Air Compressor Safety Rules

The Air Compressor produces the compressed air used to inflate tires, power pneumatic drills, sanders, and other air powered tools. It provides the compressed air that powers the various pneumatic nailers and staplers that can be used in the woodworking shop and with the correct accessories can be used to produce the vacuum needed to use vacuum chucks and vacuum bags for clamping workpieces together. With the correct filters and dryers, air compressors with sufficient capability can be used for spraying finishes.

Air compressors come in a wide variety of sizes from small units that run off an automobile 12 volt power outlet to large units that are installed as part of the permanent facilities in industrial settings.

To avoid accidents, the following safety rules must be followed by everyone working with an air compressor in the CWA / JPM shop. Failure to follow these safety rules can result in personal injury or injury to others and can result in a loss of shop privileges.

Start with a Risk Assessment to ensure a safe work area, and that the machine is ready to use:

1. **Give the work your undivided attention.**
2. Follow all procedures in **CHARLOTTE WOODWORKERS' ASSOCIATION Shop Rules and Guidelines, Electrical Safety Rules and Guidelines,** and **Shop Safety Best Practices**.
3. **Read the manual of operating/safety instructions (user's manual) that came with the air compressor. Become familiar with the operation and controls of the air compressor. If you can't find manual and if the Shop Foreman can't help you find it, someone can download a copy of the manual from the internet. This manual should tell you where the various switches and controls for the air compressor are and how they're supposed to work. It should contain a diagram showing the parts of the compressor which will is important knowledge to have before continuing with the risk assessment. It will also explain key maintenance tasks that must be performed periodically for compressors that are in continuous use, and when finished using a portable compressor before returning it to storage. Some of these like properly draining the air pressure and accumulated water from the tank are critical to keep the compressor in good, safe working order.** Since there's such a wide variety of models of air compressors and they often differ in many ways, **always read the entire user's manual before running a compressor**; it contains important information! Improper use is the number one cause for repairs and personal injury.
4. **Keep your work area clean and well lit.** Cluttered benches and dark areas invite accidents.
5. **Safety glasses (ANSI Z87.1) and (CAN/CSA Z94.3) with side shields or a face shield must be worn while working around and running an air compressor.** Everyday eyeglasses are only made of impact resistant glass, they aren't safety glasses. If you're not wearing actual safety glasses, wearing safety goggles over your regular glasses can provide the protection you need.
6. **Hearing protection should always be worn. The typical air compressor is very loud and prolonged exposure to its noise will cause or aggravate hearing loss. ANSI S12.6 (S3.19) hearing protection is recommended to best protection.**
7. **Use safety equipment.** Non-skid safety shoes, hard hat, and hearing protection must be used when situations call for them.

8. **Use the appropriate dust mask or respirator in dusty work conditions.** Air tools can create dust and if your operation does, protection from that dust is important.
9. **Always operate compressors in a well ventilated area free of combustible materials (such as dust), gasoline, or solvent vapors..** Power tools create sparks which may ignite the dust or fumes. The advice regarding flammable gases is especially important when using a compressor as the compressor would compress these gases and feed them to all attached air power tools, a definite safety hazard.
10. **If spraying flammable materials, locate the compressor at least 20 feet from the spray gun.** Separating the area where the compressor is running from the finishing area is even better, especially if the compressor is well ventilated to the outside air.
11. **Store flammable materials in a secure location away from the compressor.**
12. **Compressors should be operated in a clean, dry, well ventilated area. If necessary, extend the length of air hose to get the air tools into damp or wet areas if you need to do work in such a location. Operating electrically powered compressors in damp or wet locations exposes the tool and the operator to electrical shock.** Using an air compressor in a damp or wet environment can cause the tank to rust and cause damage to the pneumatic tools being used. Rust weakens the compressors tank and once it has progressed to a certain point can cause the tank to fail, possibly resulting in the tank exploding under pressure which can cause serious injury and potentially death.
13. **The following conditions could lead to a weakening of the air tank, and could result in a violent air tank explosion:**
    - **Failure to properly drain condensed water from the air tank, causing rust and thinning of steel air tanks.**
        - **Preventative Action: Drain air tank daily or after each use. If air tank develops a leak, replace it immediately with a new air tank or replace the entire compressor.**
    - **Modifications or attempted repairs to the air tank.**
        - **Preventative Action: Never drill into, weld, or make any modifications to the air tank or its attachments. Never attempt to repair a damaged or leaking air tank. Replace it with a new air tank.**
    - **Unauthorized modifications to the safety valve or any other components which control air tank pressure.**
        - **The air tank is designed to withstand specific operating pressures. Never make adjustments or parts substitutions to alter the factory set operating pressures.**
14. **Operate compressors in an open area with adequate distance away from any wall or obstruction that would restrict the flow of fresh air to the ventilation openings. The necessary distance you need to allow should be defined in the compressor's instruction manual, but at least 12 inches should be considered a minimum.**
15. **Never restrict the air flow to the compressor. Without proper ventilation, the compressor can overheat and could cause a fire.**
16. **Some compressors aren't intended to be operated indoors, though others are. Know the operating environment your compressor was designed for before turning it on. Gasoline powered compressors without special modification will most certainly need to be operated outdoor in fresh air to avoid accumulation of carbon monoxide, which can be deadly.**
17. **Never place objects against or on top of the compressor.**
18. **Ensure that all hose fittings are tight.** Loose fittings usually leak air which reduces the compressor's performance. If they're loose enough that they come off under pressure they can cause personal injury or could also damage equipment.
19. **Keep all hoses clean of dirt and debris and inspect them to ensure that they are in good condition.** Keeping air hoses in good condition and clean will lengthen the life of the hose. Keeping dirt and debris out of the hose interior will improve hose life and will also prevent

damage to the pneumatic tools you attach them to.

20. **When storing air hoses with male and female couplings, wrap the hose up for storage and connect the two connectors to one another if they are of compatible sizes.** Doing this will eliminate an opportunity for contamination to enter the hose.
21. **The safety valve plays a critical role in air compressor safety be relieving tank pressure if the pressure exceeds the valves release pressure (these valves are designed to match the requirements of the compressors that they are intended for). Before starting the compressor at any time, pull the ring on the safety valve to make sure that the safety valve operates freely. If the valve is stuck or does not operate smoothly, it must be replaced with the same type of valve. It's possible that the model of compressor you'll be using has a different way to check the safety valve, so refer to the operator's manual to verify the procedure for you compressor if your safety valve doesn't have a ring to open it with.**
22. **Check for binding of moving parts, and for misalignment of moving parts, breakage of parts, and any other condition that may affect the tool's operation. If damaged, have the tool serviced before using it. Many accidents are caused by poorly maintained tools. Develop a periodic maintenance schedule for your air compressor and follow it.**
23. **Check to ensure that all guards, covers and shields are undamaged, and are in place and properly secured.**
24. **Inspect tools for any damage prior to each use**.
25. **Inspect cords for defects:** check the power cord for cracking, fraying, wear, cuts or other faults in the cord insulation. **Inspect the plug for damage including cracks and missing, loose, or faulty prongs**.
26. **Before starting the compressor, verify that the tank pressure is zero, and if it isn't follow the proper procedures for draining the pressure and the water from the tank.**
27. Ensure that the drain valve is closed prior to startup.
28. If you find any problems while going through the inspection, contact the Shop Foreman and get it fixed before using the compressor.
29. **If using an air compressor <u>that isn't already running</u>, check for damaged switches.** If you're using a compressor that runs continually, don't check the switch without clearing it first will all other workers using the air supplied by that compressor. **Do not use the tool if the switch does not turn it "ON" or "OFF" reliably.** Any tool that cannot be controlled with the switch is potentially dangerous; have it repaired before using it.
30. **If your air compressor uses oil to lubricate the compressor, check the oil level.** Add oil if needed. **It would be wise to contact the Shop Foreman before adding the oil, as these tools should not normally "use" oil.**
31. **Once the air compressor is running, check it for excessive vibration. Do not use an air compressor that vibrates excessively or appears unsafe in any way. Instead, have it serviced and get the issue corrected before using it.**
32. **A damaged or malfunctioning part must be properly repaired or replaced prior to use** to avoid risk of personal injury.
33. Keep the area around where you'll be working clear of people and debris that could impair your traction or footing to avoid potential slips and falls.
34. Compressors may have exposed moving parts such as the pulley, flywheel, and belt. In operation, these moving parts can cause serious injury if they come into contact with you, your clothing or jewelry such as watches, necklaces or bracelets.
35. **Dress properly. Don't wear loose clothing or jewelry. If an air compressor can catch anything while it's running it will damage it in some way.** If you're wearing jewelry such as necklaces, bracelets, or rings that could become caught or entangled in moving parts, remove them and store them safely. Roll up long sleeves, tuck in or remove ties, etc.
36. **Tie back, or otherwise secure, long hair.**

37. **Keep your hair and clothing away from moving parts.** Loose clothes, jewelry, or long hair can be caught in rotating parts, and the result will generally include personal injury.
38. Air vents may cover moving parts and should be avoided.
39. **Air compressors can be very heavy. If you need to move the one you're working with get help if you need it to avoid injury from attempting to handle too much weight by yourself.**
40. **If you've been using tools to work on the air compressor, be sure that they are removed and stored properly before turning the compressor "ON"**. A wrench or an adjusting key that is left attached to a moving part of the air compressor can cause personal injury to the operator or a bystander. There's also the possibility that it may damage the tool, the wrench, or adjusting key. It could also damage the material being worked on or injure a bystander if it was thrown by a moving part of the compressor.
41. **Air Tank Bi-annual Inspection**: The air tank on Air Compressors are designed and may be UM coded (for units with air tanks greater than 6 inch diameter) according to ASME Section VIII, Div. 1 rules. All pressure vessels should be inspected once every two years. To find your state pressure vessels inspector, look under the Division of Labor and Industries in the government section of a phone book or call the number provided by the tool's manufacturer for assistance.

Operational Safety Rules:

1. **Approach your work in the Shop & while using the air compressor with a safe attitude!**
2. **If you don't know how to use the air compressor properly for the work you plan to do, get instruction** on how to use it correctly for what you want to do **BEFORE** beginning.
3. **Keep bystanders, children, and visitors away from the work area while operating any power tool.** Having anybody not involved in the operation nearby can create distractions that can cause you to lose focus and could result in an accident.
4. **Stay alert, watch what you are doing and use common sense when operating a power tool. Do not use tools while tired or under the influence of drugs, alcohol, or medication.** A moment of inattention while operating a power tool may result in serious personal injury.
5. **Use the air compressor, its accessories and the tools it attaches to in accordance with the manufacturer's instructions for that item and in the manner intended for the particular type and model of tool that you're using, taking into account the working conditions and the work to be performed.** Use of any tool, especially a power tool, for operations different from those it's intended for could result in a hazardous situation.
6. **The compressed air directly from these compressors is not safe for breathing. It may contain carbon monoxide, toxic vapors, or solid particles from the air tanks. Breathing these contaminants can cause serious personal injury or death.**
7. **Keep power cords away from the heat, oil, water, and sharp edges.** When connecting the compressor, route the cord in such a way that it won't be easily damaged by shop activity and so that it won't present a tripping hazard to others using the shop.
8. **Always make sure that the switch is "OFF" before plugging the compressor in.** This avoids arcing at the plug when the plug is inserted into the outlet.
9. **Some compressor models need to be attended while they're running, others do not. Know which type the compressor you're working with is (consult the information manual) and follow the appropriate procedures.**
10. **Always be sure that any connected tools are "OFF" (trigger not pulled, etc.) before turning on the air compressor.** This ensures that the tools don't start unexpectedly, no fasteners are fired from nailers or staplers, etc.
11. **Never unplug the electricity to the compressor by pulling on the power cord.** When unplugging equipment pull on the plug, not on the cord.

Using the Air Compressor

12. **Never abuse the power cord on corded tools. Never use the cord to carry the air compressor.**
13. **Ensure that the compressor is mounted in a secure and stable location. Some compressors, especially portable models, if placed in a location where they aren't stable and well secured, could fall, possibly injuring someone in the area.**
14. **Never operate a compressor on a roof or in any other elevated position. Instead of relocating the compressor, use additional air hose to reach high locations.**
15. **If using compressed air for sprayed materials that may contain harmful vapors and poisons follow all recommendations for the spray equipment and follow precautions on the Material Safety Data Sheet (MSDS) for the material being sprayed. It is especially important, in a shared shop environment such as ours to pay attention to ventilation requirements to ensure that other members using the shop are safe from the effects of these materials.**
16. **There's a risk from flying objects associated with the use of compressed air. The compressed air stream can cause soft tissue damage to exposed skin and can propel dirt, chips, loose particles, and small objects at high speed, resulting in property damage or personal injury. To prevent these types of problems:**
    - **Always wear certified and approved eye protection**
    - **Never point any nozzle or sprayer toward any part of the body or at other people or animals.**
    - **Always turn the compressor off and bleed the pressure from the air hose and air tank before attempting maintenance or attaching tools or accessories.**
17. **Some compressor surfaces can become hot enough to cause serious burns. To avoid the risk of getting burned take these precautions:**
    - **Never touch any exposed metal parts on the compressor during or immediately after operation. The compressor will remain hot for several minutes after it has been shut off and has stopped operating.**
    - **Do not reach around protective shrouds or attempt to perform maintenance until the unit has been allowed to cool.**
18. **Maintain tools with care. Keep the tools clean and in good repair.** Properly maintained tools are less likely to cause problems in use.
19. **Any alteration or modification of the air compressor is considered misuse and may result in a dangerous condition.**
20. **Do not overreach. Keep proper footing and balance at all times**. Proper footing and balance enables better control of the tool in unexpected situations.
21. **If working with a portable air compressor, turn it off and unplug it if you won't be using it for a short while**. If finished for the day, see the item below for additional requirements.
22. **Pressure stays in the compressor's tank until it is bled off. When finished using the air compressor for the day, unplug it and follow the recommended procedure for draining the tank of air and accumulated water.** Store portable air compressors and their accessories properly, out of the reach of children and other untrained persons. Tools are dangerous in the hands of untrained users.
23. **Before storing the air compressor for the day, clean it to remove any accumulated dirt and debris so that it will be ready to go when the next person wants to use it. Coil the cord neatly and then store the tool properly.**

Accessories

There are a number of accessories that might be used with an air compressor. Some, like air hoses will be used in nearly every application. Others aren't used as often, but when they're needed play a critical role in proper use of the associated air tool.

Hoses – air hoses should have an adequate pressure rating to handle the maximum pressure that the air compressor can supply. They should also have fittings that allow them to be attached to the compressor and to the tool that the compressor will be supplying air to.

Solutions for Clean Compressed Air

A number of contaminates can be in the air leaving your compressor. For optimum performance and system longevity, you need to be able to manage these contaminants before they reach you tools.

Solid particles come from ambient air contaminants like dust and from rusted or oxidized air lines. They will cause pneumatic equipment to malfunction, cause instrument and control failures, and contaminate end products in some applications.

Condensed water droplets come from the humidity in ambient air. Water will oxidize air lines and pneumatic equipment, ruin finishes and other end products.

Liquid oil and oil vapors are introduced by compressor lubricants and by hydrocarbon vapors present in ambient air. Oil-free compressed air is particularly important in food and pharmaceutical processes, but is also critical to some finishing operations.

While a dirty system can usually function adequately, it does so at the expense of downstream components. Liquid water and contaminants can damage the inside of pipes and other pneumatic components. Also, many pneumatic valves and cylinders contain small orifices that can easily get plugged with contamination.

Because compressed air quality requirements vary considerably by industries, so does the type of filter needed. Matching the level of filter used in your compressed air system to the quality of air required is the most cost effective and energy efficient option.

Sizing compressed air filters at 2 x (twice) the compressors CFM flow rate will lower the pressure drop in the filters.
This will result in:
1. Saving energy
2. The elements will last 2 x longer
3. Save on maintenance expense

Basic Filter Tips:

- **Install piping by-pass for maintenance of filters.**
- **For critical applications install duplex filter system with piped by-pass.**
- **Install differential pressure (DP) gauge to monitor element life.**
- **Change when DP is 10 psig or gauge is in the hi-yellow or red zone.**
- **Use auto drain as contaminants collect on the bottom of the filter housing and must be drain away to prevent re-entrained contaminants.**
- **Keep spare filter element kits on hand to prevent down time.**
- **Check drains and DP gauges for proper operations daily.**

Filters – some applications like spraying finishes, requires air that is dry and free of contamination including oil.

Dryers – to remove the water from the air supplied by the air compressor, a dryer is used.

Both Filters and Dryers are available in a wide range of sizes, pressure capacities, and nearly any other parameter that is used to specify them. When designing a new system, work from the needs you have with that system and give consideration to the Basic Filter Tips above. When replacing elements or repairing damaged parts do so using compatible replacement parts.

Oilers (lubricators) – Oilers are designed to deliver the proper amount of lubricating oil to tools that need oil in the airstream to operate correctly. These would usually be placed close to the fitting(s) that feed the tool(s) needing oil in their compressed air to avoid oil contamination in the remainder of the compressed air supply system.

Tire inflators come in a wide variety of models from a large field of vendors. They range from simple tools that plug into the air hose and can be pressed to the tire's valve to add air to inflators that include flex hoses and pressure gauges built in.

Air Blowguns – The simplest air tool is a blowgun or air duster. It's used to spray compressed air with a valve, which is typically operated by a lever. Fit the blowgun to the end of the air hose. Make sure the connections are tight. Air blowguns (air guns) provide a means for directing a steam of air. Many models allow the intensity of the air stream to be controlled by a trigger on the air gun. In some applications the desired results may require an air source that is free of contamination, including oils. While these tools can be a useful accessory, they can also be dangerous if used improperly.

- **Never use the air blowgun to clean brake dust from brake components. It will disperse the dust through the workshop. It's probably also worth considering that this is supposed to be a woodshop and not an automotive repair center, but we know these sorts of things seem to end up where they shouldn't really be from time to time.**
- **Do not use a high pressure air blowgun to disperse liquid solvents or fuels. A low pressure blowing action can help these volatile materials to evaporate more quickly, but a high pressure air jet could atomize the liquid, allowing it to form a flammable mixture.**
- **To avoid injury, make sure you direct the air exhaust of air tools away from yourself and others working in the area.**
- **Do not point the air blowgun at yourself or other people.**
- **Never use the air blowgun to blow air over yourself or other people. Do NOT use the air gun to dust yourself off because you risk injury. Be sure to direct the air jet away from yourself, and away from anybody else who may be working nearby.**
- **Always wear eye protection when using air tools. The air gun is often used to blast dirt and debris out of confined spaces. To avoid injury, be sure to wear eye and ear protection whenever you use the air gun and wear a proper dust mask when the situation calls for that (and this will be most of time in the woodworking shop).**
- **Pull the trigger gently and modulate the flow of air through the nozzle. If too much air is allowed through, you may blow dirt particles into the workshop or stir up dust that can remain airborne for some time.**
- Air tools are attached to the air supply by fittings that allow the supply to be connected and disconnected easily. Over time, these connections wear and will produce an air leak. If the air leak becomes excessive, the output of the air tool will be reduced. Check connections between the air hose and the tool connection every time you use it. If there is obvious wear, replace or repair any poor connections.

Pressure safety with attachments & accessories:

- **Exceeding the pressure rating of air tools, spray guns, air operated accessories, tires, and other inflatable items can cause them to explode or fly apart, and could result in serious injury.**
- **Follow the equipment manufacturer's recommendation and never exceed the maximum allowable pressure rating of attachments.**
- **Never use a compressor to inflate small low pressure objects such as children's toys, footballs, basketballs, etc.**

Fittings/Hose Connectors

24. **Use only accessories that are recommended by the manufacturer for your model of air compressor or that are approved for use with your specific air compressor model.** Accessories that may be suitable for one model of a tool may become hazardous when used on another model.
25. **Install accessories properly.** Follow the manufacturer's instructions on how to properly install and secure accessories.

Maintenance and Service

1. **Tool service must be performed only by qualified repair personnel.** Service or maintenance performed by unqualified personnel could result in a risk of injury. For example, internal wires may be misplaced or pinched. If a tool belonging to CWA or our host organization needs maintenance, contact the Shop Foreman. If the tool is still under

warranty, they will make arrangements for the service to be done under the warranty. If the manufacturer's warranty has expired, they will ensure that the tool is repaired by properly qualified repair personnel.

2. **When servicing a tool, use only approved replacement parts. Follow instructions in the Maintenance section of the manual applicable to that make and model of tool.** Use of unauthorized parts or failure to follow the correct maintenance instructions may create a risk of electric shock or other injury.
3. **Certain cleaning agents such as gasoline, carbon tetrachloride, ammonia, etc. may damage some machine parts.** Before using chemical cleaning agents on a tool, check the manual for that make and model of tool for approved cleaners and cleaning procedures.
4. Never add or change the oil or refuel (gas or diesel powered compressors) when the compressor is running or has just recently been used. This will help avoid smoke, fire, and other concerns.