Types of Fire Pumps
Types of Fire Pumps

- Positive displacement
- Centrifugal
Positive Displacement Pump
Centrifugal Pumps
Positive Displacement Pumps

- Can pump air
- Has a small amount of slippage
  - Ability of water to pass through the inner workings of the pump, not allowing 100% discharge
- Has a fixed displacement of water
Types of Piston Pumps

- Single action
  - Pumps in a forward stroke only

- Double action
  - Pumps in both forward and reverse strokes

- Examples
  - Backpack pump
  - Foam injection pump
  - Wells
  - Bicycle pump
Types of Rotary Pumps

- Commonly used in the fire service as a primer pump

- Rotary gear
  - Two gears that rotate in a tightly meshed pattern forming pockets
  - As each gear tooth reaches the discharge chamber, the air or water contained in that pocket is forced out of the pump
Types of Rotary Pumps

- Rotary vane
  - Movable vanes that automatically compensate for wear and maintain a tighter fit
  - Vanes are forced against the outer housing by centrifugal force
Centrifugal Pumps

- Can not pump air
- Capable of 100% slippage
- The main fire pump used on modern fire apparatus
- Classified as a nonpositive displacement pump
- Imparts velocity on water and converts it to pressure
- Single or multiple stage
Centrifugal Pumps
Pump Wear Rings

- Between the pump casing and the hub
- Seal is between the lower pressure of the intake side and the higher pressure in the volute
- Dirt/sediment can damage ring resulting in decreased pump effectiveness
Pump Packing

- Located around the pump shaft, within the stuffing box
- Lubricates and seals pump shaft
- Too loose
  - Can result in drafting difficulties and pump efficiency
- Too tight
  - Can result in damaging the pump shaft due to overheating
Principles Of Operation

- Centrifugal force
- Based on the principle that a rapidly revolving impeller hurls the water from the impeller eye outward
- The faster the impeller is turned, the farther the water is thrown
  - Increasing the velocity
Principles Of Operation
Influencing Factors

- Amount of water being discharged
- Speed at which the impeller is turning
  - Doubling the speed results in four times the pressure
- Pressure of water when it enters the pump from a pressurized source
Pressure (Series) Setting

- Flap Valve
- Transfer Valve
- First Stage Impeller
- Second Stage Impeller
- Driven Gear or Sprocket
Pressure (Series) Setting

1st Stage

Transfer Valve

Clapper Valve

2nd Stage

Intake

500 GPM @ 150 psi

+ 150 psi

500 GPM @ 300 psi
Parallel (Volume) Setting

- Transfer Valve
- First Stage Impeller
- Second Stage Impeller
- Flap Valve
- Driven Gear or Sprocket
Volume (Parallel) Setting

1000 GPM @ 150 psi
500 GPM @ 150 psi
500 GPM @ 150 psi

1st Stage
2nd Stage

Transfer Valve
Clapper Valve
Intake