

**SUPPLEMENTAL CORRECTION SHEET  
FOR  
ELECTRICAL FIRE PUMP SYSTEM**

This is intended to provide uniform application of the codes by the plan check staff and to help the public apply the codes correctly.

**PLAN DETAILS**

- 1. Except as permitted, fire pump supply conductors shall be either routed outside of the building or encased in or under no less than 2 inches of concrete. (695.6(B))
- 2. The fire pump supply conductors shall be installed as service entrance conductor as per article 230. (695.3(A))
- 3. The alternate source of power to the fire pump shall be an on-site emergency generator. (695.3(B)(1), 700.12, NFPA 20-03 secs. 9.2.4, 9.6)
- 4. The alternate source of power in a new high rise building shall be from an on-site legally required stand by or an emergency generator. (LABC 403-10, 2702.2.15)
- 5. Except as permitted, no disconnecting means shall be installed within the fire pump feeder circuit. (695.4.4(B)(2))
- 6. Transfer of power shall be within the fire pump room. (LABC 904.1.2, NFPA 20-03 sec. 9.6.4)
- 7. The fire pump feeder routed through the building utilizing a listed Circuit Protective System shall provide a minimum of one hour fire resistance. (695.6(B))
- 8. Indicate the Department of Water and Power service transformer electrical rating, including its impedance value. (93.0207)
- 9. Indicate the generator % regulation if other than 40%. (93.0207)
- 10. The fire pump transfer switch and controller shall be within sight and as close as possible to the fire pump motor(s) they control. (695.12(A))
- 11. All wiring from the controllers to the pump motors shall be in a rigid metal conduit, intermediate metal conduit, liquidtight flexible metal conduit, or type MI cable. (695.6(E))
- 12. Fire pump controller shall not be used as a junction box to supply other equipment. (695.6(F))
- 13. The pressure maintenance pump(s) shall not be connected to the fire pump controller. (695.6(F))
- 14. The transformer shall not have a secondary overcurrent protective device. (695.5(B))
- 15. Manual transfer switch(es) shall not be used to transfer power between the normal supply and the alternate supply to the fire pump controller. (NFPA 20-03, secs. 10.8.3.3)

- 16. The transfer switch shall not have integral short circuit or overcurrent protection. (NFPA 20-03, sec. 10.8.3.11)
- 17. The controller and transfer switch shall be in a fully functional state within 10 seconds upon application of power. (NFPA 20-03, secs. 10.1.2.7,10.8.1.1)
- 18. Indoor fire pumps shall be installed in a 2 hours fire rated room, or in a one hour fire rated room if the building and the pump room or house is fully sprinklered. (695.3(B)(3), NFPA 20-03 sec. 5.12.1.1).
- 19. The service entrance conductors shall terminate into a service rated controller. (NFPA 20-03 sec. 10.1.1.4)
- 20. The generator shall have a sufficient fuel supply to provide a minimum of eight (8) hours of operation at 100% of the rated pump(s) capacity in addition to the supply required for other demands. (NFPA 20-03 sec. 9.6.2.2)
- 21. The power source supplying fire pumps located in seismic design category C,D,E, or F as determined in accordance with ASC 7, shall be provided with minimum of 96 hours of fuel supply. (NFPA 20-03, sec 9.6.2.1, NFPA 110.05, sec 5.1.2)
- 22. The disconnecting means between the normal power source and the fire pump controller shall be supervised in the closed position by one of the following method: (695.4(b)(5))
  - a. Central station, proprietary, or remote station signal device.
  - b. Local signaling service that will cause the sounding of an audible signal at a constantly attended point.
  - c. Locking the disconnecting means closed.
  - d. Sealing of the disconnecting means and approved weekly recorded inspections where the disconnecting means is located within fenced enclosures or in buildings under the control of the owner.

Specify which method is utilized.

- 23. Outdoor fire pumps shall be protected against possible interruption of service due to explosion, fire, flood, earthquake, freezing, and other adverse conditions and shall be located at least 50 ft away from any exposing building. (NFPA 20-03 secs. 5.12.1 and 5.12.1.2.2)

## **CALCULATIONS**

- 1. Over current protection for a fire pump normal source shall provide short circuit protection and shall be set to carry a fire pump motor locked rotor current indefinitely. (695.5(B), 230.208, 230.90(a) Exception 4, 110.9, 110.10)
- 2. The fire pump system shall have a maximum total voltage drop as specified below: (695.7, NFPA 20-03 sec. 9.4.1, 9.4.3)
  - a. No more than 5% at the motor terminals with the motor operating (running) at 115% of its full load current rating.
  - b. No more than 15% of the controller voltage rating at the controller line terminals under starting condition.

The utility source (transformer) voltage drop shall be included in this calculation.

- 3. The transformer shall be sized at not less than 125% of the sum of the following: (695.5(A))
  - a. The rated full load of the fire pump motor(s).
  - b. The rated full load current of the pressure maintenance pump when supplied from the transformer.
  - c. The full load of any associated fire pump accessory when supplied from the transformer.
- 4. The transformer shall be protected by a primary protective device set at not more than 600% of transformer rating. (695.5(B))
- 5. Provide a coordination study for the fire pump overcurrent protective device(s) in supervised circuit connections. (695.4(B)(1))
- 6. Provide a short circuit selective coordination study for all the overcurrent protective devices in every feeder of feeder sources in a multi building campus-style complex consisting of more than one disconnecting means. (NFPA 20-03, sec. 9.3.2.2.4)
- 7. Transformer regulation shall be adequate to meet the 5% running and 15% starting voltage drop limitations. (695.7, NFPA 20-03, sec. 9.4.1, 9.4.3)
- 8. Provide the short circuit study and short circuit rating of the fire pump system. The fire pump system shall have adequate short circuit rating based on the available calculated fault current. (110-9 and 10)
- 9. The service entrance conductors or feeder conductor shall be sized at not less than 125% of the total motor full load current. (430.22(A))
- 10. Wye-start, delta-run connected motor feeder conductors shall be sized as follows: (430.22(A))
  - a. On the line side of the controller, the conductor shall be sized at 125% of the motor full load current.
  - b. On the load side of the controller, the conductor shall be sized at 58% of the motor full load current.
- 11. The generator overcurrent protective device(s) shall be sized to allow instantaneous pickup of the full pump room load and it shall be capable to provide short circuit protection. (695.4 (B)(1), 110.9, 110.10 NFPA 20-03 sec. 9.6.5,)
- 12. The fire pump individual sources shall be capable of carrying indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full -load current of the associated fire pump accessory equipment. (695.3(A))
- 13. The generator shall have sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load. (695.3(B)(1))

## NOTES ON PLANS

- 1. The transfer switch shall be electrically operated and mechanically held. (NFPA 20-03, sec. 10.8.3.3)
- 2. The transfer switch shall not contain any short circuit or over current protective devices. (NFPA 20-03, sec. 10.8.3.11)
- 3. The pump, transfer switch and the controller shall be specifically listed for fire pump service. (NFPA 20-03, secs. 3.2.1, 10.8.3.1 and 10.1.1.1)
- 4. Controllers of each pump operating in series or parallel shall be equipped with a sequential timing device to prevent any motor from starting simultaneously. The pumps shall start at intervals of 5 to 10 seconds from each other. (NFPA 20-03, sec. 10.5.2.4)
- 5. Fire pump(s) shall be supplied from a dedicated transformer. (695.5)
- 6. Fire pump controller shall not be used as a junction box to supply other equipment. (NFPA 20-03, sec.10.3.4.6)
- 7. The transfer switch shall not supply power to any load other than the fire pump. (NFPA 20-03, sec. 10.8.2.3)
- 8. All energized parts shall be installed at not less than 12" above the floor level. (695.12(D))
- 9. Indicate the method of fire pump starting on the plan. (93.0207)
- 10. The controller shall be of the combined manual and automatic type designed for [Full Voltage Across-the-Line] [Reduced Voltage Part Winding] [Reduced Voltage Primary Resistor] [Reduced Voltage Auto transformer] [Reduced Voltage Wye-Delta Open Transition] [Reduced Voltage Wye-Delta Closed Transition][Soft Start] starting of the fire pump motor and having the horsepower, voltage, phase and frequency rating shown on the plans and drawings. (93.0207)
- 11. All controller switching equipment for manual use in connecting or disconnecting, or starting or stopping the fire pump motor shall be externally operable. (NFPA 20-03, sec. 10.3.6)
- 12. Controller motor protection shall be limited to locked rotor and short circuit protection only. (NFPA 20-03, secs. 10.4.3.3 and 10.4.4)
- 13. Controllers of automatic sprinkler system shall be of automatic type provided with a pressure-actuated switch having independent high and low calibrated adjustments in the controller circuit. The controller shall also be operable as nonautomatic controller. (LABC 904.1.2, NFPA 20-03, sec. 10.5.2.1, NFPA 13, sec. 7.2.2.1)
- 14. Connections ahead of the main service disconnect(s) shall not be within the same compartment as the main disconnect. (695.3(A)(1))
- 15. The disconnecting means between the normal power source and the fire pump controller shall be lock-able in the "ON" position. (695.4(B)(2), NFPA 20-03 sec. 9.3.2.2.3.2)