

Risk Control

Fire Pump Testing – Weekly Operational Test

Introduction

The following covers the basic concept of weekly performance testing of electric motor and diesel engine driven fire pumps. Testing helps verify that the pumps will start automatically and operate without failure when needed.

The information provided is not intended to cover all aspects of the periodic maintenance needed by a fire pump system, its drivers, fuel supplies, power supplies or back-up power supply mechanisms. It is not intended to cover the testing of fire pumps driven by gasoline engines, steam engines or other types of drivers, although many of the procedures are similar. Nor does the test cover the annual flow test that should be completed on all fire pumps to help verify that the pumps are operating at the manufacturer's specifications. The procedures in this document are not intended to comply with any governmental regulations.

Procedures

A weekly operational test of all fire pumps should be conducted by running the pump in a "no-flow" or "churn" situation with all valves open as per normal. Qualified operating personnel should monitor the pump while the pump is running. Each pump should run for the proper time interval and be observed for problems. This document contains checklists for an electric motor and a diesel engine driven pump. The proper checklist should be used to record vital data about the pump and to help identify abnormalities in the operation of the pump. Any abnormalities should be corrected immediately or noted for future correction. If any major malfunctions, such as smoke, excessive vibration, or excessive noise are witnessed, discontinue the test immediately and repair equipment as soon as possible.

A. Test Procedure: The weekly pump operational test is part of the overall preventative maintenance procedures for a fire pump. The run test helps ensure that the pump will operate without mechanical difficulty and protect the facility if a fire should occur.

1. Notify the alarm company that the fire pump is going to be tested.
2. Start the pump with a drop in system pressure. To do this, open the drain cock located near the pump controller with the jockey pump turned off. Record the pump starting pressure.
3. Check the pump packing glands to verify that a slight discharge of water is visible. If no water is dripping, adjust the packing gland nuts appropriately.
4. Check for excessive vibration, unusual noise, or other signs of malfunction. Make corrections as needed. Discontinue the test if destructive failure appears imminent. Make repairs as soon as possible. If all appears normal continue with the test.

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5. Record the system suction and discharge pressures. Record other system data as listed on the appropriate checklist.
6. Verify that the pump operates for the appropriate time period; a **minimum** of 10 minutes for electric motor driven pumps and 30 minutes for diesel engine driven pumps.
7. Periodically verify that the pump and driver are not overheating during the test.
8. Shut down the pump manually.
9. Turn the jockey pump back on. Restore the fire pump controller to the automatic start position.
10. Notify the alarm company that the test is complete and that the alarm system should be put back to normal service.

B. Interpretation of test results: Once test data is recorded, compare it to previous tests to determine if the pump is operating satisfactorily. Significant differences in operation should be analyzed as to the cause. Corrective actions should be completed as soon as possible and the pump retested.

Maintenance

Fire pump components should receive preventative maintenance. As with any mechanical device the fire pump needs inspection, lubrication, fluid checks and changes, cleaning and testing. The following systems are typically part of a fire pump and require scheduled preventative maintenance: pump systems; mechanical transmission components; electrical systems; diesel engine systems; exhaust systems; lubrication systems; cooling systems; and battery systems.

The best resource for a preventative maintenance program for a fire pump is from the fire pump manufacturer. Fire pumps should be maintained in accordance with manufacturer's specifications; the procedures in this paper are suggested guidelines. NFPA 25 also suggests schedules for weekly, monthly, quarterly and annual inspection, testing and maintenance of these systems.

Fire pumps should also receive annual full-flow testing to measure the pump's flow and pressure performance against the manufacturer's rating of the pump. Any significant reduction in pump performance should be investigated and/or repaired immediately.

Conclusion

Fire pumps are required at many facilities to provide the needed pressure for the sprinkler and fire hose standpipe systems. Without a fire pump these systems would not operate adequately. Proper testing and maintenance of fire pump systems is critical to maintaining fire protection for such facilities. The testing procedures and checklists in this guide can help increase the reliability of a fire pump. The checklists included at the end of this document can be used as they are or they can be adapted for a particular facility and fire pump installation.

References

1. National Fire Protection Association. Inspection, Testing and Maintenance of Water Based Fire Protection Systems. NFPA 25 Quincy, MA
2. Engineering and Safety Service (ISO). Fire Protection Report FP-43-04, Fire Pumps American Insurance Services Group, Inc. New York, NY.

Note: The checklists begin on the following page.

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FIRE PUMP WEEKLY TESTING AND INSPECTION CHECKLIST (Diesel - Engine Driven)

By: _____

Date: _____

Before testing the fire pump, contact the alarm receiving station at telephone #: _____

WEEKLY TESTING AND INSPECTION			
ITEM	STATUS		
	Yes	No	N/A
Pump room heat maintained at 40° F? (70° F for diesel engines without heaters?)			
Piping valves (suction, discharge and bypass) open? (Test header valve is closed?)			
Water-jacket heater or other engine heater operating?			
Room ventilation louvers free to operate?			
Suction reservoir full?			
Wet pit suction screens unobstructed and in place?			
Both banks of the batteries' voltage readings normal?			
Both banks of the batteries' charging current readings normal?			
Both banks of the batteries' pilot lights on or battery failure pilot lights off?			
Electrolyte level in batteries normal?			
Battery terminals free from corrosion?			
Engine crankcase oil level normal?			
Engine cooling water level normal?			
Engine hours – Start of test _____ hours			
Pump started automatically by dropping pressure? Start pressure _____ psi			
Pump running suction pressure normal? _____ psi			
Pump running discharge pressure normal? _____ psi			
Pump running oil pressure normal? _____ psi			
Engine coolant temperature normal? _____ °F			
Pump packing glands have slight water drip? (The water drip cools the packing)			
Pump casing temperature within proper range (not hot to the touch)?			
Heat exchanger temperature within proper range and has visible water flow to drain?			
Water piping in good condition (no leaks from joints, cracks, etc.)?			
Relief valve operational?			
Pump run at churn (no flow) for at least 30 minutes?			
Engine hours – End of test _____ hours			
Fuel tank at least two-thirds full?			
Pump controller selector in "AUTOMATIC" position?			
All alarm pilot lights off?			

A "no" response above indicates the need for investigation and corrective action to restore the system to normal operation. These weekly inspection and test items are considered minimum requirements. The manufacturers' inspection and test requirements for the pump and engine may be more comprehensive and should be followed at all times.

Additional Comments: _____

After testing the fire pump, contact the alarm receiving station to verify alarms were received and restore alarm system to normal status.

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FIRE PUMP WEEKLY TESTING AND INSPECTION CHECKLIST (Electric - Motor Driven)

By: _____

Date: _____

Before testing the fire pump, contact the alarm receiving station at telephone #: _____

WEEKLY TESTING AND INSPECTION			
ITEM	STATUS		
	Yes	No	N/A
Pump room heat maintained at 40° F?			
Piping valves (suction, discharge and bypass) open? (Test header valve is closed?)			
Suction reservoir full?			
Wet pit suction screens unobstructed and in place?			
Pump started automatically by dropping pressure? Start pressure _____ psi			
Pump running suction pressure normal? _____ psi			
Pump running discharge pressure normal? _____ psi			
Pump packing glands have slight water drip? (The water drip cools the packing)			
Circulating relief valve has adequate flow while pump is running? (Cools pump)			
Pump casing temperature within proper range (not hot to the touch)?			
Water piping in good condition (no leaks from joints, cracks, etc.)?			
Oil level in sight glass normal? (vertical pumps only)			
Relief valve operational? (if provided)			
Pump run at churn (no flow) for 10 minutes?			
Pump controller pilot light (power on) illuminated?			
Pump controller pilot light (transfer switch) illuminated?			
Reverse phase pilot light off <u>or</u> normal phase pilot light on?			

A "no" response above indicates the need for investigation and corrective action to restore the system to normal operation. These weekly inspection and test items are considered minimum requirements. The manufacturers' inspection and test requirements for the pump and motor may be more comprehensive and should be followed at all times.

Additional Comments: _____

After testing the fire pump, contact the alarm receiving station to verify alarms were received and restore alarm system to normal status.

IMPORTANT! To save a copy of this form once filled in, you must choose File/Save As from the top menu bar, give it a unique name and save a copy to your computer. You may also print out a completed copy by clicking on the Print Form button.

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