

1. Understand how pumps are rated.
 - a. Fire pumps are rated per applicable standards from NFPA to deliver their rated capacity at 150 psi **from draft** (20' of hose and 10' of lift)
 - The actual in-service pump performance from the water tank or a pressurized water source may increase the pump's flow 10% or more compared with the same pump at draft.
 - The guaranteed maximum pressure for a single stage structural pump is only 250 psi from draft, per applicable NFPA standards.
 - b. Many engine driven pumps, such as wildland pumps, are not necessarily rated at 150 psi
 - c. Ultra-High Pressure (UHP) pumps have ratings of ≥ 6 gpm at ≥ 1100 psi.
2. It is critical to define the pressure and flow so the best pump for your use can be selected.
 - Most fire pump discharges require 120-200 psi of pump discharge pressure for hose lines, nozzles and appliances.
 - Low pressure nozzles allow for lower pump pressures to deliver the same flow rates.
 - Water supply lines may require as little as 40-50 psi of engine pressure, up to 185 psi for large diameter supply hose.
 - Long forestry lines, or if supplying lines up hills, or to high rise standpipes, may require 300 psi or higher pressure for adequate flow and acceptable nozzle performance.
 - Ultra High Pressure (UHP) hoses, nozzles and appliances are specially designed to be used at high pressures and low flows.
 - All hose, nozzles, and appliances should be selected appropriately to safely deliver the flows and pressures anticipated.
 - It is not enough just to define flow. As an example, a 500 gpm pump rated at 150 psi is a very different pump from a 500 gpm pump rated at 40 psi.
 - a. Applicable NFPA standards only require pump performance up to 2,000 feet of elevation above sea level. To maintain the rated performance above that elevation may require more horsepower or a different pump.
3. Pump size should be based on actual flows needed in a typical operation.
 - a. NFPA® 1901 Standard for Automotive Fire Apparatus defines generic ratings for what can be expected out of any size discharge. Ensure the apparatus is equipped with enough discharges to allow the pump to operate at capacity.
 - b. Review fire ground operation plans to determine what is needed from the pump.
 - Verify the sum of all flow rates for each attack line on the apparatus
 - Verify the maximum supply line volume expected for the apparatus. Note: if the supply line is operated at less than 120 psi, then deduct approximately 10% for the reduced pressure.
 - Add the rating for any master stream devices attached to the apparatus.

- c. The pump rating will likely need not be any larger than the sum of items described above that will be operated simultaneously.
 - d. If these ratings are to be maintained while being supplied from a pressurized source, the required pump capacity may be reduced up to 10%.
4. Ensure the pump is not too large for the water supply.
- a. If the pump is certified to applicable NFPA standards, it may have the potential to draft at the rated capacity provided there is access to an adequate draft site and the apparatus is equipped with properly sized suction hoses.
 - b. If the water supply to the pump is from a municipal or industrial water system, verify the pump size against the rating of those systems.
 - c. When the apparatus is to be supplied exclusively by a tanker apparatus task force, performance of the tanker (NFPA 1091 defined Mobile Water Supply Apparatus) apparatus performance should be considered.
 - d. The required tank to pump performance in NFPA® 1901 Standard for Automotive Fire Apparatus is 500 gpm. If a larger flow from the on-board tank is needed, the apparatus or pump manufacturer may need to install larger sized piping, valves and/or additional line(s).