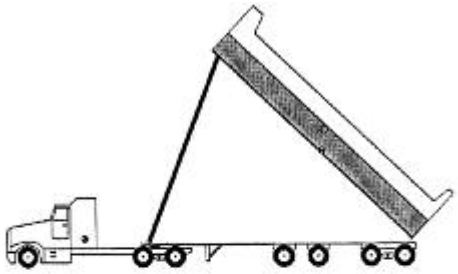
Workers around moving vehicles must wear high-visibility clothing. make sure it's in good condition and can be seen from all sides.

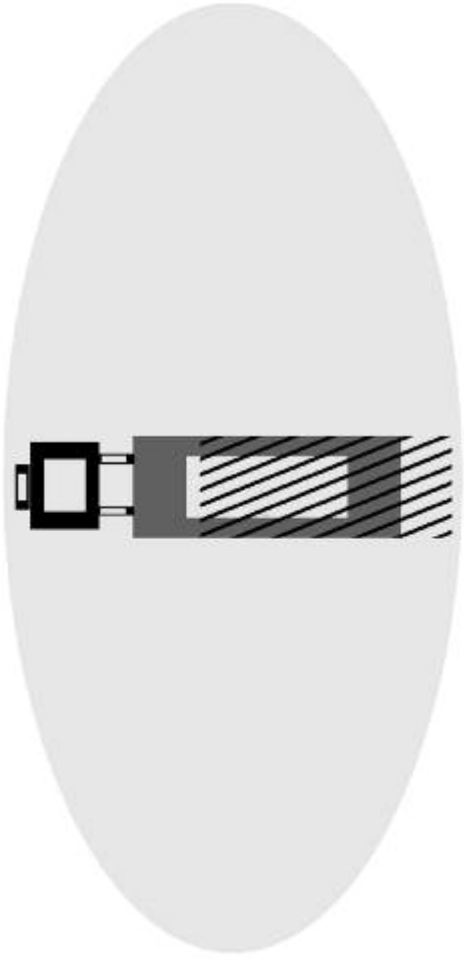
When approaching a truck, make eye contact with the driver so the driver is aware of your presence.

Demonstrate as you talk

When a truck is dumping, stay out of the danger area. *[Show your crew the shaded area in the drawing below.]*

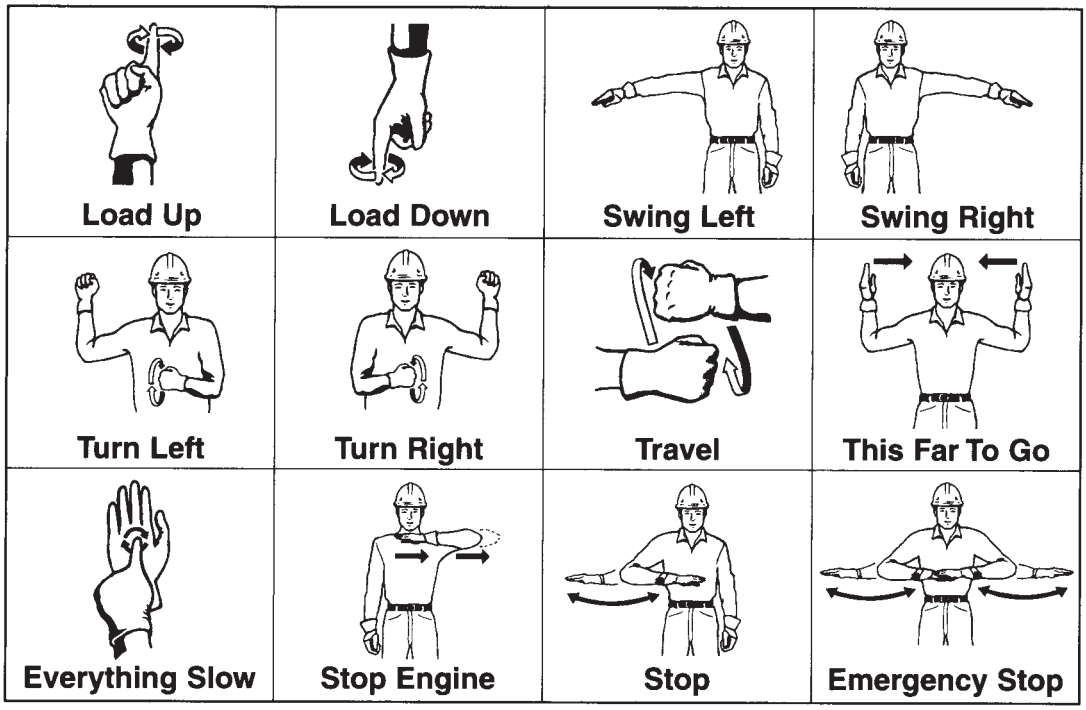
- By staying out of this area you will be safe if anything goes wrong.
- The signaller should be close enough to give adequate directions to the driver, yet far enough away to avoid injury if the truck tips over.
- Watch for overhead wires. Raised boxes can contact and break wires.

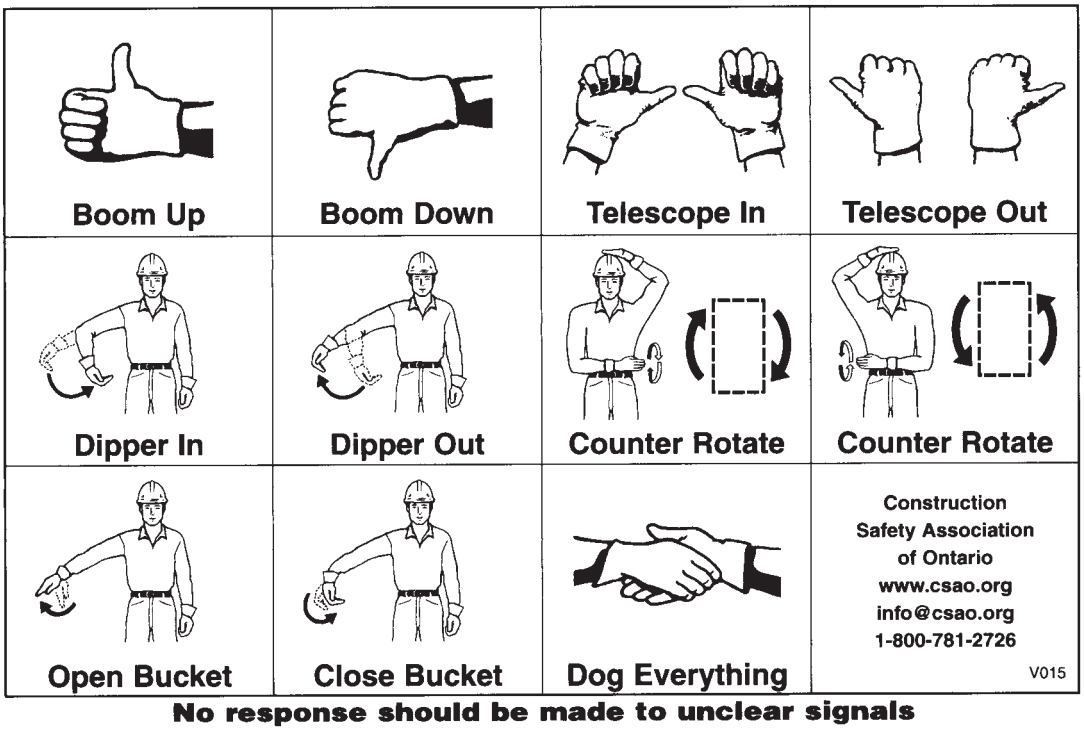




Demonstrate

Demonstrate the hand signals for excavating, below. Ask your crew to repeat after you and practice them so that they become natural. Hand out IHSA's *Excavator handsignals card* (Order V015).





No response should be made to unclear signals

Soil types

List trenching jobs on site

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Explain dangers

An unstable trench can collapse, killing or injuring workers. Soil type is a critical factor for trench strength and stability.

Identify controls

Trench stability is affected by a number of factors such as weather, moisture, vibration, and previous excavation. Time is also a critical factor. Some trenches will remain open for a long period, then suddenly collapse for no apparent reason.

Soil type is one of the most important factors.

In a single trench, soil properties can vary widely from top to bottom or along its length. Even hard soil may contain faults in seams or layers that make it unstable when excavated.

Let's take a closer look at soil types.

There are four general types of soil from dry, dense, and hard (Type 1) to wet, muddy, and unable to support itself (Type 4).

TYPE 1
- Hard, very dense. You can only penetrate it with difficulty by using a small sharp object.
- Low natural moisture content, high degree of internal strength.
- No signs of water seepage.
- You need mechanical equipment to excavate this stuff.

TYPE 2
- Very stiff, dense. You can penetrate it with moderate difficulty by using a small sharp object.
- Low to medium natural moisture content, medium degree of internal strength.
- Has a damp appearance after it's excavated.

TYPE 3
- Stiff to firm, compact to loose in consistency. May be previously excavated soil.
- Signs of surface cracking and water seepage.
- When dry, it may run easily into a well defined conical pile.
- Low degree of internal strength.

TYPE 4
- Soft to very soft, very loose in consistency, very sensitive to vibration and motion.
- Any disturbance significantly reduces its natural strength.
- Runs easily or flows unless completely supported before excavation.
- Almost no internal strength.
- Wet or muddy.
- Exerts substantial fluid pressure on its supporting system.

Demonstrate

Demonstrate tests for different types of soil. Examine soil samples on site.

Protection

List trench protection used on site

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Explain dangers

You risk injury or death if you enter a trench deeper than 4 feet (1.2 metres) that has not been sloped, shored, or protected by a trench box.

Identify controls

Sloping

Sloping the walls is one way to keep a trench from collapsing. The angle of the slope depends on soil conditions.

- Type 1 and 2 soils: Cut trench walls back at an angle of 1-to-1 or 45 degrees. That's one metre back for each metre up. Walls should be sloped starting at 1.2 metres or 4 feet up the wall.
- Type 3 soil: Cut walls back at an angle of 1-to-1, but from **the bottom of the trench**.
- Type 4 soil: Slope the walls at 1-to-3. That's 3 metres back for every 1 metre up from the trench bottom.

Shoring

Shoring is a system which supports walls to prevent soil movement. It also helps to support underground utilities, roadways, and foundations.

The two types of shoring used most commonly are timber and hydraulic. Both consist of posts, wales, struts, and sheathing.

One major advantage of hydraulic shoring is that you don't have to enter the trench to install the system. Installation can be done from the top of the trench.

Whenever possible, shoring should be installed as excavation proceeds. If there's any delay between digging and shoring, no one should enter the unprotected trench.

Trench boxes

Trench boxes aren't meant to shore up or support trench walls. They're only meant to protect workers in case of a cave-in.

The space between the box and the trench wall should be backfilled. Otherwise a cave-in or collapse may cause the trench box to tilt or turn over. It's also easier to enter the box if soil comes right up next to it.

Trench boxes are commonly used in open areas away from utilities, roadways, and foundations.

As long as you're in the trench, stay inside the box.

Ladders

Whether the trench is sloped, shored, or protected by a trench box, you need a way to climb in and out safely.

Trenches must have ladders in the areas protected by shoring or trench boxes. The ladder must be securely tied off at the top, extend above the shoring or box by at least 1 metre (3 feet), and be inspected regularly for damage.

A ladder should be placed as close as possible to where you're working – and never more than 7.5 metres (25 feet) away.

Demonstrate

Review the protective systems used on site. Check condition of sloping, shoring, or trench box. Are ladders provided for getting in and out? See Safety Talk on "Trenching—Inspection".

Inspection

List trench locations on site

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Explain dangers

Without regular and frequent inspection, you have no assurance that your sloping, shoring, or trench boxes are effective in protecting workers from trench collapse.

Identify controls

Sloping, shoring, and trench boxes must be inspected regularly. Inspection is everyone's responsibility.

- With hydraulic shoring, look for
  - ➛ leaks in hoses and cylinders
  - ➛ bent bases
  - ➛ broken or cracked nipples
  - ➛ cracked, split, or broken sheathing.

  Report any of these conditions to your supervisor.
- Check timber shoring before it's installed. Discard any damaged or defective lumber.
- Make sure that shoring members are the size required by regulation for the depth of your trench and the type of soil.
- With timber shoring, check for
  - ➛ cracked or bowed sheathing
  - ➛ wales crushed where they join struts
  - ➛ loose or missing cleats
  - ➛ split or bowed wales
  - ➛ struts off level.
- If wales show signs of crushing, this indicates structural problems and the need for more struts.
- Always check areas near shoring where water may have seeped in. The combination of water and granular soil can lead to washout. This undermines the trench wall and has killed and injured workers several times in the past.

In trench boxes, look for

- damage and other defects
- deformed plates
- cracks in welds
- bent or distorted welds in sleeves and struts
- missing struts
- bent struts
- holes, bends, or other damage to plates.
- During use, check the box regularly and often to make sure that it is not shifting or settling more on one side than the other. This can indicate movement of soil or water underneath.

  If the box is shifting or settling, get out and tell your supervisor about it.

The ground around trenches should be inspected for tension cracks. These may develop parallel to the trench at a distance of about one-half to three-quarters of the trench depth.

If you find cracks in the ground, alert the crew and double-check your shoring or trench box.

It's dangerous to overlook damage or defects in protective systems. Even though the job is short-term or almost finished, trenches can still cave in.

Demonstrate

Inspect sloping, shoring, and trench boxes on site. Check ground conditions nearby. Refer to the appropriate regulations.

Confined spaces

Definition

List confined spaces on site

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Explain dangers

The hazards of working in confined spaces are often not recognized until it's too late. For example:

- Four workers died from hydrogen sulphide poisoning in a sewage holding tank.
- A worker was killed by carbon monoxide gas from a gasoline-powered pump used to drain a pit.
- A worker was caught in a mixing tank which was inadvertently started while he was inside.

Identify controls

"Confined space" means a fully or partially enclosed space

- that is not both designed and constructed for continuous human occupancy, and
- in which atmospheric hazards may occur because of its construction, location, or contents, or because of work that is done in it.

In chemical and petrochemical plants, confined spaces include tanks, vessels, pipes, sumps, and pits. Confined spaces in heavy industrial plants can be roasters, digesters, mixers, bins, and conveyors.

Sewage-handling and water-treatment plants include various kinds of confined spaces, from settling and holding tanks to maintenance holes and wells below floor level.

In general construction, confined spaces include vaults, maintenance holes, tanks, and other spaces that meet the criteria of the definition.

Physical hazards such as live electrical conductors, operating equipment, stored energy, pressurized pipes, noise, and heat sources must be controlled in confined spaces through lockout and tagging. You must also control other dangers, including those you may introduce into the space by the work being performed. Such hazards include hazardous dusts, chemical vapours, engine exhaust, and welding fumes.

Other spaces that don't fall under the definition of confined space but need to be assessed and controlled include

- trenches and excavations
- basements
- halls
- small rooms.

These spaces must be adequately ventilated to ensure hazardous materials and atmospheres are not present and do not accumulate from the work being performed. Workers have been overcome and killed by solvent and adhesive vapours in small, poorly ventilated rooms.

Demonstrate

Identify confined spaces on the project with the crew. Discuss potential dangers.

Dangerous atmospheres

Explain dangers

Dangerous atmospheres have killed those working in confined spaces as well as those attempting rescue. Know the hazards.

Identify controls

Dangerous types of atmospheres are

- flammable and explosive
- toxic
- oxygen-deficient
- oxygen-enriched.

Flammable and explosive atmospheres include

- natural gas from leaking gas lines or natural sources
- methane from decaying sewage
- propane gas from leaking cylinders or equipment
- gasoline vapour from leaking tanks and spills
- vapour from solvents used for painting, cleaning, refinishing, etc.

Toxic atmospheres include solvent vapour and

- hydrogen sulfide from decaying sewage or raw petroleum
- carbon monoxide from engine exhaust.

Oxygen-deficient atmospheres contain less than 19.5% oxygen. Breathing oxygen-deficient air can make you lose judgment, coordination, and consciousness. In a confined space, oxygen can be displaced by other gases or used up by rusting metal, combustion, or bacteria digesting sewage.

Oxygen-enriched atmospheres contain more than 23% oxygen. They are rare in construction, and are usually caused by leaking oxygen hoses or cylinders.

You must check for atmospheric hazards before entering any confined space. You must use properly calibrated gas detection equipment. Many dangerous atmospheres cannot be detected by smell or taste.

- Make sure the equipment is able to detect what you suspect. Some detectors have sensors that check for oxygen content, explosive gases or vapours, and a range of toxic gases. Some have only one or two sensors and may not detect certain types of hazards. You may need a selection of detectors—one detector can't test for everything.
- Check all levels of the space. Some contaminants are lighter than air and accumulate near the top of the space. Others are heavier than air and settle at the bottom.
- If you leave the space for a break or lunch, test before you go back in. Dangerous atmospheres can develop without warning.

If tests indicate a dangerous atmosphere, you must NOT enter the space until it is thoroughly ventilated and subsequent tests indicate the air is safe to breathe.

Ventilation and testing must be continued as long as you are in the space.

If the space can't be adequately ventilated, you can only enter if

- you wear suitable respiratory protection and a full body harness attached to a rope anchored outside the space and held by a worker with an alarm
- you have a means of communication with the worker outside
- a person trained and equipped in artificial respiration and emergency rescue is available outside the space.

Never try to rescue a worker overcome in a confined space unless you are trained and equipped for it. Many workers trying to save their buddies have become victims themselves. Get emergency help.

Demonstrate

Review the types of confined spaces and atmospheric hazards that your crew may encounter. Demonstrate how to use gas detection equipment.

Physical hazards

List confined spaces on site

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Explain dangers

In addition to dangerous atmospheres, confined spaces such as tanks, vats, vessels, hoppers, and bins can present physical hazards:

- poor entry and exit
- cramped working conditions
- temperature extremes
- rotating or moving equipment
- reactive or corrosive residues
- electrical hazards
- uncontrolled movement of liquids or solids.

Some of these hazards involve greater risk inside a confined space than outside.

For example, electrical flashover can be more dangerous in a cramped maintenance hole where there's limited escape than in an electrical room with clear exits. And fire in a confined space can be far more dangerous than fire in an open work area.

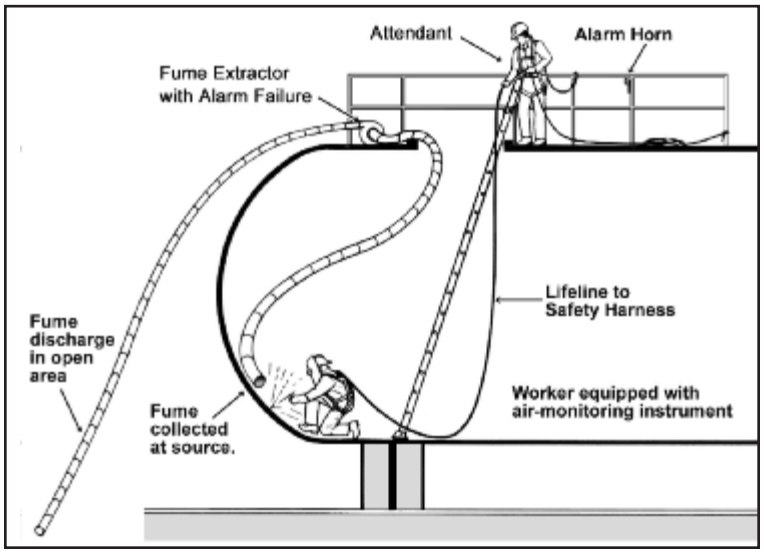
Identify controls

What can we can do to control some of the physical hazards?

- Isolate the space by disconnecting supply and drain lines. Lock out and tag the lines so they won't be reopened while you're working inside.
- Inspect the space for dangerous contents such as grain or sand that could slide, shift, and bury you inside.
- Lock out any electrical, hydraulic, or pneumatic equipment that could unexpectedly rotate, drop, roll, or snap shut in the space.
- Block and secure any equipment that could move because of gravity or stored momentum.
- Wear safety harnesses and lifelines to make rescue more efficient in case of an emergency.
- Develop a rescue plan for the space and practice to make sure that everyone knows what to do.
- Use an entry permit system. This helps identify hazards and controls, and keeps track of who is inside.

Demonstrate

Review procedures for lockout, tagging, and entry. Discuss some of the controls shown in the diagram.



List housekeeping hazards on site

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Explain dangers

Every year, poor housekeeping and storage account for a significant percentage of accidents and injuries in construction.

We all know how fast rubbish accumulates on site—scrap lumber, broken bricks, pieces of drywall, strap-bands, and packaging.

How can you concentrate on your work when you're worried about slipping, falling, or tripping over garbage and debris?

Production and installation time go up while quality tails off.

Construction rubbish is often irregular in shape, hard to handle, and full of sharp objects.

One of the biggest problems is packaging. Too often it gets removed from material and left wherever it falls.

This creates tripping and slipping hazards. It also makes other hazards hard to see. Even worse, it invites more mess. When a site isn't cleaned up, no one cares about leaving garbage where it drops

When that happens, you can't see faulty wiring, protruding nails, damaged flooring, and missing scaffold planks.

Mess also makes it difficult to use material-handling equipment. As a result, more material gets handled manually. This increases the risk of injury and damage.

Identify controls

Housekeeping means cleaning up scrap and debris, putting it in containers, and making sure the containers are emptied regularly. It also means proper storage of materials and equipment.

Effective housekeeping and storage prevent accidents and injuries.

- Clean up as work proceeds.
- Keep equipment and the areas around equipment free of scrap and debris.
- Keep stairways, ramps, and other travel areas clear.
- Secure loose or light material stored on roofs and open floors to keep it from blowing away in the wind.
- Never let material fall from any level of the project. Use an enclosed chute or lower the material in containers.
- Keep material at least 1.8 metres or 6 feet away from floor and roof openings, floor and roof edges, excavations, and trenches.
- Store material so that it won't roll or slide in the direction of the opening. Use blocking if necessary.
- Before handling used lumber, remove or bend over any protruding nails and chip away hardened concrete.
- Remove flammable rubbish and debris immediately from the vicinity of welding, flame cutting, propane heating, and other ignition sources.

Demonstrate

Review housekeeping problems unique to your crew. Discuss housekeeping problems on other areas on site.

Pliers and Wrenches

List tasks needing pliers and wrenches

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Explain dangers

Injuries with hand tools are not often serious, but they can be severe enough to send you to the hospital and make you lose time from work.

Common causes include using the wrong tool, using the right tool improperly, rushing, and lack of training or experience.

Identify controls

[Demonstrate these points as you talk.]

All tools

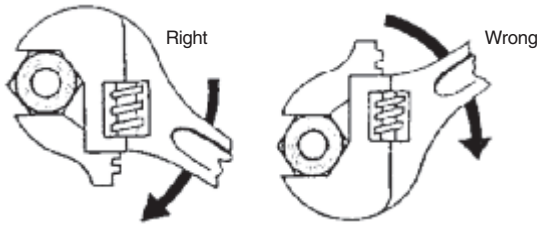
- Use tools for their intended purpose. Don't use pliers as wrenches. Don't use wrenches as hammers.
- Wherever possible, don't expose tools to extremes of heat and cold. Metal will lose its temper and get brittle.
- Don't extend the handles of tools with sleeves or cheater bars for more leverage and power.
- Don't confuse cushion grips with insulated handles. Cushion grips are for comfort only. Insulated handles are for electrical shock protection.
- Don't hammer on the handles of wrenches or pliers to gain more force. The tool could bend, break, or fly off and hit you or someone else.

Pliers

- Use pliers with enough space between the handles to keep palm and fingers from being pinched.
- Pull on pliers; don't push.
- Oil regularly. All it takes is a drop of oil on the hinge.
- Use pliers that are big enough to do the job with reasonable effort.
- Don't use pliers to turn nuts and bolts. The jaws can slip and damage corners and edges of nuts and bolt heads.

Wrenches

- Replace damaged wrenches. Straightening a bent wrench only weakens it.
- Pull on a wrench; don't push.
- Be prepared in case the wrench slips. Make sure your footing is solid, your stance balanced, and your hands clear.
- With adjustable wrenches, put pressure on the permanent jaw, not the movable jaw.



- Use the right wrench for the job. Don't use pipe wrenches on nuts or bolts. Don't use adjustable wrenches on pipe.
- On adjustable wrenches, inspect knurl, jaw, and pin for wear.

Demonstrate

Review types of pliers and wrenches used by your crew. Inspect a few for evidence of wear, damage, or misuse.

Screwdrivers

List jobs requiring screwdrivers

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Explain dangers

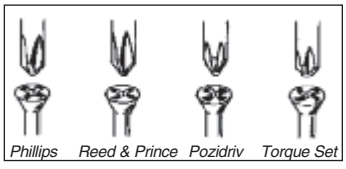
People use screwdrivers for chipping, chiselling, scraping, prying, digging, gouging, testing circuits, making holes, stirring paint, propping doors open, and taking the lids off cans.

Workers have suffered eye injuries from flying fragments of screwdrivers struck with a hammer.

Even then, the most common abuse of the screwdriver is using one that doesn't fit or match the screw. That means using a screwdriver too big or small for the screw or not matched to the screw head. The results are cuts and puncture wounds from slipping screwdrivers.

Identify controls

- Use the right screwdriver for the job. This means the right kind of tip – slot, Robertson, Phillips, whatever. It also means the right size. A screwdriver too big or small for the screw can only lead to trouble. You'll chew up the screw head, damage the screwdriver, gouge the material, or scrape your knuckles.



- Drill a pilot hole before driving a screw into wood.
- Make sure that the screwdriver handle is intact, free of splits or cracks, and clean of grease and oil.
- You should only need enough force to keep the screwdriver in contact with the screw. With a properly sized and drilled hole, the screw will draw itself into the material with minimum pressure and guidance.
- Don't hold the material in one hand and use the screwdriver with the other. The screwdriver can slip and cut your hand.
- Discard screwdrivers with chipped handles, bent shanks, and twisted or excessively rounded tips.
- Don't use bench grinders to restore tips. The excessive heat can destroy temper and reduce the hardness of shank and tip. Filing should be done by hand.
- Use screwdrivers with large handles for better grip.
- Don't use pliers on the handle of a screwdriver for more power. To remove stubborn screws, use a screwdriver with a square shank designed for use with a wrench.

Demonstrate

Review types of screwdrivers used by your crew. Inspect a few for evidence of wear, damage, or misuse.

Basic Safety

List electric tool hazards on site

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Explain dangers

The main hazards with electric tools are:

- lack of grounding or double insulation
- broken or disarmed safety devices such as retractable guards
- unfamiliarity with the tool
- failure to hold tool securely
- failure to secure work
- injuries to hands and eyes
- faulty tool cords and extension cords
- failure to use ground fault circuit interrupters (GFCIs) with tools operated outdoors or in wet or damp locations indoors.

Identify controls

Grounding

- Make sure the tool is grounded and the cord polarized or double-insulated.
- "Grounded" means an approved three-wire cord with a three-prong plug. Use the tool only in a three-pole outlet.
- You can identify two-pronged polarized tools because one prong is larger than the other.
- Never cut off or bend back the ground pin on a three-prong plug—or use a two-prong cheater or adapter—to make the plug fit in a two-pole outlet.

Demonstrate

- Double-insulated tools are labelled as such. The label will feature a D, a D inside a square, a double square, and so on.
- Make sure the casing of a double-insulated tool is not cracked, split, or broken.

Cords

- Inspect tool cords and extension cords daily for damage.
- Keep cords clear of the tool during use.
- Replace any open-front plugs with dead-front plugs. Dead-front plugs are sealed. They present less danger of shock or shortcircuit.
- Inspect tool cords and extension cords for kinks, cuts, cracked or broken insulation, and makeshift repairs.
- Don't use the cord to lift, lower, or carry an electric tool. Don't disconnect the tool by yanking or jerking on the cord. You'll damage the cord, loosen connections, and run the risk of shocks and shortcircuits.
- Protect cords from traffic. Run them through conduit or between planks along either side. If necessary, run cords overhead above work or travel areas.
- If any cord feels more than warm to the touch, check the circuit for overloading.
- Report any shocks from tools or cords to your supervisor. Tag the tool and don't use it.
- Outdoors or in damp or wet locations indoors, use a Type A GFCI. That's the law. GFCIs detect any current leaking to ground from a tool or cord and quickly cut off power before damage or injury can occur.

Demonstrate

With your crew, inspect sample tools and extension cords used on the job. Show labels indicating double insulation. Demonstrate and explain how a GFCI can identify defective cords and tools.

Explain dangers

If you have to push the tool beyond its capacity you can burn out the motor and injure yourself.

Leaning into the drill and pushing too hard is dangerous. If you lose balance or control, you can fall, or strain your neck, arm, and shoulder muscles.

Identify controls

[Have sample drills available to demonstrate.]

You need a drill powerful enough for the job. And you need a bit that is both sharp and suited to the job.

1/2- or 3/4-inch drills are heavy-duty and designed to be used with two hands. They have an auxiliary handle that you can screw into the top. This is what you want for drilling into concrete, steel, heavy timbers, and so on.

A heavier drill is also useful for hole saw bits and spade bits where the blade of the bit is considerably wider than the shank. These attachments require the power and control you get with a two-handled drill.

An **impact or hammer drill** is what you need for work such as drilling large holes in concrete or rock with a carboloy bit.

Good practice

- Heavy-duty drills or hammer drills have a low rpm and higher horsepower rating.
- Take a break when you have to, especially when you're up on a ladder or scaffold. You may even need help with some kinds of drilling.
- Check your balance and grip. Sudden torque can twist your arm and throw you off balance.
- When drilling deep holes, occasionally withdraw the bit several times with the motor running. This clears cuttings from the hole.
- When you're drilling on loose material, securing the work is half the battle.
- **HANDS OFF**. Don't hold the work in your hand, on your knee, or against your boot while you're drilling. Clamp small pieces in a vice.
- When you're drilling, don't push or lean too hard on the drill. You can damage the tool or the work, or be thrown off balance if the drill twists and grabs.
- Punching a layout hole or drilling a pilot hole can make your work more accurate, efficient, and safe.

Demonstrate

Review types of drilling done by your crew. Inspect sample drills and bits used on the job.

Sabre saws

List jobs where you'll need sabre saws

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Explain dangers

If you don't use a sabre-saw correctly it can kick back, injuring you and damaging materials. If you don't check out what's behind your work, you could also saw into wires, cables, or pipes.

Identify controls

[Have models available to demonstrate.]

Sabre saws are used to cut holes in ceilings, floors and walls and to make short, straight cuts. The sabre saw cuts on the upstroke only.

Don't use this saw for continuous or heavy cutting. Use a circular saw.

There are some basic safeguards to follow when using a sabre saw.

- You need eye protection. You should wear safety glasses with side shields. Even better are goggles for dust or a face shield.
- You need two hands to maintain control, absorb vibration, and avoid accidental contact.
- Always make sure you know what's on the other side of the surface being cut. Beware of sawing into wires, cables, and pipes.
- Make sure that the saw will clear the bench, trestle, or other support.
- Clamping material is not only safe. It reduces vibration and makes cutting more accurate.
- Don't start cutting with the blade in contact with the work. Let the saw reach full power before it touches the work.
- Hold the base or shoe of the saw in firm contact with the work. This keeps the blade cutting straight up and down and prevents it from twisting or breaking.
- Keep your free hand away from the front of the saw.
- Never reach under, around, or behind the material being cut.
- Don't try to make inside or pocket cuts without first drilling a lead hole.
- When the motor is running, working a blade in or out of a cut or lead hole can cause kickback.
- Let the saw and the blade do most of the work. Don't force the saw. The machine should turn with ease. If you have to push the saw, the blade is dull or the stock is too heavy for the saw.
- Never put the saw down until the blade and motor have stopped.

Demonstrate

Inspect sabre saws used on the job. Review situations in which the saws should or should not be used. Demonstrate external and inside cuts.

Circular Saws

List jobs requiring circular saws

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Explain dangers

The circular saw is one of the most widely used portable power tools on construction sites. If not used correctly, it can cause serious injuries.

Kickback is the most common problem. It can happen to even the most careful users. You can minimize the chance of kickback by properly setting the blade depth, maintaining a sharp blade, standing in the right position, and ensuring that the material is held securely.

Identify controls

[Have saws available to demonstrate.]

- Always wear the proper clothing and gear when operating the saw. This includes safety glasses, hearing protection, a dust mask, and appropriate footwear. Avoid wearing loose clothing and jewelry. If your hair is shoulder length or longer, tie it back so it doesn't get caught in the saw.

If you are cutting pressure-treated wood or cedar, we recommend that you use a NIOSH-approved N95 filtering face mask, or a more protective respirator.

- Read all the safety materials included in the manufacturer's instructions before using your saw.
- Always unplug the saw when changing blades, cleaning the saw, or making adjustments.
- Never use the saw near water.
- Ensure the extension cord does not run across walkways where it can be a tripping hazard or get damaged.
- Ensure that the extension cord is in good condition, and that the plug has a ground pin.
- The blade should extend only 1/8" below the piece of material that you are cutting. The risk of kickback and injury increases as more blade is exposed below the material.
- Do not over extend your body when cutting. Position yourself so that you are in control of the saw and the material.
- Never use your knee or foot to support the material you're cutting.
- Never wedge, wire, or jam the guard to prevent it from working. This is a dangerous practice that could cause serious injury.
- Never fasten the trigger's safety lock in the "on" position. The purpose of this feature is to minimize accidental starts.
- Never pull the saw backward when cutting.
- Always use the proper blade for the type of material and the type of cut.
- Before setting the saw down, make sure the guard is in place. If you don't, the saw could run across your hand or foot.
- Never carry the saw by the cord or with your finger on the trigger.

Demonstrate

Inspect the saw. Identify all safety features and make sure they are working. Demonstrate how to use the saw, as well as techniques for holding material, by making cuts in different positions and with different materials.

List jobs requiring nail guns

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Explain dangers

There are two common types of nail guns used on construction sites: pneumatic and explosive cartridge. They are both very powerful and very dangerous if not used properly.

Nail guns have the capacity to fire several nails per second and can penetrate 4" into concrete. The most common type of injuries are puncture wounds caused because the bump or trigger safety was disabled.

Puncture wounds to the extremities such as hands and feet are the most common. Puncture wounds to places like the head or neck can cause more severe injuries, and can result in death.

Identify controls

[Demonstrate with models you are currently using on site.]

[**Important: Describe the differences between a dual action trigger and a sequential trip trigger.**] **Dual action trigger**: To fire a nail, the user can hold the trigger down and press the safety catch at the nose of the gun repeatedly against a surface without releasing the trigger. **Sequential trip trigger**: To fire a nail, the user must release and press the trigger each time, even when the safety catch is pressed against a surface.

Nail Guns speed up the work, but one careless motion is all it takes to lose an eye or put a nail through your hand.

The following are good work practices to help prevent injuries:

- Always wear the proper personal protective equipment—including eye protection—when you are using the nail gun.
- Always keep your hands and fingers off the trigger when you are not using the gun. Never carry the gun with your finger on the trigger.
- Before doing any sort of maintenance on your nail gun, whether reloading it or clearing a jam, disconnect it from its air source or remove the cartridge.
- Keep your hand and fingers well away from the nail's path. Use clamps if necessary.
- Never point the gun at another person or yourself.
- When you're not using the gun, engage the trigger safety device or disconnect the gun from its power source.
- Never modify safety features, such as tying or wiring the nose contact in the activated position.
- Never allow people who have not been trained to operate a nail gun.
- Always use the proper type of nails in the gun. Check the manufacturer's instructions.
- Never overextend your reach when you are using the gun. Hold it firmly in your hand.

Demonstrate

Inspect the nail gun to ensure that it is in proper working condition, and that all safety features are intact and working. Demonstrate proper work techniques.

List floor-finishing hazards on site

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Explain dangers

Workers have been killed and critically injured when they apply coatings to floors in basements and other enclosed areas. Hazards include flash fires, explosions, and asphyxiation.

Most coatings contain petroleum products that are extremely flammable. Applying these coatings with a spray or roller can create an explosive atmosphere.

Some coatings may contain isocyanates which can cause respiratory sensitization and asthma.

Many floor coatings, adhesives, and sealants are also toxic. They can cause asphyxiation. This means that your body can't get enough oxygen to survive.

There are two causes:

- Oxygen in the air you breathe has been reduced by the products you're using.
- The products have poisoned your blood so that it can't carry oxygen through your body.
- Asphyxiation can make you lose consciousness and die.

Identify controls

WHMIS

WHMIS is your first line of defence. This is the Workplace Hazardous Materials Information System.

Read the WHMIS label on the coating, sealant, or other product you're using. It will explain the steps you must follow to avoid trouble.

More information is available in the material safety data sheet—the MSDS—that comes along with floor-finishing products.

Fire

Because most floor-finishing products are flammable, make sure that any ignition sources in the work area are turned off.

Never smoke when applying floor coatings. Air contaminated by coatings can also be ignited by pilot lights on gas appliances or furnaces and sparks from electric switches.

Ventilation

When laying or finishing floors in residential basements, test, ventilate, and monitor.

Test—make sure that the basement atmosphere is not toxic, oxygen-deficient, oxygen-enriched, or flammable. Testing should be done by someone competent to use appropriate testing equipment.

Ventilate—open doors and windows and, if necessary, use fans to exhaust and clear the air.

Monitor—Keep testing the atmosphere as long as people are working there.

Demonstrate

With your crew, review the information on the label and MSDS for a coating or other product you typically use on the job.

Fire Extinguishers

List extinguisher locations on site

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Explain dangers

Fire is a threat on many construction sites, especially where open flames, flammable products, and flammable materials are used.

Welding, flame cutting, and thermal roofing are obvious examples. But fire hazards are connected with many paints, solvents, and adhesives as well.

Identify controls

The construction regulation says that every worker who may be required to use a fire extinguisher must be trained in its use.

Fire extinguishers on construction sites must be

- accessible
- inspected regularly
- promptly refilled after use.

Extinguishers should be located

- where flammable materials are stored, handled, or used
- where temporary oil or gas fired equipment is being used
- where welding or open flame cutting is being done
- on each storey of an enclosed building being constructed or renovated
- in shops for at least every 325 square metres (2,400 square feet) of floor area.

Fire extinguishers are classified according to their capacity to fight specific kinds of fire.

Class A – for fires in ordinary combustible materials such as wood and paper where you need a quenching, cooling effect.

Class B – for flammable liquid and gas fires such as oil, gasoline, paint, and grease where you need oxygen exclusion or flame interruption.

Class C – for fires involving electrical wiring and equipment where you need a non-conductive extinguishing agent.

Class D – for fires in combustible metals such as sodium, magnesium, and potassium.

For most construction operations, a 4A40BC extinguisher will do the job.

Once you've discharged an extinguisher, report it immediately to your supervisor.

Extinguishers have a very short duration of discharge—usually less than 60 seconds.

Within that limited duration, you've got to use the extinguisher effectively.

Demonstrate

On a 4A40BC extinguisher, explain the principal features—label, nozzle, gauge, pin, and handle. Show how to hold the extinguisher properly.

The goal is to extinguish the flames at their source.

Aim the nozzle at the base of the fire and direct the spray back and forth in a rapid sweeping motion until the fire is extinguished.

Heaters

List locations of heaters on site

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Explain dangers

Temporary heaters are dangerous if you don't control the risks of explosion, fire, carbon monoxide poisoning, and lack of fresh air.

Heater exhaust is a source of carbon monoxide (CO). Even in small doses, CO can kill you. It's a clear, colourless gas that you can't smell or taste.

The first signs of carbon monoxide poisoning are headache and fatigue. More exposure can rapidly lead to loss of consciousness, arrested breathing, heart failure, and death. See the Safety Talk on carbon monoxide for more information.

Identify controls

Temporary heaters can be fuelled by

- electricity
- liquids such as fuel oil or kerosene
- propane
- natural gas.

Choose an indirect-fired heater instead of a direct-fired heater when you want to heat an enclosed space. An indirect-fired heater vents combustion by-products outdoors while ducting heated air indoors. A direct-fired heater (such as an open-flame or closed-flame heater) releases combustion by-products into the heated area.

Electric

Electric heaters are not as common as fuel- or gas-fired heaters. They're used where heated air must be free of combustion byproducts such as carbon monoxide and carbon dioxide. An electric heater is useful when working in a closed space with limited fresh air.

Liquid fuel

Liquid fuels such as oil and kerosene provide an economical source of heat. But you need a large storage tank on site for a constant supply of fuel.

Some liquid-fuelled heaters release exhaust fumes with an oily smell. This can be unpleasant for workers. A solution is to vent the combustion byproducts outdoors. This is sometimes done to heat the air over new concrete in winter.

Propane or natural gas

Propane or natural gas heaters provide an economical supply of heat. The equipment is lightweight and easy to move around on site.

Both gases are highly flammable and explosive. You need to take precautions when storing, handling, or using these gases. [See the Safety Talk on Propane.]

Tips with Heaters

- Only workers holding a certificate may operate a construction heater.
- Do not block openings for ventilation.
- The cylinder connected to a heater must be at least 10 feet away.
- Keep the flame end of the heater pointed away from the cylinder and away from flammable materials. The heat from a burner can ignite materials well past the burner's end.
- Make sure the heater has a supply of fresh air to operate safely and efficiently, and to prevent buildup of carbon monoxide.
- Test heated areas for the presence of carbon monoxide.
- Place the heater on firm, level surface to prevent tip-over.

Demonstrate

Inspect heaters being used on site.

Compressed gas cylinders

Where are cylinders used and stored?

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Explain dangers

[Present talk near fuel gas cylinders.]

These things can take off and explode like rockets. But fire and explosion aren't the only hazards.

Leaking gas can make you dizzy or unconscious.

Cylinders are also heavy and awkward to handle.

But construction would be difficult without compressed gas. So we have to know how to transport, store, and use the cylinders safely.

Identify controls

First of all, this is the WHMIS hazard symbol for compressed gas (show image at right).

Cylinders are also labelled with their contents and handling instructions.

It pays to read the WHMIS label for each of the different cylinders you use. Don't accept or use any cylinder that's not properly labelled.

How do we handle cylinders safely?

- Secure cylinders in use with rope, wire, or chain to keep them upright.
- Remove gauges and other attachments before moving cylinders.
- Keep cylinders upright when you transport, store, or use them.
- Never drop cylinders or let them bang into each other.
- Move cylinders on a hand truck or dolly. Never roll cylinders like logs or hoist them by their collars. Use a hoisting cradle to lift and lower cylinders from level to level. Never use a magnet or sling for hoisting.
- Never transport cylinders in the trunk of a car or in a closed van. Escaping gas can collect in these confined spaces and create the risk of explosion or asphyxiation.
- Keep valves closed and cylinders capped when not in use.
- Store cylinders in a secure area, preferably outdoors, away from heat, ignition sources, and flammable materials such as wood or fuel. Don't choose an area where cylinders could be knocked over by moving equipment, struck by falling objects, or damaged, so keep them away from areas such as elevators, traffic routes, and exit routes.
- Never store cylinders in enclosed, unvented places such as trailers.
- Chalk "MT" on empty cylinders to be returned to the supplier. Close valves and replace protective caps.
- Don't store cylinders of different gases in the same area. Keep them separate.

Demonstrate

Review labels. Check cylinders on site. Are they properly used and stored? Inspect a sample cylinder and valve system for damage, leaks, and wear.

Propane

List propane uses and locations on site

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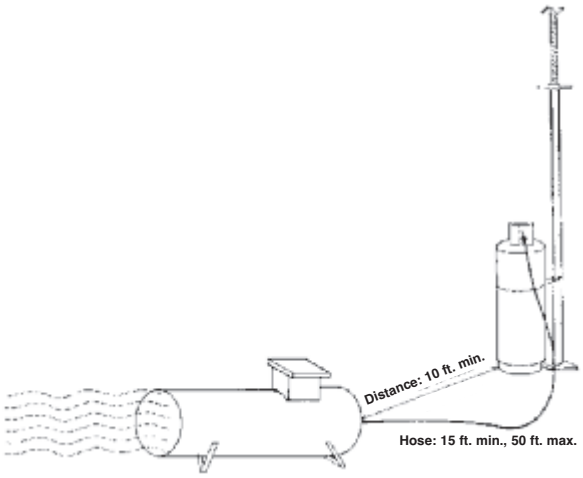

Secure the cylinder and keep it at least 10 feet away from a heater.

Explain dangers

Explosion and asphyxiation are the main risks with propane. Asphyxiation means loss of consciousness and suffocation.

Propane gas by itself is odourless. But suppliers add a strong-smelling chemical to the gas so that you can smell leaks. The smell is like rotten cabbage.

Propane gas is heavier than air. If it leaks from equipment or cylinders, it can accumulate in low-lying areas such as basements, pits, and trenches.

If enough propane gas collects in a low-lying area, it displaces air. If you enter that area you may be overcome and lose consciousness.

Propane will explode if ignited. Simply turning on a light switch or an electric drill can ignite propane concentrations in a basement or trench.

Propane-fired equipment releases carbon monoxide (CO). Even in small doses, CO can kill you. It's a clear, colourless gas that you can't smell or taste. The first signs of CO poisoning are headache and fatigue. See the Safety Talk on carbon monoxide for more informatiaon.

Identify controls

If propane equipment such as a torch or heater goes out in a confined or low-lying space, act quickly.

- Shut off the gas and leave the area.
- Don't go back to re-light the equipment.
- Don't enter the area. Inform your supervisor.

The best way to prevent leaks is to handle propane cylinders and equipment properly. [See Safety Talk on "Compressed gas cylinders" for how to deal with cylinders.]

- Whether you're transporting, using, or storing cylinders, make sure the relief valve is in contact with the vapour space in the cylinder.
- Keep propane cylinders at least 10 feet away from the heaters they are connected to.
- Don't let propane saturate your clothing. It may not feel or smell unusual, but clothing remains highly flammable for some time after exposure. Saturated clothing should be aired outside.
- Never expose any part of your skin to liquid propane. Propane under pressure is extremely cold and can cause frostbite or cryo-burns.

Demonstrate

Review arrangements for storing, handling, and using propane on site.

Carbon monoxide

List sources of CO on site

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Never work alone in an area where carbon monoxide can accumulate.

Explain dangers

- Carbon monoxide (chemical abbreviation: CO) is a clear, colourless gas you can't smell or taste.
- It's dangerous because it interferes with your body's ability to use oxygen. Even in small doses, carbon monoxide can kill you.
- The first signs are headache and fatigue. More exposure can rapidly lead to loss of consciousness, arrested breathing, heart failure, and death.
- In construction the major source of carbon monoxide is engine exhaust. Gasoline, propane, and diesel engines all release carbon monoxide. Some types of welding may also produce it.

Identify controls

Since carbon monoxide has no taste or smell, you need a gas detector to see if it's present. Some detectors are tubes that change colour when carbon monoxide is in the air. These can be used only once. Others are continuous monitors with a cell designed to sense carbon monoxide.

Whenever possible, operate engines outdoors. Welding machines and generators, for example, can be left outside—only the leads have to run into the building.

When engines must be operated indoors, take these precautions.

- Make sure the area is well ventilated. Keep doors and windows open. Use fans to bring in fresh air if necessary.
- Limit running time and don't let engines idle.
- Monitor carbon monoxide levels regularly to make sure that ventilation is adequate.
- When necessary, use exhaust hoses or fans to draw engine exhaust out of the work area.
- Keep engines well tuned. They will run cleaner and produce less carbon monoxide.
- When possible, use equipment that is electrically powered rather than gasoline, diesel, or propane powered.
- When other controls are inadequate, workers must wear respiratory protection. This means a supplied air respirator. You need a respirator attached to an independent supply of clean air.

Demonstrate

Point out sources of carbon monoxide on site. Demonstrate how to use a detector. Show how to ventilate indoor areas.

Solvents

Demonstration

List solvent hazards on site

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Explain dangers

Solvents are often used with paints, lacquers, varnishes, adhesives, thinners, degreasers, cleaners, glues, and mastics.

You can be exposed—and overexposed—to solvents in various ways.

1) Absorption—the solvent penetrates your skin. This could be through direct contact with your skin while you clean tools.
2) Inhalation—you can breathe in solvent vapours when you're applying sealants, glue, and paint, or cleaning your tools.
3) Ingestion—this means swallowing. You can ingest solvents from your hands while you eat, drink, or smoke.
4) Injection—this can happen when your skin is punctured by a high-pressure spray gun.

Different solvents can affect your health in different ways.

Short-term effects include

- irritation of eyes, lungs, and skin
- headache
- nausea
- dizziness
- light-headedness.

You can pass out and even die from exposure to very high concentrations of solvent vapour.

Solvent exposure has three long-term health effects:

1) dermatitis—this is inflammation of the skin. Look for redness, itching, swelling, and blisters.
2) nervous system disorders—you may experience fatigue, muscle shakes, memory loss, or reduced mental performance.
3) damage to liver and kidneys (chlorinated solvents can cause this).

Identify controls

- Some solvents are very flammable. Eliminate sources of ignition in the work area.
- When applying solvent-based materials, make sure there's enough ventilation. Open doors and windows. When that isn't enough, use fans.
- When the material safety data sheet (MSDS) requires a respirator, make sure that yours is approved for protection against "organic vapours." The cartridge is pink and marked "OV".
- Avoid skin and eye contact with solvents.
- Follow the instructions on the product label and MSDS regarding protection, storage, handling, etc.
- If you don't understand the instructions, ask for help. Make sure you know what to do in case of an emergency.
- Don't eat or smoke where solvents are being used.
- After working with solvents, wash thoroughly before eating or smoking.
- Don't use solvents to clean your skin or hair.
- Don't weld on materials that have been cleaned with chlorinated solvents. The result can be some very toxic gases.
- Keep lids on solvents when you're not using them. This keeps vapours from getting into the air.

Identify controls

With your crew, review the information on the label and MSDS for a solvent product used on your site.

List silica hazards on site

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Explain dangers

Silica dust and particles are a hazard on many construction sites.

We generate silica dust and particles when we

- cut and drill concrete
- sandblast concrete
- cut and drill masonry
- grind concrete and masonry
- sand drywall.

If we breathe silica dust and particles into our lungs often enough and long enough we can get a disease caused silicosis.

Silicosis is a disabling, progressive, non-reversible, often deadly lung disease. You may show no symptoms in the early stages and severe breathing problems in the later stages.

Many workers with silicosis can develop other health problems such as tuberculosis and lung cancer. They can also develop complications such as heart disease.

Identify controls

When you're doing jobs that generate silica particles—or working close by—you need protection.

Controls are simple.

- Use WATER whenever possible to control dust. Wet cutting and other wet methods can keep dust levels very low.
- If water isn't practical, attach a dust collector to the tool or equipment.
- Wear a particulate respirator only where no other control methods are available.
- Minimum protection is a half-facepiece N95 respirator. As silica dust increases, you'll need more protection.

Demonstrate

Identify parts of dust collector, show function of each, and how to attach and clean.

OR

Show how to put on and wear a half-facepiece N100 respirator.

List lead hazards on site

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Explain dangers

Exposure to lead is most common among plumbers, welders, painters, and demolition workers.

You're most at risk when there's lead dust, fume, or vapour in the air.

For instance, when you're

- working with lead and metals containing lead such as solder
- applying or removing paints containing lead
- installing or removing sheet metal containing lead
- hot cutting on material containing lead
- renovating, demolishing, and doing other work on structures or material containing lead
- removing mortar from stone walls.

Lead gets into your body mainly through

- inhalation (breathing in dusts, mists, and fumes)
- ingestion (eating, drinking, smoking, biting nails, etc., without first washing your hands and face).

Symptoms of overexposure include

- headaches
- fatigue
- irritability
- pains in joints and muscles
- abdominal pain
- constipation.

Severe lead poisoning may cause much more serious symptoms such as kidney, nerve, and brain damage. It has also caused miscarriages and stillbirths in pregnant women and reduced sperm count in men.

Identify controls

- Your employer must inform you about any lead on site. That's the law. If you're unsure, or suspect that there's lead where you weren't warned about it, tell your employer.
- If you're welding, cutting, burning, or heating products containing lead, make sure you have local exhaust ventilation.
- Use dust-collection systems on power tools that can generate lead-containing dust.
- Wear respirators and protective clothing. Protective clothing includes coveralls, gloves, and eye protection such as safety glasses, goggles, or face shields.
- Never take protective clothing home for washing or cleaning. You could poison your family.
- Practice a high standard of personal hygiene—wash up thoroughly after each exposure to lead. Wash and shower at the end of a shift.
- Eat, drink, and smoke only in places free from lead contamination
- Get rid of any lead waste at the end of each day or shift in an appropriate manner.

Demonstrate

Show and explain lead control measures on the project.

HEPA Filters

Demonstration

List HEPA filter uses on site

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Explain dangers

"HEPA" stands for "high-efficiency particulate aerosol." HEPA filters can trap the microscopic toxic particles that pass right through ordinary filters.

HEPA filters can pose problems when they

- are not replaced as required
- are not properly certified

Identify controls

In construction there are two main applications for HEPA filters:

1) industrial HEPA vacuum cleaners
2) negative air filtration units.

- Read and follow the manufacturer's instruction manual.
- If a vacuum or negative air unit requires a HEPA filter, make sure one is installed.
- Follow manufacturer's instructions on when and how to change the filter.
- Filters are contaminated with toxic substances. When inspecting or replacing filters, do so in a safe, well controlled place and wear personal protective clothing and equipment that may include an N100 NIOSH-approved air-purifying respirator, dust-resistant safety goggles, disposable coveralls, and impervious gloves.
- To replace old filters, use only new filters specified by the manufacturer.
- HEPA filters cannot be cleaned. They must be replaced with filters approved by the manufacturer.
- Don't punch holes in HEPA filters or pre-filters when they get clogged.
- Don't use compressed air to clean old filters or bang old filters to remove accumulated dust.
- Dispose of old filters as contaminated waste

To qualify as a HEPA filter, the filter must be certified by the Institute of Environment Sciences.

A filter passing the certification test is given a number and the test results are recorded on the label.

Demonstrate as you talk

- To ensure that the HEPA filter is authentic, look for the label from the Institute of Environment Sciences.
- Make sure the filter is not installed backwards, is properly seated in its housing, and is tightly secured.
- Inspect the filter housing for signs of dust that indicate the filter is being bypassed. A HEPA filter is useless if the housing leaks.
- Inspect the filter carefully for build-up and damage. If the filter appears to be clogged or damaged in any way, replace it with a new filter.
- Dust particles in the exhaust air flow mean the HEPA filter has ruptured or failed and must be replaced.

List cement hazards on site

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Explain dangers

Portland cement is used in construction every day. It can hurt you by

- contacting your skin
- contacting your eyes
- being inhaled.

Cement usually contains a metal called hexavalent chromium. This metal causes allergic dermatitits (inflammation of the skin).

Dry Cement

When you empty a bag of cement, the dust can irritate your skin. The dust reacts with sweat or damp clothing to form a corrosive solution.

Cement dust can also get in your eyes, causing redness, burns, or blindness.

Inhaling cement dust irritates your nose and throat. It can also cause choking and trouble breathing.

Wet Cement

Cement is also hazardous when it's wet—in mortar or concrete. If it gets inside your boots or gloves, or soaks through your clothes, it can cause burns and skin ulcers.

The burns caused by cement may be slow. You may not feel anything until several hours later. That's why it's important to wash cement off your skin right away.

Silica

Whether cement is wet or dry, you need to worry about silica. Repeated exposure to airborne silica can lead to silicosis, a disabling and often fatal lung disease. There may also be a link between silica dust and cancer.

For more info, see the Safety Talk on Silica.

Identify controls

What to wear

- Wear a N, R, or P 95 mask when pouring or mixing dry cement.
- Wear eye protection for mixing, pouring, and other work with dry cement.
- Wear alkali-resistant gloves.
- Wear coveralls with long sleeves and full-length pants.
- Pull sleeves over gloves.
- When working with wet mortar or concrete, tuck pants inside boots and duct-tape at the top.

What to do

- Work upwind from cement dust.
- Remove rings and watches because cement dust can collect underneath and burn your skin.
- Remove any clothing contaminated by cement.
- Don't wash your hands with water from buckets used for cleaning tools.
- When your skin comes in contact with cement, wash with cold running water as soon as possible. Flush out any open sores or cuts. Get medical attention if your skin still feels like it's burning.
- After working with cement, always wash your hands before eating, smoking, or using the toilet.
- Read the MSDS for procedures to follow after eye or skin contact with cement.
- If your eyes are exposed to cement, rinse with cold tap water for at least 15 minutes. Get medical attention if necessary.

Demonstrate

Review information on WHMIS label or cement bag.

Explain dangers

Mixing concrete

Cement dust can irritate your skin. The dust reacts with sweat or damp clothing to form a corrosive solution. Cement dust is also dangerous if it gets into your eyes, or if you inhale it.

Working with concrete

Wet concrete or mortar can burn your skin or cause skin ulcers if it falls inside your boots or gloves or soaks through your clothes. Concrete finishers kneeling on fresh concrete have had their knees severely burned.

The burns caused by concrete may be slow. You may not feel anything until several hours later. That's why it's important to wash concrete off your skin right away.

Cement usually contains a metal called hexavalent chromium. This metal causes allergic dermatitits (inflammation of the skin).

Identify controls

Mixing concrete

- Wear an N, R, or P 95 mask when pouring or mixing dry cement.
- Wear eye protection for mixing, pouring, and other work with dry cement.
- Work upwind from cement dust.

Working with concrete

Remove rings and watches because wet concrete can collect underneath and burn your skin.

- Wear alkali-resistant gloves.
- Pull sleeves over gloves.
- Wear coveralls with long sleeves and full-length pants.
- Tuck pants inside boots and duct-tape at the top to keep wet mortar and concrete out.
- Use waterproof boots high enough to keep concrete from flowing over the top.
- Remove any clothing contaminated by wet concrete.
- Don't wash your hands with water from buckets used for cleaning tools.
- When your skin comes in contact with concrete, wash with cold running water as soon as possible. Flush out any open sores or cuts. Get medical attention if your skin still feels like it's burning.
- After working with concrete, always wash your hands before eating, smoking, or using the toilet.

If your eyes are exposed to concrete, rinse with cold tap water for at least 15 minutes. Get medical attention if necessary.

Silica

Beware of silica, an ingredient in concrete.

Repeated exposure to airborne silica can lead to silicosis, a disabling and often fatal lung disease. There may also be a link between silica dust and cancer.

You can inhale silica from cement dust, or from sanding, grinding, or cutting concrete.

- Make sure you have dust control measures in place.
- Where possible, wet-cut rather than dry-cut blocks and other concrete products.
- Wear an N, R, or P 95 mask.
- Wear eye protection.

For more information, refer to the Safety Talk "Silica."

Demonstrate

Ask crew about precautions they take with concrete.

List mould hazards on site

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Explain dangers

Moulds can be a health hazard in buildings that are already built or under construction.

Some moulds are toxic. Touching them—or breathing in their spores—can be harmful.

Symptoms include

- irritated skin, eyes, nose, and throat
- runny nose and watery eyes
- trouble breathing
- fatigue and headaches.

People allergic to moulds may get nosebleeds and a severe cough.

If your immune system is weak, you shouldn't work in mould-contaminated areas.

Not everyone exposed to toxic moulds will develop symptoms.

Describe moulds

Appearance

Moulds are colourful and woolly. They can be almost any colour—red, blue, brown, green, white, or black. They reproduce by releasing spores into the air. More mould may grow where the spores land.

Location

Mould thrives on cellulose material that is wet or water-soaked. This includes drywall, ceiling tiles, wallpaper, particleboard, insulation, and plywood.

Moulds love dark, moist places and can grow at room temperature.

Mould has been found in portable classrooms with moisture problems. This is usually a black mould that looks slimy.

You may be exposed to moulds when you work in damp locations or water-damaged buildings.

Sometimes, mould can be present when you don't see it. It can be growing behind drywall, under carpets, or in a ventilation system.

Identify controls

Visible mould may be just the tip of the iceberg. More mould may be growing out of sight behind walls, under floors, and above ceilings.

Samples have to be taken and analyzed in a lab to see whether the mould is dangerous.

If you find mouldy areas on a job, tell your supervisor. The company may arrange to have tests done.

Toxic moulds must be removed. There's no way to work around them. Removal calls for special procedures, including protective equipment such as respirators, coveralls, and gloves.

If mould removal is required, it's the company's responsibility to train and equip you for the job.

Demonstrate

Demonstrate clean-up measures.

Sewage

List sewage hazards on site

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Explain dangers

Sewage contains micro-organisms such as bacteria, viruses, fungi, and parasites. These can be particularly active in summer.

Exposure to equipment or material contaminated by sewage can cause

- gastroenteritis (stomach cramps, abdominal pain, diarrhea, vomiting)
- hepatitis (inflammation of the liver, jaundice)
- occupational asthma (breathlessness, tight chest, wheezing)
- infection of eyes and skin.

Sewage commonly infects workers by

- hand-to-mouth contact during eating, drinking, and smoking or by wiping the face with contaminated hands
- skin contact through cuts, scratches, or penetrating wounds
- inhaling dust contaminated by living or dead micro-organisms.

Identify controls

- Wear the protective equipment and clothing provided by your employer, such as gloves, goggles, face shields, and N95 respirators.
- Wash with clean water, soap, and paper towels. Shower for heavy contamination.
- Store clean equipment and clothing separately from dirty equipment and clothing. Don't mix them up.
- Use the designated clean area for eating and smoking. Change out of contaminated clothing and wash up before eating or smoking.
- Always wash your hands well before touching your face, eating, drinking, or smoking.
- Where contamination is heavy, you must
  1) shower and change out of work clothes before leaving the job
  2) never take contaminated clothing home for washing.
- Get shots or boosters for polio, tetanus, diphtheria, and hepatitis.

Demonstrate

Inspect clean and contaminated areas on site.

Identify precautions being taken in dirty areas.

West Nile Virus

List WNV hazards on site

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Explain dangers

Working outdoors in summer and early autumn, you can be exposed to West Nile virus. Mosquitos transmit the virus.

The chances of getting bitten by an infected mosquito are very low. Even when infected, most people don't show any sign of illness.

About 20% of those infected develop West Nile fever. The fever causes mild, flu-like symptoms:

- fever
- headache
- body aches.

One in 150 infected people get a severe form of disease. This is West Nile encephalitis or meningitis. It affects your brain. Damage can be permanent or fatal.

Symptoms include

- headache
- high fever
- neck stiffness
- disorientation
- shakes
- convulsions
- muscle weakness
- paralysis.

Breeding grounds

Mosquitos can reproduce where water stands for more than four days. On construction sites, that means excavations, basements, and other low-lying areas.

Mosquitos can also hatch in equipment such as tarps, buckets, barrels, and wheelbarrows holding water. Even water-filled ruts in the ground can help breed mosquitos.

Identify controls

- Empty equipment regularly.
- Discard tires, buckets, cans, and containers.
- Drill drain holes in containers that can't be thrown out.
- Clean out eavestroughs, storm gutters, and roof gutters.
- Check flat roofs for standing water.
- Fill in ruts and other depressions where water can collect.

Clothing

Cover up, especially at dawn and dusk when mosquitos are most active.

1) Wear long-sleeved shirts.
2) Wear long pants tucked into your socks.
3) Apply insect repellent containing DEET to your exposed skin—never under your clothing.

DEET

DEET is the most effective repellent available. The more DEET a repellent contains, the longer it will be effective.

- A product with 6.65% DEET provides about 2 hours of protection.
- 23.8% DEET provides about 5 hours of protection.

Don't use products with more than 30% DEET.

Stay on the safe side—use the lowest percentage of DEET you can get away with while still being protected.

Demonstrate as you talk

Inspect project for places were mosquitos can breed.

Vibration White Finger

List VWF hazards on site

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Explain dangers

"Vibration White Finger" is a disease that makes your fingers turn white. It starts when your hands are exposed to too much vibration. Vibration White Finger damages blood vessels, nerves, and muscles.

There are several symptoms:

- numbness and tingling in fingers
- whitening—first your fingertips, then your whole finger
- spasms in fingers
- attacks lasting up to half an hour—often with whiteness changing to deep red—and becoming very painful
- permanent loss of feeling in your fingertips
- reduced grip strength
- attacks that become more frequent and painful.

Tool and equipment operators are at the most risk. Their hands are often exposed to high levels of vibration. High-vibration equipment includes road drills, chipping hammers, compactors, and chainsaws.

Risk depends on

- the magnitude (acceleration) of vibration. Tools such as impact wrenches, chainsaws, and jack hammers can be high-risk if workers use these tools more than 60 minutes (cumulative) per day.
- how long the vibrating tool or equipment is used
- whether operation is off-and-on, or continuous
- workplace temperature (cold is a major trigger for Vibration White Finger)
- whether or not you smoke (smoking reduces blood flow to your fingers).

Identify controls

- Where possible, do the job without using vibrating tools or equipment.
- Use tools with built-in anti-vibration features.
- Wear anti-vibration gloves as classified under ISO Standard 10819.
- Don't use vibrating equipment for long periods, especially in the cold. Short bursts are better.
- Keep your whole body warm—your hands and chest especially.
- Don't smoke.
- Keep equipment in good condition. Poorly maintained equipment can produce excess vibration. Report poorly functioning tools to your supervisor immediately.
- Follow an appropriate work/rest schedule. Rotate between different jobs.
- Exercise. It can maintain healthy blood circulation.
- Don't ignore signs and symptoms. See your doctor right away.

Demonstrate

- Ask the crew to describe any problems they have had with vibrating equipment.

List jobs with highest UV exposure

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Explain dangers

At some point we've all been burned by the sun.

Sunburn is the effect of ultraviolet (UV) radiation on the skin. Ultraviolet light is beaming down on us every day, and always has. But now there's less protective ozone in the atmosphere and risks of exposure have increased.

UV rays are more powerful than visible light rays. They're so powerful that they can cause cancer.

Ultraviolet radiation can also cause cataracts, other eye damage, and premature aging of the skin.

When you work in the sun, especially in spring and summer, you need to minimize the hazards of UV exposure.

Identify controls

1) Wear a shirt and long pants to cover most of your skin.
2) Protect the rest of your skin with sunscreen. Use SPF 30 or higher. Follow the instructions about how often to reapply. Don't forget your ears. The more you sweat, the more often you need to re-apply sunscreen.
3) Protect your eyes. Wear safety sunglasses if the tint doesn't interfere with vision. (Most safety glasses—clear or tinted—decrease your UV exposure.)
4) Avoid contact with substances known to cause photosensitization, such as coal tar.

SPF stands for Sun Protection Factor. Multiply the SPF number by 10 to know how many minutes you can stay in the sun without burning.

Use a UV-blocking lipbalm too.

Sunlight doesn't have to be direct to do damage. Light reflected off surfaces such as sand, water, concrete, and snow can also cause UV exposure.

Weather reports now include a UV index. This gives you an idea of how intense the ultraviolet radiation will be under clear sunshine or light cloud.

When the index is high (7 or higher) you can get sunburned in only 15 to 20 minutes.

The highest exposure of the day is from noon to 2.

Sunscreen should be standard equipment for anyone working in construction during spring and summer. Keep a bottle handy in your toolbox.

Demonstrate

Pass around bottle or tube of sunscreen (30 SPF) or higher) and ask crew to apply it to exposed skin.

List cooling stations on site

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Explain dangers

When your body's cooling system can't keep up with the heat, you dehydrate and your temperature rises above 38°C. You get heat-related illnesses such as:

- heat rash (plugged sweat glands)
- heat cramps (sweating has caused salt loss)
- heat exhaustion
- heat stroke (very serious—you can die).

Let's take a look at two serious heat illnesses: heat exhaustion and heat stroke.

HEAT EXHAUSTION

Heat exhaustion is when your body cannot keep blood flowing both to vital organs and to the skin for cooling.

Symptoms

- weakness, feeling faint
- headache
- breathlessness
- nausea or vomiting
- difficulty continuing work.

Treatment

Get medical aid and cool down (move to a shaded area, loosen clothing, drink cool water). It takes 30 minutes at least to cool the body down from heat exhaustion, and if it's not treated promptly, it can lead to heat stroke.

HEAT STROKE

Heat stroke is a medical emergency. You can die from it. Your body has used up all its water and salt and cannot cool itself. Your temperature rises to dangerous levels.

Symptoms

- confusion and irrational behaviour
- convulsions
- unconsciousness
- no sweating—hot, dry skin
- high body temperature—40°C or more.

Treatment

If a co-worker shows symptoms of heat stroke, you should act fast.

- Call the local emergency number or get the worker to a hospital.
- Take aggressive steps to cool the worker down (immerse in a tub of cool water or cool shower, spray with a hose, wrap in cool, wet sheets and fan rapidly).
- If the worker is unconscious, don't give anything to drink.

Identify controls

Here's how to avoid heat stress in the first place:

- Wear light, loose clothing that allows sweat to evaporate. Light-coloured garments absorb less heat from the sun.
- Drink small amounts of water (8 oz) every half hour. Don't wait until you're thirsty.
- Avoid coffee, tea, beer, or other drinks that make you go to the bathroom frequently.
- Avoid eating hot, heavy meals that increase your body temperature.
- Remember that your physical condition can reduce your ability to deal with the heat. Age, weight, fitness, health conditions (heart disease or high blood pressure), recent illness, or medications can all affect your ability to withstand high temperatures.

Explain dangers

When you're cold, blood vessels in your skin, arms, and legs constrict, decreasing the blood flow to your extremities. This helps your critical organs stay warm, but you risk frostbite in your extremities.

WIND CHILL

The wind accelerates heat loss. For example, when the air temperature is -30°C,

- with 16 km/h wind (a flag will be fully extended) your skin can freeze in about a minute
- with 48 km/h wind your skin can freeze in 30 seconds.

FROSTBITE

This means that your flesh freezes. Blood vessels are damaged and the reduced blood flow can lead to gangrene. Frostbitten skin looks waxy and feels numb. Once tissue becomes hard, it's a medical emergency.

Treatment

- Get medical aid.
- Warm area with body heat—do not rub.
- Don't thaw hands and feet unless medical aid is distant and there's no chance of refreezing. Body parts are better thawed at a hospital.

HYPOTHERMIA

This means your core temperature drops.

Moderate symptoms

- shivering
- blue lips and fingers
- slow breathing and heart rate
- disorientation and confusion
- poor coordination.

Severe symptoms

- unconsciousness
- heart slowdown to the point where pulse is irregular or hard to find
- no shivering
- no detectable breathing
- resembles death—assume casualty is alive.

Treatment

- Hypothermia can kill—get medical aid immediately.
- Carefully remove casualty to shelter. (Sudden movement can upset heart rhythm.)
- Keep casualty awake.
- Remove wet clothing and wrap casualty in warm covers.
- Apply direct body heat—rewarm neck, chest, abdomen, and groin, but not extremities.
- If conscious, give warm, sweet drinks.

Identify controls

Here's how to control cold stress:

- Wear several layers of clothing rather than one thick layer to capture air as an insulator.
- Wear synthetic fabrics next to the skin to "wick" away sweat.
- If conditions require, wear a waterproof or wind-resistant outer layer.
- Wear warm gloves.
- Wear hats and hoods. You may need a balaclava.
- Tight-fitting footwear restricts blood flow. You should be able to wear either one thick or two thin pairs of socks.
- If your clothing gets wet at 2°C or less, change into dry clothes immediately and get checked for hypothermia.
- If you get hot while working, open your jacket but keep your hat and gloves on.
- Take warm, high-calorie drinks and food.

Risk Factors

List MSD hazards on site

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Explain dangers

Musculoskeletal disorders (MSDs) are injuries of the muscles, nerves, tendons, ligaments, joints, cartilage, or spinal discs. MSDs do not include musculoskeletal injuries that are the direct result of a fall, a struck-by or struck-against event, vehicle collision, violence, etc.

Some recognized risk factors for MSDs are:

1) **Forceful exertion**

- Force is the amount of effort required to perform a task or job.
- Lifting, pushing, pulling, and gripping a tool are examples of activities that require you to exert force or muscle effort.

2) **Repetitive movements**

- Movements performed over and over are called repetitive movements.
- Nailing a deck, screwing drywall, and tying rebar are examples of repetitive tasks.

3) **Awkward postures**

- Awkward postures are those in which joints are held or moved away from the body's natural position. Examples are stooping (bending over), kneeling, and reaching overhead.

4) **Secondary risk factors**

- **Contact pressure**, which is any external pressure applied to soft tissues of the body. Holding tools where handles press into parts of the hand is an example of contact pressure.
- **Vibration** can cause damage to nerves and blood vessels as well as other soft tissues.

Identify controls

Two approaches are widely accepted for preventing MSDs.

1. **Engineering Controls**

- The preferred approach is to design the job to the capabilities and limitations of the workforce.
- Engineering controls are measures taken to physically modify the forcefulness, repetitiveness, awkwardness, or vibration levels of a job. Examples include modifying the workstation layout as well as selecting and using tools, work materials, and work methods that will reduce MSD risk.

2. **Administrative Controls**

Administrative controls are management-directed work practices and policies to reduce or prevent exposures to risk factors. Administrative control strategies include: changes in job rules and procedures such as more rest breaks; job rotation; and training.

Although engineering controls are preferred, administrative controls can be helpful as temporary measures until engineering controls can be implemented or when engineering controls are not technically feasible.

Demonstrate

- Ask the crew to describe any tasks that can contribute to MSDs and any solutions that can reduce the risk of MSDs.

Controls

List MSD controls on site

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Here are some examples of what you can do to reduce or prevent MSDs.

Manual handling of tools and materials

- Plan ahead to minimize material handling.
- Use carts, dollies, hoists, or other mechanical handling devices.
- Use ladder hoists, gin poles, daisy chains, or cranes to move materials on or off roofs.
- Use chain falls, motorized buggies, carrying handles, or extension handles for carrying large or awkward materials such as drywall.
- Break loads into smaller units. For instance, put cement in bags weighing less than 50 lb.
- Use shoulder pads when carrying loads on shoulders.
- Exercise and stretch before starting work.
- Label materials with their weight.
- Get another person to help you lift heavy objects.

Work at ground or floor level

- Use tables, benches, or stands to bring work to waist height.
- Store materials at waist height.
- Use pipe stands on pipe and steam fitting jobs, D-handles or longer handles for shovelling, rebar-tying devices, stand-up fastening systems for roof insulation, rug rippers, carpet stretchers, and pipe/conduit benders.

Overhead work

- Use drywall lifts, materials lifts, duct jacks, scissors lifts, and extension poles or stands for tools when doing overhead work.
- Make use of adjustable scaffolds, aerial work platforms, or other work platforms to decrease awkward postures.

Kneeling

- Use knee pads. Wear pants with knee pad pockets.
- Take mini rest and stretch breaks.

Hand tools

- Use handles that are more comfortable and give you a better grip.
- Select hand tools that are designed for a neutral wrist posture and that reduce the amount of force required.
- Use tools that are low torque, low kickback, and lightweight.
- Maintain your power tools regularly so that they run with low vibration.
- Use vibration-absorbing padding on grips and handles.

Demonstrate

Ask your crew to share ideas about how to reduce the risk of MSDs.

Basic Lifting

List lifting hazards on site

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Explain dangers

Construction involves lots of manual lifting.

- Back, neck, and shoulder injuries are common.
- Manual lifting in cramped or awkward conditions increases the risk of injury.

Identify controls

Avoid lifting above shoulder height. This causes your back to arch and puts a lot of stress on your shoulder and on the small joints in your spine.

Don't try to catch falling objects. Your muscles may not have time to coordinate properly to protect your spine.

Push rather than pull. Pushing lets you maintain the normal curves in your back and puts less stress on the spine.

Safe lifting starts with planning.

- Size up the load.
- Make sure the path is clear.
- Get help if you need it.
- Use a dolly or other materials handling equipment whenever you can.

Demonstrate as you talk

- **Get as close to the load as possible.** This is very important. Our lifting capacity is reduced the further away we are from the load.
- Put yourself in the best possible position for the lift. Try to avoid twisting from the waist, reaching out, and leaning over material or equipment when you lift.
- Use a well balanced stance with one foot slightly ahead of the other.
- Tighten your stomach muscles as you start to lift.
- Keep your lower back in its normal curved position and use your legs to lift.
- Pick up your feet and pivot to turn. Don't twist your back.
- Lower the load. Maintain the curve in your lower back. **You can hurt your back just as easily lowering a load as lifting it.**

Two-person lift

Partners should be roughly the same height.
Before the lift, both partners should agree on:

— type of lift (waist-high, shoulder-high, etc.)
— who will take charge
— how they will lower the load

Lifting sheet materials, part 1

List sheet material locations on site

_____

_____

_____

_____

_____

Explain dangers

If you don't lift large sheet materials like plywood right, you risk back, neck, and shoulder injuries.

Identify controls

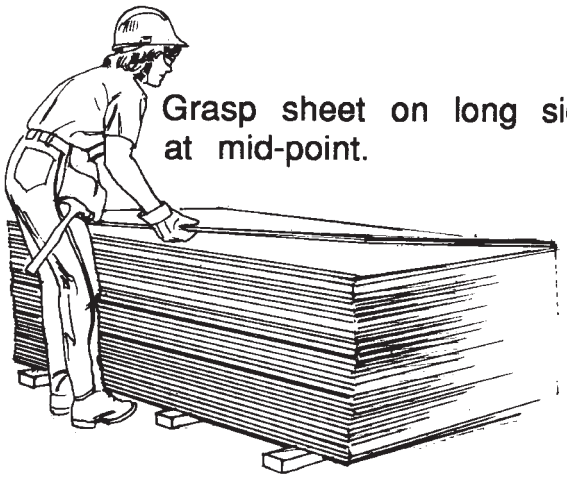
Stack sheets at a convenient height or store them up off the ground on blocking or trestles.

Here's how to lift right.

Demonstrate

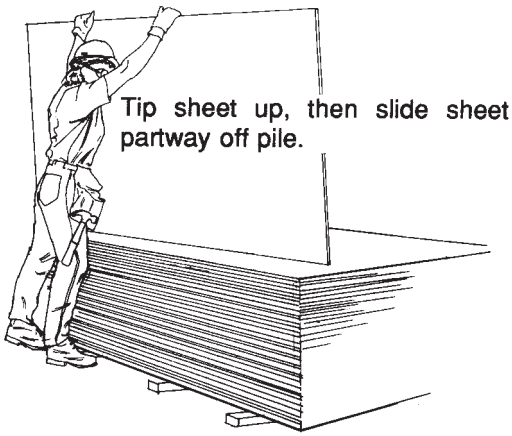
Demonstrate how to lift sheet material off a pile.

1



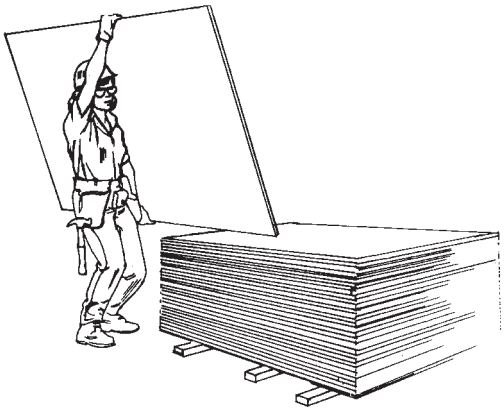
Grasp sheet on long side at mid-point.

2



Tip sheet up, then slide sheet partway off pile.

3



Bend at the knees, maintaining the normal curve in your low back. Grasp sheet above and below at mid-point.

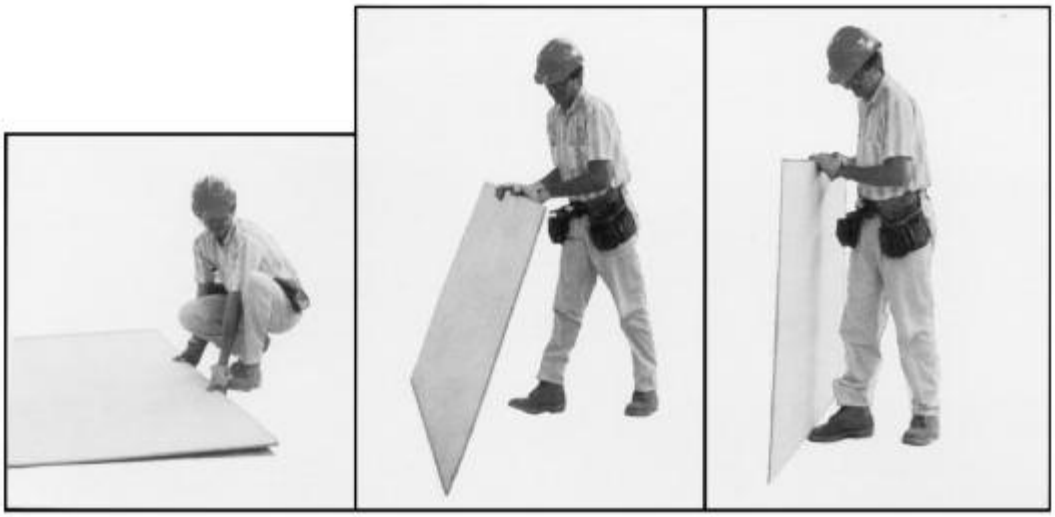
4

Carry sheet, keeping back erect. Avoid leaning to one side.

Lifting sheet materials, part 2

Demonstrate

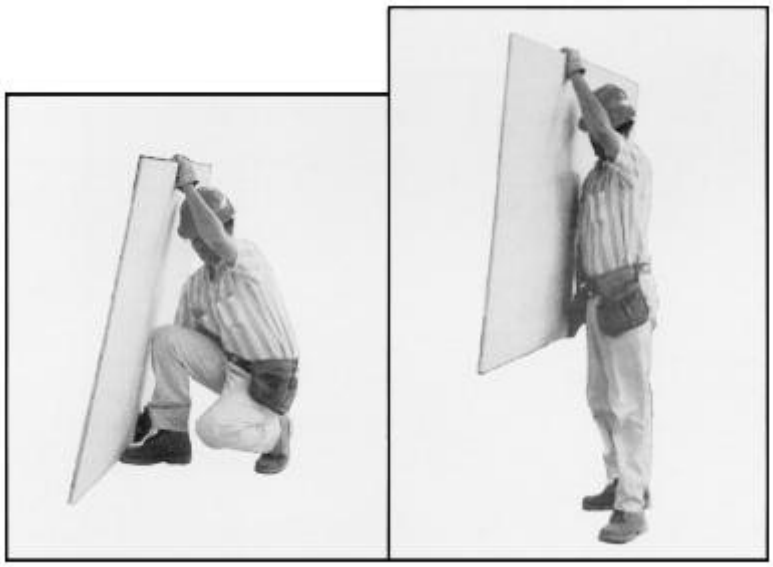
Demonstrate how to lift sheet material off the floor.



Bend knees, keeping back as upright as possible.

Tip sheet up to horizontal position.

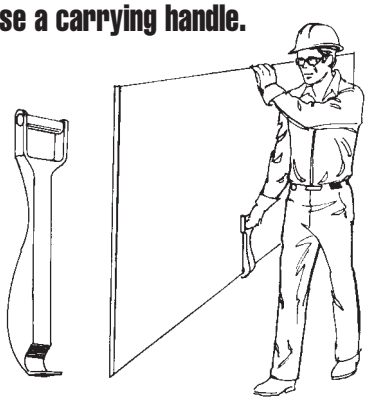
Lift sheet slightly and put toe under mid-point.



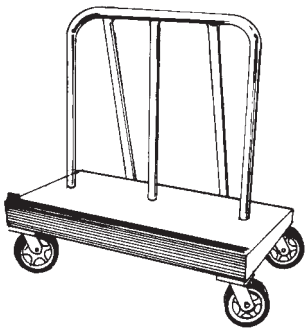
Bend at knees, keeping back upright. Slip free hand under sheet.

Stand and lift, maintaining the normal curve in your lower back.

To carry sheet material a distance, use a carrying handle.



If the walking surface is level and hard, use a drywall cart.



Stretching exercises

Demonstrate

We recommend you hand out to your employees IHSA's ***Before You Start Work*** exercises card (V012). Learn to do the exercises before you give the talk. Demonstrate each exercise to the group, and ask the group to do it after you.

CAUTION: Participation must be voluntary. If workers have any doubts about their ability to do the exercises safely, they should not do them. If they feel any pain, they should stop immediately.

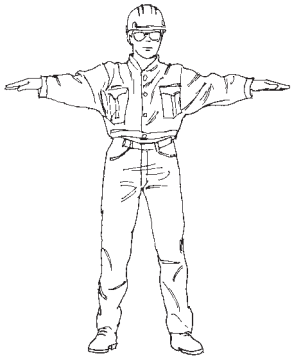
Getting ready for the job means more than lining up tools and material.

We should get our muscles ready too. Exercising before work can help prevent back, neck, and shoulder injuries.

Warm up first. This helps to get your muscles warm and loose. A warm muscle is a lot less likely to tear than a cold one.

March in Place

Stand in position. Pump arms and legs in opposite directions. Make sure that your heels touch the ground. Continue 3 to 5 minutes.



Arm Circles

Stand with arms raised horizontally and slightly in front of shoulders, palms down, and feet shoulder-width apart. Rotate arms in forward circular motion for 15 seconds. Relax. Repeat 3 to 5 times.

Now we're ready for some stretching exercises.

[The following stretches should be performed in a slow, controlled manner and held in a sustained stretch for 20-30 seconds. Avoid bouncy, jerky movements. Stretch only to a comfortable position, not to the point of pain.]

Knee to Chest

Support yourself with one hand. With your free hand, pull your knee toward your chest and hold it for 30 seconds. Repeat with the other leg. Repeat three times for each leg.

Hip Stretch

Stand with one foot in front of the other. Place your hands just above the knee of your front leg. Gently bend your front knee. Keep your back foot flat on the floor. Hold 20-30 seconds. Repeat with other leg. Repeat three times for each leg.

Thigh Stretch

Support yourself with one hand. With your free hand, bend your leg back and grasp your ankle. Gently pull your ankle towards your body. Keep your trunk straight. Hold 20 to 30 seconds. Then repeat with the other leg. Repeat three times for each leg.

Calf Stretch

Lean on a solid support with your outstretched hands. Bend one leg forward and extend the other leg straight behind you. Slowly move your hips forward. Keep the heel of your back leg on the ground. Hold 30 seconds, relax, and repeat with the other leg. Repeat three times for each leg.

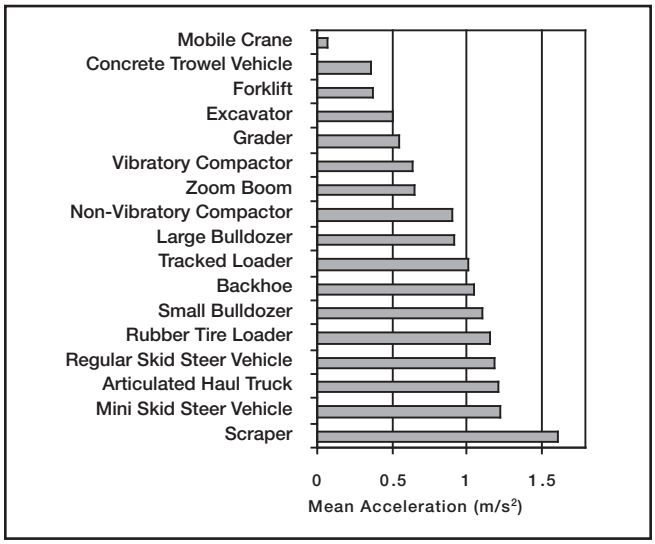
Backward Stretch

Stand up and bend backwards, holding for 2-4 seconds. Repeat three times. This will help relieve lower-back muscle tension. Do this stretch after working in a crouched, bent, or stooped position.

List whole-body vibration hazards on site

Heavy equipment operators are exposed to vibration from bulldozers, backhoes, loaders, skid steer vehicles, excavators, and other construction machines (see graph below). The three main sources of whole-body vibration (WBV) from heavy equipment are

- low-frequency vibration caused by the tires and terrain
- high-frequency vibration from the engine and transmission
- shock from running into potholes or obstacles.



Vibration magnitude for various types of construction equipment. For eight hours of continuous work, the magnitude of vibration should not exceed 0.5 m/s².

Sources: ISO 2631; The European Vibration Directive.

The health effects of WBV have been compared for operators of heavy equipment and for workers in a similar environment but who were not exposed to WBV. With short-term exposure to vibration magnitude at 1 m/s², workers reported symptoms such as abdominal and chest pain, headaches, nausea, and loss of balance. Long-term exposure to WBV can cause serious health problems, particularly related to the spine and the gastrointestinal system.

Recommendations

Until improved equipment comes on the market, heavy-equipment operators should do the following to reduce WBV:

- Report any poorly maintained equipment. A good suspension system and correct tire pressure will help to reduce vibration.
- If your seat has hydraulic dampers and shock absorbers, adjust the seat to your weight and height.
- Slow down when driving over potholes and rough terrain such as shale or rock.
- Report any rough terrain to your supervisor. Other workers may be able to level or smooth-out the road.
- Get out of your vehicle (in a safe location) every hour for a few minutes to stand, stretch, and give your body a break from vibration.

Demonstrate

- Ask the crew to describe any problems they have had with WBV.
- Show them the level of vibration of their equipment using the graph.

Welding

List challenging conditions for welding on site

_____

_____

_____

_____

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The risks

Welding presents workers with a number of hazards. The most common are

- metal fumes
- welding arc light (both visible light and invisible ultraviolet light)
- particles getting in your eyes
- burns
- noise.

Welding also comes with the risk of musculoskeletal disorders (MSDs). Most studies on this topic have found that the main contributing factors to MSDs come from work conditions:

- awkward postures such as squatting, kneeling, or stooping due to the confined or tight locations
- lifting heavy equipment or materials
- keeping your neck bent or keeping your shoulders raised for a long time
- the stress on your neck from supporting the heavy weight of your hard hat and welding mask.

These conditions can lead to MSDs such as back, shoulder, neck, or knee problems.

More than half of the injuries to welders involve the back, neck, shoulders, arms, and hands. Your workplace should focus on preventing injuries to these parts of the body.

Reducing MSD risk

You can prevent MSDs associated with welding. Your focus should be on reducing or eliminating

- forceful exertion (e.g., heavy lifting).
- awkward postures, including body positions where you don't move for a long time.

Reducing exertion

To reduce forceful exertion, consider the following:

- Use auto-darkening lenses. They darken as soon as the arc is struck. They eliminate the need to keep opening and snapping-closed your helmet, and so they reduce neck strain.
- Use mechanical lifting equipment whenever you can, particularly when loading or unloading material.
- Use height-adjustable mobile lift tables for transporting material into the workshop. These tables can also be used to support material when you're loading machines. A smaller table can be used for smaller sheets of metal or machines such as a punch press. The larger table can be used for the "break and bending presses" as well as incoming materials.
- Pre-assembly and material handling equipment help reduce unnecessary lifting.
- When you have to lift, ask someone to help you.

Reducing awkward postures

To reduce awkward postures, consider the following:

- Position the work at a height between your waist and your shoulder.
- Use lifting and turning tables with wheels.
- Use welding guns which have swivels and can be used in either hand.
- Sit on a work stool when the work is low.
- Use a work table or work bench instead of bending over to work on the ground.
- Use a rotating clamp for pipe.
- Put your welding leads on pulleys.
- Take stretch breaks throughout the day to relieve discomfort and get the muscles moving.

Use this master to make copies. Fill out a Report Form for each talk delivered.

Report Form

IHSA'S SAFETY TALKS

Title of Safety Talk _____

Company	**Project**
Talk given by	**Date**

Crew attending

List other topics discussed during the talk

Concerns	**Response/follow-up**

Signed _____ **Title** _____

Retain a copy for company records.

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