

PUMP TESTING



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Lately I have been doing quite a bit of flow and pressure testing on our primary engines. This got me thinking that we never test the pump on the grass truck let alone test the attack package for flow capacity. So how should we go about testing our portable pumps and attack package?

NFPA 1906 section 16.13 provides guidance to test pumps on wildland apparatus and can be applied to portable pumps as well. The tests are very similar to testing engine pumps. Testing is done from draft with suction hose sized based on pump capacity. The intake and discharge pressures are measured during the test to evaluate net pump pressure. If no gauge is present on the inlet of the pump a test gauge will be used using existing test connections at the pump inlet. If the pump is not equipped with a test port at the inlet, a spool piece with a test port will be needed between

the suction hose and inlet. Flow can be measured using a flow meter or pitot tube and gauge with a smooth bore nozzle.

The first part of the test is the vacuum test, the intake valves are opened, and the intakes capped or plugged. The first part of the test is done with all caps removed from the discharges and the discharge valves closed. The priming system should create a vacuum of 17 in.Hg at an elevation of 2000ft. For elevations greater than 2000 feet, the target vacuum is reduced by 1 in. Hg for each 1000 feet of elevation over 2000 feet. Once the desired vacuum is obtained discontinue the use of the primer. The vacuum should be held with no more than a 10 in. Hg drop for 5 minutes. At the end of 5 minutes the test is repeated with the discharge valves opened and discharges capped.



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For the pump capacity test connect the needed discharge hoses to the flow measuring devices and the suction line and straining connected and placed in a water source. To start the capacity test the pump must be primed in 30 seconds or less. Open the discharges connected to the flow measuring device and increase the throttle till rated flow of the pump is achieved. Record the time, flow, intake and discharge pressure at this point. This flow is then maintained for 30 minutes. Data should be taken every 10 minutes. NFPA 1906 requires data to be taken every 15 minutes, since the test is a short duration taking data every 10 minutes will improve the quality of the data without putting a burden on the data collector.

Once the capacity test is complete if the pump is used with a tank the flow from the tank to pump is tested. The test is best conducted with a means to continually fill the tank through the top fill hatch. The same flow testing equipment used for the pump capacity test will be used to test the tank to pump flow. Open the tank to pump valve and the discharge valves going to the flow meters. At this time start the flow to refill the tank through the top fill hatch. Increase the pump throttle till maximum tank to pump flow is reached. The maximum flow of the tank to pump plumbing will be indicated by the pump starting to cavitate. Cavitation is recognized by sound or when increase in the throttle does not produce an increase in discharge pressure. The pump should not be operated in a flow range that causes cavitation. If the pump cavitates during this test before

the pump capacity is achieved back the throttle down till the pump is no longer cavitating. When the flow is maximized start recording data for flow and discharge pressure. This test will run for 15 minutes with data taken every 5 minutes.

Once the pump is tested it is good practice to test the flow of the actual attack package connected to the pump. If a smooth bore is used a pitot tube and gauge can be used to measure the flow. Otherwise a flow meter should be installed at the discharge of pump where the line under test is connected. In this configuration it is a good idea to have a pressure gauge at the inlet and outlet of the flow meter to document the pressure drop the flow meter may add to the system. Using the water source the pump will use under normal operating conditions provides the best demonstration of how the system will perform in fire ground operations. If the normal operations are supplied from the tank total system performance should be evaluated with the tank as the supply. Take this opportunity to time how long tank water will last for each attack package. This will give the crew the amount of time available to operate before and additional water supply is secured.

Pump testing can be involved but definitely worth the time. Not only does NFPA require annual testing, it provide a means to become more familiar with the capabilities and limitation of the pump along with the water supply and delivery packages used on the apparatus.



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