**Fire Pump Inspection, Testing, & Maintenance**

**Policy Statement**

Fire pumps are an essential part of some fire protection systems. They are used to increase the water pressure for the system it is supplying. If your fire protection system has a fire pump, it is required to complete inspection, testing, and maintenance to ensure proper functioning.

**Procedures**

When a healthcare provider has a fire pump installed to increase the water pressure for the fire suppression system, routine inspection, testing, and maintenance of the fire pump assemblies shall be completed and documented. The minimum frequencies for inspection, testing, and maintenance are outlined. Alternate inspection, testing and maintenance procedures shall be based on the manufacturer’s recommendations. If manufacturer recommendations are not included, guidelines can be found in Table 8.1.2 of the 2011 Edition of the NFPA 25.

Testing and maintenance of the fire pump shall be completed by qualified individuals only. When testing the fire pump system, qualified operating personnel shall be in attendance whenever the pump is in operation.

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| Frequency | Item | Notes |
| Weekly | Inspection of the pump house, heating, & ventilating louvers.  | See detailed list below under 1.  |
| Inspection of the fire pump system |
| Testing of the diesel engine driven fire pump.  | Testing shall be conducted by starting the pump without flowing water for a minimum of 30 minutes.  |
| Monthly | Testing of the electric motor driven fire pump.  | Testing shall be conducted by starting the pump without flowing water for a minimum of 10 minutes.  |
| Annually | Testing of flow condition | See detailed requirements under 2 section G below.  |
| Testing of fire pump alarm signals.  | See detailed requirements under 2 section J below.  |
| Maintenance of the hydraulics.  | Complete according to manufacturer’s recommendations.  |
| Maintenance of the mechanical transmission.  |
| Maintenance of the motor.  |
| Varied (based on manufacturer’s recommendations) | Maintenance of the electrical system.  |
| Maintenance of the controller, various components.  |
| Maintenance of the diesel engine system, various components.  |

1. The purpose of inspection shall be to verify that the pump assembly appears to be in operating condition and is free from physical damage. The following visual observations shall be performed weekly:
	1. Pump house condition:
		1. Heat is adequate, not less than 40 degrees Fahrenheit (5 degrees Celsius) for pump room with diesel pumps without engine heaters.
		2. Ventilating louvers are free to operate.
	2. Pump System:
		1. Pump suction, discharge, and bypass valves are fully open.
		2. Piping is free of leaks.
		3. Suction line pressure gauge reading is within acceptable range.
		4. System line pressure gauge reading is within acceptable range.
		5. Suction reservoir is full.
		6. Wet pit suction screens are unobstructed and in place.
		7. Waterflow test valves are in the closed position.
	3. Electrical System:
		1. Controller pilot light (power on) is illuminated.
		2. Transfer switch normal pilot light is illuminated.
		3. Isolating switch is closed – standby (emergency) source.
		4. Reverse phase alarm pilot light is off, or normal phase rotation pilot light is on.
		5. Oil level in vertical motor sight glass is within acceptable range.
		6. Power to pressure maintenance (jockey) pump is provided.
	4. Diesel Engine System:
		1. Fuel tank is at least two-thirds full.
		2. Controller selector switch is in auto position.
		3. Batteries (2) voltage readings are within acceptable range.
		4. Batteries (2) charging current readings are within acceptable range.
		5. Batteries (2) pilot lights are on or battery failure (2) pilot lights are off.
		6. All alarm pilot lights are off.
		7. Engine running time meter is reading.
		8. Oil level in right angle gear drive is within acceptable range.
		9. Crankcase oil level is within acceptable range.
		10. Cooling water level is within acceptable range.
		11. Electrolyte level in batteries is within acceptable range.
		12. Battery terminals are free from corrosion.
		13. Water-jacket heater is operating.
	5. Steam System Conditions:
		1. Steam system pressure gauge reading is within acceptable range.
2. Testing:
	1. Testing of diesel engine-driven and electric motor-driven fire pumps assemblies shall be conducted without flowing water.
	2. The test shall be conducted by starting the pump automatically. See the table above for the duration of testing based on the type of engine/motor.
	3. Pump System Procedures:
		1. Record the system suction and discharge pressure gauge readings.
		2. Check the pump packing glands for slight discharge.
		3. Adjust gland nuts if necessary.
		4. Check for unusual noise or vibration.
		5. Check packing boxes, bearings, or pump casing for overheating.
		6. Record the pump starting pressure.
	4. Electrical System Procedures:
		1. Observe the time for motor to accelerate to full speed.
		2. Record the time controller is on first step (for reduced voltage or reduced current starting).
		3. Record the time pump runs after starting (for automatic stop controllers.
	5. Diesel Engine System Procedures:
		1. Observe the time for engine to crank.
		2. Observe the time for engine to reach running speed.
		3. Observe the engine oil pressure gauge, speed indicator, water, and oil temperature indicators periodically while engine is running.
		4. Record any abnormalities.
		5. Check the heat exchanger for cooling waterflow.
	6. Steam System Procedures:
		1. Record the steam pressure gauge reading.
		2. Observe the time for turbine to reach running speed.
	7. Annual Flow Testing:
		1. An annual test of each pump assembly shall be conducted by qualified personnel under minimum, rated, and peak flows of the fire pump by controlling the quantity of water discharged through approved test devices.
		2. If available suction supplies do not allow flowing of 150% of the rated pump capacity, the fire pump shall be permitted to operate at maximum allowable discharge.
		3. Use of pump discharge via hose streams:
			1. Pump suction, discharge pressures and the flow measurements of each hose stream shall determine the total pump output.
			2. Care shall be taken to prevent water damage by verifying there is adequate drainage for the high-pressure water discharge from hoses.
		4. Use of pump discharge via bypass flowmeter to drain or suction reservoir:
			1. Pump suction and discharge pressures and the flowmeter measurements shall determine the total pump output.
		5. Use of pump discharge via bypass flowmeter to pump suction (closed-loop metering).
			1. Pump suction and discharge pressures and the flowmeter measurements shall determine the total pump output.
	8. Pertinent visual observations, measurements and adjustments specified shall be conducted annually while the pump is running and flowing water:
		1. At no-flow condition (churn) as follows:
			1. Check the circulation relief valve for operation to discharge water.
			2. Check the pressure relief valve (if installed) for proper operation.
		2. At each flow condition as follows:
			1. Record the electric motor voltage and current (all lines).
			2. Record the pump speed in rpm.
			3. Record the simultaneous (approximately) readings of pump suction and discharge pressures and pump discharge flow.
		3. For electric motor-driven pumps, the pump shall not be shut down until the pump has run for 10 minutes.
		4. For diesel motor-driven pumps, the pump shall not be shut down until the pump has run for 30 minutes.
	9. For installations having a pressure relief valve, the operations of the relief valve shall be closely observed during each flow condition to determine whether the pump discharge pressure exceeds the normal operating pressure of the system components.
		1. The pressure relief valve shall also be observed during each flow condition to determine whether the pressure relief valve closes at the proper pressure.
		2. The pressure relief valve shall be closed during flow conditions if necessary to achieve minimum rated characteristics for the pump and reset to normal position at the conclusion of the pump test.
	10. For installations having an automatic transfer switch, the following test shall be performed to ensure that the over-current protective devices (i.e. fuses or circuit breakers) do not open:
		1. Simulate a power failure condition while the pump is operating at peak load.
		2. Verify that the transfer switch transfers power to the alternate power source.
		3. Verify that the pump continues to perform at peak load.
		4. Remove the power failure condition and verify that, after a time delay, the pump is reconnected to the normal power source.
	11. Alarm conditions shall be simulated by activating alarm circuits at alarm sensor locations, and all such local or remote alarm indicating devices (visual and audible) shall be observed for operation.
3. Maintenance:
	1. A preventative maintenance program shall be established on all components of the pump assembly in accordance with the manufacturer’s recommendations.
	2. Records shall be maintained on all work performed on the pump, driver, controller, and auxiliary equipment.
	3. The preventative maintenance program shall be initiated immediately after the pump assembly as passed acceptance tests.

Documentation of all inspections, testing, and maintenance shall be indicated on form and provided to life safety code surveyors and fire pump inspectors and repairmen as requested.

**Resources:**

NFPA25, 2011 Edition. *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.* [*https://ia801209.us.archive.org/22/items/gov.law.nfpa.25.2011/gov.law.nfpa.25.2011.pdf*](https://ia801209.us.archive.org/22/items/gov.law.nfpa.25.2011/gov.law.nfpa.25.2011.pdf)