

Buying and Installing an Air Compressor:

Things you should know before you purchase any air compressor

- **FACT:** Tank size really has nothing to do with cfm flow needed to operate a sandcarving machines. Always remember two important facts about air compressor purchase:
 1. Size of the tank does not make the air compressor better or make up for insufficient compressor pump volume...the tank is used for basic air storage, blowing up a car tire etc., and it is also used as a first crude air dryer to eliminate moisture from the air being compressed. The use of a tank also lessens the start-stop function of the compressor motor making it last longer. Compressed air is made hot, normally about 300-degrees F, the tank is used to cool the air and remove moisture when the hot air comes in contact with the cold tank. The moisture is removed from the air inside the tank, collected and needs to be removed on a regular schedule. This is the reason you find water inside the tank and the reason you need to drain the water being collected inside the tank. If you are using an undersized air compressor the use of an efficient dryer is critical because the hot air will heat up the cold tank and moisture will pass into the cabinet. **FACT:** Any time air is cooled moisture from the air, humidity, is removed by turning water vapor into liquid water. When you turn on the air conditioner in your car and the air is cooled moisture is removed and you see the moisture being drained on the ground below the car...just imagine pouring this water into your dry abrasive sandcarving machine!
 2. Make sure the air compressor has the right volume flow needed to operate the equipment controls and not strictly nozzle pressure...more is better and less is a disaster! **FACT:** Tank size should never be used to make up for an undersized air compressor pump volume. This will most certainly cause pre-mature air compressor failure and moisture problems...undersized air compressors need to operate longer to keep up with volume needs. **FACT:** All compressors have a duty cycle rating... Air compressor duty cycles are 10 minute time periods, not one hour or one day but simply 10 minutes. If the air compressor you purchase has a 100% duty cycle it never needs to turn off to cool the pump head and you can operate the unit running for 24 hours a day without damage. Almost all 100% Duty Cycle Air Compressors use a slower pump RPM speed and create less heat... this also creates a cooler compressed air temperature. If the compressor you purchase has a 60% duty cycle it will need to run 6 minutes and cool 4 minutes. Running longer because it is undersized, never letting the compressor turn off to cool, will most certainly cause failure of the air compressor. Duty Cycle is one of the most often ignored items during compressor purchase and also ignored during compressor use. Never mind this because it is one of the most used selling items by the manufacturer by simply not really explaining, now you know!

Example: A person purchased an air compressor that has a tank size of 80 gallons. The free flow of the compressor was listed in really big letters at 15 cfm. Free flow is what the air compressor will produce when pumping to atmosphere and not into a tank. This means no tank back pressure to slow down volume production when tank pressure builds. As pressure builds inside the storage tank the air volume being pumped is lessened. Most pressure blast models require an operating line pressure of 90 psi regardless of the blasting pressure for operation of the machine controls. The line pressure must not drop below 90 psi and will if the volume of the pump does not meet the volume needs of the nozzle size. The higher operating pressure is used to operate the machine controls and has nothing to do with the lower blasting pressure. When the air compressor is just about to turn off at the maximum high pressure, the

air volume being produced will be at its lowest volume. The larger the difference between free flow volume and a second volume rating at 90-100 psi, the lesser the quality of the air compressor pump. Often the second volume will be listed somewhere in much smaller numbers. Some companies try to hide this fact by showing free flow at a lower 60 psi number. Other companies speed up a smaller piston to create more volume but this also lowers the duty cycle of the compressor. As you can see by the information any time the tank pressure drops below 90 psi all the remaining air inside the tank can not be used because the machine needs 90 psi pressure to operate the controls. The "Epiphany" is tank size has no real affect on a compressor that has inadequate volume production at 90-100 psi.... this will shorten the life time usage of any air compressor.

3. Direct pressure blasting machines depend on the nozzle size to determine compressed air volume requirements. As a nozzle wears the I.D. hole gets larger, the compressed air volume, measured in cfm, required to maintain the blasting pressure on a larger I.D. nozzle hole increases....just than simple. If you want to prepare for needed volume created by a used nozzle, purchase double the volume listed by the new nozzle.

Rule of Thumb: Always look for the air compressor production volume at 90-100 psi. Never use the free flow air volume unless you are looking at the air compressor quality remembering that the greater the difference between the two numbers the poorer the air compressor construction and nobody wants to pay a high price for a low quality air compressor because it had a big tank! Look for the best duty cycle you can afford remembering that more volume than you need helps correct for a lesser duty cycle by simply allowing the compressor to stop and cool....always last longer.

Always try and purchase an air volume that is double the machine nozzle flow requirement remembering to think about operation of a larger nozzle size than standard. This will allow for nozzle wear without nozzle replacement and lower the cost of operation. If you have only enough compressed air to operate a new nozzle size, when the nozzle I.D. hole wears the air compressor will not be able to maintain blasting pressure without dropping the line pressure. Very quickly the nozzle will require replacement.... if the air compressor volume is more than required, nozzle replacement would not be required for a long time. If the blasting pressure required at the nozzle is 30 psi and the nozzle air flow volume required is 5.7 cfm...always look for an air compressor volume 10-11 cfm, about double, at 90-100 psi... do not use free-flow for compressor volume, free flow has no back pressure against the pump that lessens the flow volume.

Things you should know about air compressor installation:

- **FACT:** Normally machine controls will restrict flow by offering resistance of the air to flow through the controls. This is normally a 10% loss showing up as a need to set a higher air regulator pressure than the required pressure needed during blasting. Needing to set a very high air regulator setting before blasting, more than 10%, is an indication that air installation to the machine has some problems. While this does not need to be corrected or fixed you will need to understand more regulator push pressure will be needed to maintain the desired blasting pressure.

Always use a supply hose larger and never smaller than advised....

Long air supply hoses will create flow volume restrictions and require an increase to the static regulator setting prior to blasting...

Never use coiled air supply hose, these are normally ¼” I.D. and create lots of flow volume restriction also creating the need to increase the static regulator setting prior to blasting....

When using larger than standard 3/32” blasting nozzles, never use quick disconnects for main machine compressed air connection, this will also create the need to increase the static regulator setting prior to blasting ...

When the installation of the main air inlet line occurs, the best installation for air volume flow uses barb hose fittings on the air inlet hose. Barb hose fitting have the same hole size as the hose...quick disconnect fitting have a restricted 1/8” hole size regardless of hose I.D. size. This will also create the need to increase the static regulator setting prior to blasting..

Always pay attention to the distance between the air compressor and blast machine. Maximum air compressor pressure at the compressor and line pressure at the machine are different numbers. As the distance increases between the two items the static line pressure drops. With a single stage compressor that often has a high pressure of 120 psi it is possible to only have a machine air inlet line pressure of 80 psi when the distance is too great.... this will also create the need to increase the static regulator setting prior to blasting but may also affect the operation of the machine controls with a lower than 90 psi line pressure at the machine.

Try to not use plumbing reducers, bushings, elbows or plumbing “Ts” on the main air supply line...one 90-degree elbow is equal to the flow restriction of 100’ of straight pipe and a T fitting in place of a 90 elbow is a disaster!

SUMMARY:

Shopping for air compressors:

- When shopping for air compressors always pay attention to the volume produced at 90-100 psi try to ignore the free-flow number if you can.
- Purchase a cfm volume by doubling the nozzle requirements to reduce the need for worn nozzle replacement....a worn nozzle requires additional compressed air to maintain the pressure.
- Do not be fooled by a large tank size, make sure the volume produced at 90-100 psi matches the recommendation for cfm volume required listed above.
- Pay attention to the Duty Cycle of the air compressor remembering 100% is best and the time cycle used for Duty Cycle is only 10 minutes.... Using an air compressor at a higher than rated duty cycle will create excessive heat and void the warranty.
- Watch out for small pump sizes with fast pump RPM speeds...this normally lowers the duty cycle of any air compressor by increasing the piston heat created.
- Two stage compressors produce the most compressed air at the highest pressures. Single stage air compressors have lower maximum pressures and normally lower duty cycles and air volumes.
- Cast iron pump construction is best but most certainly look for cast iron piston sleeves.. smaller compressor sizes are normally aluminum pump construction.
- It is possible to purchase a Two Stage, 5 HP, 220 volt- single phase air compressor you can operate on home power source that pumps a volume of 25-27 cfm at 150 psi....anything lower is simply less than best so pay attention to volume!

- Motor horse power and motor rating are not the same....It is possible to have a 220 volt single phase motor listed as an 8 HP but this is a motor horse power rating and not really the motor HP. In today's markets there are no 8 HP motors, only rated 8 HP rated. The largest single phase motor is 5 HP unless you want to have a special motor built using a lot of copper!

Installing air compressors:

- Use only one quick disconnect fitting for the operation of the standard 3/32" nozzle size..
- Never use a quick disconnect fitting with a nozzle sizes of 1/8" and larger
- Never use coiled air hose
- Use only 3/8" I.D. hose size or larger
- Avoid using long air supply hose, when using long hoses increase the hose ID size by one
- Avoid long distances from air compressor to blast machine
- Avoid using plumbing restrictors that are often undersized elbows, bushings, T-fittings ... also avoid using too many..
- If you are experiencing a large gauge psi drop between pre-set regulator pressure and the blasting pressure some or all of the above items exist. Eliminating them will close the two settings but not necessary. Knowing you need a higher setting to correct for not perfect installation is OK..
- With any marginal air compressor make sure to install a good Ambient Dryer at the machine inlet.