



HEALTH, SAFETY &  
ENVIRONMENTAL PROGRAM

## Section: Safe Work Practices

PREPARED BY: HEALTH AND SAFETY TEAM

DATE OF ORIGIN: 02/02/2023

REVISION # 1

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# SAFE WORK PRACTICES

## PURPOSE

Safe work practices cover typical daily activities in the workplace; such as use of tools, equipment, and vehicles and work methodology. CF recognizes the importance of safe work practices in all our workplaces. It is imperative that all workers adhere to these practices to maintain a safe working environment.

## SCOPE

The safe work practices contained in this section are to be used as working guidelines; some jurisdictions may have variations to these practices. Review all pertinent requirements in your area.

Project managers are responsible to ensure that regulations and all applicable legislative requirements for the jurisdiction are met.

All CF workers are required to maintain safe work practices in their workplace.

The best practices in this section are to achieve general compliance to safety requirements in construction, and industrial settings.

Project management and direct supervision play a major role to ensure that the internal responsibility system of informing, directing, and maintaining compliance to health & safety standards is always achieved in the workplace.

If the supervisor or manager is aware of a more convenient, more effective and efficient practice that does not compromise health & safety these practices may be substituted provided that they comply with all applicable legislative requirements.

## PRACTICES

### Ladders Standard

Workers involved in the use of ladders shall be familiar with their characteristics and the necessary safety precautions.

#### Practice

- The ladders supplied must be in good safe working condition as recognized through inspection, see H&S\_FORM\_036.
- Any ladder, which becomes unsafe to use must be tagged and / or identified unsafe for use and then reported to the supervisor, who will decide whether to arrange for repairs or destruction. Defective ladders should not be kept around the project, as they will eventually be used.
- Manufactured ladders are a uniform design. Job built ladders requires 300 mm (12") spacing for the rungs and 400 mm (16") spacing for side rails. Use 38 mm x 89 mm (2" x 4") side rails up to 5.8 m (19'), 38 mm x 140 mm (2 x 6) side rails for ladders longer than 5.8 m (19').
- If used as a regular means of access:
  - Fasten securely in place;
  - Allow to extend at least 1 m (3') above landing area;
  - Allow at least 150 mm (6") toe space behind rungs; and



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- Keep a 1.8 m (6') clear area at bottom and top.
- When used as temporary access, a ladder must be either securely fastened in place or held by another worker. Maintain 3-point contact; always face the ladder, and only use for access / egress purposes.
- Aluminum, metal or conductive ladders must not be used in close proximity to energized equipment.
- Studies have shown that falls from ladders can result in serious injuries. Set them up securely and keep belt buckle inside side rails. Mount/dismount while facing the ladder.
- The base of the ladder should be angled 4:1 or 3:1.
- When a stepladder is being used as a self-supporting unit, its legs shall be fully spread and its spreader shall be locked and shall be level on solid ground.
- Do not stand any higher than the second last rung of a stepladder.
- A stepladder should be used only for short-term light duty work. Otherwise, use a scaffold or man lift.
- Workers working on ladders who are exposed to a fall hazard as specified in the PPE section Fall Arrest must be protected by fall protection as outlined in Fall Arrest Practice.
- Only CSA Grade 1, Grade 2, or Job Built ladders will be allowed on a project.

#### Ladder Handling

1. Lay fully retracted ladder on its side on the ground, with fly-side facing away from you, and ladder-feet behind you to your right.
2. Count the number of rungs on the base, note where the centre of the ladder is then walk along the ladder to the first base-rung past the centre.
3. With your body at right angles to the ladder, and without twisting or bending your back, bend your knees and grasp one of the upper rails in each hand, right hand behind the left.
4. Straighten legs and stand, allowing arms to fully extend.
5. Walk forward carefully. If you need to turn, do so with your feet not your waist.

#### Raising/Lowering an Extension Ladder

Get help raising any ladder that you do not feel comfortable raising/lowering alone.

1. Position the ladder fly side up, at right angles to the wall and with the top end of the ladder approx. 3-feet from the wall.
2. While standing in front of, and facing, the top of the ladder, bend knees slightly, grasp and lift both base rails and straighten up, while retaining a loose grip on each rail.
3. Walk toward the centre (approx. Balance-point) of the ladder, while sliding your hands along the rails.
4. Firmly grasp both rails and extend your arms to a full upright position.
5. Walk backwards towards, and rest the top of the ladder against, the wall.
6. Walk to a position immediately behind the ladder feet, and while bracing the ladder feet to keep them from moving, extend the fly to the appropriate height.
7. Grasp the ladder rails at waist height, lift the foot end clear of the ground then move toward the wall until the long-leg on the set-up-assist label is vertical, or the foot of the ladder is 1- foot out from the wall for every 4-feet of height to the ladder support point.



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8. If you are on a hard, clean, non-slip surface ensure that each rubber foot pad is resting squarely, and evenly on the surface.
9. If you are on a soft, loose, or slippery surface, rotate each ladder foot until the “picks” are behind the base rail and pointing down. Using your foot, on the bottom ladder rung, push each pick into the ground as far as possible.

#### Scaffolds - General Requirements

##### Standard

Workers involved in the use of scaffolds shall be familiar with their characteristics and the necessary safety precautions. Please see attached scaffold checklist, see H&S\_FORM\_037.

##### Practice

- All scaffolding must have solid footing or anchorage capable of supporting the intended loads without settling or shifting.
- No objects such as barrels, bricks, blocks, boxes, etc. can be used in conjunction with a scaffold.
- Erection, alteration, or dismantling of a scaffold shall be supervised by a competent person.
- Scaffold planks shall be Construction Grade Spruce, Number 1 Grade Spruce, or stronger. [Actual size 50 mm x 3 m (2" x 10') rough cut] Maximum span is 2.2 m (7'). Certified laminated planks (OHSA Burke) are available on request. Also, the planks must be secured to prevent movement (e.g. cleats, nails, or wire). See jurisdiction in your area.
- All fittings and gear shall be used.
- When height of a scaffold exceeds three times the least lateral base dimension:
  - increase base lateral dimensions accordingly with outriggers, or
  - Tie securely into the structure every third lift
- All scaffolding shall have perimeter guardrails, top rail at 1.1 m (42") high, a toe board, and a mid-rail. If room does not permit railings, workers on the platform (minimum two planks) shall wear a full body safety harness and shock-absorbing lanyard secured to a solid part of the project.
- All scaffolding shall be fully planked; where this is not practical, workers shall wear a full body harness and shock-absorbing lanyard secured to a solid anchorage. Never less than two planks or 460 mm (18").
- Maximum space between planks is 13 mm (½ "). Planks from one scaffold to another must overlap by 300 mm (12") or more AND be secured to each other. Cover overlaps with plywood to reduce the trip hazard.
- Planks may extend over end supports 150 mm to 300 mm (6" to 12"). Planks must be cleated or otherwise secured.
- Scaffolds exceeding 15 m (50') in height from its base support, or 10 m (30') for tube, clamp-type scaffolds, or suspended scaffolds, shall be designed and inspected by a professional engineer prior to use.
- Scaffolds shall be erected level and plumb by means of screw jacks and base plates. Where ground deflection is possible, compaction is required followed by the use of mud sills.
- Screw jacks and base plates may be replaced by manufacturer supplied casters/wheels whose brakes will be applied at all times except when being moved.
- Running scaffold requiring anchorage due to its height shall be tied into the structure every 10 m (30') horizontally or as applicable jurisdiction.
- Access to the scaffold platform shall be by properly sized ladder.
- Rolling scaffolds shall not be moved with workers on board.



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- Rolling scaffolds must have brakes locked while a worker is on it.
- Most manufactured tubular scaffolding with standard planking is rated for a capacity of 11 kilo-newton's (2,500 lbs) uniformly distributed and 2.6 kilo-newton (600 lbs) concentrated centre point loading. Refer to manufacturer instructions, or design requirements, to ensure the safe working load is not exceeded.
- Masonry units (bricks, blocks) are to be distributed evenly over the working platform of the scaffold. Loaded skids should be over top of the scaffold frame.
- The worker should check the scaffolding daily and defects are to be reported to the supervisor for correction. As a guideline, use scaffold checklist. Modify as required.
- Any hording affixed to any scaffold that may affect wind loading such as wood, wraps/tarps must be considered into the overall design of the scaffold. This material may also be required to be flame retardant pending the application. Please consult the H&S Dept.

Note: An engineered scaffold is not to be altered unless approved by the engineer that designed it.

#### Tie-Ins

Tie-ins anchor a scaffold to the structure it serves, preventing the scaffold from falling into or away from the structure. Tie-ins also improve the scaffolds lateral stability by bracing the structure.

Guidelines for tie-ins are 4.6 meter (15 ft) vertical and 6.4 meter (20) horizontal intervals

Consult local requirements, design standards and engineering practices when using and installing tie-ins.

#### Hoarding

Hoarding refers to tarps or other material used to cover a scaffold. When hoarding is used, the stress on the ties stabilizing the scaffold increases due to wind loading.

Guidelines for tie-ins for hoarded scaffolds are 3 meter (10 ft) vertical and 3 meter (10 ft) horizontal.

Consult local requirements, design standards and engineering practices when installing hoarding.

**Note:** Hoarding material may be required to be fire rated pending the activity being performed inside the hoarding. (Welding, burning etc)

#### Base Plates

Base-plates distribute concentrated leg loads over a larger area. They also connect scaffold standards and mudsills. They are attached usually with pins and locking devices. Base-plates usually have predrilled nail holes for attaching the plates to a mudsill.

#### Scaffold Tagging

Some workplaces may require the standard use of a scaffold tagging system to identify the status of use and last date of inspection. Where this is required the following practice is to be followed.

- Scaffolds must be inspected prior to initial use and at intervals not exceeding 7 calendar days.
- Scaffolds are to be inspected by a competent worker who is experienced in the erection of scaffolds.
- Inspection of scaffolds must include - but is not limited to:



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- o Damage to frames, braces, base plates, clamps and other structural components Guardrail, mid-rail and toe boards condition
- o Ladders and ladder gates/fences
- o Damage to hooks on manufactured platforms
- o Splits, warps, knots and dry rot in planks
- o Lamination defects in veneer planking
- o Compatibility of components
- o Proper amount and correct mix of components

Defective components found during any inspection or which have been identified through any other source must be removed and replaced immediately.

The results of the scaffold inspection are to be documented and displayed on a solid colour coded tag posted at each point of entry.

All scaffold tags will be of a solid red, yellow or green color with black lettering.

GREEN or "Safe For Use" tags will be hung on scaffolds that have been inspected and are safe for use.

YELLOW or "Caution – Potential Hazard" tags indicate that a scaffold is safe for use but there are some other hazards. The tag must identify the REASON for the caution and the POTENTIAL HAZARD

RED or "Not Safe For Use" tags will be posted prior to initial inspection of a scaffold or when the scaffold has been deemed unsafe for use. The REASON must be written on the tag as:

- Under Erection
- Being Dismantled
- Repairs Required
- Overhead Protection Only

Scaffold tags shall display as a minimum:

- Date of last inspection
- Inspection expiry date (Next Inspection Due)
- Inspected By – name and signature
- Date erected
- Duty rating
- Possible hazards (Yellow tags only)
- Scaffolds that have no tag displayed are deemed RED tagged and are NOT TO BE USED

Note: Please consult the H&S Department for further instruction and use.



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### Ramps, Runways and Platforms Standard

Temporary structures used for access shall be constructed, installed, and used so that an injury will not result.

#### Practice

- In general, a ramp, runway, or platform must be able to support 50 psf (2.4 kilonewtons) and be at least 460 mm (18" wide). This is roughly equivalent to two scaffold planks spanning no more than 2.4 m (8' wide).
- Maximum gradient of slope = 1:3  
Ramps that are not nearly horizontal need 19 x 38 mm (1" x 2") cleats space regularly at 46 cm (18") securely nailed to the walking surface.
- Where there is danger from falling materials, a ramp, runway, or platform shall be covered by a canopy of adequate strength.

Platforms have the same safety requirements as scaffold platforms - Safe Work Practices – Access Structures - Scaffolds

- If it is possible to fall a vertical distance of 2.4 m (8') or into water from a ramp, runway, or platform, guardrails shall be erected.
- If a wheelbarrow or other similar conveyance is used on a ramp, runway, or platform AND if it is possible to fall, 1.2 m (4') guardrails shall be installed.

### Compressed Gases – General Information

#### Standard

All workers involved in the use of compressed gases shall be familiar with their characteristics and the necessary safety precautions.

#### Practice

The supervisor shall discuss the following general characteristics in crew safety meetings:

- Acetylene
  - o This highly flammable hydrocarbon fuel combines with oxygen to produce industry's hottest flame (5900 degrees Fahrenheit - 3255 degrees Celsius). The danger of explosion is high because the gas is very unstable. Acetylene cylinders are packed with a porous material saturated with acetone to make storage, transportation, and usage safe. Never use acetylene above 15 psig; alternatively, with copper and copper alloys.
- MAPP
  - o Methylacetylene-propadiene can replace acetylene for most operations. MAPP is very stable and has a very strong odor. MAPP can be used safely at higher pressures than acetylene.
- Hydrogen
  - o The lightest gas known is highly flammable and burns in air with an almost invisible blue flame. Hydrogen and oxygen combine to produce a cooler flame (4000 degrees Fahrenheit - 2200 degrees Celsius) than acetylene; so it is suitable for brazing aluminum, magnesium and in welding lead.



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- Oxygen
  - o The most important gas in the world. Oxygen is non-flammable but nothing can burn without it. 21% oxygen supports normal combustion. Pure oxygen can cause spontaneous combustion when combined with grease or oil.
  - o Never use oxygen as a substitute for compressed air to operate pneumatic tools.
- Argon, Helium, Nitrogen, Carbon Dioxide
  - o Good ventilation is required when using any gas. These gases at high concentration cause asphyxiation. Apart from the hazard of rupturing cylinders these gases are non-hazardous, non-flammable and inactive.

### Compressed Gas Welding

#### Standard

All workers involved in the use of compressed gases for welding shall be familiar with their characteristics and the necessary safety precautions.

#### Practice

1. Locate cylinders away from sources of excessive heat or physical damage. They should be secured upright in a cylinder truck or against a firm support.
2. Slightly open ("crack") and then close immediately the cylinder valves (except for hydrogen gas) to blow out dust and foreign matter that could restrict the gas flow or damage the regulator seats. Stand to one side of the cylinder valve outlet when doing this.
3. Attach the oxygen and fuel gas regulators to their respective cylinders. Screw the nuts tightly with the proper wrench. Never force poorly fitting connections.
4. Make sure the pressure adjusting knobs or screws on the regulators are released.
5. Connect the green hose to the oxygen regulator and the red hose to the fuel gas regulator.
6. Connect the hoses to the torch -- green hose to the oxygen inlet and red hose to the fuel gas inlet.
7. Connect mixer and welding tip (or tip assembly) to torch handle.
8. Open the oxygen cylinder valve slowly and completely.
9. Open the fuel gas cylinder not more than one full turn.
10. Open the oxygen torch valve and turn the pressure adjusting screw on the oxygen regulator to the desired pressure. Continue the oxygen purge for approximately ten seconds for each 30 m (100') of hose. Close oxygen torch valve.
11. Open the fuel gas torch valve, turn the pressure adjusting screw on the fuel gas regulator to the desired pressure, and continue purging for ten seconds for each 30 m (100') of hose. Close the fuel gas torch valve.
12. To light the torch, open the fuel gas torch valve 1/2 turns and immediately lights the tip with a spark lighter. DO NOT USE MATCHES OR LIGHTER. Open the fuel gas torch valve further until the flame is free of soot.
13. Open the torch oxygen valve and adjust until a neutral flame results.
14. To weld, wear snug fitting goggles with properly coloured and designed lenses and follow MSDS for type of respiratory requirements.
15. Ensure a fire extinguisher of suitable size and classification is readily available during all welding operations.



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**Compressed Gas Cutting Standard**

All workers involved in the use of compressed gases for cutting shall be familiar with their characteristics and the necessary safety precautions.

**Practice**

The practice for setting up to use cutting torches or cutting attachments is identical to procedure Compressed Gas Welding (Safe Work Practices – Compressed Gas Welding), except that when adjusting the oxygen regulator pressure (Step #10) both the torch oxygen valve and the cutting oxygen valve must be open.

**Dismantling Equipment**

**Standard**

All workers involved in the use of compressed gases shall be familiar with safe dismantling practices.

**Practice**

1. Close the torch oxygen valve.
2. Close the torch fuel gas valve.
3. Close the fuel gas cylinder valve.
4. Close the oxygen cylinder valve.
5. Open the torch fuel gas valve and bleed the fuel gas line. Release the fuel gas regulator knob.
6. Close the torch fuel gas valve.
7. Open the torch oxygen valve and bleed the oxygen line. Release the oxygen regulator knob.
8. Close the torch oxygen valve.
9. Ensure a fire extinguisher of suitable size and classification is readily available during all compressed gas cutting operations.

Note: Regulators and torches can now be disconnected or, if the shutdown is temporary, the torch can be hung in a safe place. Torch heads must never be locked in toolbox or left inside a confined space while still connected to the hose and bottle.

**Compressed Gas Equipment - Defective Equipment Standard**

All compressed gas equipment shall be free of defects when in use.

**Practice**

- Compressed gas equipment shall be inspected for defects prior to use.
- Damaged, leaking torches, regulators, hose, and accessories must be taken out of service.
- Repairs may be made by authorized workers or replacements shall be supplied by the supervisor.
- Keep equipment clean by using oil-free rags.
- Never oil any regulator or cylinder valve because of the likelihood of explosion/fire.





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- A soap bubble test must be conducted at the connection to ensure no leaks on compressed gas system. All associated gaskets are to be installed prior to test and use. (Ensure the soap does not have an oil, fat or grease base)

#### Hose Inspection

Routine hose inspection should be conducted by a competent operator to ensure safe operation of equipment.

The operator(s) should look for evidence of the following before use:

- Cracking on hose surface;
- Deep cracks;
- Exposed braiding;
- Burns;
- Separation of hose layers;
- Bulges
- Sponginess;
- Degraded hose should be replaced with new hose of the proper grade for the application

While in use ensure:

- Hose is not to be subjected to sparks, hot metal or slag;
- No sharp objects, kinks or sharp bends, tension, or strain;
- Hose shall be kept from the path of heavy equipment and vehicle traffic;
- Upon shutdown, or when equipment is used infrequently, all residual pressure shall be safely released from the apparatus and hose.

#### Backfires and Flashbacks Standard

Flashback arrestor valves shall be installed on both hoses and at the torch end to prevent flashbacks or as per the manufacturer's instruction.

Practice

Backfires:

- When flame burns back into tip
- Accompanied by loud popping sound
- Caused by touching tip to work
- Caused by insufficient gas pressures

Flashbacks:

- When flame burns back into torch
- Accompanied by loud hissing sound
- Can be very dangerous
- If flashback occurs:
  - o Turn off oxygen torch valve immediately
  - o Turn off fuel gas torch valve



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- o Turn off oxygen cylinder valve
- o Turn off fuel gas cylinder valve
- o Thoroughly inspect the torch regulators and hoses
- Sometimes caused by incorrect gas pressures
- Sometimes caused by incorrect tip
- Check manufacturer's recommendations

IMPORTANT - Repeated flashbacks indicate serious problems in the equipment. Eliminate the problems prior to reusing. If you are not sure, ask your supervisor.

#### Safe Handling of Compressed Gases

##### Standard

All workers involved in the use of compressed (liquid) oxygen and nitrogen shall be familiar with their characteristics and the necessary safety precautions.

##### Practice

- Oxygen, nitrogen, argon and other elements normally exist as gas. When compressed into a liquid form they have ultra-cold temperatures:

	Degrees °F	Degrees °C
Carbon Dioxide	-109	-78
Xenon	-163	-108
Krypton	-244	-153
Oxygen	-297	-183
Argon	-303	-186
Nitrogen	-320	-196
Neon	-411	-246
Hydrogen	-423	-253
Helium	-452	-269

- A small volume of liquid gas evaporates to several hundred times this volume as a gas. Containers of liquid oxygen or liquid nitrogen must not be sealed. Explosion may result.
- Warning signs must indicate the presence of liquid oxygen - prohibiting flames, heat, and smoking. If combustibles are accidentally impregnated with liquid oxygen, they should be allowed to "air" for at least one hour in open air.
- Liquid oxygen, if accidentally spilled on asphalt, may cause an explosion spontaneously.
- Because of the potential for oxygen displacement, leading to asphyxiation, proper ventilation is the major precaution to take with liquid nitrogen.
- Evaporating liquid oxygen in a confined space or building will cause oil or grease to burn spontaneously.
- Contact with the skin causes a reaction similar to a burn.
- The term "cryogenic" refers to very cold liquid gases.



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- Refer to product MSDS sheet for specific personal protective equipment to be used while handling, transporting or using the compressed gas.

Example: Propane: When handling propane safety glasses, face shield, neoprene gloves (impermeable gloves), and coveralls are required.

#### **Cylinder Storage Standard**

Compressed gas cylinders shall be stored so that no damage may occur.

#### Practice

- Store oxygen and fuel cylinders at least 6 m (20') apart.
- If the above is not practical, separate oxygen and fuel gas cylinders by means of a one- hour fire-resistant wall 1.5 m (5') high.
- Store oxygen and fuel gas cylinders on a fireproof surface outside.
- Keep cylinders away from:
  - o Open flames o Electric arcs o Molten slag o Sparks
  - o Exposure to sun
- Cylinders are not designed for temperatures above 54°C (130°F).
- Keep cylinders at least 6 m (20') from flammable materials:
  - o Paint
  - o Oil
  - o Solvents
- Identify storage areas. Clearly post "NO SMOKING".
- Secure all cylinders upright.
- Keep full and empty cylinders separated.
- Close valves of empty cylinders and fit screw caps. Mark empties "MT" with chalk. Empty cylinders must be moved outside as soon as disconnected.
- Do not accept unmarked cylinders. All cylinders must have a WHMIS / Hazard Communications label.
- Provide adequate fire extinguishers within 10 m (30') of cylinder storage areas.
- Post signs to prohibit parking within 10 m (30') of a cylinder storage area.
- The control valve of a storage cylinder for compressed gas, other than a cylinder connected to a regulator, supply line, or hose, shall be covered by a protective cap that is secured in its proper position.

#### **Propane Cylinder Inspection**

##### Standard

Propane cylinders must be inspected to ensure they meet regulatory compliance.

##### Practice

Cylinder inspections shall be documented on the Propane Cylinder Inspection Checklist, H&S\_FORM\_038.

#### **Temporary Heat Standard**

Temporary heat shall be arranged so that no danger of uncontrolled fire or atmospheric hazards exists.



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**Practice**

- Combustibles such as tarpaulins, wood and flammable liquids will be positioned no closer than 3 m (10'). If combustibles are in the direct flow of heat, no closer than 6 m (20').
- Safety features on the heaters must be operating properly. Check this feature. Contact the manufacturer/supplier for further information.
- Heaters cannot be set on combustible materials and must be protected from damage due to overturning.
- The temptation is great to locate heaters near a means of access/egress because fresh air is available for combustion. It is against the law to restrict access/egress with a portable heater.
- Fuel lines must be guarded to prevent accidental damage.
- When open flame heaters are operating continuously, a designated person will be assigned to inspect it periodically.
- A viable means of extinguishing a fire must be readily available.
- Familiarize yourself with the fuel source emergency shutoff.
- Any temporary heating system requiring the use of propane requires special training in propane handling (where legislated) Please contact your H&S Department for further details.
- Open flame heaters shall not be used as temporary heat in an occupied building.
- When there are conditions that may cause an atmospheric hazard, consult the H&S Department.

**Tiger Torch**

**Standard**

All CF employees involved in the use of a tiger torch shall comply with the following safe work practice, to ensure the job is conducted in the safest manner possible.

**Practice**

1. Ensure that you are acquainted with the safe operation of the equipment
2. Read the Owner's Manual with special attention to the safe work practice Do's and Don'ts
3. Utilize CF's safe work procedure to compare against your FLRA card identified hazards
4. Inspect torch, and affixed fuel source bottle
5. Conduct a leak test as follows:
  - a. Step 1: Close torch adjusting valve
  - b. Step2: Slowly open the supply tank shut off valve
  - c. Step 3: Test all connections for possible gas leaks using a leak test solution, e.g.; (SNOOP)
  - d. If a leak is found at the torch, adjust valve tighten the stem packing nut clockwise. Slowly open the supply tank shut off valve and check for the leak again (repeat if necessary)
  - e. If a leak is found at the supply tank shut off valve close the shut off valve and retighten counterclockwise, Slowly open the valve and check for leaks (Repeat if necessary)
  - f. Make sure the gas supply line is long enough that there is no chance of misdirection of open flame to the gas supply tank (gas line should be 20" or more in length)
  - g. With both the supply valve and the torch adjustment valve in the off position clean the torch manifold out using a wire brush to ensure all debris has been removed
6. Hook up a suitable propane fuel supply
  - a. Ensure that the fuel supply tanks are the equivalent of a 20 lb certified tank



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- b. Place the supply tank in an area with no risk of open flame or spark
  - c. The tank should never exceed 49 degrees Celsius. Store in a well ventilated area away from any other flammable materials or heat source
  - d. After assembling the gas line connections conduct leak test (See step 5 controls)
  - e. Ensure fuel lines have regulators.
7. Ignite the torch
- a. Ensure that the gas supply tank is turned on. Turn the torch adjustment valve  $\frac{1}{4}$  turn and while facing the torch away from the operator ignite immediately using a striker. Always light the torch in a well ventilated area
  - b. Never use a pocket lighter to light the torch. Always use a torch striker as your ignition source
  - c. Utilize flame retardant/resistant clothing if available as well as leather gloves
  - d. Light the torch away from any flammable materials, e.g ; oily rags, wood, etc
  - e. Always have a fully charged ABC fire extinguisher readily available.
8. Turn off the torch and put it away
- a. Always give the torch end assembly time to cool off before storing indoors or near flammable material
  - b. Close the tank supply valve. Slowly open the torch valve assembly until all residual gas within the line has had time to escape
  - c. Fuel tanks should never be stored indoors and should be stored outdoors in compliance with legislative standards for the "Safe Storage of Liquefied Petroleum Gases"
  - d. Disassemble the torch and gas line away from the supply tank and place the plastic protective caps back onto the end of the hose assembly as well as the propane tank.
  - e. Never store the torch in an enclosed toolbox or cabinet attached to the propane bottle.  
Torches are not to be used for heating of work areas or thawing of lines and equipment, etc., or when no one is present to monitor the usage.

### Storage and Handling of Propane

#### Standard

Propane shall be stored and handled to eliminate the possibility of damage to cylinders.

#### Practice

- Oxygen and fuel cylinders shall be stored separately in well ventilated areas away from excessive heat and physical hazards.
- When moving propane cylinders, the valve protective collar should not be used as a means of attachment to a hoist hook.
- Never use a sling to move cylinders, only a secure container.
- Cylinders must be upright and securely tied to an immovable anchor point.
- Cylinders should be stored in definitely assigned places away from elevators, stairs, or walkways.
- Avoid placing cylinders in an area where stray electricity or accidental arcing could occur.
- Check for and eliminate any gas leaks at cylinder valves, regulators, and connections. Use a soapy water solution to check for leaks.
- Leaking cylinders should be taken outdoors and clearly tagged. Return the cylinder to the supplier when completely empty; it is illegal to ship a leaking cylinder.



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- The cylinder valve should be opened slowly. Stand to one side when opening a valve.
- Cylinder valves should be closed at all times except when propane is actually being used.
- Mark empty cylinders "MT" with chalk. Spent cylinders must be moved outside as soon as disconnected.
- Propane is odorless so an additive smelling like "rotten cabbage" is introduced to help detect leaks.
- Propane used in temporary heating requires specific training in propane handling (where legislated) Please contact your health & safety department for further details.
- Proper personal protective equipment must be worn. This includes the appropriate eye protection, hand protection (impermeable) and a respirator where exposure is expected to surpass legislated limits.

#### **Welding (Electric Arc Process Equipment)**

##### Standard

All workers involved in the use of electric arc process equipment shall be familiar with its characteristics and necessary safety precautions.

##### Practice

- All equipment used in the process must be CSA / OSHA approved.
- For safety and convenience, electrical supply lines to welding machines should be controlled from individual cut-off switches.
- Keep equipment and accessories safe from damage and in perfect running order.
- Set up welding operations in a dry location, free from puddles of water or wet ground.
- Cables should not have repairs made any closer than 3 m (10') from the electrode holder.
- Cables should be placed so tripping hazards are not created.
- Loose connections at the machine, in the electrode holder or at the ground clamp will cause loss of power, make for poor welds, and might even cause arcing sufficient to set off a fire.
- Electrodes shall be removed from the holder and disposed of immediately in a receptacle when the equipment is left unattended
- Holder must never be left lying overtop of compressed gas bottles.
- The power supply to welding machines shall be shut off when work is stopped or when equipment must be moved.
- Overloading welding machines or forcing cables to carry currents beyond the rated capacity causes overheating and reduces service life.
- Daily checks of equipment for loose or corroded connections, cable damage, dirty or defective jaws of electrode holders and ground clamps shall be conducted by the welder.
- Shades #12 and #14 have suitable optical density, transmit less light, and less infra- red, ultra-violet and violet rays; so, should be used in MIG or TIG welding.
- Ultra-violet rays can cause skin burning, tanning and "arc eyes." Skin exposed for only 10 seconds will develop a "burn." Dermatitis is not unusual when skin is repeatedly exposed to ultra-violet rays.
- Check MSDS of electrodes or material you are welding on for proper type of respiratory equipment.
- Wear cuff-less trousers to eliminate the danger of spatter and sparks being trapped.
- CSA/ANSI approved safety glasses are recommended to be worn even under helmets and face shields.
- To protect others in the area, proper shielding screens are required for the welding operations.
- Dark woolen clothing or leather is recommended.



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- Keep work areas uncluttered and organized.
- The supervisor shall (in order of preference):
  - o Eliminate the accumulation of fumes;
  - o Provide adequate ventilation;
  - o Provide adequate respirators.
- Other than routine adjustment, leave repairs of electrical equipment to experienced electricians.
- Gasoline driven equipment must be operated only where the engine fumes can be vented outdoors. Carbon monoxide exposure can be fatal.
- Never switch the polarity with an electric welder in operation. Idle the machine or switch it off for the change.
- Make sure electrical equipment is grounded and connected to the proper receptacle.
- Be sure the branch circuit, main disconnect switch or primary input circuit fuses are removed before attempting any inspection or work on the inside of a welding machine.
- Placing the ON-OFF POWER switch on the welding machine in the OFF position does not remove voltage from the power terminals inside the machine.

#### Electric Arc Process - Restrictions

Standard

Electric arc process equipment will not be used where people may be endangered.

Practice

- No welding shall be done in any areas where there may be flammable materials, explosive gases, or vapors without authorization from supervisor.
- No welding is to be done in any tank, pipeline, compartment, or container, which has contained flammable material until it, has been purged, cleaned, and proven to be free of explosive vapors.
- Do not allow welding current to pass through:
  - o Crane cables or slings
  - o Oxygen, acetylene, or other compressed gas cylinders
  - o Tanks or storage containers used for flammable liquids
  - o Pipes carrying compressed air, steam, gases or flammable liquids
  - o Conduits, chains, metal handrails or ladders
- Only qualified welders shall weld scaffold bracket clips, ear plates, erection nuts, and lifting lugs at the direction of a professional engineer.

#### Electric Arc Process - Precautions Practice

Welders shall observe the following safety precautions:

- Have a solid footing and remember that peripheral vision is diminished by welding shield.
- Store electrode holders where they cannot contact people, fuels, or compressed gas cylinders.
- Remove all electrodes from holders and disconnect the machine from power source when welding is stopped for any period of time such as breaks, etc.
- Burn electrodes to no less than 38mm to 50 mm (1½" to 2") in length. Burning them shorter damages the electrode holder.
- Keep electrodes and holder dry. If exposed to water or steam, dry thoroughly prior to use.



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- Place electrode stubs in a noncombustible container to prevent slips and falls.
- Utilize air currents to direct fumes away from you.
- Shield yourself and passersby from stray radiation and flashes.
- Guard or mark with chalk "Hot" any completed work.
- Chip slag so that debris flies away from your body.
- Wear gloves when changing electrodes.
- Wear the appropriate PPE; consult the Safety Department for assistance.
- Do not weld near or on degreasing operations or paints because of the formation of hazardous gases.

#### Electric Arc Process - PPE Standard

Workers involved in the use of electric arc process equipment shall use proper protective equipment needed for eye and face protection.

#### Practice

- The arc welding lens assembly consists of 3 parts:
  - o Outside: clear plastic or tempered glass
  - o Centre: shade lens – filter
  - o Inside: clear lens MUST be plastic
- Use gaskets provided with helmets or goggles.
- Wear arc welding helmets for all arc welding or cutting operations.
- Do not use gas welding goggles for arc welding.
- Wear side-shielded safety glasses at all times, even under welding helmets.
- The supervisor may replace side-shielded safety glasses with equivalent protection.
- Replace pitted or cracked lenses.
- Replace loose or damaged helmets; invisible and dangerous light rays (ultraviolet) can enter undetected.
- Contact lens users should prevent dust from entering eyes. Severe discomfort or eye damage results from particles lodging behind contact lenses.
- Refer to the respiratory protection guidelines for proper selection of respiratory protection.
- Ensure sturdy, opaque, or translucent (not clear) screens are erected to protect passersby.
- Screens should have a space of at least 50 cm (20") at bottom to permit ventilation. Selection of shade numbers are as follows:





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<b>Welding Operation</b>	<b>Suggested Shade Number</b>
Torch Soldering	2
Torch Brazing	3 or 4
Oxygen Cutting	
under 1" (25 mm)	3 or 4
1"-6" (25 to 150 mm)	4 or 5
over 6" (150 mm)	5 or 6
Gas Welding	
under 38-50 mm (1/8")	4 or 5
3.2 - 12.7 mm (1/8" - 1/2")	5 or 6
over 12.7 mm (1/2")	6 or 8
Shielded Metal - Arc Welding	
2.5 - 4 mm (3/32" - 5/32") electrodes	10
4 - 6.4 mm (5/32" - 1/4") electrodes	12
over 1/4" (6.4 mm) electrodes	14
Gas Tungsten - Arc Welding	
under 50A	10
50-150A	12
150-500A	14
Gas Metal - Arc Welding	
60-160A	11
160-250A	12
250-500A	14
Carbon - Arc Welding	14

#### Defective Tools and Equipment Tagging

##### Practice

Employees are to inspect tools and equipment for any damage prior to each use to minimize the risk of injury while operating machinery, tools and equipment. Employees are to be properly trained to use the tools and equipment safely and have operator's manual available for reference if required. If a tool or piece of equipment is found defective the following must take place:

- Immediately stop using the tool and shut off the equipment.
- If a tool is defective, remove it from service, and tag it clearly "Out of service for repair".
- Report it to your supervisor and return tool/equipment to appropriate tool crib or shop and do not store with safe operating tools and equipment.
- Replace or repair, damaged equipment immediately.
- Do not use defective tools "temporarily" when tagged out of service.
- Most procedures indicate that the only person who can remove the tag is the person who attached it.
- Only when it is determined that the tool or piece equipment is safe, can it be used again.
- Keep a record/log of all repairs.

#### Hand Tools - Wrenches Practice

- With the correct jaw size and grip, a wrench does not slip.
- Face an adjustable wrench forward. Pull with movable jaw towards you. Pushing on a wrench is not recommended due to slippage problems.
- Store wrenches in a tool box, rack, or tool belt.
- Avoid the following unsafe practices:
  - o Using a pipe wrench on nuts or bolts.
  - o Using a wrench on moving machinery
  - o Using pliers instead of a wrench



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- o Using a makeshift wrench
- o Using worn wrenches
- o Inserting a shim in a wrench for better fit
- o Striking a wrench with a hammer to gain more force
- o Increasing leverage by adding sleeve additions
- Use eye protection and protective gloves with wrenches

#### Hand Tools - Hand Saws Practice

1. Select a saw of proper shape and size for stock being cut.
2. Choose a saw handle that keeps wrist in a natural position in the horizontal plane.
3. Check the stock being cut for nails, knots, and other features that may damage or buckle the saw.
4. Start the cut carefully to prevent blade from jumping. Pull upward until blade bites.
5. Apply pressure on the down stroke only.
6. Support long stock in vise, clamp or with helper.
7. Keep teeth and blades properly set, sharpened and tightened.
8. Protect saw teeth when not in use.
9. Use eye protection with hand saws.

#### Hand Tools - Hacksaws Practice

1. Select correct blade for material being cut.
2. Secure blade with teeth facing forward.
3. Keep blade rigid and frame properly aligned.
4. Use strong steady strokes directed away from you.
5. Use entire length of blade in each cutting stroke.
6. Use light machine oil on the blade to keep it from overheating and breaking.
7. Cut hard materials more slowly than soft materials.
8. Clamp thin flat pieces.
9. Keep two hands on the hacksaw and adopt a solid stance.
10. Use eye protection and protective gloves with hacksaws.

#### Hand Tools – Non-Sparking Standard

Where isolation, ventilation, and purging of flammable atmospheres are inadequate to ensure a safe area, non-sparking tools shall be used.

#### Practice

- Non-sparking or spark resistant tools are made of light metals such as brass, bronze, stainless steel, aluminum, beryllium, titanium, magnesium, and copper.
- Remember that all metals are capable of producing a spark, but those listed above can only do so in ideal circumstances. The hazard is reduced but not eliminated entirely.
- These hazards remain, even with non-sparking tools:
  - o Ignition by friction or impact
  - o Ignition by chemically generated spark



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- Non-sparking tools cannot be certified as safe because of the surfaces they may strike, which then produce a spark.
- It is possible to certify an electric motor for work in hazardous locations. These motors are almost 100% unable to ignite an explosive atmosphere.

#### Hand Tools - Striking Tools

##### Practice

- Striking tools may be cold chisels, punches or drift pins.
- Hold the chisel, for shearing and chipping, at an angle allowing the level of the cutting edge to lie flat against the shearing plane.
- Punch and chisel holders are available to prevent accidentally striking the holding hand.
- Discard tools, which are bent, cracked, or chipped.
- Redress burred or mushroomed heads.
- Redress the cutting edge to its original shape. Grind to a slightly convex cutting edge.
- Avoid the following unsafe practices:
  - o Applying too much pressure to the head when grinding a chisel (the heat generated can remove the temper; immerse the chisel in cold water periodically when grinding)
  - o Using cold chisels for cutting or splitting stone or concrete
  - o Using a chisel as a drift pin or punch
  - o Holding a chisel while someone else strikes it (use tongs or holder)
- Wear eye protection when striking a chisel, punch, or drift pin.

#### Hand Tools - Vises Practice

- Attach a vise securely. Place bolts in all the holes in the base of the vise. Use lock washers under the nuts.
- If the jaw of the vise projects slightly beyond the edge of the workbench, long work can be accommodated.
- Keep the work as close as possible to the jaws to reduce vibration.
- Support long work rather than putting extra strain on the vise.
- Clean and oil all moving parts.
- Use jaw liners if the work may be damaged or marred.
- Avoid these unsafe practices:
  - o Cutting into the jaws
  - o Using a handle extension for extra leverage
  - o Using the jaws as an anvil
  - o Hammering to tighten the handle
  - o Welding or brazing a vise
- Use eye protection suitable to the hazard.

#### Hand Tools - Hammers Practice

- Select hammers according to their intended use. Misuse can cause the striking face to chip.
- Strike the surface squarely.



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- Avoid the following unsafe practices:
  - o Using hammer with a loose or damaged handle
  - o Using a hammer head that is cracked, dented, chipped or mushroomed
  - o Welding, grinding or heat treating a hammer head
  - o Striking with the side or cheek of a hammer
  - o Striking one hammer with another hammer
- Wear eye protection when using a hammer.

#### Powered Hand Tools – Basic Electrical Safety

##### Standard

All electrical extension or power cords shall be maintained in good condition and grounded effectively.

##### Practice

- Workers shall inspect for the following defects. Unsafe electrical tools and equipment shall be taken out of service for repair or replacement.
- All electrical extension or power supply cords must be approved for intended use and location.
- All electrical extension or power supply cords must be provided with grounding conductor Light duty cords are not permitted. Replace with heavy duty power cords.
- Power cords should not be tied in knots, which can cause short circuits.
- Worn or damaged outer jackets shall be removed from service.
- All electrical extension and power supply cords are to be fitted with approved cord end attachment devices that are installed in an approved manner.
- Eliminate "octopus" connections.
- Broken three prong plugs shall be replaced. Check that the third prong is properly grounded.
- Ensure all electrical extension or power supply cords are maintained and protected from physical or mechanical damage; keep power cords out of water and protect them from cutting due to traffic passing over by using conduit or placing planks alongside them.
- At temporary service panels, a tie bar is recommended so that cords will not be damaged when pulled out from a distance.
- With all electrical appliances or tools, disconnect from the power source prior to making adjustments.
- All tools are to be double insulated; the power cord must provide effective grounding.
- Switches should not be bypassed by connecting and disconnecting the power cord.
- Test tools regularly for grounding with a continuity tester.
- Suspend power cords where practical. This eliminates trip hazards etc.
- Do not clean electric tools with flammable or toxic solvents.
- Use a ground fault circuit interrupter (GFCI) outdoor or in wet locations.
- Do not carry tools by the power cord. Damage could result.
- Agents such as heat, water, oil, and chemicals can damage the insulation on cords and tools.
- Do not wear loose clothing, or jewelry while using revolving power tools.
- When a tool or cord is defective, tag the item as such prior to sending it into the tool crib for repair. If repairs are not possible on site, take the item out of service.
- An approved ground fault circuit interrupter (GFCI) is to be used with any portable generator. The GFCI must be plugged in as close to the tool as possible.



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NOTE: A GFCI and a Reset switch are not the same. A ground fault circuit interrupter will shut down power supply when stray current is detected from a faulty cord or tool. A reset switch only detects power surges.

### Powered Hand Tools – Drills

#### Standard

All workers involved in the use of electric drills shall be familiar with their characteristics and the necessary safety precautions.

#### Practice

- Safety glasses are required. When drilling overhead, tight fitting goggles are required.
- Keep drill vents clear to maintain adequate ventilation.
- Use sharp drill bits.
- Keep cords clear of the cutting area.
- Disconnect power supply prior to changing or adjusting bit or attachments.
- Tighten the chuck securely and remove the chuck key before starting drill.
- Some things to avoid:
  - o Bent drill bits
  - o Exceeding manufacturer's capacities
  - o High speed steel (HSS) without cooling or lubricant
  - o Reaching under stock being drilled
  - o Use auxiliary handle for larger work or continuous operation.
- For continuous work in concrete or wood use appropriate respiratory protection.
- The circular or rotating motion (torque) in tools such as drills can be transferred to your hands if the bit becomes lodged in the work. Severe strains have resulted from sudden twists.
- The power switch or trigger should be "fail safe" so that it cannot be locked on.
- Use a tool to clean up or debar. Many hand and finger injuries result from the temptation to sweep away cuttings without skin protection.
- Use a vise or clamp to hold small work.
- Inspect tool at least daily before startup. Look for loose or damaged parts, adequate lighting, lubrication, and material that could vibrate into your work area.

### Powered Hand Tools – Circular Saws Standard

All workers involved in the use of circular saws shall be familiar with their characteristics and the necessary safety precautions.

#### Practice

- When using "skill saws" the following eye protection shall be used:
  - o Safety glasses or
  - o Tight fitting goggles
- In confined areas (i.e. indoors), a nuisance dust mask shall be worn.
- Use a sharp blade designed for the work.



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- Check the retracting lower blade guard frequently to make sure it works freely.
- Allow saw to attain full speed prior to cutting.
- Allow retracting lower blade guard to return to its seat before laying saw down.
- Disconnect power supply prior to making adjustments or changing a blade.
- Keep all cords clear of cutting area.
- For safety, use two hands to control the saw; one on trigger switch and the other on front knob handle.
- Keep motor free of sawdust and chip accumulation.
- Allow the blade to cut at high speed rather than forcing it. The few seconds saved by forcing a cut are not worth the premature wear out of the saw.
- Secure the work being cut to avoid movement.
- Follow all manufacturer guidelines for safe use.
- Some things to avoid:
  - o Fixing or holding open the retracting blade guard
  - o Placing hand below work being cut
  - o Over tightening the blade locking nut
  - o Twisting the saw to change direction or check cut
- Always check work to be cut for nails or foreign objects.
- Do not carry the saw with your finger on the trigger and power connected.
- When ripping stock, use a wedge and guide that is clamped to the work.
- Store the tool in a secure area to prevent damage or theft.
- Do not use a circular saw above shoulder height.

#### **Explosive Actuated Fastening Tools Standard**

Workers involved in the use of explosive actuated fastening tools shall be familiar with their characteristics and the necessary safety precautions.

#### Practice

- Operators of explosive actuated fastening tools shall be instructed in their proper and safe use.
- This training shall be given by the manufacturer or his authorized and qualified agent.
- The qualification card shall be carried by the operator at all times the tool is used by the operator.
- The following protective equipment is required by the operator at all times:
  - o Hard hat
  - o Safety glasses and face shield
  - o Hearing protection
- Do not permit bystanders in the immediate vicinity of the work.
- Care and servicing of tools:
  - o CLEAN and maintain in accordance with manufacturer's instructions
  - o CHECK tool prior to each use
  - o REMOVE defective tools from service
  - o STORE tools and cartridges in a locked container
- Use of tools:
  - o Use at 90° to work surface



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- o Check the chamber to ensure barrel is clean and free of obstruction
- o Do not use in presence of flammable or explosive vapors
- o Do not place hand in front end (muzzle) of a loaded tool
- Use of projectile:
  - o use only studs or nails provided by manufacturer of tool
  - o ENSURE that base material can hold the projectile
  - o LOAD tool immediately before use
  - o don't leave tool unattended
  - o if base material hardness is unknown, use a hand hammer to drive the projectile as a test
- Use of charge cartridges:
  - o use cartridges recommended by tool manufacturer]
  - o cartridges are colour-coded for strength
  - o make trial fixing with weakest cartridge
  - o HOLD the tool in fixing position at least 15 seconds when too misfires
  - o UNLOAD misfired cartridge with extractor tool and deposit into water
  - o do not carry unfired cartridges in pockets
  - o do not discard unfired cartridges carelessly

#### Powered Hand Tools – Air Powered Standard

Workers involved in the use of air powered hand tools shall be familiar with their characteristics and the necessary safety precautions.

#### Practice

- Air powered tools includes:
  - o Nailing and stapling guns
  - o Grinders
  - o Drills
  - o Jack hammers
  - o Chipping hammers
  - o Riveting hammers
  - o Impact wrenches
- Air hoses:
  - o PREVENT tripping hazards created by hose
  - o Hose connections must fit properly and be secured by wire or chain
  - o Install quick disconnects of a pressure release type rather than disengage type; attach the male connector to the tool, not the hose
  - o CHECK regularly for cuts, bulges, abrasions; replace if defective
  - o TURN OFF air pressure when tool not in use
  - o BLOW OUT airline prior to use
- Air pressure rating of air supply hoses must be at least 1035 kPa (150 psi) or 150% of the maximum pressure produced in the system, whichever is higher.
- Operation:



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- o Post warning signs and shields if others may be affected by flying chips, dust and noise
- o Support heavy tools to gain safe control of tool
- o Exercise care to protect hands, feet and body in case tool slips
- o Use hearing protection as required
- o Use gloves to assist in reducing hand/arm vibration
- Air cleaning:
  - o Cleaning with compressed air is dangerous
  - o Use pressures below 207 kpa (30 psi) at nozzle
  - o Blowing debris from clothing using compressed air is forbidden

#### Powered Hand Tools – Portable Grinders Standard

Workers involved in the use of portable grinders shall be familiar with their characteristics and the necessary safety precautions.

##### Practice

- Follow the MSDS requirements when handling and using grinding wheels
- An abrasive wheel can break, causing serious injury.
- Clean and service grinders according to manufacturer's recommendations.
- Grinders should not operate when unattended. "Dead man" or constant pressure switches are required, as per manufacturer's requirement. Grinders without trigger locks should be purchased when buying new equipment. Grinders manufactured with trigger locks should have locking devices removed by a competent person
- The following protection is required at all times when using a grinder:
  - o Shielded safety glasses and face shield Or tight fitting goggles
  - o Metatarsal safety boots are advisable
  - o Respiratory protection is advisable
- Wheel speed is related to safety. Excessive speeds cause vibration, rough operation, wheel breakup, and difficulty in controlling the tool.
- Run newly mounted wheels for one minute before grinding.
- Inspect all wheels for cracks and defects prior to mounting.
- Store grinders in a safe area
- Do not grind near flammable materials.
- Do not clamp portable grinders in a vise for grinding handheld work.
- Do not force wheels onto a grinder or change mounting hole sizes.
- Do not remove guards or handle.
- Use appropriate disk size and RPM rating for grinder as per manufacturer guidelines.

#### Powered Hand Tools – Bench and Pedestal Grinders

##### Standard





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Workers involved in the use of bench and pedestal grinders shall be familiar with their characteristics and the necessary safety precautions.

#### Practice

Supervisor shall discuss the following in crew safety meetings:

- Fasten bench and pedestal grinders securely.
- Adjust tool rests to within 3 mm (1/8") of wheels when wheel is not moving.
- Maintain 6 mm (¼ ") wheel exposure with a tongue guard or a movable guard.
- Stand to one side of the grinder until operating speed is reached.
- Bring work into contact with the grinding wheel slowly and smoothly avoid bumping.
- Apply gradual pressure to allow the wheel to warm up slowly and evenly.
- To prevent grooving, move the work back and forth across the wheel.
- Match the abrasive quality of the wheel to the work.
- Dress wheels regularly. Do frequent light dressings rather than heavy dressings.
- Support dressing tool to apply leverage without undue effort. With revolving cutter dressing tools, use the lugs as anchors.
- Replace worn wheels when they cannot be dressed.
- Operating speeds relate to safety.
- Visually inspect wheels for possible damage prior to mounting.
- Always wear eye and face protection when grinding.

#### Note:

- Only use grinding wheels as per the manufacturers intended use
- Do not use a wheel that has been dropped

### Wheel Mounting of Grinders

#### Standard

Workers required to install wheels on portable grinders shall be trained by the supervisor in the correct and safe application of the tool.

#### Practice

- Inspect the wheel and conduct a "ring test" prior to installation. "Ring test" means listening for a ringing sound when the wheel is suspended from hole by pin or finger and tapped gently with a non-metallic tool (i.e. screw driver handle).
- "Ring test" does not apply to small wheels i.e. wheels less than 10 cm (4") in diameter.
- Do not use wheels that sound dead or cracked.
- Select wheels according to manufacturer's recommendation.
- All abrasive wheels are fragile.
- o Things to avoid:
  - Dropping a wheel
  - Piling other material on top of a wheel
  - Transporting without protective padding



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- Storage recommendations:
  - o Store on edge in racks
  - o Keep wheels away from excessive heat
  - o Keep dry
  - o Stack cylinder and straight cup wheels on the flat side on cardboard

**Lead Acid Batteries – Boosting Standard**

Workers involved in the boosting of lead acid batteries shall be familiar with their characteristics and the necessary safety precautions.

Practice

- The chemical reaction in lead acid batteries produces hydrogen gas, which is the most explosive gas known.
- To prevent the possibility of a spark when boosting, follow this practice:
  - o Connect booster cable to positive terminal of dead battery
  - o Connect same booster cable to positive terminal of live battery
  - o Connect other booster cable to negative terminal of live battery
  - o Connect last clamp to metallic ground below dead battery
- Do not attempt to boost a frozen battery.
- Always wear safety glasses and a face shield when boosting batteries.

Welding and Cutting Fumes

Standard

All workers exposed to hazardous fumes resulting from welding and cutting operations shall take the following precautions:

Practice

- Welding could be dangerous without the right protective equipment. Metal Fume Fever (alias Z Chills) is a common problem, but has no lasting effects.
- Fumes are tiny particles of metal oxide formed when metal vapors cool and can be seen as smoke. These metal oxide particles are small enough to be inhaled easily and can affect vital organs such as the brain, heart, kidneys, liver, and spleen. Dust presents the same hazard.
- The following chart is a general summary of fumes resulting from welding and cutting operations.

Fume	Source	Potential Health Hazard
Cadmium Oxide	Cadmium coatings	Lung and kidney effects, pulmonary edema (fluid in the lungs)
Chromium	Alloy in stainless steel high alloy steel	CRVI suspected carcinogen



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Copper Fume	Copper alloys and electrodes	Irritant, fume fever
Fluoride	Fluxes on low hydrogen electrodes	Kidney and bone effects (with high exposure)
Iron Oxide	Ferrous alloys and consumables	Respiratory irritant in high concentrations
Lead	Brass, bronze, tern plate galvanized steel	Systemic poisoning
Magnesium Oxide	Aluminum or magnesium alloys	Fume fever
Manganese	Hard facing alloys	Nervous system disorders
Nickel	Stainless steel	Dermatitis, respiratory irritant
Z Oxide	Galvanized coatings	Fume fever

- The gases of concern to welders are carbon monoxide, carbon dioxide, and oxides of nitrogen. Ultra-violet light from the arc forms ozone and phosgene gas. Resulting conditions are irritation of the nose, throat, and lungs. Fresh air supply is needed.
- In tanks, welding operations can displace oxygen with gaseous by-products leading to asphyxiation. Ventilation is called for.
- Using the shortest practical arc length cuts down the amount of fume and ultra-violet light. Keeping the electrode and work as close as possible to 90 degrees reduces fumes considerably.
- A general principle for health protection points to the installation of ventilation and fume extraction equipment. Diluting contaminants to safe levels is the next efficient means of control.
- If the measures in #7 above are not possible, the welder should use a NIOSH approved respirator.
- In the case of oxygen deficient atmospheres or toxic elements inside a tank, large pipeline, or other enclosed space, self-contained breathing equipment will be needed.

#### Internal Combustion Engines – Fumes

##### Standard

When internal combustion engines are located in a sheltered or enclosed area, there is always the possibility of fume and gas exposure in the workplace.

##### Practice

- Fumes caused by internal combustion are:



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- o Carbon monoxide – deadly in high concentrations
- o Carbon dioxide – displaces oxygen in poorly ventilated areas
- o Hydrocarbons – irritants
- Most of the fumes from internal combustion rise and accumulate against the top or ceiling of the enclosure.
- If the odour of internal combustion is noticeable, it should be reported to the supervisor.
- Carbon monoxide poisoning has these symptoms:
  - o Headaches
  - o Tightness across the forehead and temples
  - o Weariness, weakness, dizziness
  - o Nausea
  - o Loss of muscular control
  - o Watering, stinging eyes

If any of these symptoms develop, get fresh air immediately.

#### Internal Combustion Engines – Ventilation

##### Standard

When internal combustion engines are exhausted into a confined work area, the supervisor shall ensure that air quality is maintained at a healthy level.

##### Practice

In order of priority, the supervisor shall take these precautions when internal combustion engine fumes accumulate in the work area:

- Fit a non-flammable flexible hose to the exhaust pipe of the engine taking fumes well away from the work area, preferably outdoors.
- Provide fans to dilute the exhaust fumes.
- Conduct emissions test prior to use in enclosure.
- Emission controls (scrubbers) are required on diesel powered equipment in enclosed areas.

#### Portable Generator Standard

All portable generators shall be used so as not to pose an electrical, atmospheric, or explosion hazard.

##### Practice

- Inspect portable generators for damage or loose fuel lines that may occur during transportation. Refer to Equipment over 10HP Inspection H&S\_FORM\_55.
- Only run generator in well ventilated area. Be aware of wind direction so that fumes are blown away from work area.
- Use ground fault circuit interrupters (GFCI) when using a generator
- Never hook generators directly to the electrical system of a structure without a transfer switch.
- Before refueling shut the generator down and let it cool.



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- Never use a generator indoors.

### Potential Injuries/incidents

- Shocks from electrocution
- Carbon monoxide poisoning from generators exhaust
- Fires from fueling

### Carbon Monoxide Hazards (CO)

Generator exhaust can very quickly produce high levels of CO fumes. Humans cannot smell or see CO, so you may be exposed without even realizing it. If you start to feel sick, dizzy, or weak while using a generator, get fresh air immediately - those symptoms are signs that you have inhaled high levels of CO fumes.

The CO from generators can rapidly lead to full incapacitation and even death. If you experience serious symptoms, seek medical attention immediately and inform supervisor that CO poisoning is suspected.

### Housekeeping

#### Standard

Work surfaces shall be free of scrap and debris so tripping hazards can be eliminated. Improper storage of materials and cluttered work areas are not safe. To maintain a clean hazard free workplace, management, supervision, and workers must co-operate.

#### Housekeeping Requirements

- Daily jobsite clean-up program
- Disposal of rubbish
- Individual clean-up duties for all workers
- Materials piled, stacked, or otherwise stored not to permit tipping and/or collapsing
- Materials stored away from overhead power lines
- Work areas and access/egress routes must be kept tidy, well lit, and ventilated
- Signs posted to warn workers of hazardous areas
- 3 R's
- Coordinating with site owner, constructor/prime contractor for existing waste management programs for disposal of waste or scrap material.

#### Practice

- Clear access/egress routes and work areas
- Reusable material to be removed to a safe storage area,
- Adequate illumination, and clean-up of debris
- Keep stairs and landings clear and well lit
- Provide warning signs
- Secure material against the wind. After removing material, re-secure pile
- Gather up and remove debris as often as required to keep work areas and access/egress routes orderly



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- Keep equipment and the areas surrounding equipment clear of scrap and waste
- Keep stairways, passageways and gangway free of materials, supplies and obstructions at all times
- Secure loose or light material stored on roof or on open floors to prevent blowing by wind
- Pick-up, store, or dispose of tools, materials or debris which may cause tripping or other hazards
- Before handling used lumber, remove or bend over protruding nails and chip away hardened concrete
- Wear appropriate Personal Protective Equipment for the task
- Do not permit rubbish to fall freely from any level of the project. Lower by means of chute or other approved devices
- All sub-trades are responsible for and are required to ensure that proper housekeeping is maintained in the workplace

#### **Illumination/Task Lighting**

##### Standard

Accidents can be attributed to poor lighting. Illumination in work areas shall be adequate for the task at hand.

##### Practice

- Poor quality illumination causing direct glare, reflected glare, dark shadows, and eye strain should be a prime concern.
- Accidents are known to result from delayed eye adaptation when coming from bright surroundings into dark areas. Keep doorways and other entries clear of tripping hazards that are momentarily invisible upon entry.
- Smoke, steam and other substances in the air should be ventilated to allow proper visibility.
- Where the possibility of sudden darkness due to power interruption exists, the supervisor shall provide portable lights to permit safe egress from the work area.
- Temporary lights shall be fitted with bulb guards to prevent accidental breakage.
- Florescent light tubes shall be stored in protective sleeves.
- Always turn off lights prior to changing bulbs or tubes. Sudden surge of power while inserting bulbs or tubes can, and have caused explosive results.
- When using string lighting ensure all broken or missing bulbs are replaced to prevent electrical hazards.

#### **Floor Openings and Guarding for Falling Material Standard**

Floor openings shall be identified and guarded. Guard for potential falling material.

##### Practice

- Floor holes from 25 mm to 300 mm (1" to 12") through which materials, but not persons may fall shall be securely covered.
- Floor openings larger than 300 mm (12") through which materials and persons may fall, shall be securely covered and marked "DANGER OPEN HOLE".
- Acceptable floor opening covers are:
  - If in roadways, strong enough to support vehicular axles
  - If in aisles where workers walk shall not project more than 2.5 cm (1") above the walking surface
  - Shall not be accidentally displaced
- Stairway and ladder way floor openings shall be protected by a standard railing i.e.



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1.1 m (42") high with a mid-rail and capable of resisting a lateral force of 200 pounds.

- Guardrails consisting of a top rail 1.1 m (42"), mid rail, and toe board are to be provided at the perimeter, open sides and ends of:
  - o Floor including the floor of a mezzanine
  - o The surface of a bridge
  - o A concrete roof while the formwork remains in place
  - o A scaffold platform, work platform, runway, or ramp.

**Wall Openings**

Standard

Wall openings shall be guarded to prevent accidental falls.

Practice

- Wall openings above or adjacent to dangerous equipment, chemical or acid tanks, degreasing units, and similar hazards shall be guarded with a guardrail using a top rail and mid rail and capable of resisting a lateral force of 200 pounds).
- Open-sided floors, platforms, or edges allowing a fall of 1.4 m (4') shall be closed with standard railings (unless covered by Section 1 above).
- Stair sets having four or more risers shall have standard railings.
- Window wall openings, where the bottom of the opening is less than 900 mm (3') from the floor, require standard guardrails.
- When guarding wall openings, standard railing may be replaced by grill work with openings not more than 200 mm (8"), ONLY if a lateral force of 200 lbs can be resisted.
- Wall openings shall be protected with a standard railing, if they are 1 m (3') high or less, and 450 mm (1.5') or wider.

**Roofs Standard**

Roofers and other workers shall be protected from falling.

Practice

- To warn workers when approaching the perimeter of an unprotected roof edge, a physical barrier of wire, rope, chain, or wood fence can be used. The barrier will be installed 2 meters from the roof edge.
- A person specifically trained and dedicated to alert any person to the roof edge can be used (roof monitor) however a physical barrier as discussed above is also required.
- The warning line shall be flagged at 2-meter intervals with high visibility material.
- The line shall be supported such that its lowest point including sag is not less than 91.4 cm (36") from the roof surface and its highest point is not more than 105 cm (42") from the roof surface.
- If barriers are not practical, a fall arrest system shall be used.
- A travel restraint system can also be used restricting worker access to the perimeter.

During extreme heat/cold conditions refer to Occupational Health section



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### Working Alone Best Practice

Best practices for Working Alone includes:

- Management's commitment to the health and safety of their employees
- Assessing the hazards of the workplace.
- Taking corrective actions or measures to prevent or minimize hazards or incidents for occurring.
- Training and educating workers so they can perform their jobs effectively and safely with the measure that have been put into place.
- Investigating an incident that has been reported by worker and following through with measures that will prevent the incident from occurring again.
- Re-evaluating current safety measures on a regular basis to ensure that these measures work, taking into account any changes in your business operations.
- Workers must have a system of communication that can always reach emergency services. This could be a cell phone, 2-way radio (if someone is constantly monitoring the channel), land phone line, etc.

### Working Alone

When working alone or when you're the only person on site working in an isolated area out of view from other workers.

- Ensure you have a designated contact—employer, supervisor, or someone else who knows where you are and what you're doing.
- Communicate regularly with your designated contact
- Before beginning work, identify and eliminate, or control all hazards in the work area.
- Inform the site supervisor (or someone who can call for help) that you are on site and will check out with him or her when you leave.
- Make other workers aware of your presence so they can check up on you.
- With your designated contact, have a plan in case of emergency.
- Use the Personal Checklist for Working Alone, H&S\_FORM\_039.

Working alone is prohibited where the work involves:

- High voltage
- Toxic chemicals
- Confined spaces
- Trenches
- Working over/around water
- Use of aerial devices/bucket trucks
- Night time calls (i.e. highway maintenance)

### Employees Who Travel Alone

Some of the risk to workers who travel alone involves injuries from motor vehicle incidents. The risk is greater when workers cannot communicate in remote areas or unable summon help.

Equipment and Supplies – Well maintained vehicles prevent exposing employees to unnecessary risk. Appropriate first aid and emergency supplies must be provided.





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Travel Plan – The supervisor will ensure that an appropriate system to communicate with the worker’s whereabouts is put in place.

**Winter Driving**

Perhaps the deadliest danger of all is "black ice." Black ice is ice which forms on a roadway, usually due to snow melting and re-freezing. Se it is almost invisible, drivers fail to recognize black ice conditions and may drive at normal speeds-often resulting in very serious accidents. Always be alert to the possibility of black ice when temperatures are near or below freezing. Pavement that looks dry but appears darker in color and dull-looking should alert you to the presence of black ice.

Failing to allow enough time to stop is a major cause of winter driving accidents. During slippery conditions stopping distances can triple.

- Driving at a slower speed
- Anticipating stops at traffic lights and intersections,
- Applying brakes sooner than normal will help ensure accident-free stops. When braking, brake carefully with short, rapid application of the brakes. Always allow plenty of extra space between you and other vehicles to minimize the need for quick stops.

Acceleration, turning, and passing also present dangers during winter.

- Accelerate slowly to avoid loss of traction and subsequent loss of control
- Turn slowly, with caution, to avoid sliding into a stationary object or the path of an oncoming vehicle.
- Avoid sudden movements. Pass with care because passing lanes are not maintained as well as driving lanes.
- Leave extra space between yourself and other vehicles so there's room to maneuver in case something goes wrong.
- During a skid, steer cautiously turn in the direction you want the car to go.

Here are some other tips you should remember for driving safely in winter:

- Always use your seatbelt.
- Turn on your headlights during adverse weather conditions. Overcast skies and falling snow limit visibility. It is important to see and be seen.
- Like all the signs say, bridges and overpasses freeze before the roadway. Use extra caution on these.
- Remember that driving in winter weather conditions causes physical and mental fatigue and reduces reaction times. Get plenty of rest and adequate nutrition. Don't drive while you're sleepy or on medication that causes drowsiness.
- Prepare your vehicle well ahead of time. Check fluid levels, tire pressure, lights etc. as per the trip inspection.

Failing to do proper trip inspections can and has led to accidents.

- Avoid using your cell phone while driving. Distractions will reduce your response time.

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### 22.59 Concrete Saw Practice

- When ordering parts always includes model and serial number of unit.
- Strictly follow the maximum RPM instructions for the type of blade you are using.
- Safety guard must be in place – never change the size of guard and/or blade without changing the belt drive on the machine – they are matched.
- Do not use in flammable areas (sparks).
- Use only in well-ventilated areas.
- Keep all body parts away from moving parts and/or blade – no loose clothing.
- Wear appropriate PPE (goggles, dust mask, hearing protection, hard hat and safety boots).
- Never leave a running machine unattended.
- Never get in front of the direction of travel of the machine.
- Never operate the machine alone.
- Always check the lifting frame before lifting.
- Check blade shaft RPM and match to type of blade being used.
- Do not use damaged blades.
- Inspect blades twice daily for wear and cracks and/or arbor damage.
- Do not stand in line with the blade (flying debris).
- Never twist or grind with a blade.
- Use a blade shaft locking pin or backup wrench when changing blades. Refer to Operator's Manual Do's and Don'ts

### Cleaning Solvents and Flammable Materials

Cleaning solvents are used in day-to-day construction work to clean tools and equipment. Special care must be taken to protect the worker from hazards, which may be created from the use of these liquids. Wherever possible, solvents should be nonflammable and nontoxic.

The foreman must be aware of all solvents/flammables that are used on the job, and be sure that all workers who use these materials have been instructed in their proper use and any hazard they pose.

The following instructions or rules apply when solvents/flammables are used:

- Use non-flammable solvents for general cleaning.
- When flammable liquids are used, make sure that no hot work is permitted in the area.
- Store flammables and solvents in special storage areas.
- Check toxic hazards of all solvents before use (MSDS).
- Provide adequate ventilation where all solvents and flammables are being used.
- Use goggles or face shields to protect the face and eyes from splashes or sprays.
- Use rubber gloves to protect the hands.
- Wear protective clothing to prevent contamination of worker's clothes.
- When breathing hazards exist, use the appropriate respiratory protection.
- Never leave solvents in open tubs or vats – return them to storage drums or tanks.
- Ensure that proper containers are used for transportation, storage and field use of solvents/flammables.



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- When transferring flammable substances between containers make sure the containers are electrically bonded or grounded.
- Where solvents are controlled products, ensure all employees using or in the vicinity of use or storage area are trained and certified in the Workplace Hazardous Materials Information System. Ensure all WHMIS requirements are met.

For further information see the appropriate current Occupational Health and Safety Regulation

**Safe Disposal of Paint Cans Used for Daily Work Activities**

- All empty spray paint cans will be placed back into the original box upside down.
- Boxes will be stored at the respective yards. Once an amount has accumulated, an outside agency will dispose of the paint cans safely.
- Do not throw away spray paint cans. These cans will be recycled.

**All-Terrain Vehicle (ATV, Gator) Safety Standard**

All CF workers that operate an ATV must be familiar with the manufacture specifications of that ATV and any applicable legislation for the region where it will be used.

Operating an all-terrain vehicle within its limitations is essential. It's also important to be aware of the laws that apply when and where you may operate any ATV. Riding responsibly is important to your safety, your co-workers and the public.

**Practice**

- Read your owner's manual and follow all of its instructions and warnings.
- Follow your ATV's warning labels.
- Hard hats, safety glasses and any other construction PPE must be worn while operating the equipment.
- All riders are required to wear a seat belt if the vehicle comes equipped.
- Ensure you are familiar with the vehicle and practice safe riding techniques at all times.
- Inspect the ATV before riding, as advised in the owner's manual (for example, check your tire pressure).
- Operate the ATV at reduced speeds on any project.
- Use proper riding techniques to avoid losing control on hills, rough terrain and in turns. Keep legs and arms inside.
- Avoid paved surfaces whenever possible – pavement may seriously affect handling and control.
- It's preferred that any ATV (Gator) be equipped with roll over protection whenever possible
- If the ATV is designed for two or more riders, be aware of the following:
  - o The ATV will handle differently (cornering, braking, acceleration) compared to riding alone.
  - o Reduce speed and use extra caution.
  - o Ask your passenger to get off and walk if conditions require

**NEVER:**

- Operate an ATV that you are not familiar with or comfortable driving.
- Operate or be a passenger on an ATV while under the influence of drugs or alcohol.



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- Drive too fast for your skills or the driving conditions.
- Carry a passenger, unless your ATV was built for two people.
- Overload your ATV beyond its maximum weight capacity.