

FIRE PUMPS WITH MULTIPLE WATER SUPPLIES


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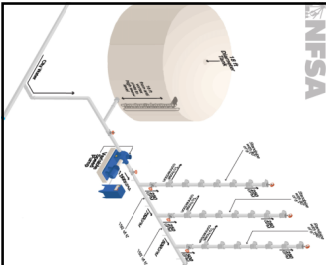
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COURSE DESCRIPTION



Explore the challenges that could be posed when designing a fire pump system with two different water supplies. This course will review the options to overcome these challenges in compliance with NFPA standards.



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LEARNING OBJECTIVES

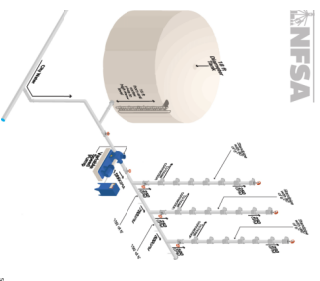
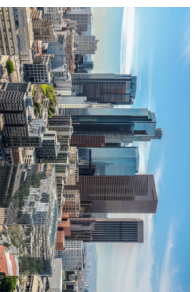
- 1 Review Scenarios When Multiple Water Supplies are Required
- 2 Understand the Challenges Introduced When Two Water Supplies are Provided
- 3 Develop Design Criteria for Break Tanks
- 4 Understand Variable Speed Pump Options



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WHEN ARE TWO SUPPLIES NEEDED OR REQUIRED

- Redundancy
- Supplement One Inadequate Supply
- Seismic Zones
- IBC (2021) Secondary water supply required for high-rise buildings in areas with a seismic design category of C.D, E or F



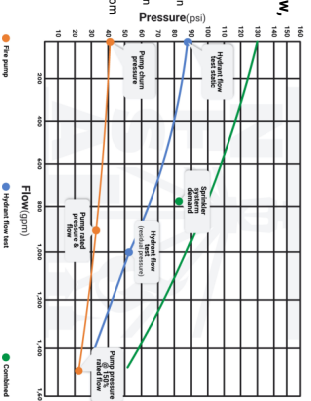
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WHAT PUMPS DO

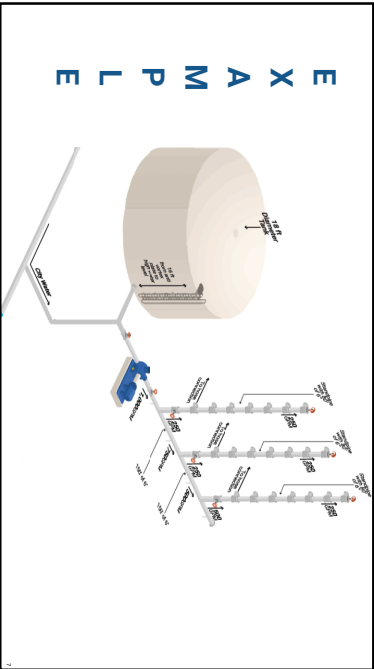
Fire pumps cannot create flow, only increase pressure.

$P_{\text{suction}} + P_{\text{pump net}} = P_{\text{discharge}}$

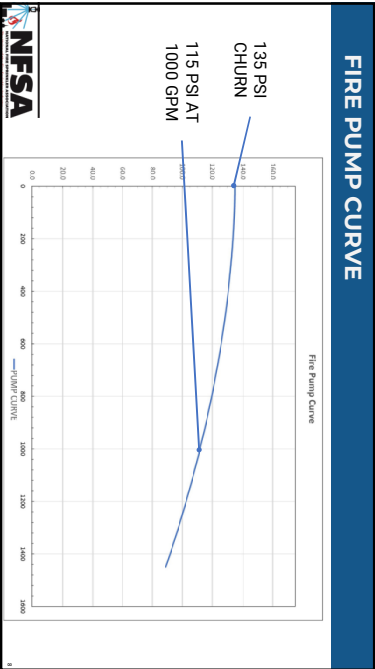
- P_{suction} = Pressure sure at pump suction flange for given flow
- $P_{\text{pump net}}$ = Net pump pressure for given flow
- $P_{\text{discharge}}$ = Total Discharge pressure from pump discharge flange.



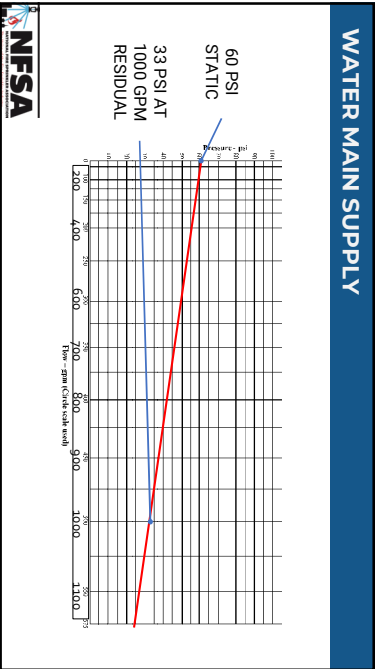
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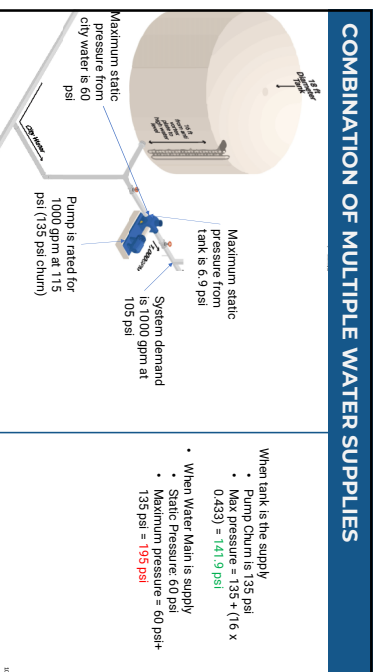
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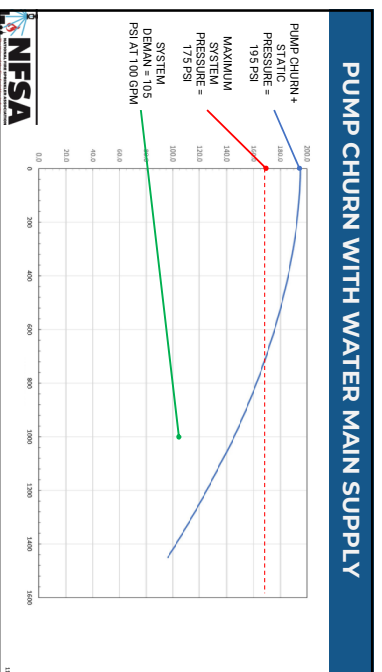
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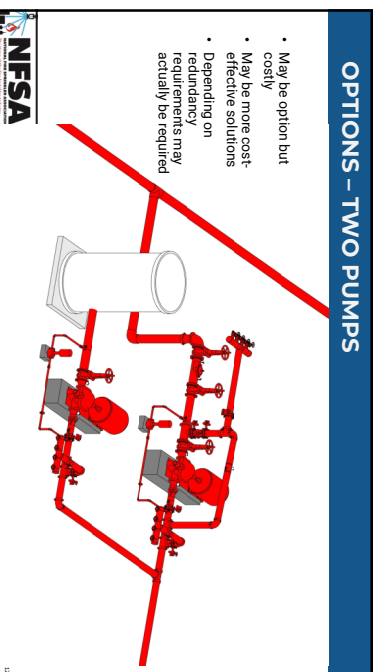
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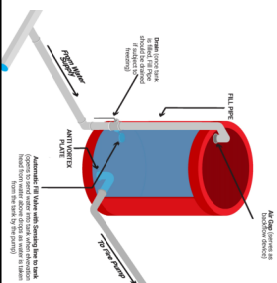


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BREAK TANK DESIGN

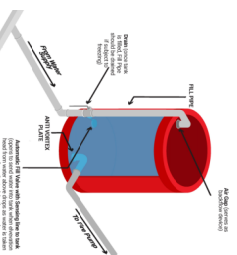


- Minimum of 15 minutes of water with the pump at 150% of rated flow
- If the tank is sized for less than 30 minutes 2 automatic fill lines are required.
- Must fill tank at 150% of rated flow of pump
- If water supply to refill can't meet 150% of fire pump rating, then must meet 110% of fire protection flow demand
- Manual bypass fill sized the same as automatic fill lines
- Low water level audible and visible signal in the vicinity of the refill mechanisms



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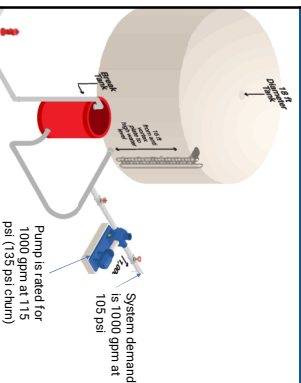
BREAK TANK DESIGN



- If the tank is sized for 30 minutes or more 1 automatic fill is required:
- Must fill tank at 110% of the rate necessary to meet the duration demand
 - 1.1 x (Duration Demand – Tank Capacity)/duration
- Manual bypass fill sized the same as the automatic fill line
- Low water level audible and visible signal
- Proximity of the refill mechanisms
- Pipe from water supply to refill follows NFPA 24
- Refill mechanism maintained at 40F
- Refill starts when water level drops 4 inches

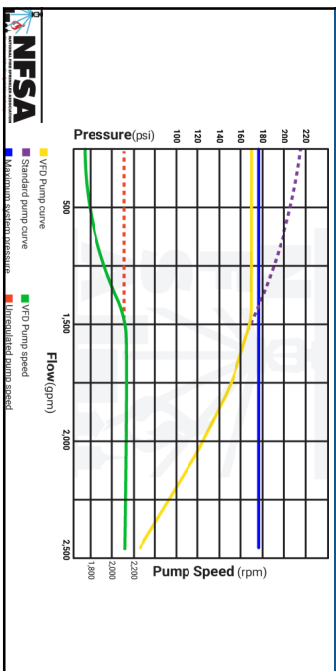
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BREAK TANK EXAMPLE



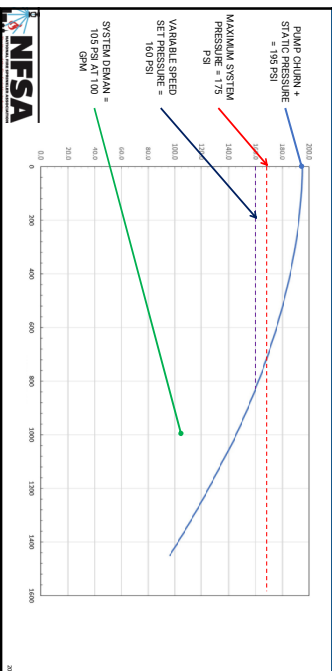
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VARIABLE SPEED FIRE PUMP



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VARIABLE SPEED PUMP EXAMPLE



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VARIABLE SPEED PUMP

- Variable Speed Electric Pumps use a Variable Frequency Drive (VFD) to regulate pump speed.
 - Adds considerable cost
 - Increases footprint
- Variable Speed Diesel Pumps use Pressure Limiting device
 - Adds cost but not as much as VFD
 - Does not increase footprint



NFSA

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LAST SLIDE



Questions?



Take survey for certificate [here](#):



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Next Learning Branch: April 7th
Fire Pumps for High Rises
Jeff Dunkel



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