



# Property Risk Consulting Guidelines

## TESTING FIRE PUMP CONTROLLER FEATURES

### INTRODUCTION

Fire pump controllers are equipped with numerous features that must be tested on a periodic basis to ensure fire pump reliability.

### POSITION

Include the testing of the fire pump controller features in the Fire Protection Equipment Inspection as discussed in OVERVIEW. AXA XL Risk Consulting recommends the testing schedule shown in Table 1. The tests should be performed by individuals familiar with the equipment.

TABLE 1  
Fire Pump Controller Features

	INSPECT WEEKLY	TEST ANNUALLY
1. Start By Dropping Water Pressure***	YES	YES
2. Start By Remote Manual Actuation	NO	YES
3. Start By Remote Equipment Control	NO	YES
4. Running Alarm***	YES	YES
5. Running Timer	YES	YES
6. Cooling-Water Solenoid*, **	YES	YES
7. Lubrication Solenoid (Vertical Turbine)*, ***	YES	YES
8. Low-Lubricating Oil Pressure Alarm*, ***	YES	YES
9. Low-Lubricating Oil Pressure Switch*, **	YES	YES
10. Ratchet-Relays*	YES	YES
11. Start By Power Failure*	NO	YES
12. High-Engine Temperature Alarm*, ***	YES	YES
13. High-Engine Temperature Switch*, **	YES	YES
14. Overspeed Shutdown (Diesel)*	YES	YES
15. Overspeed Position Alarm*, ***	YES	YES
16. Failure-To-Start Alarm*, ***	NO	YES
17. Battery-Failure Alarm*	NO	YES
18. Battery-Failure Lockout Circuit*	NO	YES
19. Start By Manual Actuation*	YES	YES
20. Start Engine With Loss Of Controller	NO	YES
21. Fuel tank interstitial space liquid intrusion	NO	YES
22. Low engine temperature*	YES	YES
23. Low fuel level	YES	YES

\* Does not apply to all engines  
 \*\* Bench test  
 \*\*\* Tested on first start during weekly operation

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Use the following procedures to perform the numbered tests outlined in Table 1:

1. Starting on a drop in water pressure is tested weekly as part of the weekly inspection, if the controller is arranged to automatically drop the pressure in the sensing line at a prescribed time. Verify by observing its operation.  
  
Test this function manually on an annual basis. Check the water pressure. Test the auto starting feature by manually reducing the water system pressure.
2. If provided, test the remote manual actuation device to ensure the circuit is functioning properly.
3. If provided, test automatic remote starting equipment by operating the water flow alarm, dry pipe valve or deluge valve.
4. Check local and remote running alarms.
5. If a running period timer is used, verify its settings.
6. Check the rate of discharge from the engine cooling system and observe the operation of the solenoid valve. Clean strainers as required.
7. On vertical turbine pumps having oil lubricated shaft bearings, check for oil in the sight glass to confirm operation of the solenoid valve.
8. The circuit may be tested by jumping the terminals on the pressure switch while the engine is running.
9. On some controllers the trouble lamp lights momentarily each time the engine is started. This provides an automatic test of the pressure switch, observed during weekly starting. If this feature is not provided, verify the position of the normally closed pressure switch contacts annually, while the engine is not running. Use an ohmmeter or a test light that does not exceed battery voltage.
10. Start the engine twice under automatic control and observe the operation of the ratchet relay plungers, observing the dimming of the appropriate battery lights, or listen for the reaction of the contactor solenoid armature.
11. When provided, test power failure starting of the engine by opening the ac circuit to the controller.
12. Test the high engine temperature alarm circuit by jumpering the terminals on the temperature switch.
13. Test the high temperature switch according to the engine manufacturer's recommendations.
14. The method of overspeed shutdown is engine specific. It may be accomplished either by shutdown of the air damper for Detroit Diesels manufactured prior to 1980 or by shutdown of the fuel solenoid for all other engines. Test overspeed with the pump discharge valve shut. The engine should shut down at approximately 20% overspeed and should operate the alarm. If the relief valve has to be adjusted for this test, reset it to the correct pressure at the completion of the test. Some engines may have a verify switch on the instrument panel which will verify the operation of the overspeed switch. Some engines require that terminals on the back of the instrument panel be jumpered to activate the switch. Be sure and use the reset switch to place the engine back in operation.

If a solenoid-operated air damper is used as the overspeed shutdown device, place a jumper across the normally open contact terminals of the overspeed switch which actuates the air damper solenoid. This should energize the solenoid and close the air damper. If a mechanically-operated air damper is used, the air damper may be operated by hand to check its mechanical features.

Newer engines use fuel solenoids with contacts that can be jumpered to simulate an overspeed condition. Where this cannot be done, a speed adapter is installed in place of the

normal tachometer drive adapter during the test. This device simulates an overspeed condition by sending a doubling of the speed to the governor. In all cases follow procedures established by the manufacturer.

15. If an air damper position supervisory switch has been provided, it should continue to operate until the air damper is reset.
16. Test the failure-to-start alarm by disconnecting the starter cable (be sure and secure it so that it doesn't touch anything) at the engine.
17. If provided, test the battery failure alarm by opening the dc circuit breakers in the controller one at a time. This should de-energize a time delay relay to reverse the "on" or "off" condition of the corresponding battery lamp and operate the alarm. Press the controller-reset push-button to reset the relay. This alarm is also tested with item 18.
18. Disconnect the battery cable as follows to avoid the possibility of a charging-current spark igniting hydrogen vents:
  - a. Turn controller switch to "Off."
  - b. Open the ac circuit to the battery charger.
  - c. Disconnect cable from one battery.
  - d. Restore ac circuit to battery charger.
  - e. Turn controller switch to "Automatic."
  - f. Operate reset push-button for disconnected battery.

Start the engine twice on the in service battery to prove that the ratchet-relay locks in on each connected battery set. The failure alarm for the disconnected battery should sound on the first attempt to start. Reconnect the battery cable and repeat the procedure for the other battery.

19. Start the engine with each battery by the manual push-button.
20. Start/stop engine with loss of controller using the instructions found on the required placard supplied by the engine manufacturer on all new installations. For older models, obtain instructions from the manufacturer and post them at the engine.
21. You can short this device at the tank which will give a signal at the controller.
22. This signal is very new and currently it comes into the ECM on the engine instrument panel. This can be shorted at the terminal block on the instrument panel.
23. This device can be tested by removing the probe from the tank and allowing it to send a signal to the controller.