



Equipment II Compressors

Course Objectives

1. Describe the purpose, theory of operation, and function of a compressor.
2. Relative to a gas, describe the relationships between pressure, volume, and temperature.
3. Distinguish between dynamic and positive displacement compressors.
4. Describe the operation, components, and typical applications for each type of dynamic compressor.
5. Describe the operation, components, and typical applications for each type of positive displacement compressor.
6. Identify typical auxiliary equipment associated with compressors.
7. Describe common performance issues related to compressors and their causes and indicators.



Key Terms (Define the following)

compressor - _____

blower - _____

surge - _____



Principles

General Compressor Categories			
Dynamic		Positive Displacement	
Axial Flow	Centrifugal	Reciprocating	Rotary
	<ul style="list-style-type: none"> • Single-stage • Multi-stage 	<ul style="list-style-type: none"> • Single-acting piston • Double-acting piston • Diaphragm 	<ul style="list-style-type: none"> • Screw • Sliding vane • Lobe

Ideal Gas Law

Moles of gas

Pressure Temperature

PV = nRT

Volume Gas constant

Boyle's Law (@ constant temperature)

↑ Pressure ↓ Volume

↓ Pressure ↑ Volume

Gay-Lussac's (@ constant volume)

↑ Pressure ↑ Temperature

↓ Pressure ↓ Temperature



Questions

1. A compressor _____ the pressure of a gas, such as air, and in turn _____ its volume.

2. List the functions of a compressor in chemical manufacturing.

3. According to the Ideal Gas Law:
 - a. If the volume of a gas is compressed in half and the temperature remains the same, its pressure will _____.
 - b. If the absolute pressure of a gas is doubled and the temperature remains the same, it will take up _____ the volume.
 - c. If the absolute temperature of a gas is doubled and its volume remains the same, its pressure will _____.
 - d. If the pressure is doubled and the volume remains the same, the absolute temperature of a gas will _____.

4. Why must gas compressors be able to handle extreme pressure?

5. List the two main categories of compressors.
1) _____ 2) _____

6. List the two main categories of dynamic compressors.
1) _____ 2) _____

7. List three applications for an axial-flow compressor.
1) _____
2) _____
3) _____

8. In a centrifugal compressor, what happens to the output pressure if the speed of the impeller increases?

9. List three applications of a centrifugal compressor.

- 1) _____
- 2) _____
- 3) _____

10. List the two main categories of positive displacement compressors.

- 1) _____
- 2) _____

11. List the types of rotary compressors.

12. What is the purpose of a filter in the intake line of a compressor?

13. List the methods of cooling an air compression system.

14. What is the difference between an inner cooler and an outer cooler in a multi-stage compression system?

15. List the symptoms of surging.

16. Give an example of a non-compressible fluid and explain what happens if it is drawn into a compressor?

