Technician Track - VMT Program: Compressor Types/Air Tools

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Disclaimer

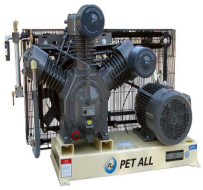
This presentation is not intended to be a comprehensive program covering all aspects of this topic. All technicians are encouraged to read and follow all applicable standards, codes and regulations related to this topic.

- ✓ It is the responsibility of each individual contractor to follow local building codes and licensing requirements and to work safely in accordance with OSHA guidelines.
- ✓ It is the contractor's responsibility to take proper precautions on each project to prevent cross contamination. Always take the health and safety of the building occupants into consideration before you conduct any cleaning procedures.
- ✓ All of the following tips are only general tips. They do not cover every situation and it is your responsibility to adapt these tips to the individual system you are working on.
- ✓ The Instructor is not responsible in any way for the work you perform after viewing this slide show. You are responsible for your own work.
- ✓ The views and opinions following are the instructors opinions and not necessarily the official position of the National Air Duct Cleaners Association.

What We'll Learn

- Compressor Types
- High Pressure Or High Volume
- CFM Requirements
- Air Tools

Compressor types



The Three Most Common Compressor Types

- reciprocating or piston compressors
- centrifugal compressors
- screw compressors

The Reciprocating or Piston

- The reciprocating or piston compressor provides back and forth movement of a piston located inside the compression chamber. During operation, a reciprocating air compressor compresses a fixed amount of free air using a specific amount of pressure.

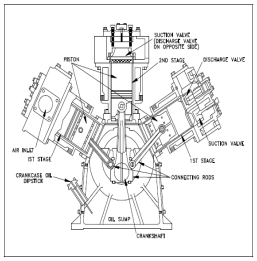
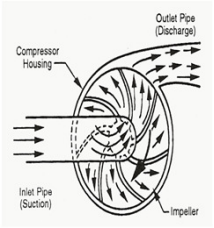


Figure 1 Reciprocating Air Compressor

Centrifugal Compressors



- The centrifugal compressor uses an impeller mounted on a shaft. When the rotation of the impeller increases, it produces a faster moving air at a high pressure. The diffuser found around the impeller then converts the kinetic air energy at a high-pressure level into a potential energy.

Reciprocating compressor video

- https://www.youtube.com/watch?v=pqeFYGIsaB4

The Rotary Screw Compressor

- A rotary screw compressor compresses air using two rotating inter-meshed rotors while the rotary sliding vane compressor compresses air between the casing and the rotating rotor by making use of its movable rotor blade.

Rotary Screw Video

- http://www.youtube.com/watch?feature=player_detailpage&v=S08sj8pfJJs

Portable Reciprocating

Single Phase vs. Three Phase Electric

Single Phase uses 1 Alternating Current (AC). (120/240volts)

- Usually only single phase is available in Homes

Three Phase has a different motor that uses 3 alternating currents at their peak voltage to maintain a more consistent voltage.

- Usually only in large Commercial and Industrial projects.
- Normally an Electrician is required to wire a Three Phase Electric Compressor into the electrical panel.
- Voltage requirements are at 220/440 volts.
- Draws significantly less current than single phase motors.

Electric Pros. & Cons.

PROS

- Ideal for Indoor use
- Generally quieter than gas compressors
- Small & Light weight-Easily transported

CONS

- Length of power cord is limited (extension cords not recommended)
- Electrician may be required
- Limited on heavy-duty uses (pressure)
- Cannot be used on jobsites with no power

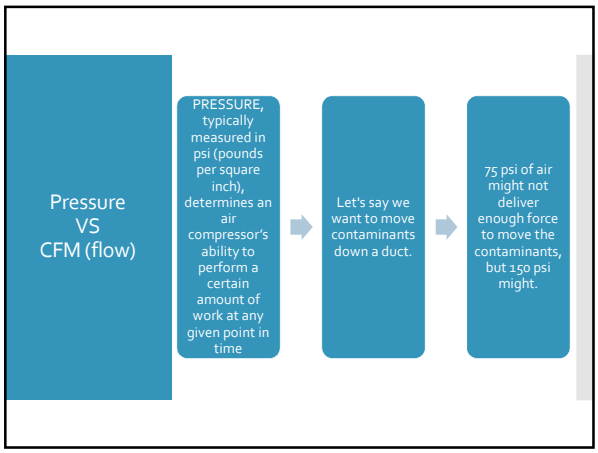
Gas Pros. & Cons.

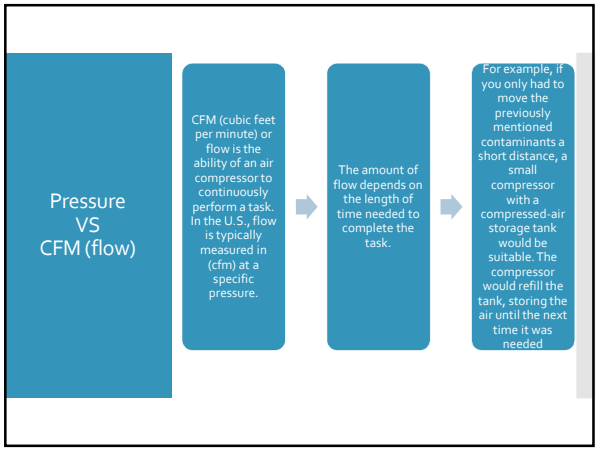
PROS

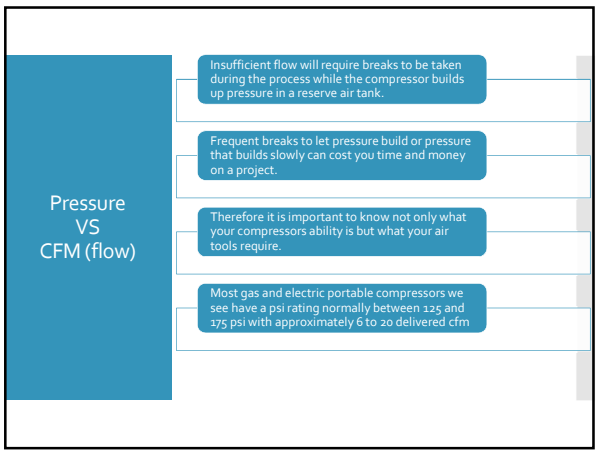
- Normally more pressure
- Higher CFM rating
- Electricity is not needed
- More heavy duty

CONS

- Louder than electric
- Heavy-may require two people for moving it
- Requires you to carry fuel
- FUMES may enter work site


Pressure
VS
CFM (flow)
PRESSURE, typically measured in psi (pounds per square inch), determines an air compressor's ability to perform a certain amount of work at any given point in time
Let's say we want to move contaminants down a duct.
75 psi of air might not deliver enough force to move the contaminants, but 150 psi might.


Pressure
VS
CFM (flow)
CFM (cubic feet per minute) or flow is the ability of an air compressor to continuously perform a task. In the U.S., flow is typically measured in (cfm) at a specific pressure.
The amount of flow depends on the length of time needed to complete the task.
For example, if you only had to move the previously mentioned contaminants a short distance, a small compressor with a compressed-air storage tank would be suitable. The compressor would refill the tank, storing the air until the next time it was needed


Pressure
VS
CFM (flow)
Insufficient flow will require breaks to be taken during the process while the compressor builds up pressure in a reserve air tank.
Frequent breaks to let pressure build or pressure that builds slowly can cost you time and money on a project.
Therefore it is important to know not only what your compressors ability is but what your air tools require.
Most gas and electric portable compressors we see have a psi rating normally between 125 and 175 psi with approximately 6 to 20 delivered cfm

Pressure VS CFM (flow)

A high volume "tow behind" compressor will have approximately 100 -185 CFM and depending upon the manufacturer, provide between 90 to 120 PSI

Pressure VS CFM (flow)

Now that you understand more about the differences between CFM vs. PSI, You will have to make the decision on Electric vs. Gas compressors.

Both will get the job done, but you must consider your operations and company needs.

Gas or Diesel

GAS

- Flexible control over engine speed to conserve fuel
- Gas unit is generally cheaper to buy
- Generally less noisy than diesel models
- Usually cleaner exhaust than diesel

DIESEL

- Tend to be more powerful than gas
- Better suited for Industrial applications
- Diesel is usually more economical than petrol
- Usually requires less maintenance than petrol engine due to the ignition system.

AIR TOOLS for use with Gas or Electric Compressors

Assortment Of air rods and ends

Whipping the inside of panned off floor joists

Assortment of air agitation ends

AIR TOOLS for use with Gas or Electric Compressors

Forward blowing air ball

Reverse blowing air ball

Forward blowing with "tentacles"

AIR TOOLS for use with High Volume Compressors

Assortment of high volume air agitation and sweeping tools

Close up of an air line and end

Why is water blowing out of my AIR TOOLS

- Air includes water or water vapor depending on temperature and humidity
- When the compressor draws in air and compresses it, the moisture vapor begins to condense
- This is more pronounced in summer months because of higher humidity

Why is water blowing out of my AIR TOOLS

It is impossible to prevent the moisture from entering the compressor, but you can get rid of most of it.

Why is water blowing out of my AIR TOOLS

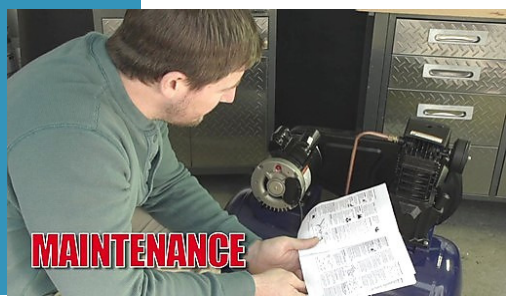
The first step is to DRAIN DAILY or more often if possible

Why is water blowing out of my AIR TOOLS

There are other types of air dryers commercially available

- Refrigerated air dryers
- Desiccant air dryers

Preventative Maintenance Services (PMS)



Compressor Maintenance

- Regardless of how big or small the compressor you use, they all will require periodic maintenance.
- Maintenance Tasks will be based on hours running.
- You will need to check with the manufacturer of your specific model to find out recommended PMS

SAFETY FIRST

- Before performing any maintenance function, switch main disconnect to "off" position to assure no power is entering the unit.
- "Lock-Out Tag- Out" all sources of power.
- Be sure all air pressure in the unit is released.
- **Failure to do these steps may result in serious injury or equipment damages.**

Daily PM Tasks

- Check oil level of both compressor and engine if so equipped.
- Drain moisture from your tank by opening tank drain valve located on the bottom. Do not open drain valve if tank pressure exceeds 25 PSIG.
- Stop, Look & Listen for any unusual noise, failure to compress, overheating, vibrations or belt slippage and correct before damage of a serious nature develops.
- Turn off compressor at the end of each day's operation. General exterior cleaning is highly recommended.

Weekly PM Tasks

- Clean dust and foreign matter from cylinder head, motor, fan blade, air lines, intercooler and tank.
- Remove and clean intake air filters
- Check V-belts for tightness. The V-belts must be tight enough to transmit the necessary power to the compressor. Adjust the V-belts according to the manufacture's recommendation.

Weekly PM Tasks

- Check the alignment of pulleys. Adjust if necessary.
- Tighten mounting hardware to secure motor on base.
- Re-install guard and secure with bolts.
  WARNING: Never operate unit without belt guard in place. Removal will expose rotating parts which can cause injury or equipment damage.

EVERY 90 DAYS OR 500 HOURS

- Change crankcase oil. Use type and grade oil as specified. Inspect oil for foreign debris (metal shavings)
- Check entire system for air leakage around fittings, connections, and gaskets, using an ultrasonic leak detector or using soap solution and brush.
- Tighten nuts and cap-screws as required.

90 DAYS OR 500 Continued

- Check and clean compressor valves, replace gasket valve assembly when worn or damaged.
- CAUTION: Valves must be reinstalled in original position. Valve gaskets should be replaced each time valves are serviced.
- 5. Pull ring on all pressure relief valves to assure proper operation.

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Thank you for Participating!