

## Fire Protection Hydraulics and Water Supply Analysis

FPST 2483 Chapter 10  
Fire Pump Testing

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## Module objective

- Upon completing this module, the student should be able to:
  - Understand the required tests to commission a fire pump
  - Understand the equipment needed for fire pump tests
  - Understand the steps to complete a fire pump test
- Reading materials
  - Brock's book, chapter 10

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## Required Tests

- NFPA 20
- Hydrostatic Test
  - Suction
  - Discharge
- Underground Flush
- Performance Test

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## Performance Test



- 3 Standard Test Points
  - 140% Pressure at Churn
    - NO Flow
  - Pumps Rated Pressure and Flow
  - 65% Pressure at 150% of Flow

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## Equipment



- 2-1/2 inch or larger hose connections
  - # dependent upon test header
- Playpipes
  - Hose Monster or Flowbusters Acceptable
  - Method to Secure Playpipes
- Pitot Tube / Gauge
- Method to Measure Pump Speed (rpm)
- Voltmeter
- Ammeter

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## Pump Test



1. Calculate the expected pitot pressure
  - 100% of rated flow
  - 150% of rated flow
$$P = (Q / 29.83 c_d d^2)^2$$
2. Connect hoselines and nozzles / diffusers
  - Hosevalves closed
3. Revolution Counter in place

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## Pump Test



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4. Start Pump
  - No Flow, Churn pressure
  - Record suction (horizontal pump only) and discharge pressures
  - Measure rpm
  - Voltage and Current readings
  - Circulation Relief Valve should be OPEN

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## Pump Test



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5. Open the control valve in the line leading to the test header and open the hose valves for the first flow measurement.
6. Adjust flow such that the pitot pressure readings are for 100% of the rated flow.
  - Record suction (horizontal pump only) and discharge pressures
  - Measure rpm
  - Voltage and Current readings
  - Circulation Relief Valve should be CLOSED

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## Pump Test



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7. Open additional hoselines and adjust to 150% of rated flow.
  - Record suction (horizontal pump only) and discharge pressures
  - Measure rpm
  - Voltage and Current readings
  - Circulation Relief Valve should be CLOSED

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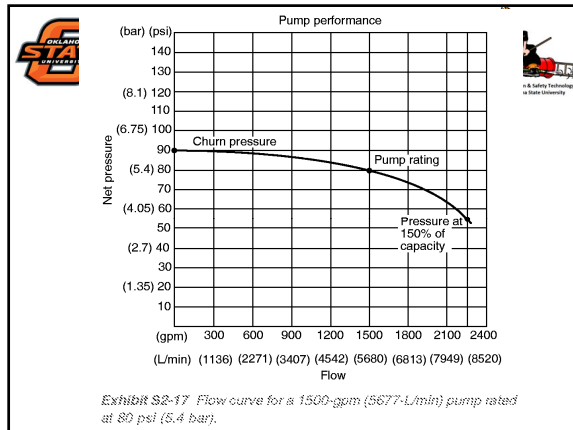
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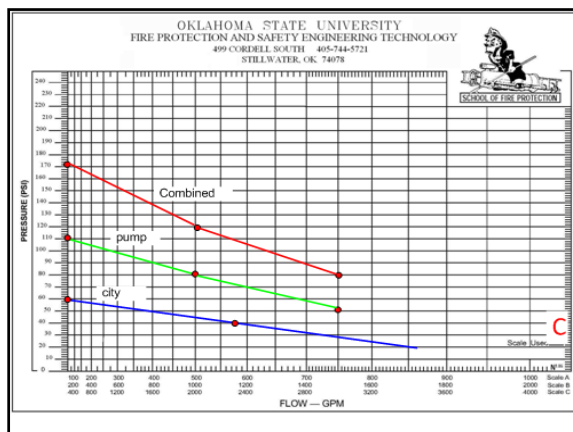
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## Affinity laws

- Pump performance at any pump speed can be corrected to the rated pump speed by affinity laws.

$$\frac{Q_1}{Q_2} = \frac{rpm_1}{rpm_2}$$

$$\frac{P_1}{P_2} = \left( \frac{rpm_1}{rpm_2} \right)^2$$

$$\frac{hp_1}{hp_2} = \left( \frac{rpm_1}{rpm_2} \right)^3$$

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## Summary



- We have learned
  - Required Tests
  - Equipment needed for Performance Tests
  - Steps to complete a Test

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