Tools, Equipment, and Construction Safety
WAC 296-807
WAC 296-24, Part D & H-1
& WAC 296-155, Part G & I &N

1.0 General Protection

Employees must utilize machinery, tools, materials, or equipment, whether owned by the employee or the University, in accordance with the safety or health requirements of this program or any applicable Washington Administrative Code (WAC).
Selecting the proper tool or piece of equipment for a particular job is an important step in maintaining a safe work place. Tools and equipment must be used in accordance with the manufacturer's designed or intended purpose.

2.0 Hand and Power Tools (WAC 296-155, Part G)

Employees will use proper tools suitable to the job being done. Only tools in good repair may be kept or used on the premises or on the job. Employee-owned tools must meet all safety requirements, whenever used for work.

2.1 Hand Tools

Use the proper tool for the job. When possible, purchase tools with ergonomic features. The following guidelines apply to all tools and equipment, and to their operation.

- Cutting tools must be kept sharp. It is the responsibility of the employee using the tool to keep the tool sharp. Exercise caution when using sharp cutting instruments, especially when encountering resistance. When possible, cut away from the body.
- Hammers and other tools having separable handles must have the handle securely fastened to the tool.
- Wrenches having jaw openings at right angels or less than 180 degrees to the handle must be placed on the nut with the jaw opening in the direction the handle is to move. Use the correct size wrench and test for slippage on the nut before exerting pressure. Do not use a piece of pipe or a "cheater" to extend the handle for leverage; use a larger wrench. Be aware of equipment torque specifications. Wrenches with cracked or spreading jaws must not be used. Damaged wrenches must be removed from service or repaired according to the manufacturers specifications.
- The tips of screwdriver blades must be sharpened and properly dressed to fit screw slots. A screwdriver must not be used as a cutting tool.
- Tools with heads that have mushroomed from repeated hammering must not be used. Remove such tools from service.
- Powder/Fuel Actuated Tools- No employee may operate a power or fuel actuated tool without a valid operator's license (where required) and training.

• Anticipate the path that a utility knife might take and place your hands and body in a safe position before starting. Injuries can be avoided by cutting away from yourself and others.

2.2 Insulation and Electrical Work

• Handles of tools, such as pliers and screwdrivers may be covered with insulation to improve grip or to avoid unexpected electrical shorts, but this covering must not be relied on for insulation or protection against personal injury on voltages above 250 volts.
• Screwdrivers having metal shanks extending through the handles must not be used for electrical work.
• Metallic tapes or metallic rules must not be used near electrical equipment. Cloth tapes with metal reinforcing will be considered metallic tapes.

2.3 Tool Storage

Tools temporarily stored or laid aside on the job must be placed so as not to create a stumbling or falling hazard. They may not be left on ladders or in traffic areas. Tools with sharp edges must be covered or stored in such a way as to guard against a cutting hazard. Particular care must be used when working in an elevated position. Tools must not be left unsecured, but should be kept in containers.
Tools must be stored in such a manner as to prevent them from becoming damaged.

3.0 Electrical Powered Tools and Equipment

Electric power-operated tools must either be of the approved double-insulated type or be grounded.
Portable ground fault circuit interrupters (GFCI's) must be installed in wet locations when there are new or remodel construction projects.
The use of electric cords for hoisting or lowering tools is not permitted.

3.1 Extension Cords and Trouble Lights

Extension cords used for lighting supply must have conductors enclosed in common rubber sheaths and must be waterproofed for their entire length except at terminals. Ordinary twisted lamp cords and metallic sockets do not meet these requirements. Lamps for trouble lights must be enclosed in guards.
Lamp guards on trouble lights must be gas-proof when used in potentially explosive atmospheres. Lamp guards on trouble lights used in locations with exposed electrical contact points must be of non-conducting material.

3.2 Electrical Power Cords

• All power cords must be of the three-conductor type with proper ground plug (UL approved) enclosed in common rubber waterproof sheaths.
• All power tools must be insulated and grounded with three-conductor type cords and ground plug.
• The ground connection on the power plug must not be cut off or removed at any time.

• Extension cords that are frayed, worn or that have missing ground prongs must be removed from service. Extension cords must have sufficient capacity rated in amps or volts for the rating on the portable power electric tool to be used.

• The use of cheater plugs also known ground-lifters, is prohibited. If a work location does not have a three-wire grounded receptacle available, replacement of the receptacle by an electrician should be requested.

3.3 Portable Electric Tools

• Electric cords supplying portable power tools must be rubber sheathed with adequate terminal connections, and must include a ground wire attached to the tool casing and to an outlet ground or other low resistance ground.
• Portable electric power tools must be grounded. If double insulated tools are used, they must be distinctively marked.
• The user must thoroughly inspect portable electric power tools and cords before use. Extension cords must not be used in place of fixed wiring.
• Employees using portable electric power tools should first assure themselves of a firm stance, and secure the piece being worked on in such a way as to prevent unexpected turning or other movement.
• Portable electric power tools with frayed or worn cords, missing ground prongs, or with loose or worn parts must be removed from service.

4.0 Assured Equipment Grounding Program (296-155-447)

The purpose of this program is to establish procedures to test, identify hazards, and maintain (in safe operating condition), all cords, cord sets, plugs, electrical equipment connected by a cord. A copy of this program, including the specific procedures adopted by the University must be available at the job site for inspection. Sub contractors are also responsible for implementing and supervising all elements of this program including the required testing and inspections

4.1 GFCI’s In Place of Assured Equipment Grounding Program

Cord sets equipped with GFCI’s do not need to be checked as a part of an assured equipment-grounding program. Departments or employees who wish to avoid the process of having to inspect cord sets may do so by replacing them with GFCI equipped cord sets.
All 120 volt single phase 15 and 20 ampere receptacle outlets on a particular site, which are not part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground fault circuit interrupters for personal protection. Receptacles on a two wire single phase portable or vehicle mounted generator rated not more than 5 kW, when the circuit conductors are insulated from the generator frame and all other grounded surfaces, need not be protected with ground fault circuit interrupters.

4.2 Daily Inspections

The employee using the equipment will visually inspect each cord set, attachment cap, plug of cord sets, and any equipment connected by cord and plug, except cord sets and receptacles which are fixed and not exposed to damage before each days use. The employee will look for

external defects, such as deformed or missing pins or insulation damage, and for indications of possible internal damage. Equipment found damaged or defective must be removed from service and repaired or destroyed.

4.3 Test Procedures

The following three tests shall be performed on cord sets or receptacles that are not a part of the permanent wiring of the building or structure and cord-connected and plug-connected equipment that is required to be grounded:

- All equipment grounding conductors shall be tested for **continuity** and shall be electrically continuous.
- Each receptacle and attachment cap or plug shall be tested for correct **attachment** of the equipment-grounding conductor. The equipment-grounding conductor shall be connected to its proper terminal.
- Each outlet receptacle or power source shall be tested to ensure proper **polarity**.

5.0 Accident Prevention Tags

- Do not use any machinery, tool, material, or equipment that is not in safe operating condition.
- Unsafe machines, tools, materials, or equipment must be identified as unsafe by tagging or locking the controls (if applicable) and notifying the supervisor.
- The tag should indicate the name of the person placing the tag, the nature of the problem, and the date. When the unsafe condition is corrected the tag and/or lock can be removed and the tool or equipment returned to service.

6.0 Power Equipment (WAC 296-807 & 296-155, Part G)

Power equipment must be used in a manner consistent with the manufacturer's recommendations. Supervisors must read and be completely familiar with the manufacturer's operating instructions and recommended safety procedures. Because of the hazards inherent with power equipment, supervisors must verify that an employee has been properly trained on a piece of equipment before permitting that employee to use it. Equipment must be shut off when left unattended.

6.1 Bench Grinder

The tool support must be positioned at or above the center line of the wheel and be kept as close to the wheel as possible without touching, but never more than 1/8 inch away. Use the face and not the side of the wheel for grinding. The grinding wheel must be checked for cracks, breaks, or defects. Defective wheels shall be taken out of service and reported to the supervisor. Small items shall be held with pliers to keep hands away from the wheel. A tongue guard must be in place on each pedestal or bench grinder. The tongue guard is located above the tool rest and must be positioned less than one-fourth ($1/4^{th}$) of an inch from the surface of the wheel.

6.2 Portable Grinders

Immediately before mounting, all grinding wheels must be closely inspected and sounded by the user to make sure they have not been damaged in transit, storage, or otherwise, before they are mounted. They should be tapped gently with a light, non-metallic implement, such as the handle or a screwdriver for light wheels, or a wooden mallet for heavier wheels. This is known as the “ring test.” If wheels sound cracked (dead) they must not be used.

6.3 Drill Press

A few safety precautions must be remembered while operating a drill press.

- Know your drill press. Read the owner’s manual very carefully. Learn its applications and limitations, as well as the specific potential hazards peculiar to it.
- Always wear safety glasses or a face shield.
- Be sure that the chuck key is removed from the chuck before turning on the power. Using a self-ejecting chuck key is a good way of insuring that the key is not left in the chuck accidentally. To avoid accidental starting, make sure the switch is in the OFF position before plugging in the cord. Always disconnect the drill from the power source when making repairs.
- Never attempt to use a hand auger bit in a drill press. Use only drills and bits designed for machine use. Consult the owner’s manual for recommended accessories. The use of improper accessories may present hazards.
- Hold the work piece firmly so that it will not fly or spin off the table. It is generally best to fasten the work piece securely with clamps or hold it in a vise. This is especially true when drilling or boring small work pieces.
- Keep the guard on the spindle pulley to prevent your hair and clothing from getting caught. No loose clothing, gloves or jewelry may be worn when working on the drill press. A hair net is required for long hair. See the Personal Protection section.
- Use the recommended spindle or chuck. Most operations can be done successfully with the 0 to ½ in. capacity geared drill chuck.
- Be sure the drill bit or cutting tool is locked securely in the chuck. Remember that all adjustments should be made with the power off.
- Adjust the table so that the hole in the table center is beneath the drill, or set the depth stop to avoid drilling into the table. It is a good idea to place a piece of wood beneath the work piece to prevent this.
- Do not use too high a spindle speed. Use the recommended speeds. If there is any doubt, use the lower speed. The wrong application of high speed can burn up the cutting tool and/or work pieces, and can hurl the work off the table with considerable force. A speed that is too slow with a heavy feed can cause the tool to dig into the work piece, which can stall the motor or break the cutting edges. Always disconnect the machine from the power source when changing speeds or making adjustments.
- On deep cuts, raise the bit frequently to clean the chips out of the hole. If the drill becomes stuck in the hole, turn off the machine before attempting to raise the bit.
- Use a brush to keep the table and work piece free of sawdust or chips. Always disconnect the machine from the power source before cleaning.
- When using sanding drums and other abrasive accessories, make sure the work area is well ventilated.
- Never try to stop the machine by grabbing the chuck after the power is turned off. Do not run the tool unattended. Turn off the power, and do not leave the drill press until the chuck comes to a complete stop.

6.4 Power Cutoff Saw

Approved eye protection and ear protection must be worn when performing operations using a power cutoff saw, or when working in close proximity to a power cutoff saw or grinder. The upper hood must completely enclose the upper portion of the blade down to a point that will include the end of the saw arbor. The sides of the lower exposed portion of the blade must be guarded to the full diameter of the blade by a device that will automatically adjust itself to the thickness of the stock and remain in contact with stock being cut to give the maximum protection possible for the operation being performed.

6.5 “Skill” or Chain Saws

All hand-held power circular saws having a blade diameter greater than two inches and that lack positive accessory holding means must be equipped with a constant pressure switch or control that will shut off the power when the pressure is released. All hand-held gasoline-powered chain saws must be equipped with a constant pressure throttle control that will shut off the power to the saw chain when the pressure is released.
Chaps must be worn when using a chain saw.

6.6 Bandsaw

The guard must be kept in proper condition. All portions of the saw blade must be enclosed or guarded, except for the working portion of the blade between the bottom of the guide rolls and the table. Bandsaw wheels must be fully encased. The front and back of the band wheels must remain enclosed by solid material, or by wire mesh, or perforated metal. Such mesh or perforated metal must be no less than 0.037 inch (U.S. Gage No. 20), and the openings must be no greater than three-eighths inch.
Solid material used for this purpose will be of an equivalent strength and firmness. The guard for the portion of the blade between the sliding guide and the upper-saw-wheel guard will protect the saw blade at the front and outer side. This portion of the guard must be self-adjusting to raise and lower with the guide. The upper-wheel guard must conform to the travel of the saw on the wheel, and the top member of the guard should have at least a two-inch clearance outside the saw and be lined with smooth material, preferably metal. Effective brakes should be provided to stop the wheel in case of blade breakage.
The bandsaw must have a tension control device to indicate a proper tension for the standard saws used on the machine. This will help eliminate saw breakage due to improper tension.
Feed rolls of bandsaws must be protected with a suitable guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The edge of the metal guard must come to within three-eighths inch of the plane formed by the inside face of the feed roll in contact with the stock being cut.

6.7 Batteries

Because explosive fumes may be emitted during charging or operating batteries, all potential sparks or flames must be kept away from the top of any liquid cell battery. Do not disconnect the cables while the charger is running. Smoking is not permitted in the vicinity of a battery that is being charged.

7.0 Fixed and Portable Woodworking Machines (296-24-165)

This section applies to the use of fixed and portable power tools for processing materials that generate chips or dust from wood, reconstituted wood products, or plastics.

7.1 Definitions

Point of operations means that point at which cutting, shaping, boring, or forming is accomplished upon the stock.
Push stick means a narrow strip of wood or other soft material with a notch cut into one end that is used to push short or narrow pieces of material through saws.

Block means a short block of wood, provided with a handle similar to that of a plane and a shoulder at the rear end, which is used for pushing short stock over revolving cutters.
Jigs and Fixtures are devices for holding, supporting, or restraining material from movement while operations are being performed.

7.2 General Woodworking Machine Construction

- Each machine should be so constructed as to be free from sensible vibration when the largest tool is mounted and run idle at full speed.
- Arbors and mandrels should be constructed so as to have firm and secure bearing and be free from play.
- Saw frames or tables should be constructed with lugs cast on the frame or with an equivalent means to limit the size of the saw blade that can be mounted, so as to avoid excessive speed caused by mounting a saw larger than intended.
- Circular saw fences should be so constructed that they can be firmly secured to the table or table assembly without changing their alignment with the saw. For saws with tilting tables or tilting arbors the fence should be so constructed that it will remain in a line parallel with the saw, regardless of the angle of the saw with the table.
- All belts, pulleys, gears, shafts, and moving parts should be guarded.
- When possible, each power-driven machine should be provided with a disconnect switch that can be locked in the off position.
- The frames and all exposed, non-current-carrying metal parts of portable electric machinery operated at more than 90 volts to ground, should be grounded. Other portable motors driving electric tools that are held in the hand while being operated should be grounded if they operate at more than 90 volts to ground. The ground should be provided through a separate ground wire and polarized plug and receptacle.
- Combs (feather boards) or suitable jigs should be provided at the workplace for use when a standard guard cannot be used, as in dadoing, grooving, jointing, molding, and rabbeting.

7.3 Table Saw

The table saw guard must completely enclose that portion of the saw above the table and that portion of the saw above the material being cut. The hood and mounting must be arranged so that the hood will automatically adjust itself to the thickness of the material being cut and remain in contact with it without offering any considerable resistance to the insertion or passage of material being sawed.

The hood must be strong enough to resist blows and strains incidental to reasonable operating, adjusting, and handling. It must also protect the operator from flying splinters and broken saw teeth. It must be made of material that is soft enough so that it will be unlikely to cause tooth breakage. The material should not shatter when broken, should be non-explosive, and should be no more flammable than wood. The hood must be so mounted as to insure that its operation will be positive, reliable, and in true alignment with the saw. The mounting must be adequate in strength to resist any reasonable side thrust or other force tending to throw it out of line.

Unusual Shapes: When a hood-type guard cannot be used because of unusual shapes or cuts, a jig or fixture that will provide equal safety for the operator must be used. Combs (featherboards) or suitable jigs must be used when a standard guard cannot be used, as in dadoing, grooving, jointing, molding, and rabbeting. On the completion of such operations, the guard must be immediately replaced.

Push Stick: A push stick must be used on short or narrow stock or when there is a possibility of the hand contacting the blade.

Spreader and Anti-kickback Devices: Each table saw should be furnished with a spreader to prevent material from squeezing the saw or being thrown back on the operator. The spreader should be made of hard tempered steel or its equivalent, and should be thinner than the saw kerf. It should be of sufficient width to provide adequate stiffness or rigidity to resist any reasonable side thrust or blow tending to bend or throw it out of position. The spreader should be attached so that it will remain in true alignment with the saw even when either the saw or table is tilted, and should be placed so that there is not more than one-half (1/2) inch space between the spreader and the back of the saw when the largest saw is mounted in the machine. The provision of a spreader in connection with grooving, dadoing, or rabbeting is not required. On the completion of such operations, the spreader should be immediately replaced.

7.4 Jointer

The planer or jointer cutting head knife must not project out greater than one-eighth ($1/8^{th}$) inch beyond the cylindrical body of the head.

The opening in the table must be kept as small as possible. The clearance between the edge of the rear table and the cutter head must not be more than one-eighth inch. The table throat opening must not be more than two and one-half inches when tables are set or aligned with each other for zero cut.

The jointer guard must cover all the section of the head on the working side of the fence or gage. The guard must effectively keep the operator’s hand from coming in contact with the revolving knives. The guard must automatically adjust itself to cover the unused portion of the head and must remain in contact with the material at all times.

The jointer guard must cover the section of the head back of the gage or fence.

7.5 Lathe

Safe, effective use of a wood lathe requires study and knowledge of procedures for using this tool. Read and thoroughly understand the owner/operator’s manual. Always wear safety goggles or safety glasses that include side protectors and a full face shield when needed.

Tie back long hair. Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories.

Check the owner/operator's manual for proper speed recommendations. Use slower speeds for larger diameter or rough pieces and increased speed for smaller diameters and pieces that are balanced.
Make certain that the belt guard or cover is in place. Check that all clamping devices (locks), such as on the tailstock and tool-rest are tight.
Check the speed, drill bit or tool to make sure it matches the size, thickness or type of material being machined. Drill bits and cutting tools must be kept sharp with a proper angle on the cutting edge. Improper speed may break, overheat or damage the bit or tool.

7.6 Press Operations

Presses must be operated in accordance with the manufacturer's recommendations. Presses must be clearly marked with the manufacturer's stated load capacity and the rating must be visible from the point of operation. Hazards include danger from flying pieces of parts that may have shattered or slipped out under great pressure.
Protection of operators: Operators must stand in a position or be shielded by a guard from possible injury due to failure of the press, failure of the work material or other operational hazards.
Instruction to operators: Operators must be trained and instructed in the safe methods of operation before starting work on a press. The employee will be supervised to insure correct use of safe procedures.
Work area: Employees must maintain adequate clearance between machines so that movement of one operator will not interfere with the work of another. Ample room for cleaning machines, handling material, work pieces, and scrap must also be maintained. All surrounding floors must be kept in good condition and free from obstructions, grease, oil and water.
Overloading: Presses may only be operated within the tonnage and weight ratings specified by the manufacturer.
Freedom from movement: Work being pressed must be free from slippage or unintended movement.

7.7 Radial Arm Saws

The radial arm saw may be guarded with a fixed enclosure, fixed barrier guard, or a manually adjusted guard or a standard automatic adjusting guard. In those instances where an alternate fixed-type guard is used, it must provide protection equivalent to the protection afforded by the automatically adjusting guard.
The upper hood should completely enclose the upper portion of the blade down to a point that will include the end of the saw arbor. The upper hood should be constructed in such a manner and of such material that it will protect the operator from flying splinters, broken saw teeth, etc., and will deflect sawdust away from the operator. The sides of the lower exposed portion of the blade should be guarded to the full diameter of the blade by a device that will automatically adjust itself to the thickness of the stock and remain in contact with stock being cut to give maximum protection possible for the operation being performed.
An adjustable stop should be provided to prevent the forward travel of the blade beyond the position necessary to complete the cut.
Installation should be in such a manner that the front end of the unit will be slightly higher than the rear, so as to cause the cutting head to return to the starting position in the following manner when released by the operator:

• The cutting head or carriage should return to the rest or starting position in a gentle motion
• The cutting head or carriage should not bounce or recoil when reaching the rest or starting position
• The cutting head or carriage will remain in the rest or starting position

Each radial arm saw used for ripping should be provided with non-kick-back fingers or dogs located on both sides of the saw so as to oppose the thrust or tendency of the saw to pick up the material or to throw it back toward the operator. They should be designed to provide adequate holding power for all the thickness of material being cut. Ripping and ploughing must be against the direction in which the saw turns. The direction of the saw rotation must be conspicuously marked on the hood. In addition, a permanent label not less than 1 ½ inches by ¾ inch with standard proportional lettering should be affixed to the rear of the guard hood at approximately the level of the arbor, where the blade teeth exit the upper hood during the operation of the saw, reading as follows: “Danger: Do not rip or plough from this end.” The label color shall be danger red.

8.0 Ladders

Departments are encouraged to purchase fiberglass ladders over wood ladders because they do not damage as easily. Always inspect a ladder carefully prior to use. Never use a ladder that you believe is unsafe. Always face the ladder while ascending or descending it. Never carry materials or tools while climbing or descending a ladder except in a tool pouch. Always be certain that shoes are free of mud and grease to prevent slips and falls. Ladders must never be lengthened by splicing additional sections to them. The only ladder that can be spliced is a fixed ladder that is permanently installed to a structure. Unattended ladders should be closed and lowered to the ground or floor.

8.1 Ladder Working Loads

Ladders shall be capable of supporting the following loads without failure:
Self-supporting portable ladders: At least four times the maximum intended load, except that each extra-heavy-duty type 1A metal or plastic ladder shall sustain at least 3.3 times the maximum intended load.
Portable ladders that are not self-supporting: At least four times the maximum intended load, except that each extra-heavy-duty type 1A metal or plastic ladders shall sustain at least 3.3 times the maximum intended load.
Fixed ladders: At least two loads of 250 pounds each, concentrated on two consecutive places of attachment. Each step or rung shall be capable of supporting a single concentrated load of at least 250 pounds.
General ladder ratings are as follows:

Type	Duty Rating	Working Load
IAA	Industrial	Special duty - 375 lbs. Maximum
IA	Industrial	Extra heavy - 300 lbs. Maximum
I	Industrial	Heavy - 250 lbs. Maximum
II	Commercial	Medium - 225 lbs. Maximum
III	Household	Light - 200 lbs. maximum

8.2 Stepladders

A stepladder provides a reasonably stable base for carrying on work when both hands are used. It is usually equipped with a pail shelf for tools and materials. The steps of the ladder in most cases are flat and wide enough for comfortable standing. These ladders are self-supporting with wide spread bases.

Stepladders should be used only if the space in which the ladder is placed is sufficiently large to permit the proper placement of the ladder.
A stepladder is a temporary elevated base from which to work. It should not be used to move between different levels.
Proper use means adhering to the following:

- The ladder shall be placed on a firm, level base. If this requires blocking, then the blocking and the ladder must be firmly tied or anchored together.
- The ladder should be placed so that the work can be done without leaning or stretching past the side rails.
- All stepladders should be opened fully so that the spreaders lock themselves in the open position.
- If it is necessary to reach a greater height, use a longer ladder. It is dangerous to use boxes or other items to increase the height of a ladder.
- Unless a ladder is equipped with a top platform and guardrails, operations must be conducted from no higher than two steps from the top of the ladder.
- Tools and materials should be removed from the top and pail shelf before the worker descends. Nothing should ever be left on a ladder.

8.3 Straight, Extension, and Fixed Ladders

Straight or extension ladders are used in places where a stepladder cannot be used due to limited space and heights greater than a stepladder can provide. A straight ladder may not exceed thirty feet in length.
Proper use means adhering to the following:

- The procedures for the inspection and placement of stepladders apply to straight ladders. There is, however, an additional factor in placing a straight ladder properly. The base of a straight ladder must be placed at a distance from the vertical wall equal to one fourth the working length of the ladder. For example, if the ladder is placed at a working height of 16 feet, it shall be four feet away from the vertical wall.
- Ladders must be long enough to extend at least 3 (three) feet above the top landing.
- Straight ladders must always be placed so that the top of the two rails are against a solid support. They should be lashed, preferably at top and bottom, to prevent movement. If it is not possible to lash the ladder in position, a helper must hold the ladder firmly.
- When it is necessary to work from a straight ladder, the highest level one may work from is the third rung from the top of the point where the ladder contacts the vertical surface.
- In dangerous situations, a ground person should act as a spotter for foot traffic, powered industrial trucks (forklift) or other vehicles.
- Keep hands and fingers in the clear at all times to avoid crushing.

8.4 Ladder Inspection

Guidelines for proper inspection and maintenance of stepladders are as follows:

- Be sure that hinge spreaders are securely fastened to the ladder and can be opened to the fullest extent without binding.
- Inspect steps to be certain that they are tight. A loose step is one that can be moved, even slightly, by hand.

- See that the ladder doesn't wobble or shake due to damage and side strain.
- Check safety feet for proper condition.

Guidelines for proper inspection and maintenance of extension or straight ladders are as follows:

- Before using a ladder, carefully inspect it to determine whether it is in sound condition. If there is any defect no matter how slight, withdraw it from use immediately. Have the ladder inspected by a qualified person, and if it cannot be placed in perfect condition, destroy it. Substandard ladders must never be kept.
- Inspect the rails and rungs to be certain that they are not cracked, split or broken. Repair slivered or splintered areas.
- Check the extension locks and pulley. A lock that is defective must be replaced. Check the rung sections exposed to wear by the action of the extension locks. See that the safety feet are in good condition and operating properly.
- Determine that the extension locks are securely fastened in position to the side rail. If there is any indication that the side rail splitting at the bolt or rivet holes, remove the ladder from service.
- Inspect the connecting joints of sectional ladders. The metal plate of the grooved ends of the sections should be rigidly secured in position, and the rivet or bolt should be positioned firmly.
- Check the outside rung extensions at the top of each section to determine that there is no deterioration, cracking, or loosening of the rung. All members of each section and its support should be sound and firmly secured.
- All portable ladders should be kept coated with a protective material such as paint, varnish, or lacquer. Paint may only be a satisfactory coating for a new ladder when a careful inspection is made by an experienced person and the ladder is not to be sold. Ladders may not be placed in front of doors opening toward the ladder unless the door is blocked open, locked shut, or guarded by a worker.

9.0 General Hoisting Requirements

Only trained, designated personnel are permitted to operate cranes, cherry pickers, Genie lifts, articulated arm vehicles, boom hoists, or similar equipment. These employees must also be completely familiar with the manufacturer's recommendations concerning safe operating procedures. Operators must follow manufacturer's recommendations completely.
Prior to initial use, equipment must be inspected to insure that it is safe and in proper operating condition. The rated capacity can be found in WAC 296-24-294 and its subsections. Rated capacity of slings, ropes, and equipment must not be exceeded. The rated capacity of a rope or sling often is reduced to 50% when the angle of loading approaches 60 degrees from the vertical. The tables in WAC 296-24, Part D must be consulted to determine actual capacities for different

ropes or configurations. This WAC can be obtained from the Environmental Health and Safety Coordinator.

9.1 Maintenance Procedure

Any unsafe conditions disclosed by an inspection must be corrected before operation of the hoist or lift is resumed. Only designated personnel may do adjustments and repairs.

After adjustments and repairs have been made the crane may not be operated until all guards have been reinstalled, safety devices reactivated, and maintenance equipment removed.

9.2 Load Limit

The manufacturer's recommended load limit must be clearly displayed on the hoisting device. The rated load limit must never be exceeded. The manufacturer's recommendations must be followed. Allowance must be made for windy conditions and work must be stopped when winds are severe.

9.3 Equipment Guards

Guards must be securely fastened. Each guard will be capable of supporting without permanent distortion, the weight of a two-hundred (200) pound person unless the guard is located where it is impossible for a person to step on it.
Railings must also be able to withstand a two-hundred (200) pound force in a horizontal direction without deflection. Railings on vertical lifts must meet the requirements of a standard guardrail. A standard guardrail consists of a top rail, intermediate rail, toe board, and posts, and has a vertical height of 36 inches to 42 inches from upper surface of top rail to the floor or platform. Each length of railing must be smooth-surfaced throughout its length. The intermediate rail is located halfway between the top rail and the floor or platform.

9.4 Hooks

Hooks must meet the manufacturer's recommendations and must not be overloaded. If a hook is overloaded, it will suffer deformation or distortion. The capacity of the chain/hook system is set by the manufacturer who made them and can be obtained from the supplier. Safety latch type hooks must be used.

9.5 Operating Near Electric Power lines

Employees, lift equipment, or devices of any kind may not approach nearer than 10 feet to any power line. For other instructions pertaining to operations near overhead electric lines see WAC 296-24-960.

9.6 Fire Extinguishers

A fire extinguisher (carbon dioxide, dry chemical, or equivalent) must be kept in the truck cab or vicinity of lift equipment. Operators and maintenance personnel will be made familiar with the use and care of the fire extinguishers provided. To schedule fire extinguisher training, contact the Environmental Health & Safety Coordinator.

9.7 Operators

Training is required before personnel may operate any aerial lift equipment. Each operator must be familiar with the manufacturer's recommendations, safe practices, and equipment limitations. Refresher training may be required.

9.8 Steel Chains

Chains used for overhead lifting must be made of proof-tested alloy steel. Welded alloy steel chain slings must have permanently affixed durable identification stating size, grade, rated capacity, and sling manufacturer.
Hooks, rings, oblong links, pear-shaped links, welded or mechanical coupling links, or other attachments, when used with alloy steel chains, must have a rated capacity at least equal to that of the chain.
The use of job or shop hooks and links or makeshift fasteners formed from bolts, rods, or other such attachments are prohibited.
If at any time any three-foot length of chain is found to have stretched one-third the length of a link it must be discarded.
The practice of placing bolts or nails between two links to shorten chains is prohibited.
Splicing broken chains by inserting a bolt between two links with the heads of the bolt and the nut sustaining the load, or passing one link through another and inserting a bolt or nail to hold it, is prohibited. Annealing of chains is prohibited.

9.9 Wire Rope

Only wire ropes that have a capacity exceeding 5 times the manufacturer's recommended safe working load for a particular lifting job may be used. Protruding ends of strands in splices on slings and bridles must be covered or blunted. Wire rope must not be secured by knots.
The following limitations apply to the use of wire rope:

- An eye splice made in any wire rope must have not less than three full tucks.
  Note: This requirement does not preclude the use of another form of splice or connection, which can be shown to be as efficient, and which is not otherwise prohibited.
- Except for eye splices in the ends of wires and for endless rope slings, each wire rope used in hoisting or lowering, or in pulling loads, must consist of one continuous piece without knot or splice.
- Wire rope may not be used, if in any length of eight diameters, the total number of visible broken wires exceeds 10 percent of the total number of wires, or if the rope shows other signs of excessive wear, corrosion, or defect.

9.10 Natural Rope and Synthetic Fiber

Natural or synthetic fiber ropes must be inspected for wear, mold, or damage before each use. They may only be used if the manufacturer's recommended load capacity exceeds the load by a factor of five times.

9.11 Overhead Power Lines

Where overhead electric conductors are encountered in proximity to a work area, the supervisor is responsible for:

- Ascertaining the voltage and minimum clearance distance required, as stated below,

- Maintaining the minimum clearance distance,
- Ensuring that the requirements of WAC 296-24-960 are complied with. Employees must be capable of calculating the safe and proper working distances.

Low voltage lines. When work is being carried out in proximity to energized electrical service conductors operating at 750 volts or less, such work shall be performed in a manner to prevent contact by any worker with the energized conductors.
Overhead lines. If work is to be performed near overhead lines, the lines shall be de-energized and grounded, or other protective measures shall be provided before work is started. If the lines are to be de-energized, arrangements shall be made with the person or organization that operates or controls the electric circuits involved to de-energize and ground them. If protective measures, such as guarding, isolating, or insulating, are to be used these

precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.
Unqualified persons. When an unqualified person is working in an elevated position, or on the ground, near overhead lines, the location shall be such that the person and the longest conductive object he or she may contact cannot come closer to any unguarded, energized overhead line than the following distances:

- 10 ft. for voltages to ground 50kV or below;
- 10 ft. plugs 0.4 inch for every 1kV over 50kV, for voltages to ground over 50kV.

For other instructions pertaining to operations near power lines see WAC 296-24-960.

10.0 Jacks and Supports (WAC 296-807)

All jacks, supports, stands and similar equipment should be marked with the manufacturers rated load limit. The rated load limit must never be exceeded. Hoisted or jacked equipment must be secure from movement before working on it. Equipment must be properly blocked and thoroughly supported before work may be performed under it. Check to insure everyone is clear before lowering equipment onto blocks or supports. Only approved chains, cables or slings may be used for lifting equipment.
Wooden blocks shall be placed between metal jack-stands and metal equipment to prevent slippage or movement.

10.1 Jack Types

A jack is an appliance for lifting and lowering or moving horizontally a load by application of a pushing force. Jacks may be of the following types: Lever and ratchet, screw and hydraulic. The rating of a jack is the maximum working load it is designed to lift safely through a specified distance. The operator must make sure that the jack used has a rating sufficient to lift and sustain the load. The rated load must be legibly and permanently marked in a prominent location on the jack by casting, stamping, or other suitable means.

11.0 Compressed Air Use (WAC 296-807)

Compressed air may not be used for cleaning purposes unless it is reduced to less than 30 p.s.i. (pounds per square inch) at the point of operation and then only with effective chip guarding and personal protective equipment.

11.1 Compressed Air Tools

• In the use of compressed air tools, care should be used to prevent the tool from being shot from the gun.
• When momentarily out of use the gun should be laid in such position that the tool cannot fly out if the pressure is unexpectedly released. When not in use, all tools should be removed from the gun.
• In disconnecting a compressed air tool from the air line (portable air compressor), care should be exercised to first shut off the pressure and then to operate the tool to exhaust the pressure remaining in the hose. Tools using quick release couplings may be detached without shutting off the pressure.

• Compressed air hoses or guns must not be pointed at or brought into contact with the body of any person.

12.0 Pneumatic Powered Tools and Hose

• The operating trigger on portable hand-operated utilization equipment must be so located as to minimize the possibility of its unanticipated operation and must be arranged to close the air inlet valve automatically when the pressure of the operator's hand is removed.
• A tool retainer must be installed on each piece of utilization equipment that, without such a retainer, may eject the tool.
• Hose and hose connections used for conducting compressed air to utilization equipment must be designed for the pressure and service to which they are subjected.
• Only the valve should be used to turn off air pressure. Never crimp the hose to shut off the pressure.

13.0 Structures and Overhead Work

Where overhead work is in progress protective measures must be initiated to prevent tools or other objects from falling on those below. Hard hats must be worn when working beneath other workers or equipment or when there is a possibility of injury from falling objects.

14.0 Trenching

Excavations or trenches four (4) feet in depth or greater must utilize proper shoring or sloping procedures as defined in WAC 296-155-650 through 66411. SU employees will not conduct trenching deeper than four feet. This work, if necessary, will be contracted out. Before underground excavating begins, utility locations must be identified.

15.0 Forbidden Activities

• Removing, displacing, damaging, destroying or carrying off any safety device, safeguard, notice, or warning furnished for use on the campus.
• Interfering with the use of any method or process adopted for the protection of any SU employee.
• Neglecting to do everything reasonably necessary to protect the life and safety of employees.