

ELECTRIC FIRE PUMPS: USE AND MAINTENANCE

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OVERVIEW

Electric fire pumps, also known as “booster pumps,” increase water pressure in fire sprinkler systems. Consider using booster pumps when water supplies do not provide adequate pressure for the operation of a sprinkler system. Fire pumps are connected to a city water main, water tank, reservoir, or ponds that are designed for firefighting purposes.

The reliability of a fire protection system depends on the operation of the pump. In some instances, a secondary water source is required. And in most cases, an electric motor driven fire pump drives the system.

OPERATION

A fire pump consists of a suction port that draws water from the source and a discharge port that expels water at a higher pressure rate. A check valve prevents water from leaking back into the source once the pump stops operating. Since an electric motor drives the pump, it is important to calibrate both at the same “RPM.”

The motor and pump assembly is started by a controller box equipped with a pressure sensing device that will engage when the pressures drop below a preset point. It is possible to change the set point while in the field.

A smaller pump, called a “jockey pump,” is sometimes installed to supplement small pressure changes and low water volume resulting from leaks or expansion within the system. The jockey pump is set to cut in before the main pump, and has a field adjustable pressure-sensing device as well.

PRESSURE SETTINGS

A fire pump engages automatically when the sensing device detects a pressure drop in the sprinkler system. The National Fire Protection Association recommends that the jockey pump (if utilized) be set to shut off at “pump churn” pressure plus the minimum static pressure on the suction side of the pump.

Set the jockey pump start pressure at approximately 10 psi less than the jockey pump shut off pressure. Set the main pump to cut in about 5 psi less than the jockey pump start pressure, and cut out at the same shut off pressure as the jockey pump.

Many systems are set to cut in whenever pressure drops. Some building owners or managers are concerned about the possibility of water damage caused by maintaining high pressure in the system. However, this could be problematic during testing, as the low pressure in the lines are prone to create a “water hammer” effect, which can cause leaks throughout the entire system.

PUMP MAINTENANCE

If your property is equipped with a fire protection pump, it requires periodic inspection, maintenance, and testing. Additionally, it should include alarm devices to ensure reliability during an emergency.

Depending on the ability of your in-house staff, you may perform some or all of the inspection, maintenance, and testing procedures internally. Regardless, it is best to hire a sprinkler contractor for the annual flow test.

If the fire department or a central station monitors your sprinkler system, it is imperative that you notify them before and after you conduct any testing.

A list of some of the major maintenance and testing items are listed below:

INSPECTIONS: SUGGESTED AT WEEKLY INTERVALS

- Check to make sure valves are open between the water source and the sprinkler system (including system by-pass valves, if any). The valve to the test connection should remain closed during normal operation.
- Check to make sure the controller power switch is on (closed) and the power light is on. This also applies to the transfer switch, if present.
- Make sure there is a heat source in the pump room/ location. If your area is subject to freezing weather, install a heater that maintains a 40-degree temperature in the pump room.
- Check for leaking pipes. It is normal for the pump to drip water from the two pump shaft seals. This provides lubrication when it is operating and helps prevent overheating.
- Check pressure gauges for normal readings. A line on the gauge face or tag for the suction side gauge and system side (after the check valve) gauge is helpful to indicate normal pressure.
- If the alarm panel/control box has visual or audible alarms, they should not be in the alarm mode when inspecting or servicing equipment.

MAINTENANCE: SUGGESTED ANNUAL INTERVALS

- Inspect and lubricate pump bearings and coupling.
- Check gauge and pressure switch accuracy on both the main pump and jockey pump.
- Tighten all electrical connections.

TESTING: INTERVALS AS INDICATED

- **Pump Churn Test:** Check if pump starts with a drop in pressure. Record the gauges on the suction and discharge sides. Test weekly.
- **Pump Alarm Tests:** Test pump alarms for pump running, power failure, and valve tamper every quarter. Check alarm functions with the central station.
- **Pump Flow Test:** Operate pump with water flowing through the unit. Test the pump at churn, at 100% of its rated GPM capacity, and at 150% of its rated capacity. The resulting pressure should equal the pump rated pressure. The resulting pressure at 150% of the rated flow should be no less than 65% of the rated pressure at 100% flow. It is advisable to have a contractor equipped to perform this function. Some pumps have a flow gauge built into the system, which allows for testing without a water discharge on the property. Test annually.

- **Transfer Switch Operation:** Test manual or automatic transfer of power supplies annually.

The National Fire Protection Association has additional details on inspection, testing, and maintenance procedures listed in NFPA 25 Standard for the Inspection Testing and Maintenance of Water Based Fire Protection Systems (2020 Edition, Chapter 8 Fire Pumps, Sections 8.2 Inspection and 8.3 Testing) that can serve as an additional resource for help.

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