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கனடிய-இலங்கை உள்ளூராட்சி மன்றங்களின் ஒருங்கிணைந்த நிகழ்ச்சித்திட்டம்

Canada/Sri Lanka Municipal Cooperation Program

Batticaloa Health and Safety Manual

Project supported by the Canada/Sri Lanka Municipal Cooperation Program (MCP) of the Federation of Canadian Municipalities, in collaboration with the Ministry of Local Government and Provincial Councils. MCP is undertaken with the financial support of the Government of Canada provided through the Canadian International Development Agency (CIDA)

Health and Safety Manual for Municipal Workers in Batticaloa

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INTRODUCTION

This publication is not a definitive guide to Sri Lankan Government regulations or to practices and procedures wholly applicable under every circumstance. The appropriate regulations and statutes should be consulted. In general common sense and due diligence, along with proper training and use of protective equipment can prevent accidents or long term disabilities.

1.1 Procedure for Accidents and Injuries.

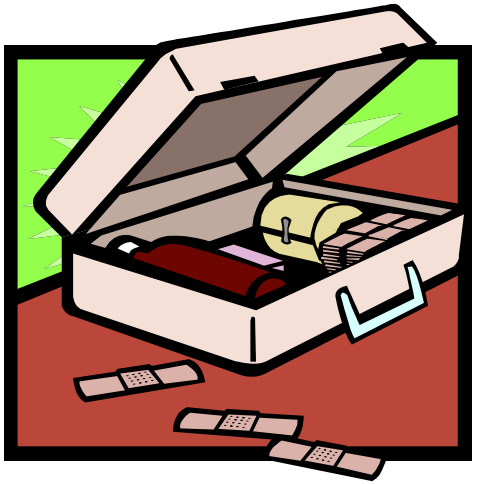
Where a serious accident occurs at the workplace workers should:

- Protect the accident scene from continuing or further hazards – for instance, traffic, operating machinery, fire or live wires.
- Give first aid to the injured as soon as possible. Information on basic first aid is included in this manual.
- Call for a vehicle to transport injured to nearest hospital.
- Meet and direct the transporting vehicle to the accident scene.
- Inform supervisors. They can then contact relatives, notify authorities,

1.2 First Aid Supplies

First Aid Kits location and Contents

- One or more First Aid kits should be kept at each Municipal Council Facility such as; Municipal Hall, Works Yards, Stores Building, Libraries, Health Offices.
- Crews working at locations remote from municipal facilities should have access to a first aid kit located in a vehicle or other convenient location
- First aid kits should be kept in easily accessible locations
- Staff should be aware of the locations.
- Any materials from the Kit used should be replaced immediately



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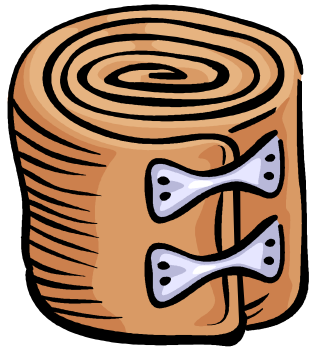
List of Medicines and Accessories in a First Aid Box

#	Description	Quantity
1	Paracetmol or Panadol	3Pkts
2	Providone Iodine Solution	One
3	Wintogeno,Winterpan or Winterub	One
4	Soframycin Cream	One
5	Burnol Cream	One
6	Dettol or Septer Liquid 100 ml	One
7	Siddhalepa or Vicks Balm	One
8	Samahan	5 Pkts
9	Jeevani 1000 Ml	One Pkt
10	Digene Tablet	One Card
11	Cotton Wool	50g
12	Cotton Bandage	3 rolls
13	Cotton Crepe Bandage	One
14	Cotton Buds	One Pkt
15	Plaster Roll 1 x 5 yards	One
16	Plaster Strips	10 Nos
17	Gauze	One yard
18	Surgical Scissor	One
19	Surgical Forcep	One



1.3 First Aid Training

- First Aid training given by a qualified First Aid teacher should be made available to staff working in each of the Municipal Facilities.

- At least one staff member in each location should be certified through the above training program to administer Basic First Aid.

- The first aid training provided should include dealing with shock, burns, bleeding, as well as provision of Cardio Pulmonary Resuscitation (CPR)

2.0 WORKPLACE HAZARDOUS MATERIALS

2.1 Right To Know

- Every worker has the right to know about the hazards of materials they work with and be provided the means to find out that information. This information can be found through:
  - o product labels
  - o worker training and education.

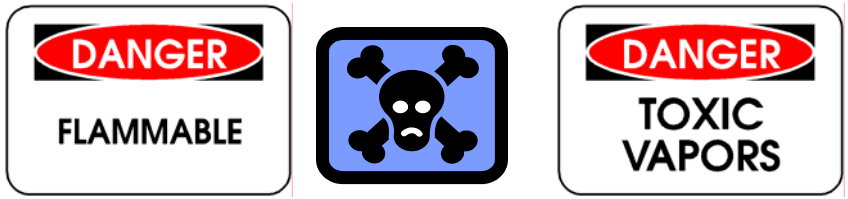
- The employer should provide training for use of hazardous materials the workers will be working with or near.
- Training should be provided as new products are introduced – with a general updating on new products at least annually.

2.2 Supplier Labels

Labels are required on certain hazardous products and workers should make themselves aware of what the labels mean. Labels generally include:

- product identifier
- appropriate hazard symbol(s)
- risk phrases (such as "dangerous if inhaled")
- precautions (such as "wear rubber gloves")
- first aid measures
- supplier identifier

Hazardous chemicals should never be transferred from the original container with appropriate label information to smaller unmarked containers. If smaller containers of the product are required these smaller containers should also be equipped with the same safety information printed on the original container



2.3 Hazardous Materials Training

Knowledge of the risks and use of hazardous materials with appropriate protective equipment can minimize the health risks to workers. Hazardous materials may cause illness or disease in workers by entering the body in four different ways, as follows:

- **Inhalation** is the most common route of entry for a toxic substance. High risk substances for inhalation are toxic chemicals such as paints, solvents and asbestos. The best protection against inhalation of hazardous materials is to always use high risk materials in a well ventilated area with lots of fresh air available. Appropriate respiratory masks should also be supplied and worn for work involving small suspended particulates such as spray painting, sand blasting, grinding, and other dusty work.

- **Absorption**. Some chemicals can penetrate through the skin and reach the bloodstream. Toluene, Mineral Spirits and Solvents are examples of chemicals which are absorbed through the skin. Protective gloves and clothing should be worn by workers to protect from absorption these types of hazardous materials through the skin.

- **Ingestion** is a third major route of entry for toxic substances is through the mouth. Toxic materials may reach the stomach when food or drink is consumed, when cigarettes are smoked in a dusty work area, when clean lunch rooms are not provided, when workers fail to wash their hands before eating or smoking, or when food is left unwrapped in a dusty place. Lead dust, for example, is easily ingested in this way and can have serious health effects. Once swallowed, the substances enter the digestive tract and may enter the bloodstream. Ingestion of hazardous materials can be avoided by frequent hand washing when working with such materials as well as careful storage of food to keep it free from contamination.

- **Injection**. Chemicals and infectious materials can be injected into the body by means of puncture wounds from nails or staples or cuts from broken glass, jagged metal, or broken wires and discarded hypodermic needles. Particular care against cuts and puncture wounds should be taken by workers exposed to potentially infectious materials such as sewage, garbage or medical wastes. Paint or oil from a high pressure spray guns or hydraulic systems can also penetrate the skin. This is very serious and requires prompt medical attention. Protective gloves and clothing should be worn by workers to protect from injection of hazardous materials through the skin.

2.4 Asbestos Hazard

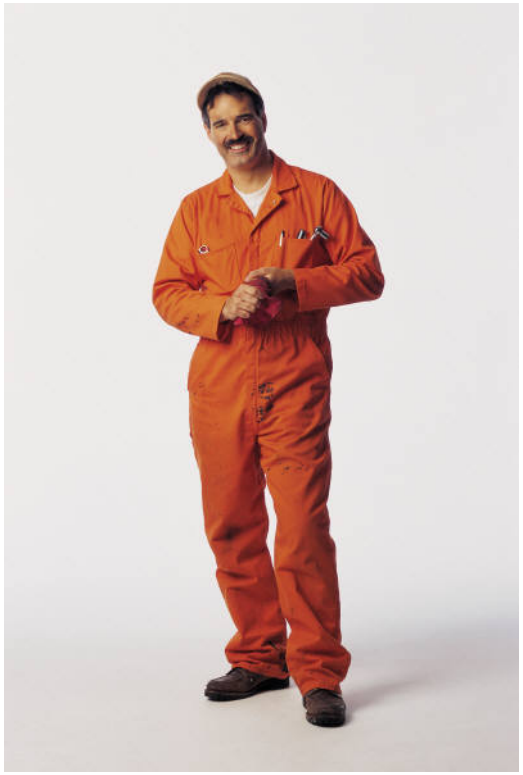
Asbestos is use for roofing sheets, insulation, gaskets and packing, brake pads and water pipes and is common in Sri Lanka. Cutting and sanding of asbestos material creates fine airborne dust which may stay airborne for 24 hours or longer. Air movements created by air-conditioning systems will spread these airborne fibre particles throughout the building unless the work area and ductwork is sealed off. When inhaled, asbestos has been shown to cause asbestosis and lung cancer.

Cutting of asbestos, when required, should be done in such a way that no dust is created. When this is not possible the cutting should be done outdoors and workers should wear canister style respiratory protection. Workers should also wear protective clothing to and wash hands after working with asbestos

ASBESTOS

3.0 WORKER HEALTH

3.1 Skin Protection



Skin inflammation can be caused by hundreds of workplaces substances like solvents (paints), epoxy resins, acids, caustic substances, and metals. Dermatitis appears as redness, itchiness, or scaling of the skin. Several common substances which municipal construction and maintenance workers are likely to come into contact with are listed in the table below along with a description of the hazard and the appropriate protective equipment to use for each substance.

MAJOR DERMATITIS HAZARDS IN CONSTRUCTION / MAINTENANCE AND MAINTENANCE WORK

MATERIAL	TYPE	OCCUPATION /ACTIVITIES	PERSONAL PROTECTION NEEDED
Waste and Storm Water	Allergic/ Corrosive / hazardous/ Bio hazardous Infectious contaminated Material blood products.	-Labours-Labours, Equipment Operators	-Needle resistant gloves and gum boots, hard hat, goggle, Inoculations for tetanus, hepatitis should be provided to these workers
Solid waste	Allergic/ Corrosive / hazardous/ Bio hazardous Infectious contaminated Material blood products	-Labours, Equipment Operators	-Needle resistant gloves and gum boots, hard hat, goggle, Inoculations for tetanus, hepatitis should be provided to these workers
Wet Concrete	Allergic/Corrosive	- Concrete Workers	- Rubber boots, rain pants, rubber gloves , hard hat, goggle.
Epoxy Materials	Allergic (solvents may aggravate allergy)	- Cement Finishers - Seamless Floor Installers - Painters - Tile/Terrazzo Installers	- Barrier creams - Gloves resistant to specific solvents, hard hat, goggle - Good personal hygiene.
Coal Tar	Allergic	- Roofers - Painters -Construction Workers	- Change work clothing daily if doing dusty work - Barrier creams usually workl - hard hat, goggle - Good personal hygiene
Solvents/ Degreasers	Allergic/ Corrosive	- Mechanics - Painters - Service Trades	- Appropriate gloves, hard hat, goggle - Minimize skin contact - Good personal hygiene
Cleaners	Corrosive	- Labourers - Service Trades	- Rubber gloves, boots, hard hat, goggle and may be rain pants - Good personal hygiene

3.2 Heat Protection

Workers performing heavy work in a hot environment found in Sri Lanka are at risk of heat related health risks. Heavy physical work requires careful evaluation to prevent heat disorders.

When the ambient temperature is high, if possible the working hours should consist of early mornings and late afternoons, with long break during the noon hours, when it is hotter.

Prevention of Heat Related Health Risks for Workers

- Wear light, loose clothing that permits the evaporation of sweat.
- Drink small amounts of water—8 ounces (250 ml)—every half hour or so. Don't wait until you're thirsty.
- Avoid beverages such as tea, coffee, or beer that make you pass urine more frequently.
- Where personal protective equipment PPE must be worn, use the lightest weight clothing available.
- Wear light-coloured garments that absorb less heat from the sun
- Avoid eating hot, heavy meals. They tend to increase internal body temperature by redirecting blood flow away from the skin to the digestive system.
- Don't take salt tablets unless a physician prescribes them. Natural body salts lost through sweating are easily replaced by a normal diet.

Recognition and Treatment of Heat Related Impacts

Symptoms of heat related illness can include fatigue, skin rashes, muscle cramps, headache, nausea and feeling faint. Treatment includes:

- resting in a cool place
- drinking cool water
- removing unnecessary clothing.
- If possible showering or sponging with cool water

If not treated promptly heat exhaustion can lead to heat stroke—a medical emergency. The primary signs and symptoms of heat stroke are:

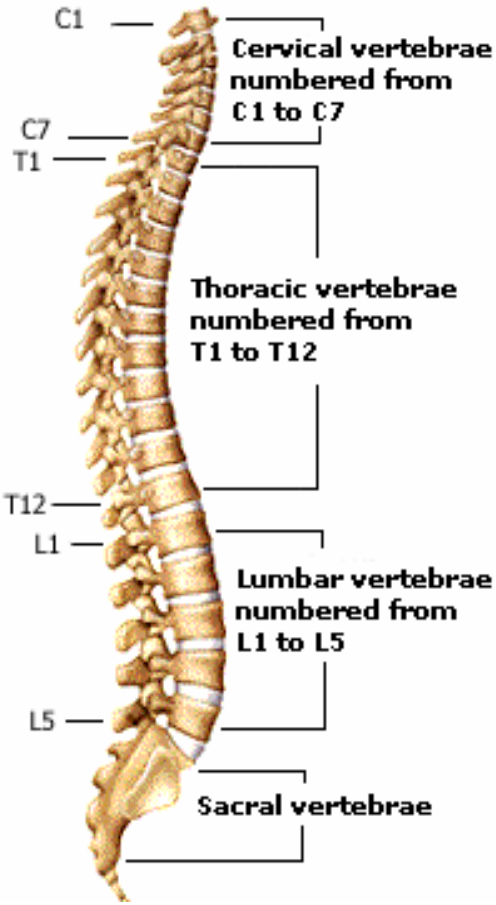
- confusion, irrational behaviour,
- loss of consciousness,
- convulsions,
- lack of sweating, hot, dry skin.

For any worker showing signs or symptoms of heat stroke, Call the ambulance, Provide immediate, aggressive, general cooling. Transport casualty to hospital.

3.3 Back Protection

More than half of back injuries result from lifting excessive weight or lifting incorrectly. To prevent injuries, you need:

1. proper posture,
2. correct lifting techniques,



Posture

- Correct posture is not an erect, military pose. It means maintaining the naturally occurring curves in your spine.
- Keeping your spine aligned in this manner reduces everyday stresses on your back and minimizes the effects of the normal aging process on the spine.
- When working in a crouched, bent, or stooping position for a prolonged period, take regular breaks by standing up and bending backwards three times.
- Prolonged standing often causes an increased curve in your back. Elevating one foot on a stool or any other object (a phone book or brick will do) will take stress off the lower spine.
- When working overhead in an arched position for prolonged periods, take regular breaks by returning to stable footing and bending forward three times

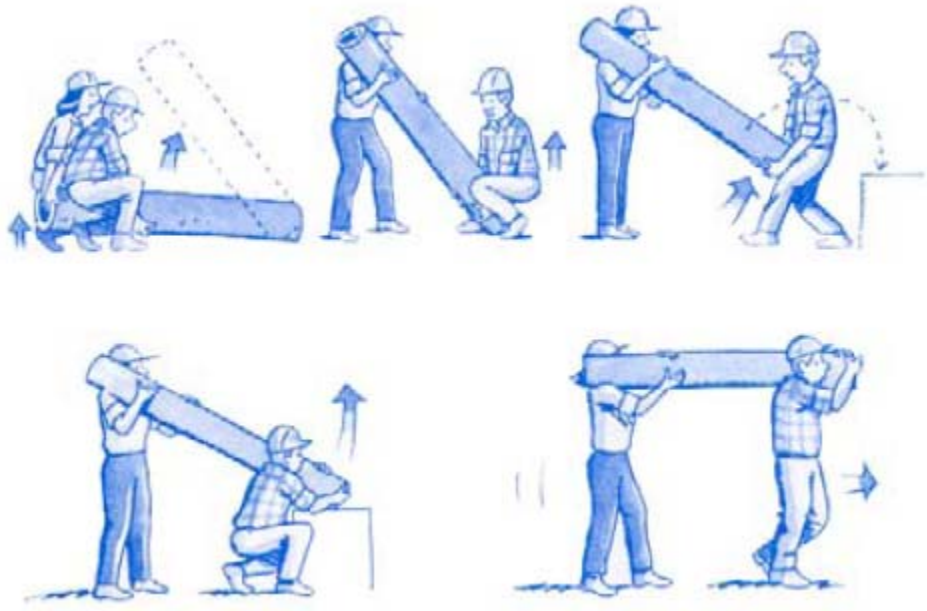
Proper Lifting

Improper lifting is the most common cause of Back injuries for workers. To avoid this:

- Plan your move. Size up the load and make sure pathway is clear.
- Don't lift if it is too heavy, Get help as needed or use a dolly or other device if necessary.
- Use a wide-balanced stance with one foot slightly ahead of the other.
- Get as close to the load as possible.
- Tighten your stomach muscles as the lift begins.
- When lifting, keep your lower back in its normal arched position and use your legs to lift.
- Pick up your feet and pivot to turn – don't twist your back.
- Lower the load slowly, maintaining the curve in your lower back.
- Avoid lifting above shoulder height. This causes the back to arch, placing heavy stress on the small joints of the spine.

Two-Person Lift

Lifters should be of similar height. Before starting they should decide on lifting strategy and who will take charge. For a two-person lift of a long load, the lifter who takes charge must see that the load is carried with a clear line of vision. Begin by lifting load from ground to waist height. Then lift the load from waist to shoulder. Lifters should unload at the same time.

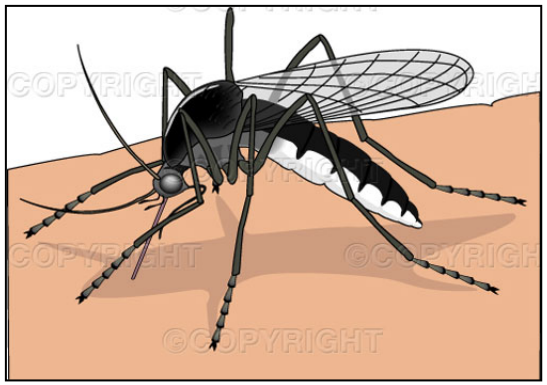


- **Balance**
  Avoid one-handed carrying if possible. Try to distribute the weight evenly on each side. If you cannot avoid one-handed carrying, such as with a single pail, hold the free arm either straight out or on your hip as a counterbalance.

3.4 Communicable Disease Protection

Mosquito Borne Diseases

In Sri Lanka serious diseases such as Malaria, Dengue Fever, and Chikungunya Fever are transmitted to humans by mosquito bites. Municipal workers are particularly at risk when working in and around drainage channels and wetlands where mosquitoes breed. Actions to protect against these diseases are:



- Eliminate standing water in channels or containers where mosquitoes could breed.
- Undertake insecticide spray programs to eliminate mosquitoes in and around work areas.
- Wear light coloured long sleeved shirts, long trousers, socks and shoes (rather than sandals) to avoid being bitten when working in areas where mosquitoes are prevalent.
- Wear approved mosquito repellent containing active ingredient DEET when working in areas where mosquitoes are prevalent.

Water Borne Diseases

Serious diseases such as cholera, typhoid fever, toxoplasmosis, and hepatitis “A” can be transmitted through exposure to contaminated water. These diseases can be transmitted through drinking water or accidental ingestion of waste water. Municipal workers are at risk from contaminated drinking water and when working with wastewater in drainage channels and pumping septic tanks. Actions to protect against these diseases are:

- Ensure that safe drinking water is available for all workers. To be safe water must be boiled vigorously for one minute or be commercially bottled.

- Wear rubber gloves when handling wastewater or septic tank effluent or items that have been in contact with this.
- Wear a face shield where there is a likelihood of being sprayed or splashed with wastewater.
- Wash hands well with soap and warm water after working in wastewater, especially before eating or food preparation.

- Rinse gloves, boots, and hand tools that have been exposed to wastewater with clean water and a disinfectant at the end of the work.

Personal Transmission

Diseases can also be transmitted directly from person to person in a variety of ways:

- By Air – airborne droplets produced by coughing and sneezing can transmit diseases such as tuberculosis and influenza
- By Touch – direct touching, such as a handshake, followed by hand to mouth contact can transmit diseases such as influenza.
- Sharing Utensils – shared use of water bottles, cups, eating utensils, (through transfer of saliva), can transfer diseases such as typhoid, hepatitis “A”, and influenza.
- Intimate Contact – contact such as unprotected sexual activity, sharing of IV needles, and exposure to blood can result in transmission of diseases such as HIV/Aids and Hepatitis"B”.

Actions to protect against this type of disease transmission are:

- Cover the nose/mouth when coughing or sneezing;
- Use tissues to contain respiratory secretions and dispose of them in a waste receptacle after use;
- Wash hands frequently with warm water and soap. Always wash hands thoroughly after using the toilet, after contact with contaminated objects and before eating or undertaking food prepartation.
- Do not share water bottles, cups, or eating utensils with co-workers
- Wear rubber gloves when there is a risk of contact with blood or medical waste products or human waste. Special care should be taken to avoid puncture wounds from used IV needles.

Tuberculosis (TB)

Tuberculosis is a serious infectious disease which is increasingly prevalent in Sri Lanka.

TB Transmission

- Tuberculosis is spread through air droplets which are expelled when persons with infectious TB disease cough, sneeze, speak, or sing.
- To become infected, a person has to come in close contact with another person having active tuberculosis.
- Transmission occurs only from persons with active TB disease (not latent TB).

TB Symptoms

Most people infected do not show any symptoms (latent TB). In patients where TB becomes an active disease, it most often infects the lungs.

- Symptoms include a productive, prolonged cough of more than three weeks duration, chest pain, and coughing up blood.
- Other symptoms can be fever, chills, night sweats, appetite/weight loss, and fatigability.

TB Prevention

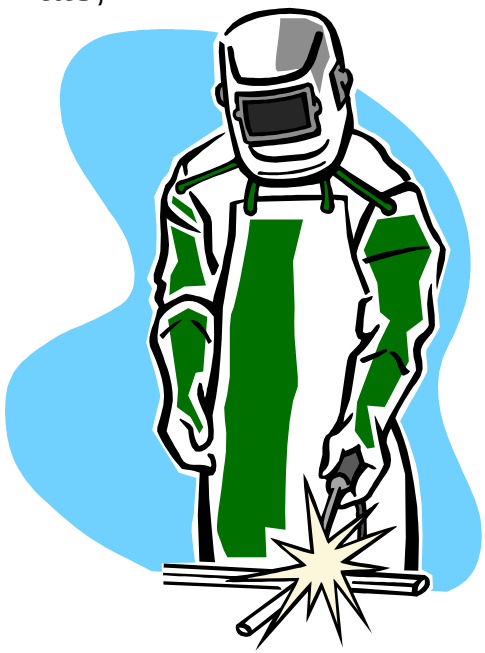
In the workplace, prevention and control of TB can be undertaken by testing new employees and employees with TB symptoms for the disease.

- Latent infection is diagnosed by a tuberculin skin test.
- Where it is determined that an employee is infected, the employee's family members should also be tested.
- Employees found to have active TB should not come to work and should receive medical treatment immediately.
- Employees found to have latent TB can continue to work but should also obtain treatment.

4.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal protective equipment (PPE) is something all construction / maintenance workers require. Specific Equipment needed depends on the job being undertaken.

PPE is designed to protect against safety and health hazards. Hard hats, safety glasses, and safety boots, for instance, are designed to prevent or reduce the severity of injury if an accident occurs. Other PPE, such as hearing and respiratory protection, is designed to prevent illnesses and unwanted health effects. Other PPE, such as high visibility clothing is designed to avoid the occurance of an accident. It is important to remember that PPE only provides protection. It reduces the risk but does not eliminate the hazard.

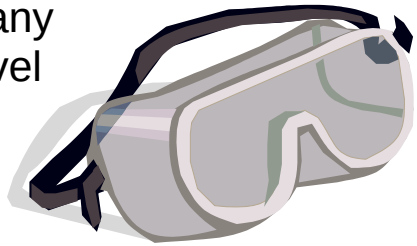


4.1 Eye Protection

Proper eye protection, selected to match the specific hazard, combined with safe work procedures, can help to minimize the number and severity of eye injuries. For many jobs wearing proper eye protection should be considered mandatory.

- **Safety Glasses**
  Safety glasses provide general eye protection while undertaking many types of work and all outside workers should have their own pair. Safety glasses provide the first level of eye protection but have the advantage of being inexpensive and comfortable to wear.

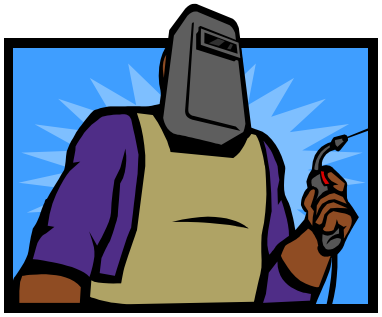
- **Goggles**
  Goggles also provide general eye protection while undertaking many types of work. They are also inexpensive and provide a higher level of protection than safety glasses. Goggles have adjustable or elasticized headbands and are equipped with ventilation ports to allow passage of air and prevent fogging. Goggles may be worn over prescription eyeglasses by workers.



- **Face Shields**

Face shields are device that includes a transparent window or visor to shield the face and eyes from impact, splash, heat, or glare. They provide a higher level of protection than goggles as the whole face is protected. Face shields are used applications where there is a risk of flying particles or splash of liquids which

- **Welding Helmets**



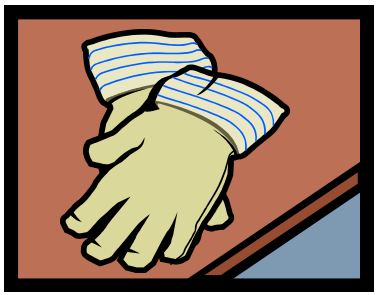
This equipment is specific welding and steel cutting work and provides radiation and impact protection for face and eyes. The filter or shaded plate is the radiation barrier. Ultraviolet rays from arc welding have the potential to cause very serious eye damage. Because of this it is essential that all workers undertaking welding work be provided with this equipment. Workers in the vicinity of welding operations should avoid looking at the arc welding flame as this may cause eye damage.

4.2 Head Protection

Approved hard hats should be mandatory for all construction / maintenance workers on the job. The hard hat must protect the wearer's head against impact and against small flying or falling objects. All workers should be issued with their own properly fitted hard hat.

4.3 Hand Protection

The hands are susceptible to injury from sources such as; sharp needles or jagged edges on materials and tools, heat, corrosive chemicals, and UV rays from welding. Many types of protective gloves are manufactured to protect workers. Types include



- Leather, cloth or composite gloved to provide general protection from abrasion, cuts, scrapes and heat
- Rubber to provide protection from chemicals and biohazards

4.4 Foot Protection

Work boot help protect against toe, ankle and other injuries. In heavy duty work boots a steel toe protects against falling objects while a steel insole prevents punctures to the bottom of the foot. Work boots are available in various styles and sole materials for different types of work. For example, rubber boots may be better suited for work in wet areas or concrete work.

- Workers exposed to sewage and other wastewater should be issued with rubber boots
- Workers undertaking welding, steel fabrication, masonry or stone construction should be issued with steel toed work boots.

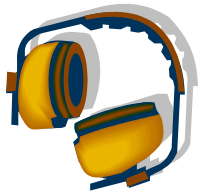
4.5 Hearing Protection

Workers often are required to use noisy equipment. Depending on the noise level, duration of exposure, and other factors, a temporary or permanent hearing loss may result. Temporary hearing losses will usually be restored by the body within a few hours after the exposure has ceased. Extremely loud noise or prolonged exposure to noise may result in permanent hearing loss.
Proper hearing protection should be worn to protect the worker from hearing damage when working in loud areas.

- General hearing protection is provided by wearing of approved disposable ear plugs. Use where noise levels are 85-95 dB

- For higher intensity noise Ear muff type protection should be worn. Use where noise levels are 95-110 dB

- For extremely intense noise both ear muffs and ear plugs should be worn together. Use where noise levels are above 110 dB



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4.6 Respiratory Protection

Workers are sometimes exposed to dangerous dusts, gases, fumes, mists, and vapours.

- Work generating dusts, gases, fumes, smoke etc, should preferably be undertaken outdoors, in open sided sheds, or in well ventilated buildings.
- Respirators are not the best method of protection from respiratory hazards because they can be unreliable if not properly fitted and maintained and they may be uncomfortable to wear.
- In spite of these drawbacks, in some construction operations respiratory protective equipment is the only practical control.
- The first level of respiratory protection can be provided by simple, inexpensive dust masks.
- For a higher level of Air purifying respirators or “canister” type respiration masks can be supplied with filters specially provided for the type of hazard.

Warning: Air-purifying respirators simply remove certain airborne hazards. They do not increase or replenish the oxygen content of the air and should never be worn in atmospheres containing less than 19.5% oxygen.

4.7 Fall Protection

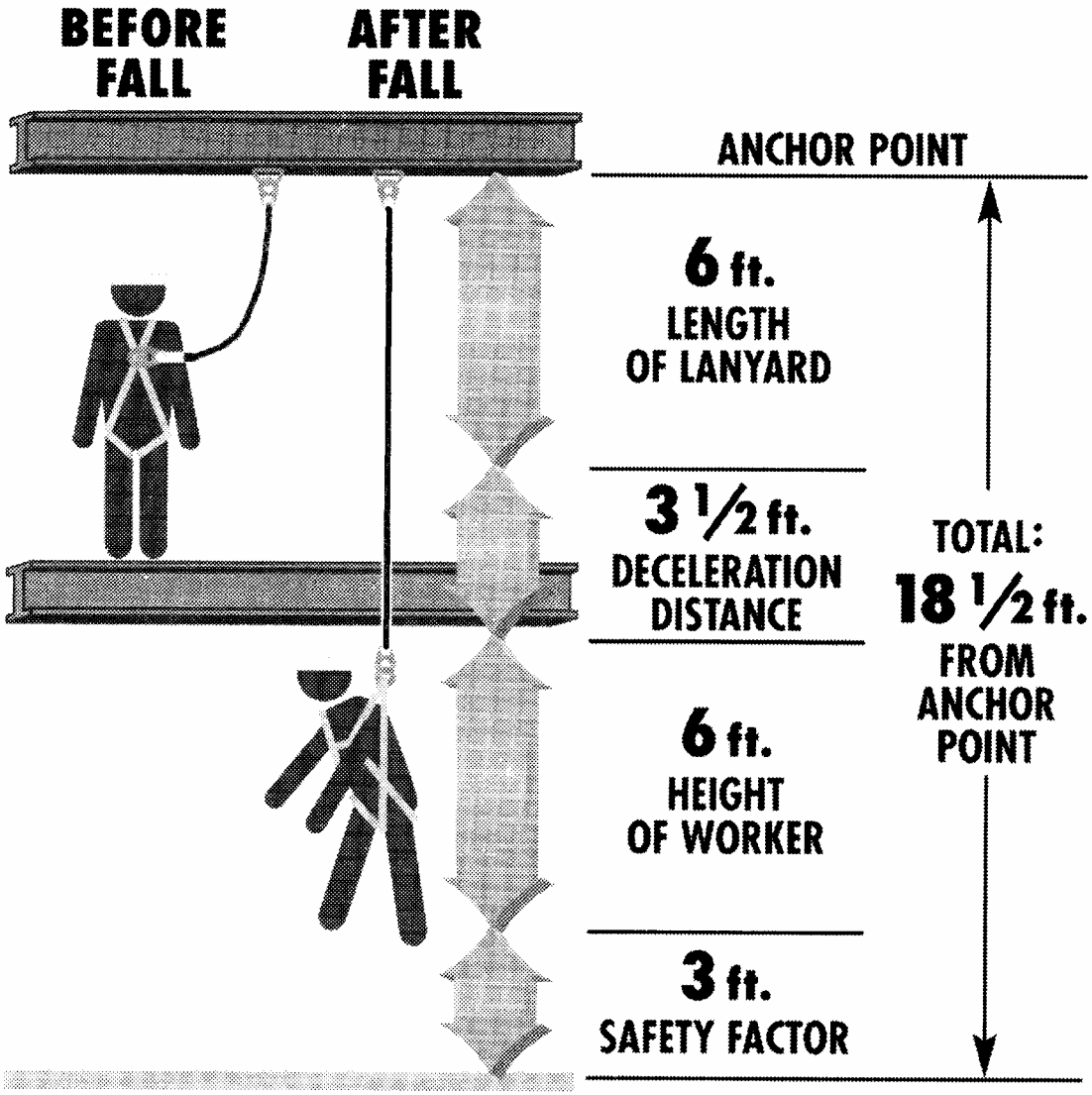
Where a worker is subjected to a risk of falling over 6 feet (3m) and where workers cannot be protected from falls by guardrails or travel restraint or safety net, they should be protected by a fall arrest system.

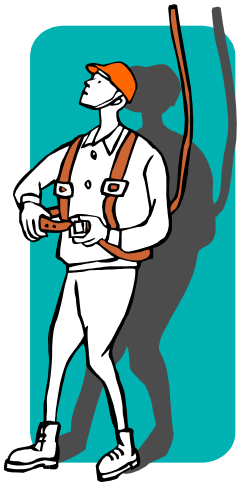
In the event of a fall, these systems must keep a worker from hitting the ground, the next level below, or any other objects below. A fall-restricting system is designed to limit a worker's free fall distance to 0.6 metres (2 feet).

A fall-arrest system must:

- include an approved full body harness (B)
- include a lanyard equipped with a shock absorber unless the shock absorber could cause a falling worker to hit the ground or an object or a level below the work ©
- Include an adequate fixed support; the harness must be connected to it via a lifeline. (A)
- prevent a falling worker from hitting the ground or any object or level below the work

Examples of work where a fall protection device might be needed include working on rooftops, water tank towers, retaining walls, window washing and painting high buildings.


BEFORE FALL
AFTER FALL
ANCHOR POINT
6 ft.
LENGTH OF LANYARD
3 1/2 ft.
DECELERATION DISTANCE
6 ft.
HEIGHT OF WORKER
3 ft.
SAFETY FACTOR
TOTAL:
18 1/2 ft.
FROM ANCHOR POINT



4.8 High Visibility Clothing

In many situations workers may be endangered by moving vehicles or other heavy equipment such as cranes and excavators. In these situations protection should be provided to the worker by wearing of clothing that provides a high level of visibility to co-workers, vehicle drivers and heavy equipment operators. There are two distinct features to high-visibility clothing:

- bright background material colour (fluorescent orange or red)
- Reflectivity striping for high visibility in low light. arranged on the garment with two Vertical stripes down the front and forming an X on the back.

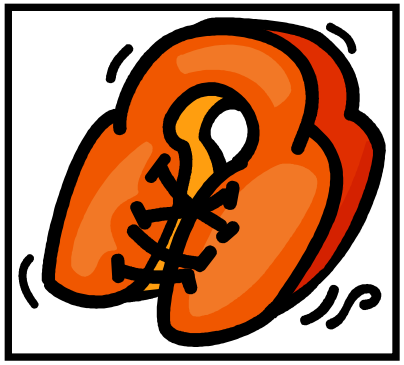
Common high visibility clothing includes high visibility vests, t-shirts, coveralls, hats, and hard hats

Vest

T-Shirt

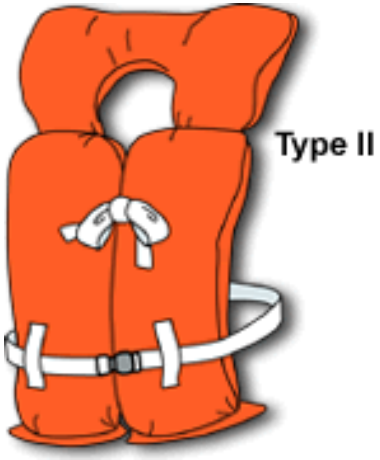
Jacket

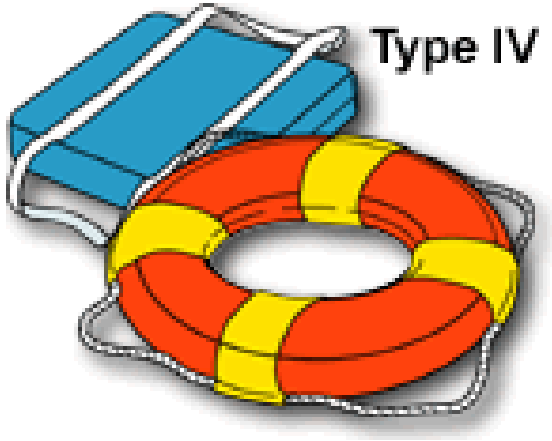
4.9 Personal Floatation Devices (PFDs)



Where a risk of falling into deep water exists, workers should be provided with and wear an approved life jacket or personal floatation device (PFD). This should be warn at all times when in proximity to the water. This type of work may also require that a rescue plan be prepared and equipment to effect the plan such as boats, motors, ropes and throw able devices be provided.

Personal flotation devices should be issued to those working on boats, barges, wharves, dams, locks, breakwaters and water reservoirs.





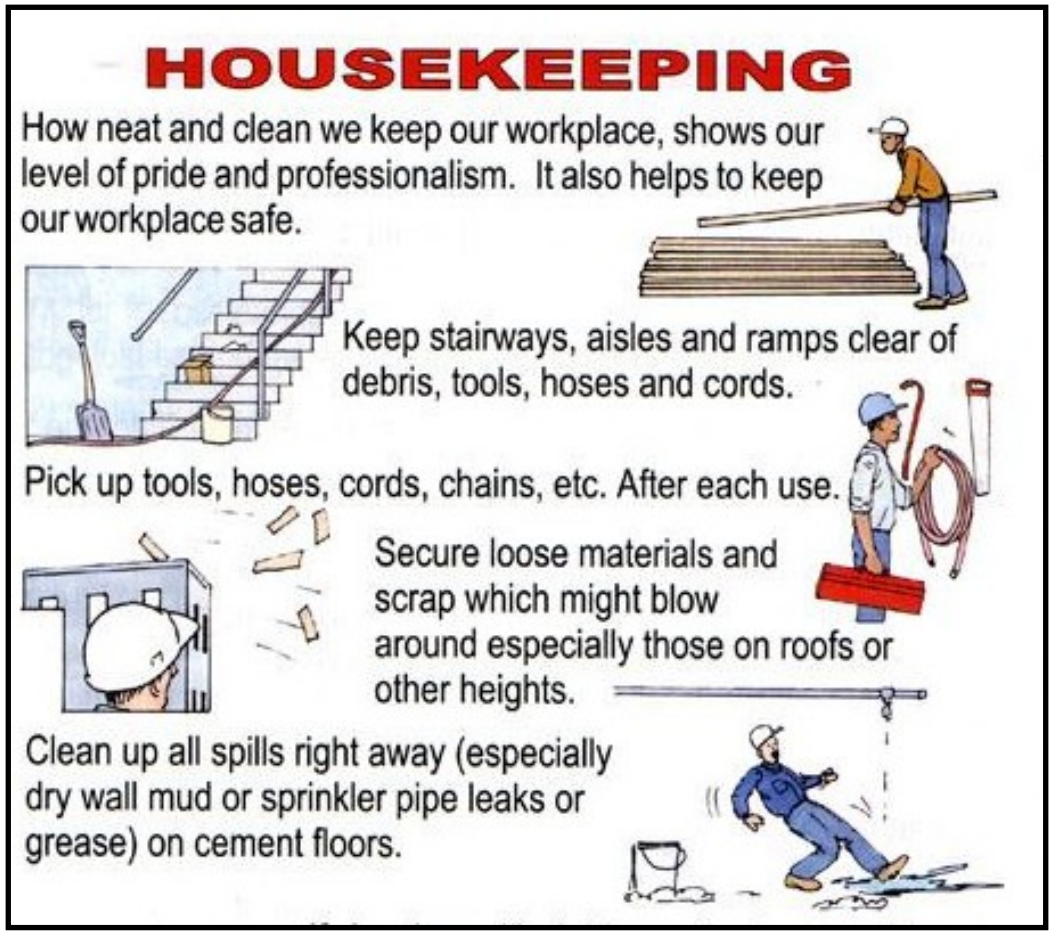
5.0 JOB SITE SAFETY

Many injuries result from poor housekeeping, improper storage of materials, and cluttered work sites. The following areas require attention to ensure a safe work site.

5.1 Material Cleanup and Storage

Job Site Tidiness helps reduce worker accidents and injuries this includes:

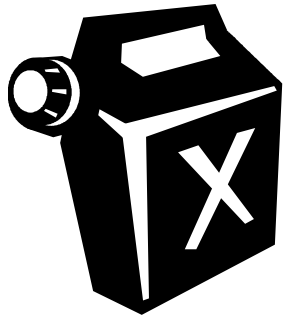
- daily jobsite cleanup program and disposal of rubbish
- materials piled, stacked, or otherwise stored to prevent tipping and collapsing
- work and travel areas kept tidy, well-lit, and ventilated
- Signs posted to warn workers of hazardous areas.



Flammable Materials

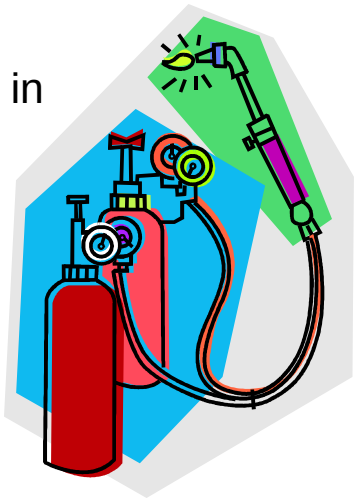
- Store fuel only in approved containers marked with the contents i.e. “petrol”
- Store well away from any flame or source of ignition

Hazardous Chemicals



- Refer to manufactures labels for specific information on each product.
- Follow manufacturer's recommendations for storage. Observe all restrictions concerning heat, moisture, vibration, impact, sparks, and safe working distance.
- Post warning signs where required.
- Have equipment ready to clean up spills quickly.

Compressed Gas Cylinder



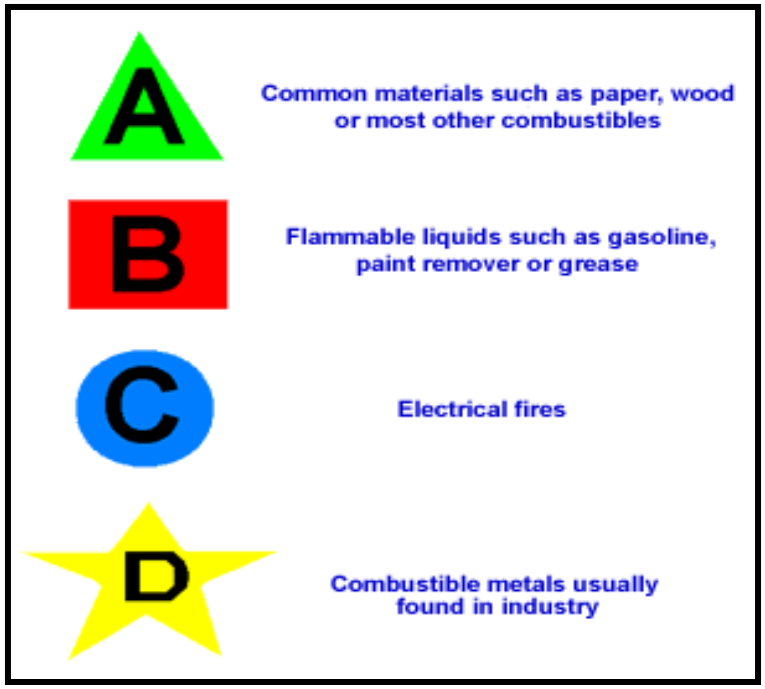
- Always store and move cylinders in the upright position. Secure cylinders upright with chains or rope.
- Lock up cylinders to prevent vandalism and theft. Store cylinders in a secure area
- Keep full cylinders apart from empty cylinders.
- Store cylinders of different gases separately.
- Keep cylinders away from heat sources. When heating with propane, keep 45-kilogram (100 lb.) cylinders at least3 metres (10 feet) away from heaters; keep larger tanks at least 7.6 metres (25 feet) away.

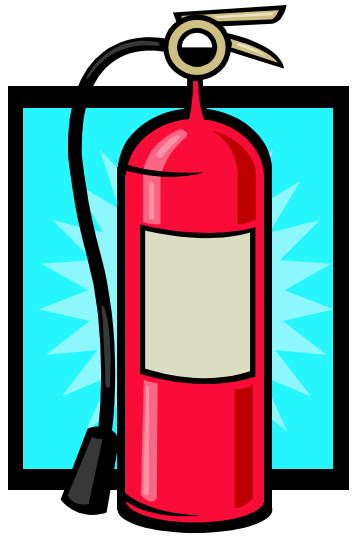
5.2 Fire Protection

Fire Extinguisher Provision

Job Site Safety includes fire prevention and fire protection. Fire Extinguishers should be located in visible locations and at locations that are high risk for fires. . Fire extinguishers must be:

- Accessible and not blocked from view.
- Regularly inspected, at least once per year.
- The proper type, as noted below, for the type of fire risk in the area.
- Promptly refilled after use.





Fire Extinguisher Use

Workers must be trained to use fire extinguishers properly. Except for volatile liquid fire aim the extinguisher at the base of the fire to extinguish the flames at their source.
To operate the Fire Extinguisher read the operating instructions on the tank. In general, Fire Extinguishers will be equipped with the following parts and be operated as follows:

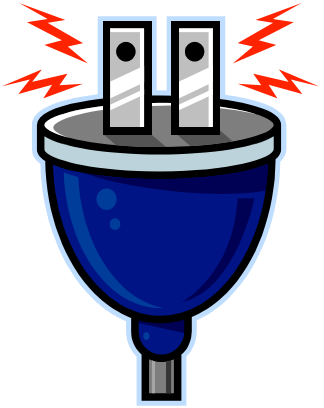
Parts

- Operating lever
- Safety Locking pin
- Pressure gauge
- Discharge nozzle
- Canister
- Label
  - type of extinguisher (A,B,C,D)
  - instructions

Use

- Select correct extinguisher for class of fire
- Pull the locking pin
- Aim at base of fire
- Squeeze and hold the discharge lever
- Sweep from side to side
- CAUTION - monitor the area, the fire could re-ignite
- Always notify supervisor of extinguisher use so it can be replaced or recharged and the fire investigated

5.3 Electrical Safety



Electricity is always a potential source of danger.

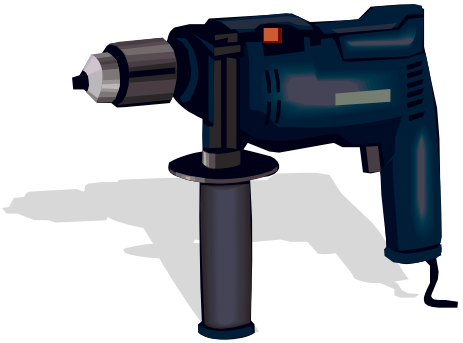
Consider all electrical wires and equipment live until they are tested and proven otherwise.

Electrical Fires

- Never put water on fires in live electrical equipment or wiring.
- Water is a conductor and increases the risk of flash, arc, and electrocution.
- An electrical fire in a confined space can rapidly deplete oxygen and may release toxic fumes.

Electric Power Tools

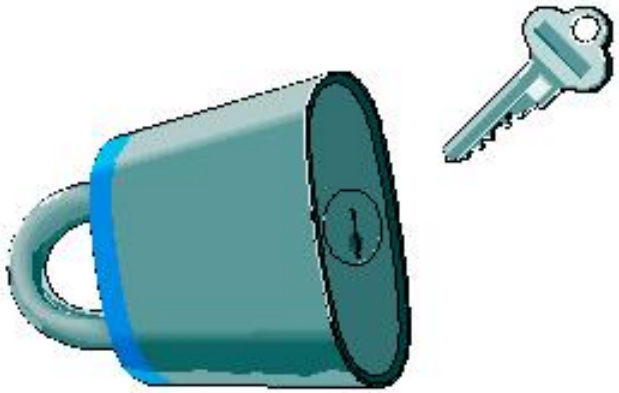
- Use only tools that are earthed.
- Make sure the casings of the tools are not cracked or broken
- Do not throw tool or raise or lower them by their power cords



5.4 Lockout and Tagging

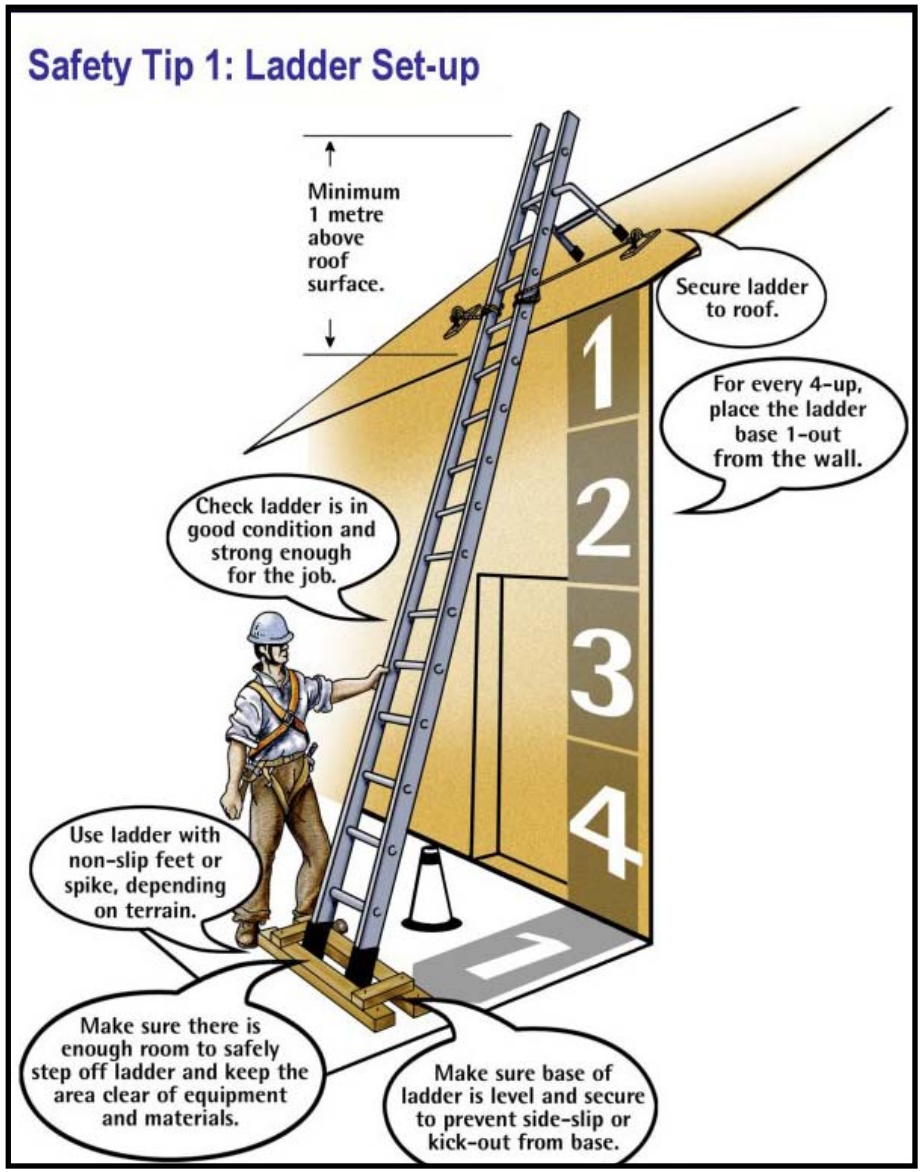
Lockout and tagging ensures that hazardous energy sources are under the control of each worker.

- Serious or fatal accidents can occur when people assume that machinery is turned off or made harmless—but it isn't.
- Lockout involves workers using a padlock to keep a switch in the "off" position, or to isolate the energy of moving parts of a machine
- Each worker is issued with his own padlock which has a tag identifying the worker.
- Tagging notifies that systems must not be re-energized without the authority of those named on the tag.
- ONLY the worker locking out a piece of equipment with his tag can remove that lock once he has verified it is safe to put back into operation



5.5 Ladder Safety

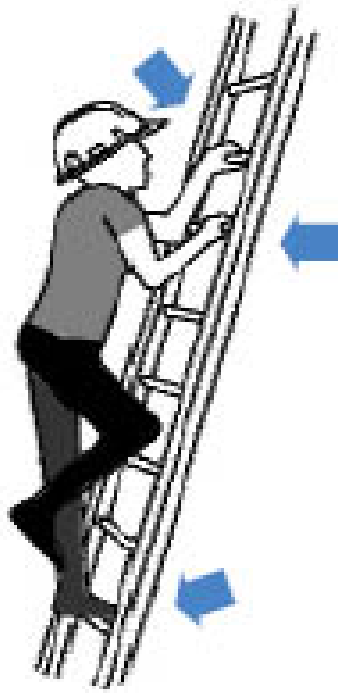
To ensure safety when using ladders workers should do the following:



Ladder Setup

- Check the ladder for defects at the start of a shift.
- The base of the ladder should be secured against accidental movement.
- The ladder must be set up on a firm level surface.
- Ladders should be erected at an angle such that the vertical distance between the top support and the base is not more than four times, or less than three times the horizontal distance between these points
- Before setting up a ladder, check the area for overhead power lines. Ladders made of aluminium or steel should never be used near power lines
- Ladders should never be used horizontally as substitutes for scaffold planks.

Using a Ladder

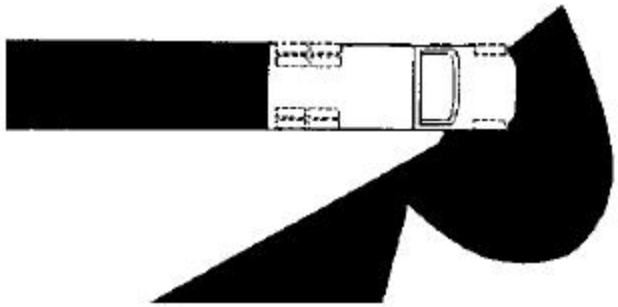


- When a task can only be done while standing on a ladder, the length of the ladder must be such that the worker stands on a rung no higher than the fourth from the top. The ladder should also be tied off or equipped with a suitable stabilizer.
- Only one person at a time should be allowed on a ladder.
- Always face the ladder when climbing up or down and when working from it.
- Maintain 3-point contact when climbing up or down a ladder. That means two hands and one foot or two feet and one hand on the ladder at all times
- When working from a ladder, keep your centre of gravity between the side rails. A person's centre of gravity is approximately in the centre of the body at belt height.
- Whenever possible, avoid climbing up or down a ladder while carrying anything in your hands. Tools, equipment and materials should be placed in a container and raised or lowered by rope, if necessary.
- Keep boots free of mud, grease, or other slippery materials if using ladders.

6.0 VEHICLE AND EQUIPMENT SAFETY

Vehicles and equipment on construction / maintenance projects pose a serious problem for personnel on foot, especially when the equipment is reversing. Fatal accidents resulting from workers being backed over by dump trucks and other equipment occur all too frequently. Anyone on foot in the vicinity of reversing vehicles and equipment is at risk.

6.1 Blind Spots



Dark Areas are Blind Spots

The main problem with reversing vehicles and equipment is the driver or operator's restricted view. Around dump trucks and heavy equipment such as bulldozers and graders there are blind spots where the operator has no view or only a very limited view. The operator may not see someone standing in these blind spots. Consequently the driver or operator must rely on mirrors or signallers to back up without running over someone or into something. Dump trucks and cranes are the kinds of equipment that hit overhead power lines most often. Workers should be aware of these blind spots when equipment is reversing and never assume that an operator can see them and will stop or avoid them.

6.2 Accident Prevention

To prevent injuries and deaths caused by vehicles and equipment backing up, there are four basic approaches:

1) Site planning - the layout of the work site is done so that equipment is not required to reverse in the vicinity of workers on foot.

2) Signallers – where site planning required workers and equipment to operate in the same areas at the same time signallers can be utilized to provide direction to the equipment operator and ensure that the operator is aware of all workers near his equipment

3) Training - equipment operators and workers alike need to be trained regarding the extreme hazards that mobile equipment presents to workers on foot. Awareness of the hazards can help protect workers.

4) Electronic devices – devices such as back up alarms and beepers can be used to warn workers that equipment is reversing.

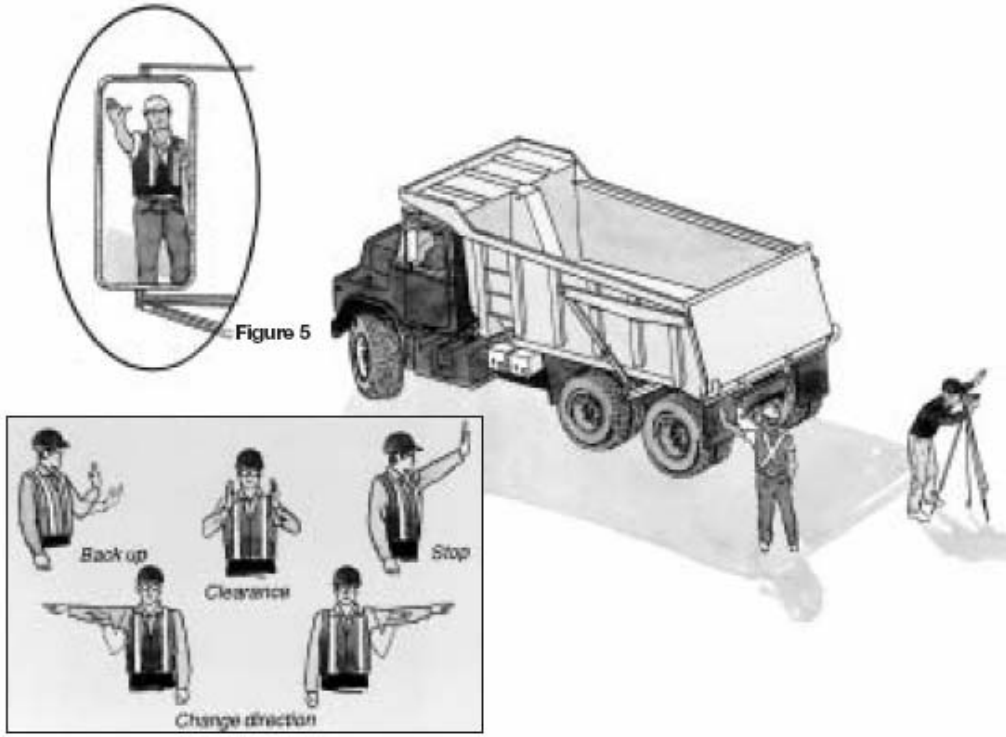


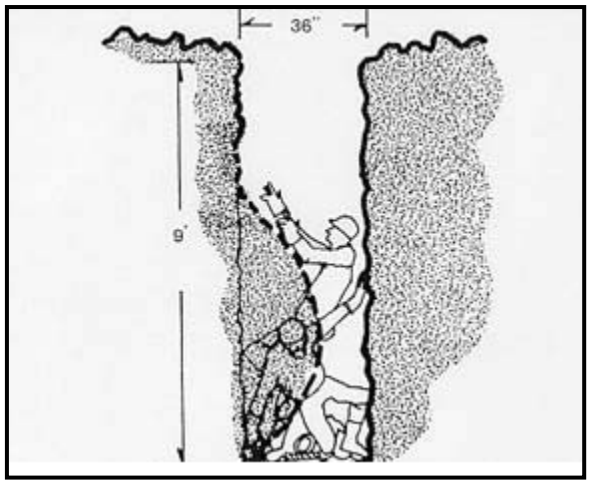
Figure 5

6.3 Traffic Control

Often construction and maintenance activities will require the use of workers to undertake Traffic Control for public traffic, construction site vehicles or both. Traffic control persons (TCPs) must be given written and oral instructions by the Supervisors regarding their duties. A worker who is required to direct vehicular traffic:

(a) Should not perform any other work while directing vehicular traffic;
(b) Should be positioned in such a way that he or she is endangered as little as possible by vehicular traffic;
(c) Should be given training and instruction directing traffic, including a description of the signals that are to be used;
(d) Should wear fluorescent or bright orange in colour safety vest and traffic control paddles clearly indicating “stop” and “slow” on alternate sides.

7.0 EXCAVATION SAFETY



Municipal construction often requires excavation of ditches for installation of pipes, culverts, flumes, or other foundations. Workers entering into excavations to dig, compact, lay pipe, or construct form are at risk from the collapse of the side of the excavation. Workers should never enter an excavation deeper than 4 feet (1.2m) unless it has been made safe by:

- Sloping the sides
- Installing timber shoring approved by the superintendent
- Utilizing a steel trench cage

7.1 Trench Side Sloping

Trench excavations can be made safe for workers to enter by sloping the sides of the trench more than 4 ft (1.2m) above the trench bottom back at a slope of at least 1 to 1. i.e. for every additional foot of depth the trench side should move out 1 foot as well. Some soils conditions will permit safe excavations at steeper slopes than this but only qualified experts should make this decision. Workers should never slope sides steeper than 1 to 1 unless this is specifically approved by the construction superintendent in writing.

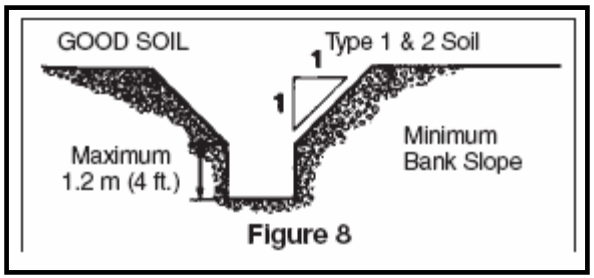


Figure 8

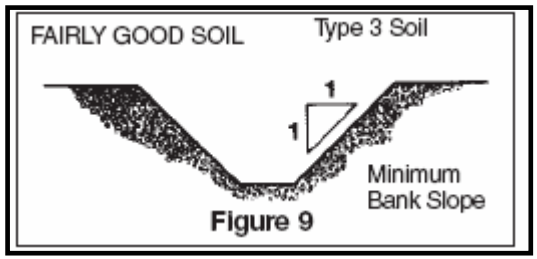


Figure 9

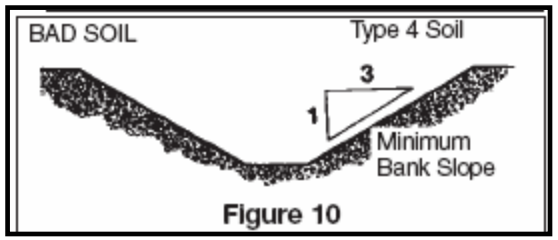


Figure 10

7.2 Timber Shoring of Trenches

Where it is desired to keep the trench walls vertical or steeper that permitted under sloping protection, the trench may be shored using a system of timber struts, horizontal walers and vertical plank sheeting. These systems must be designed by an expert at timber shoring. Workers should not attempt timber shoring without a shoring plan prepared by such an expert and training on the proper installation methods for this type of shoring.

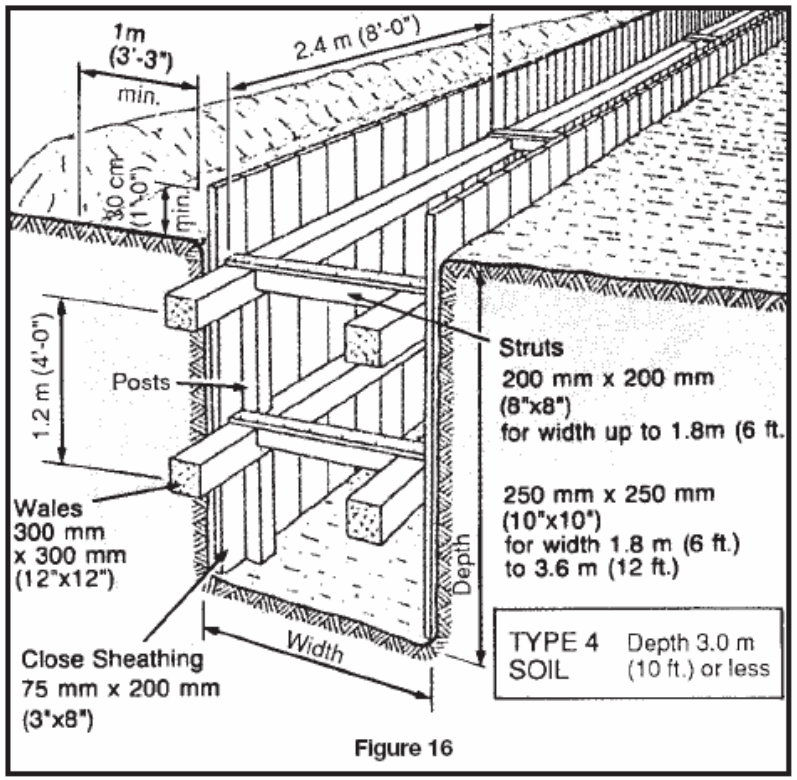


Figure 16

7.3 Trench Cage Shoring

As an alternative to timber shoring a Steel Trench Cage may be utilized to protect workers in steep sided trenches. Trench Cages should be designed by professional engineer to withstand trench collapse loadings. Trench cages can be fabricated in a variety of lengths and heights. They are most often adjustable in width to accommodate placement of a variety of pipe diameters. Trench cages are heavy and require the use of a backhoe or excavator to deploy them and move them along the trench as the pipeline is installed. Where there are frequent lateral connections or other utilities crossing the ditch Trench Cages are a viable alternative to timber shoring.

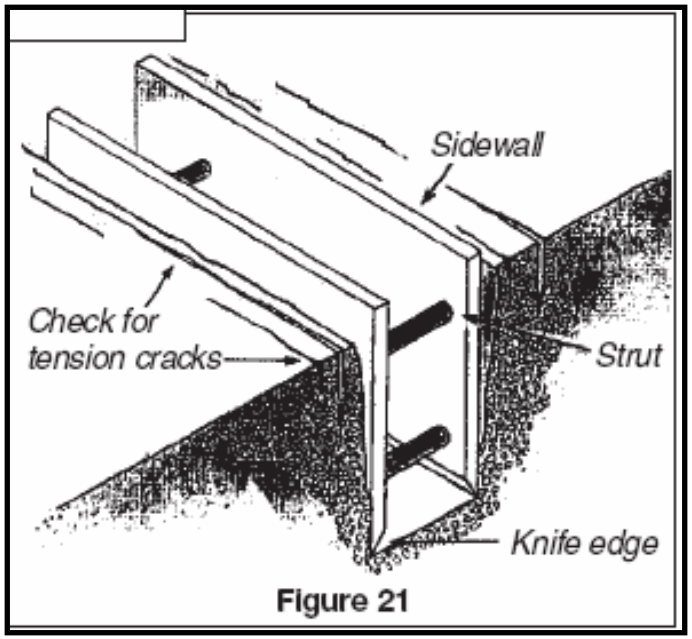


Figure 21

7.4 Other Trenching Safety Issues

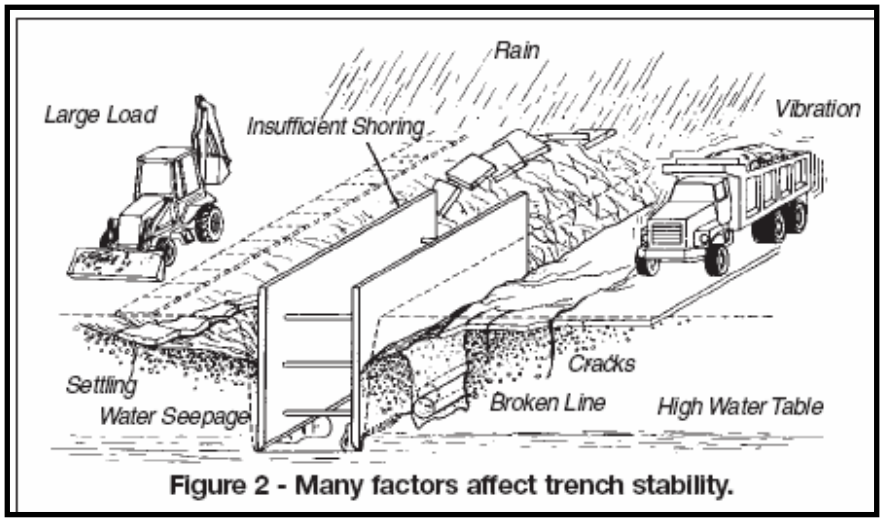


Figure 2 - Many factors affect trench stability.

Vibration

Vibration from vehicular traffic or from operations such as earth moving, compaction, pile driving, and blasting can affect excavation stability. Assess the impacts of equipment vibration on trench stability.

Moisture Content

Changes in soil moisture content due to either rainfall or drying of the soils adjacent to the trench may effect the stability of the trench. After significant rainfall or if "drying" cracks are noted in the trench vicinity, reassess the trench stability.

Loading Adjacent to the Trench

Trench failures can occur due to loading of the ground adjacent by either heavy equipment such as cranes or excavators or by piling heavy materials such as sand, concrete pipe, or other backfill materials near the edge of the trench. Very heavy loadings such as these should be set back from the edge of the trench by at least the depth of the trench.

Check for Buried Utilities before Digging

Check with local authorities to verify the location of other buried utilities such as electrical cables, telephone cables, water and sewer pipes before digging. Serious danger to workers exists if underground cables are cut when excavating.

8.0 CONFINED SPACE SAFETY

8.1 Confined Space Definition and Examples

A confined space is defined as a location that:
(a) that is partially or fully enclosed;
(b) that is not both designed and constructed for continuous human occupancy,
(c) where atmospheric hazards may occur because of its construction / maintenance, location, or contents, or because of work that is done in it.

Examples of Confined Spaces	Common Hazards
Sewage handling systems Settling tanks, sewers, manholes, pumping areas, septic tanks, digesters.	Toxic and/or explosive atmospheres such as hydrogen sulphide and methane; oxygen deficiencies.
Water treatment plants Settling tanks, holding tanks, equipment and wells below floor level.	Oxygen deficiency, chlorine gases, ozone; also possibly methane and hydrogen sulphide produced by decaying
Chemical and petrochemical projects Tanks, vessels, storage tanks, underground tanks, pipes, sumps, pits, any area where a worker cannot readily escape from a toxic or explosive atmosphere; any area where toxic, explosive, or oxygen deficient atmospheres may be encountered.	Toxic and explosive gases, vapours and fumes; physical hazards of cramped entry and exit, narrow passages, and chemical spills.
Heavy industrial projects Sumps, pits, roasters, digesters, mixers, bins, flues, ducts, conveyors, elevators, bag houses.	The hazards will depend on processes and materials involved but may include methane, hydrogen sulphide, oxygen deficiency, flammable agents, electrical hazards, moving parts, and engulfment due to free-flowing materials
General construction Vaults, caissons, trenches	Toxic materials such as carbon monoxide from temporary heaters in low-lying areas; refrigerants; high-voltage transmission equipment; physical hazards involving poor lighting and cramped working conditions.

8.2 Atmospheric Hazards in Confined Spaces

A hazardous atmosphere in a confined space may be due to existing conditions (e.g., residue in a tank,) or it may be created by the work being done inside the confined space (e.g., welding or using solvents) or it may be due to release of methane from surrounding soils seeping into the confined space.

Before entering a confined space:

- The atmosphere should be tested for oxygen level and presence of explosive gases.
- Fresh air should be directed into the confined space using electric fans.
- Worker entering the confined space should wear a harness and safety line connected to the surface.
- Workers should remain outside the confined space, remain in contact with the worker inside and be prepared to rescue the worker inside by using the safety line

BLOWERS

PORTABLE ATMOSPHERE TESTER

9.0 HAND TOOL SAFETY

Common cause of injuries or fatalities is using the wrong tool, using the right tool improperly, haste, lack of personal protective equipment and lack of training or experience.

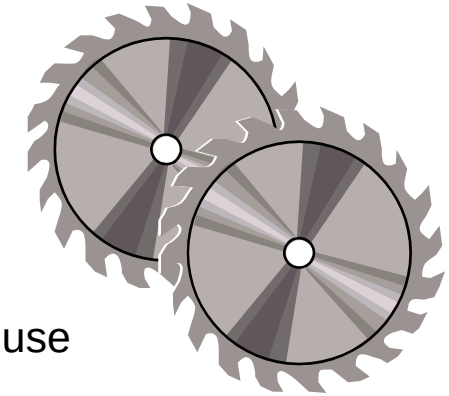
General safety in use of hand tools includes:

- Wear eye protection and where necessary face protection where flying chips or particles may occur
- Wear hand protection where pinch points or slips could cause injury to hands
- Use the right tool for the job.
- Don't over stress the tool to the point it may break.
- Position hands such that slips of the tool will not cause injury.

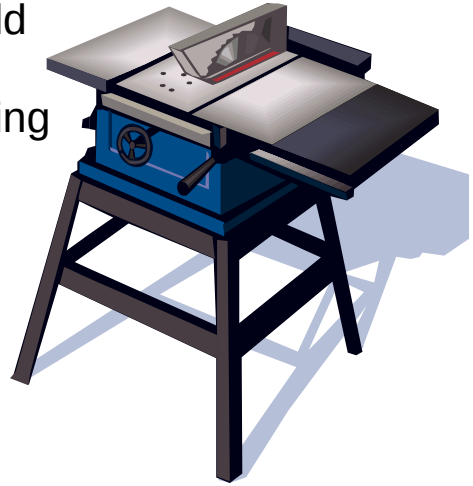
#	Tools	Occupation / Activities	Health Issues	Prevention	Controls
1	Hand Saws	Carpenters, Form work installers & Labours	Not serious, hand or thumb injury and inhaling dust	Choose the right saw and hold the (secured) timber away from the cut	Hard hat and Safety boots
2	Wood Chisels	Carpenters, Form work installers & Labours	hand or thumb injury and inhaling dust	Choose the right chisel and hold the timber behind the chisel	Hard hat and Safety boots
3	Cold Chisel	Metal worker, Mason, Mechanic	hand or thumb injury	Prevent fragments flying off	Hard hat, Safety boots, Safety Goggle and Gloves
4	Axes and Hatches	Carpenter	Body injury	Aim target and control the hammer	Hard hat, Safety boots, Safety Goggle and Gloves
5	Sledgehammer	All	Body injury	Aim target and control the hammer	Hard hat, Safety boots, Safety Goggle and Gloves
6	Claw Hammer	All	Body injury	Aim target and control the hammer	Hard hat, Safety boots, Safety Goggle and Gloves
7	Utility Knives	All	hand or thumb injury	Cut material away from the body	
8	Screw Driver	All	hand injury	Match the fastener	
9	Hand Planes	Carpenter	hand or thumb injury	Use correct plane and sharp iron	Hard hat, Safety boots, and Safety Goggle
10	Plumb Bobs	Carpenters and Masons	Body injury due falling weight	Dangerous if dropped. Ensure no one is below.	Hard hat, Safety boots,
11	Crow Bars	All	Body injury due accidental piercing	This a multi purpose dangerous tool & use common sense	Hard hat, Safety boots, and Safety Goggle
12	Nail Puller	Carpenter	Hand injuries	Keep the claw well away	Hard hat, Safety boots, and Safety Goggle
13	Pipe Wrench	Steel worker , plumber	Injury, fall	Never use Cheater, Stand on stable ground	Hard hat, Safety boots, and Safety Goggle
14	Rod & Bar Cutters	Rod workers	Injury due flying debris	Keep fingers away, Cover cutting item	Hard hat, Safety boots, and Safety Goggle
15	Bolt Cutters	Rod workers	Injury due flying debris	Keep fingers away, Cover cutting item	Hard hat, Safety boots, and Safety Goggle

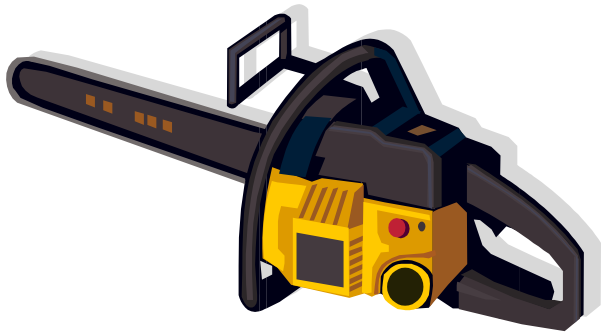
10.0 POWER TOOL SAFETY

Safety Basics



- Make sure that electric tools are properly grounded or double-insulated.
- Never remove or tamper with safety devices.
- Study the manufacturer's instructions before operating any new or unfamiliar electric tool.
- When any portable electric tool operated outdoors or in wet use ground fault circuit interrupters (GFCIs).
- Before making adjustments or changing attachments, always disconnect the tool from the power source.
- When operating electric tools, always wear eye protection or full face protection.
- When operating tools in confined spaces or for prolonged periods, wear hearing protection.
- Make sure that the tool is held firmly and the material properly secured before turning on the tool.





Item #	Tools	Occupation / Activities	Health Issues	Prevention	Controls
1	Drills	Carpenter, Steel Fabricator, Mechanics	Electric shock, Wrist pain, dust and fall.	Hold/Clamp material. Take usual precaution with electricity	Hard hat, Safety boots for high speed & metal work safety goggles.
2	Electric Plane	Carpenter	Electric shock, dust Hand &Wrist injury	use guide and not the finger	Hard hat, Safety boots & safety goggle,
3	Electric Saw	Carpenter	Electric shock, dust Hand &Wrist injury	use guide and not the finger	Hard hat, Safety boots, goggles, hearing protect
4	Sabre (Jig) Saw	Carpenter	Electric shock, dust Hand &Wrist injury	Clamp the material, hold saw with both hands & cut away from the body.	Hard hat, Safety boots & safety goggle,
5	Chain Saw	Carpenter, Logger, Labour	It can be lethal. Struck by the object being cut.	Cut from top. hold saw with both hands, keep chain sharp, don't cut with tip,	Hard hat, Safety boots, full face protection, long pants, Good gloves, hearing protection.
6	Chop Saw	Carpenter, Mason, Welder	Limb injuries, sparks and dust , eye injury	Use good blade & cut at right angle. Never use as grinder	Hard hat, Safety boots & goggle. Spark resistant cloths.
7	Angle Grinder	Welder, Steel Fabricator, Mechanic	Limb injuries, sparks and dust , eye injury	Grind such that sparks are directed away from you	Hard hat, Safety boots & goggle. Heavy gloves, , hearing protection, Spark resistant cloths
8	Quick Cut Saw	All	Blade exposure, exhaust and dust	Good working condition, proper blade and guard	Hard hat, Safety boots & safety goggle and mask
9	Power Tools Pneumatic	All	Very powerful, Dust & injuries	See manufacture's Instructions	Hard hat, Safety boots & goggle and mask, hearing protection
10	Welding & Cutting	Welders	Toxic fumes, electric shock, burn, radiation, flash blindness	Handle carefully & secure cylinders	Screened helmet, Safety boots, fire resistant dress.
11	High Pressure washers and Pumps	All	Injuries from the jet, exhaust fumes	Stand on stable ground with both hands on the jet	Hard hat, Safety boots & goggle