

Topic: DRAFTING

Level of instruction: 2

Behavioral objectives: Student will be able to operate a pumping apparatus at a draft and supply hand lines and master streams from a static water source.

Materials Needed: Pumper capable of drafting, static water supply able to supply the rated capacity of the pump, 2 sections of hard intake hose, Strainer, utility ropes, ladders, salvage covers, hoses and nozzles for hand lines, master stream appliance and hose, PPE (Helmets, Coats, Gloves).

References: IFSTA Pumping Apparatus Driver/Operator Handbook 2<sup>nd</sup> edition.

Preparation: Drafting is an important skill for an Engineer. Fire service pumps are rated based on flows achieved at a draft. Ultimately, people's lives could depend on your ability to develop and maintain a water supply from a static source.

Presentation:

Drafting

- Using atmospheric pressure push water into the pump.

Selecting the drafting site – very important based on the type of incident.

- Amount of Water
  - Pools, streams, lakes, canals, etc. – needs to have enough to support incident.
  - Other considerations-
    - Tides
    - Temperature – avoid water above 90 F or below 35 F
- Type of water – in an emergency any type can be used. Always flush the pump after using nonpotable water.
  - Debris – Leaves, algae, and other foreign mater clogs strainers and reduces capacity
  - Sand – May damage seals, vanes, pump packing, and waterways from abrasion
  - Can remove the pump from service
- Accessibility of water – The higher the pump is above the water the lower the capacity.
  - As the amount of lift increases
    - Elevation pressure increases
    - Less friction loss can be overcome
    - Capacity of the pump decreases
  - Maximum lift to be effective is about 20 feet – 60% of pump capacity.
    - Better to use longer intake line than to be higher
  - Stability of the ground, time of year, operator safety

## Preparing to draft once a site has been selected

- Assemble and position intake hose – due to the drafting site this is usually done in a safe, stable location away from the apparatus. Once the intake is fully assembled it is then moved into position and secured to the pump intake, or the intake hose is placed in the water and then the pumper is positioned.
  - Check gaskets
    - In place
    - No dirt or debris
    - Storz connector gaskets have a rib
  - Use a mallet and /or spanners to assure airtight connections
  - Use manpower to make connections off the ground to avoid dirt in the couplings.
  - Strainer Types
    - Traditional – for rated pump capacity needs to have 2' above, below and on all sides to avoid air and debris.
    - Floating – works well in shallow sources, water enters on one side only limiting pump capacity.
    - Low-level – Used in portable tanks and pools – can draft as low as 2"
  - Attach strainer and secure with rope.
    - May be used to keep strainer above the bottom
    - Use rope to secure other items that are close to the water.
  - Avoid positioning the intake hose over railings, fences, or any obstruction that places the intake hose above the pump intake. An air pocket may form preventing effective drafting.
- Close any open drains or valves
  - Booster / Hard lines
  - By-pass valves
  - Circulators
  - Coolers
  - Intake relief valve – may need to be capped
- Isolate tank – close tank to pump
- Place the transfer valve in Volume (parallel) on two stage pumps
- Engage the pump
- Increase engine speed to 1000-1200 RPM
  - Keeps alternator charging
  - Helps prevent loss of prime
- Operate the primer
  - Lowers air pressure inside the pump by removing the air
  - Intake gauge registers a vacuum
    - Approximately 1" of vacuum equals 1 foot of lift
  - Intake hose fills with water and drops

- Should take no more than 30 seconds with 20' of intake hose and 10' of lift
  - Typically takes 10-15 seconds
  - If greater than 30 seconds stop priming and find problem
- Stop operating the primer pump when a prime has been achieved
  - Pressure gauge indicates prime
  - Water will be discharged from the primer pump
  - Sound changes may indicate prime
- Increase throttle to keep pressure between 50-100 psi once a prime has been established and before opening any discharges

#### Operating the pump from a draft

- Open discharges slowly while watching the discharge pressure
  - If pressure drops below 50 psi, pause and allow pressure to return
  - If valves are opened too quickly you may lose the prime
  - The primer pump may need to be operated again to purge more air
- Water should be kept moving to cool the pump and help maintain the prime
  - Flow a booster line if hoselines are not ready for water
  - Flow these lines back into the water source
  - The tank filler may be used if the tank has room
    - Avoid overfilling the tank
- Once streams are established set the relief valve
- Friction Loss
  - Hose
  - Appliances
  - Strainer
  - PDP
- Monitor all gauges frequently
  - Intake / Pressure
    - Slow drop in pressure may indicate debris at the strainer
    - Lower pump RPM if cavitation occurs – look for drop in pressure
  - Temperature
    - May need to use different pumper

#### Shutting down

- Slowly lower throttle to idle
- Disengage pump
- Allow pump to drain
- Operate primer for a few seconds to purge water and lubricate pump
- Flush pump and /or tank unless water is very clean

## Other considerations while drafting

### Atmospheric pressure

- 14.7 pounds per square inch at sea level or 29.9 inches of Mercury, depending on current weather
- Altitude reduces the amount of lift and pump capacity
  - Deduct 0.5 psi per 1,000 feet of elevation rise.

### Water under and around the pumper

- Control leaks and runoff to reduce erosion
- Use salvage cover to protect draft site

### Problems to drafting

- Air leaks on the intake side of the pump
  - Most common
- Whirlpools in tanks or shallow water sources
  - Longer intake hose
  - Use a ball or other object to prevent drawing air into intake
- Air leaks at the pump packing
- Insufficient fluid in the primer reservoir
- Engine speed too low
- Lift is too high
- High point in the intake hose creating an air pocket
- If the primer fails it may be possible to establish a draft using tank water

### Cavitation – Occurs when pump capacity is exceeded

- Pulsating hose lines
- Sputtering at the nozzle
- Gauges bouncing or pressure gauge not increasing
- Noise at the pump, may sound like gravel in the pump.

### Exercise

1. Spot the apparatus for drafting
2. Establish a draft and supply a master stream appliance at 1,000 gpm.
3. Secure and return apparatus to service