



SECTION:	Student Management and Welfare	APPROVAL DATE:
SUBSECTION:	Student Welfare	April 8, 2002
POLICY NAME:	Technological Studies Safety	LAST REVISED:
POLICY NUMBER:	APP.C.SMW.G.8	April 8, 2002

SAFETY PROCEDURES

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1. GENERAL EQUIPMENT

- a) Remove all rings, watches, necklaces and jewelry when using equipment.
- b) Power must be turned off when machines are not in use.
- c) Read the safety rules and instructions regarding each machine.
- d) Never work alone in a hazardous situation or location.
- e) Keep floors clean and well swept.
- f) Never leave hand tools or work on the table of any machine even if it is not in motion.
- g) Always keep tools and equipment away from moving all parts.
- h) Before operating any machine for the first time, ask the teacher to demonstrate and explain the function of the machine.
- i) Before starting the machine, make sure that both the work and the cutting tool are secured.
- j) Do not touch handles or levers of machines or equipment until you have received instruction.
- k) Operate power equipment well within its capability; replace a fuse only by a fuse of the same value. Do not overload circuits.
- l) Never use damaged or defective machines.
- m) Use all guards and hold-down devices on the machine that will add to the safety of the operator.
- n) Machines with loose or poorly secured guards must not be operated until guards have been properly adjusted.
- o) Always check the machine guards to make sure they are in place, operating and not damaged before using machine. Inform the teacher of any problem.
- p) If a machine has been repaired, or set up recently, recheck the guards and their performance.
- q) Wear proper eye protection.
- r) Wear proper hearing protection.
- s) If you have occasion to remove a machine guard for any purpose, ensure that the machine is securely locked out to prevent its being activated while the guard is out of place. This operation must be supervised by the teacher. Always replace the guard and check its performance before using the machine.
- t) Unguarded rotating parts, such as mower blades, snowblowers, tillers, outboard propellers, chain saws or open crankshafts must be treated with extreme caution and worked on in an isolated location.
- u) Certain types of guards are adjustable. Make sure that the guards are adjusted to give the maximum protection.
- v) If the job you are doing requires that you work with another student, only one should operate the machine and the power switches.
- w) Always remove all tools from the machine after completing set up.
- x) Stand clear whenever power machines are being started. Do not have ragged sleeves, loose clothes, ties, long hair, etc. near the revolving parts.
- y) Keep fingers as far away from the machine as the size of the work permits, and never any closer than 125 mm. Use push sticks.
- z) Do not stand directly in line with fast-moving discs, such as saws, grinders or wheels.
- aa) Allow machines to reach proper working speed before commencing work.
- bb) Any form of distraction, such as talking, standing close or waving is a dangerous practice to anyone who is operating and near power equipment. Wait for an opportune movement if you must interrupt the operator.
- cc) Always keep your hands away from the work when the machine is running.
- dd) Never reach over a revolving cutter, saw or shaft.

2. HAND TOOLS

- a) Remove all rings, watches and jewellery where conditions warrant.
- b) Maintain correct posture to reduce the possibility of back injury.

- c) When using hand tools, balance your weight equally on both feet. Proper stance will help prevent accidents.
- d) Have a proper storage location for tools to protect them from loss or damage. After use, clean and return tools to their proper place so they are always ready when you need them.
- e) Hand tools, when damaged, worn or in an unsafe condition, must be repaired or discarded. These conditions must be reported to the teacher.
- f) Use tools only for their designed purpose.
- g) Wipe oil or grease from tools before and after use.
- h) Blunt cutting tools are the cause of many accidents. Use chisels, knives, blades, etc., which are sharp and ready for use.
- i) Carry all sharp and pointed tools or objects with the sharp point toward the floor.
- j) Wear eye protection whenever using a hammer, nails, cold chisel, etc.
- k) Hammers must be fitted with clean, sound and secure handles. When heads become loose, repair by inserting new wedges or fitting new handles.
- l) Hammer faces must never be struck against hardened surfaces, e.g. another hammer, anvils.
- m) Never stand behind anyone who is swinging a hammer. If you have to observe what is being done, stand off to the side, out of the way of the hammer head.
- n) Consider other people, especially when chipping or cutting off rivet heads or burrs. Cover the part so that it cannot fly and cause damage.
- o) When striking, the end of a chisel becomes mushroomed from the impact of the hammer. Bring the end back to its normal shape as particles of the mushroom will chip off and could injure your eye or face.
- p) When loosening or tightening nuts and bolts, be careful that the wrench does not slip or give suddenly. This can be very dangerous, resulting in injury to knuckles and fingers.
- o) Use pressure on the solid jaw only of an adjustable wrench.
- p) Tools such as wrenches are designed to produce the correct leverage for their length. Do not run the risk of breakage and injury by using extensions such as a pipe.
- q) Wrenches, which due to wear do not fit well, should be turned into the instructor to avoid hand injury.
- r) When cutting off material with a hand hack-saw, care must be taken to avoid injury to your hand on the final stroke.
- s) Always cut away from your body and keep hands behind cutting edge.
- t) Screw drivers should not be used as pry bars; if they bend under load, they are no longer useful and may be dangerous to use as a screw driver.
- u) Files should not be used as pry bars; they are extremely brittle and when breaking will release fragments which could injure or blind you.
- v) Always use a file with a proper fitting handle to protect your hand from serious injury.
- w) Do not leave vices open when not in use.
- x) Do not put tools on ledges or ladders.
- y) When working above floor level, keep tools contained and do not lower by dropping.

3. PORTABLE POWER TOOLS

- a) Before operating any machine for the first time, ask the teacher to explain the function of the guards and to demonstrate them in operation.
- b) Before starting the machine, make sure that both the work and the cutting tool are secured.
- c) Do not touch handles or levers of machines or equipment until you have received instruction, and then only with permission of the teacher.
- d) Remove all rings, watches and jewelry.
- e) Power must be turned off when machines are not in use.
- f) Read the safety rules and instructions regarding each machine tool.
- g) Electrical equipment and portable tools must be properly grounded. Ensure that ground wires are not missing, broken or improperly connected.
- h) Never work alone in a hazardous situation or location.

- i) Keep floors clean and well swept.
- j) Never leave hand tools or work on the table of any machine, even if it is not in motion.
- k) Always keep tools and equipment away from all moving parts.
- l) Power tools must not be operated in the vicinity of flammable materials.
- m) Avoid the use of loose power cords on floor.
- n) Operate power equipment well within its capability; replace a fuse with a fuse of the same value. Do not overload circuits.
- o) Never use damaged or defective power tools.
- p) Use all guards that will add to the safety of the operator.
- q) Power tools with loose or poorly secured guards must not be operated until guards have been properly adjusted.
- r) If power tool has been repaired, or set up recently, recheck the guards and their performance.
- s) Appropriate safety apparel such as goggles and hearing protection should be worn.
- t) If the job you are doing requires that you work with another student, only one student should operate the power tool.
- u) Remove all wrenches, chuck keys, etc., from the power tool after completing the set up.
- v) Do not have ragged sleeves, loose clothing, ties, long hair, etc., near the revolving parts.
- w) Do not stand directly in line with fast-moving discs, such as saws, grinders or wheels.
- x) Allow power tools to reach proper working speed before commencing work.
- y) Any form of distraction, such as talking, standing close or waving is a dangerous practice to anyone who is operating and near power equipment. Wait for an opportune moment if you must interrupt the operator.
- z) Wait until the power tool has come to a complete stop before setting down.
- aa) Unplug the power tool before changing blades, bits, etc.
- bb) Remove the plug from the receptacle by grasping the plug and not the cord.
- cc) Be sure to clean up the area when finished and to place all scrap items in the scrap boxes.
- dd) Remember: good housekeeping promotes safety.
- ee) Disconnect power tools when not in use or when transporting.
- ff) Inspect power tool cords periodically and, if damaged, have them repaired or replaced immediately.
- gg) Power tools must be switched off, unplugged or locked out before doing any cleaning, oiling or adjusting.
- hh) Do not touch the switch of a power tool until you are ready to turn it on or off.
- ii) Never use your hands or body to slow down or stop a power tool.
- jj) Guide power tools - do not force them.
- kk) Keep pressure constant when cutting. Do not force the cut.
- ll) Use two hands on the power tool when required.
- mm) When using power tools, balance your weight equally on both feet. Proper stance will help prevent accidents. Do not over-reach. Make sure you are secure from falling, should the tool stall or kick back.
- oo) Be certain that any material to be worked on is properly clamped.

a) Electrical Cords

- Electrical portable tools must be properly grounded. Ensure that ground wires are not missing, broken or improperly connected.
- Periodically run a current leakage check on portable power tools and check for proper grounding to make sure they are safe to use.
- Never carry a power tool by the cord or yank it to disconnect it from a receptacle.

- Keep electrical cords from heat, oil, moisture or sharp edges.
- Avoid contacting or cutting power cords during use of power tools.
- Always use power tools in a dry condition and a safe environment if the surrounding area is wet.
- Do not wind the cord of power tool tightly around the equipment.
- When coiling and uncoiling extension cords, care should be taken to prevent twisting or kinking of the cord. Do not coil cord around arm but coil on the floor, allowing for natural lay. The longer the cord, the larger the circumference of the coils should be.
- Extension cords should be of an approved 3-wire type and inspected regularly. They should be kept clean and, if damaged, be repaired or replaced immediately.
- Avoid the use of temporary electrical connections.
- Avoid loose extension cords on floors.
- Don't tap into live wires. Find the switch or circuit breaker and open the circuit before doing any work.
- If it is not possible to remove the source of power supply, do not touch the wiring until you know the correct procedures and safety precautions.
- Transformer experiments must be energized with as low a voltage as possible.
- Induction coils must be clearly marked for the low voltage and high voltage connections.
- When cutting flexible cable, BX, or Greenfield cable with a hacksaw, hold the cable against a solid support, not against your knee.
- Keep ends of wire under control to avoid injury to yourself and others.
- Ensure the power to any live conductors that could be drilled into is turned off. If you drill into a live conductor/circuit you can be seriously injured or killed.
- Do not make holes with a knock-out punch or remove knock-outs in panels containing live conductors.
- Avoid cutting into welds with knock-out punches; these welds could contain hard spots that might shatter the punch.
- Do not try to make knock-outs in heavier gauge metal than that for which the manufacturer has designed the punch.

b) Soldering

- A soldering iron stand must be provided for each iron.
- All soldering irons must be considered hot and therefore, they must only be picked up by the handles.

- Keep hands away from mouth and eyes when soldering.
- Wash hands thoroughly after using solder.
- Use a vacuum de-soldering tool to eliminate excess solder.

c) Appliances

- Always disconnect appliances and equipment from electrical outlets before attempting repairs.
- When servicing AC/DC appliances, use an isolation transformer.
- Never leave makeshift wiring to be finished later. Do the job right and prevent accidents.
- When appliance repairs are complete:
 1. plug into a dead receptacle;
 2. clear people from the area;
 3. energize receptacle with the circuit breaker.
- Whenever testing appliances and equipment which remain connected, stand on an insulated surface and wear appropriate gloves.

d) Electronics

- Discharge capacitors and high voltage points after they are disconnected and before they are serviced.
- When connecting the leads of test equipment, the common or neutral lead must be connected first.
- Do not use test equipment from different test benches. A hazardous situation could exist.
- To eliminate possible hazards, oscilloscopes should not be removed from the case.
- Students must be aware of the possibility of dangerous exposure to radio frequency radiation from defective or poorly adjusted television or video display devices.
- When etching printed circuit boards using an arc light or other ultra-violet device, never look directly at the source.
- Do not use etchants stronger than ferric chloride or ammonium persulfate. Follow instructions on label.
- Etching must be done in a closely controlled area.
- Air agitated power etchers must be operated in a well ventilated area.
- Etchants will stain skin, clothes and equipment. Wash involved areas with a cleaner that is safe and non-contaminating. Use proper protective clothing and equipment.
- Tongs must be used to handle printed circuits boards until etched and rinsed.
- Used etchant should be disposed of in an approved manner.

- Extra caution should be observed when working around the neck of a cathode ray tube.
- Dispose of cathode ray tubes in the proper manner.
- Dangerous exposure to radio frequency radiation from video display devices must be avoided. Provide proper ventilation and ensure equipment is properly adjusted and free of defects.

e) Batteries

- When mixing acid and water, always add acid to water, never add water to concentrated acid.
- Rubber gloves, a rubber apron and cup-type eye protection should be worn when servicing automotive batteries.
- Any form of ignition should not be allowed in battery charging areas (designated or occasional).
- Sulphuric battery acid can be injurious to eyes and skin. Flush any acid splash immediately with large quantities of clean water to prevent injury. Flush eyes for at least 15 minutes. Following this, see a doctor.
- Acid spills on upholstery or clothing can be neutralized by applying a solution of baking soda and water to the spill.
- Adequate ventilation is required whenever batteries are being charged. Battery caps should be loosened or removed whenever possible to prevent build-up of flammable gases.
- Do not set tools on top of the battery at any time.
- To prevent explosion of battery packs, test equipment and some electronic equipment, proper polarity and voltage must be used.
- Do not attempt to charge a dry cell battery unless it is a nickel/cadmium battery; charge only with an approved nickel/cadmium charger.

f) Compressed Air

- Proper signs must be posted near compressed air outlets.
- Never use the air hose to clean out wheel brake units. A shop vacuum will clean more safely.
- Spinning bearings with the air hose is a dangerous practice. The bearings can disintegrate at high speed causing injury and damage.
- The spark plug cleaner uses high pressure air and powder abrasive. If the blast is triggered without a spark plug in the cleaning port, serious eye injury is probable. Disconnect when not in use.
- Do not use the air hoses to clean yourself. The high pressure blast can drive dirt, grease or air under the skin or into the blood causing injury or death.

4. BENCH AND PEDESTAL GRINDERS

- a) Check grinding wheel for damage before each use.
- b) Never use a grinding wheel that is loose on the shaft.
- c) Always check the clearance of the tool rest before starting work. Clearance should never be more than 3 mm.
- d) Always set the tool rest clearance when the wheel is not turning.
- e) When mounting or replacing any grinding wheel, always ensure that it passes the ring test before you secure it to the spindle.
- f) In securing the wheel to the spindle, be sure that the blotters are affixed to both sides of the wheel and that washers and nuts are of the correct size. Do not over tighten.
- g) When starting up any grinding wheel, stand to one side out of line with the wheel, especially if it is a new one.
- h) Always ensure that the wheel spins at the recommended number of revolutions per minute. Excessive speed can cause the wheel to shatter.
- i) Use the face of the wheel only and use the entire face to avoid grooving the wheel.
- j) Always feed the work to the wheel gradually. Too much pressure or striking the wheel suddenly may cause it to fracture.
- k) Shut off power immediately if the wheel begins to chatter or vibrate.
- l) Never use tools or hands to stop any grinder.
- m) Flammable materials (e.g., batteries) should not be in the vicinity of grinding operations.

5. DRILL PRESSES

- a) Eye protection must be worn by everyone in the vicinity of an operating drill press.
- b) Select drills carefully as to good condition and suitability for the job.
- c) Use drills correctly sharpened to cut clockwise and see that they are running true.
- d) Make sure that the chuck wrench has been removed from the drill chuck before starting the machine.
- e) Clamp the work securely to the table before starting the machine. Attempting to hold the work under the drill with one hand can result in serious and painful injuries.
- f) Make sure that drills are fed by the operator at the proper drilling rate. Forcing or trying to drill too quickly can cause drills to break or splinter with the chance of serious injuries.
- g) Do not use bits with screw feeds.
- h) If the work should slip from the clamp, never attempt to stop it with the hands.
- i) Never reach around or in back of any rotating drill.
- j) Always ensure that the machine has come to a complete stop and has been switched off before you attempt to change the belt for speed regulation.
- k) If the drill sticks in the work, stop the motor and rotate the drill by hand to free it from the work.
- l) File, scrape or countersink all burrs from drilled holes and be sure that the file is fitted with proper handle.
- m) Always clear away chips and curls with a hand brush, not with hands.
- n) Loose clothing, neckties, jewelry, etc., must not be worn when operating drill presses.
- o) Long hair must be contained so that it does not constitute a hazard.

6. PROTECTIVE CLOTHING

- a) Be sure to wear approved safety glasses or the appropriate type of face shield before you start working on any machine or operation even when a permanent shield is present.
- b) Wear an approved respirator when a relevant environmental hazard exists.
- c) Wear approved hearing protection when the noise level conditions warrant.

- d) Wear the proper protective clothing when appropriate for the job, e.g. hard hats, welding gloves, chaps, gaiters, etc.
- e) Oily coveralls can cause skin irritation. Change overalls when necessary.
- f) Shoe laces must be tied with no long ends.
- g) Wear clothing that is appropriate for the specific shop.
- h) Do not use flammable liquids for cleaning clothing.
- i) Do not use an air hose to clean or dry personal clothing.
- j) Do not wear conductive hard hats in the vicinity of electrical equipment.
- k) Approved hard hats must never be painted or have holes drilled in them.
- l) The suspension of hard hats must be changed once a year or more frequently if required. Hard hats must be replaced every five years.
- m) In order to maintain hard hats properly, there must be minimum exposure to sunlight, extreme heat, cold and chemicals.

7. HAZARDOUS PRODUCTS

- a) Adequate first aid provisions and appropriate fire extinguishers must be available when working with hazardous products.
- b) All containers must be labeled as to their contents. Safety data sheets dealing with the hazard, the safe handling, the proper use, the first aid treatment and the method of disposal must be readily available for all hazardous products. (See WHMIS information).
- c) Appropriate protective clothing must be worn depending on the nature of the hazard.
- d) Adequate ventilation is required whenever a possible explosive or toxic environment exists.
- e) Smoking or other forms of ignition must not be allowed in hazardous locations such as battery charging and gasoline handling areas.
- f) If corrosive or explosive liquids or oils are spilled, they must be neutralized first and cleaned up immediately. Ask the teacher for clean-up procedure.
- g) Know the symbols for hazardous products. (See WHMIS information).
- h) Do not use own air pressure to blow out possible hazardous areas of dust, particles, etc. Use a special vacuum or lightly brush the dust into a container for disposal.
- i) There are many new chemical processes on the market. Obey the instructions packaged with the product, avoiding contact with the skin and the breathing of fumes present.
- j) Always add acid to water, never add water to acid.
- k) Bases (alkaline liquids) and acids have violent reactions; always use caution when operating with these products.
- l) Reacting chemicals must be stored in separate areas away from each other.
- m) Etchants, such as ferric chloride or ammonium persulfate, must be used with extreme caution. Follow instructions on the label.
- n) Never store flammable liquids in glass containers. If broken, they create a serious potential hazard such as an explosive atmosphere.
- o) Before transferring combustible liquids from one container to another, the containers must be bonded and grounded to prevent static ignition.
- p) Open containers must never be used to contain flammable liquids at any time.
- q) Varsol-style parts cleaning tanks must have thermal lid supports and require adequate ventilation.
- r) Students must be warned not to immerse their hands in varsol or other petro-chemical solvents or cleaners. Suitable gloves must be used.
- s) Students handling varsol, other cleaners, must wear eye protection (cup type).
- t) Never use cleaning solvents on clothes in the shops.
- u) Cleaning solvents and paint must be stored away from the work area in a secure place with a fire-resistant door. All containers must be labeled.
- v) Do not store highly flammable liquids near electrical equipment because vapour can be ignited by an arc, spark, etc.

- w) Gasoline must be stored in an approved fire-resistant container in a secure area with a fire-resistant door. Both container and area must be clearly marked Gasoline Storage.
- x) Gasoline must not be siphoned by mouth from tanks or vehicles. Ingestion or inhalation of gasoline can cause injury or death.
- y) Paints, solvents and other volatile material must be stored in approved containers in fireproof cupboards.
- z) Butane lighters must not be allowed in shops.
- aa) Priming an engine with raw gasoline must be avoided because it can cause fire, injury or death.
- bb) Never use gasoline as a cleaning solvent for hands, clothes or equipment.
- cc) Never allow any form of ignition in a gasoline handling area or wherever gasoline vapours are present.
- dd) Refuelling vehicles from portable metal gasoline containers requires the use of a bonding cable to prevent static ignition. Static can also be prevented by pressing the nozzle of the container against the filler neck of the vehicle.
- ee) Welding and cutting operations must not be allowed in the vicinity of the vehicle fuel tank or supply lines.
- ff) Propane powered vehicles are not allowed in the shop.
- gg) Extension lamps and power tools must be kept away from leaking gas lines, tanks or spills.
- hh) The varsol (parts) cleaning tank must be used with adequate ventilation, face protection and rubber gloves.
- ii) The lid of the varsol tank must be kept closed when not in use and must be fitted with a thermal-type lid closure.
- jj) Use extreme care when handling penetrating oil because it causes intense eye and skin irritations.
- kk) Penetrating fluid and brake fluid react with paints, plastics, synthetics and upholstery. Treat with caution and wipe up spills immediately.
- ll) The carburetor degreaser/cleaner is a strong caustic solution and is as dangerous as acid. Keep cleaning fluids away from battery acids and any form of heat. Acids and alkali solutions react violently with each other and heated carburetor cleaners produce toxic gases.

8. HOIST AND LIFTING DEVICES

- a) The teacher should supervise the hoisting. Proper supervision when hoisting a vehicle would not be left or delegated so that one student is supervising another.
- b) When lifting a vehicle, there must be an observer positioned to the side of and well away from the vehicle to assist the hoist operator in raising the vehicle at an even level.
- c) To prevent damage to the vehicle, the hoist must be fully lowered before the vehicle is moved.
- d) Hoist posts and pads must be correctly positioned to the individual before a lift is attempted.
- e) Vehicles must be properly positioned on the hoist before a lift is attempted.
- f) Students must not work under vehicles which are not in a full lift position without safety locks engaged.
- g) Operators must always face the lift vehicle while the lift is underway.
- h) Hoists must be inspected for proper operation and safe condition by competent personnel in intervals of no more than one year. Permanent records should be signed by inspecting personnel and kept on file by the shop teacher.
- i) Before working under a vehicle, it must be supported securely on approved stands placed at strategic lift points.
- j) Keep jack handles secure, out of the way or removed to prevent damage and injury should they fall.
- k) Do not exceed the rated capacity of any lifting crane.
- l) Do not stand under any operating crane.
- m) Use cranes only for vertical lifts.

- n) Never jack up a vehicle when anyone is working underneath the vehicle. The jack might slip and allow the vehicle to drop.
- o) Jacks must be used within their rated capacity. The lift must be vertical; never on an angle. Lift in line with the vehicle centre line to prevent toppling.
- p) Engine slings must be securely fastened to the engine before lifting. Fasteners must be of correct size for the lifting weight and fully tightened to secure sling lugs.
- q) Overhead shop doors should be operated only when doorway is clear of people and obstructions.

9. WELDING

a) Personal Protective Equipment

- Wear leather gloves or use hand pads for handling scrap, sheet metal or material.
- Wear appropriate hand protection when handling hot materials.
- Safety glasses must be worn when chipping, grinding, drilling, punching, chiselling, spot welding or wire brushing.
- Greasy clothing or coveralls can catch fire easily during welding or grinding operations. The grease also causes skin irritations and dermatitis.
- Do not use compressed air to remove dust from clothing or hair. The high pressure blast can drive dirt, grease or air under the skin or into the blood causing injury or death.
- Never use oxygen as a substitute for compressed air.
- Cuffless pants must be worn, all laces fastened, and all loose clothing contained. Keep sleeves rolled down and collars buttoned.
- When working with oxy/acetylene, eye protection with a minimum #5 eye filter must be worn.

b) Housekeeping

- Sheet metal and other sharp-edged materials must be stored in protected-style storage areas and handled with care.
- Always sweep the weld area before welding and remove all combustible materials. If this is not possible, the materials must be covered with a metal or fire-resistant guard.
- Always keep welding stations free of metal chips and weld spatter. As well as a skid hazard, these chips can cut or burn through the soles of footwear.
- Do not throw electrode stubs on the floor. They create a slipping hazard.
- Keep a safe, clean area around the welding station to protect others from spatter and hot metal.
- Welding and cutting operations must not be allowed in the vicinity of the vehicle fuel tank or supply lines.

- Fuel tanks should be protected or removed when welding in the vicinity (i.e. when installing or welding a trailer hitch onto a vehicle.)

c) Gas Welding

- Adequate ventilation must be provided to remove fumes, dust and gases from affected areas.
- Do not apply welding heat to galvanized materials as this will release toxic gases. Proper ventilation procedures must be taken.
- An approved fire blanket must be in a prominent place and easily accessible to all students.
- An approved fire extinguisher must be in a prominent place and easily accessible to all students.
- Lighters and matches must never be allowed in the welding area.
- Never use oil or grease as a lubricant for cylinder fittings. High pressure oxygen can cause the lubricant to degrade into carbon and hydrogen, causing a flash fire.
- Always leak test, using soap and water solution, after fitting hoses, regulators and tanks. Never force hose connections.
- If a gas build-up of leaked acetylene occurs, evacuate the area.
- Leaking acetylene cylinders must be moved immediately and carefully outdoors and allowed to discharge in a safe open area. It is illegal to transport a leaking cylinder of any type.
- Exercise caution when lighting or extinguishing the welding torch.
- Avoid overheating brazed areas. Zinc oxides are produced which cause irritation to the lungs, eyes and nose.
- Quenching hot metal in oil can cause a fire. Use a vented hood area and extra caution.
- Quenching hot metal in a water bath can cause eruptions of hot water or steam. Use caution.
- Always seek advice and use caution if it is absolutely necessary to cut and weld castings or containers. Those might contain toxic or flammable materials which react adversely to the welding heat.
- Always seek advice, and use caution if it is absolutely necessary to cut and weld casting or equipment which have been degreased. The degreasing fluids release deadly phosgene gas at welding heat.
- Call all flammable gases by their correct name, e.g. acetylene, propane, butane, natural gas. Never use the group name “gases”. They all have different properties.
- Leaking acetylene cylinders must be moved immediately and carefully outdoors to discharge in a safe, open area. It is illegal to transport a leaking cylinder of any type. If gas build-up has occurred, evacuate the area.
- Never tamper with the safety devices or markings on a gas cylinder.

- Gas cylinders must be fitted with safety caps when in storage or transit.
- Gas cylinders must be chained securely in the vertical position.
- All flammable gas cylinders which are winter heated must be kept well away from the heat sources.
- Should the outlet of an acetylene cylinder become iced-up, defrost with warm water; not boiling water or open flame.
- Do not use the recessed top of a flammable gas cylinder to hold tools or equipment.
- Never attempt to repair or remove a cylinder valve.
- Where flammable gas cylinders have a removable main valve handle, the handle must always be in place whenever welding is in progress.
- Each cylinder must have an approved regulator for that particular use.
- Never use a hammer or wrench to open a cylinder valve.
- Always ensure that the regulator is backed out before opening the main valve. The sudden or extreme increase in pressure could blow out the adjusting screw or damage the gauges.
- Never repair a damaged hose. Replace it immediately.
- Always purge hoses before starting up - especially after fitting fresh tanks. Purge at the rate of ten seconds per hundred feet of hose.
- Acetylene can degrade at fairly moderate pressures. Never use acetylene at pressures higher than 15 PSIG (100 KPa).
- One to one and one-half turns on the acetylene cylinder valve allows a full flow from the cylinder, yet allows fast shut-down in an emergency.
- Never hang the torch on the cylinder valve or regulators.
- Use a striker to light the oxy/acetylene flame.
- Keep flames and electric arc away from flammable gas and oxygen cylinders.
- Welding metal must be cooled before disposal.
- When cutting with an oxy/acetylene torch, never direct hot slag onto wood or concrete floors. Make sure that the torch hoses are not exposed to the slag that is removed.
- Exhaust fans must be on when welding.

d) Electric Welding

- Always keep welding stations and clothing dry to avoid electric shock. Avoid damp or wet welding stations.
- Keep flames and electric arc away from flammable gas and oxygen cylinders.

- Lighters and machines should never be allowed into the welding area.
- Most sources of electrical energy are dangerous. If the electrical source doesn't kill, it can produce serious and lasting injury. Always use extreme caution.
- The welding arc produces ultra-violet rays which destroy skin cells. Since ultra-violet rays are "cool" rays, the arc welder may have no sense of radiation heat. All exposed skin areas must be appropriately covered.
- Arc welders must be protected by an approved welding helmet with an #10 or #12 filter and heat resistant clothing (leather preferred). Leather gloves should be in good condition with no holes. Observers must be at a safe distance and using similar eye and face protection.
- Never wrap the arc welding cables around the welder's body. Insulation failure or short-circuit heat can cause injury or death. The cables could also cause tripping or prevent emergency exit.
- Never strike an arc until you, and any observers, are aware and suitably protected.
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- Most sources of electrical energy are dangerous. If the electrical energy doesn't kill, it can produce serious and lasting injury. Always use extreme caution.
- Always remove the electrode before leaving the work station. This may prevent eye-flash if the arc welder is inadvertently turned on.