

**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. Code References in parenthesis are related to the 2017 Los Angeles Electrical Code and the 2013 NPFA 20.

PLAN DETAILS

- 1. Except as permitted, fire pump supply services or on-site power production facilities conductors through a building or other structure shall be either routed outside of the building or installed in a raceway and encased in or under no less than 2 inches of concrete. _____(695.6(A)(1))
- 2. The fire pump supply conductors shall be installed as service entrance conductor as per article 230.6, 230.9 and Parts III and IV of Article 230. _____(695.3(A)(1))
- 3. The fire pump feeder and control conductors between the fire pump transfer switch and standby generator that are routed through a building shall be encased in a minimum of 2 inches of concrete, or use either a minimum two-hour fire rated assembly or a listed Circuit Protective System with minimum fire resistance rating of two hours. _____(695.6(A)(2)(d)(1), (2) & (3), 695.14(F)(1), (2) & (3))
- 4. The alternate source of power to the fire pump in a high rise building shall be an on-site emergency generator. _____(695.3(B)(2), 700.12, LABC 403.4.9.1, 8604.6.5)
- 5. Except as permitted, no disconnecting means shall be installed within the fire pump feeder circuit. _____(695.4(A), 695.4(B)(1)(a))
- 6. The fire pump shall be located in a fire pump room. _____(LABC 403.3.3, 913.2.1, NFPA 20-2013 Secs. 4.12.1.1.1, 4.12.1.1.2)
- 7. Except as permitted, the fire pump room shall have a minimum of 2 hours fire barriers. _____(LABC 913.2.1, NFPA 20-2013 Sec. 4.12.1.1)
- 8. Transfer switch(es) shall be as close as practical and within sight of fire pump they control. _____(695.12(A))
- 9. Indicate the Department of Water and Power service transformer electrical rating, including its impedance value. _____(93.0207)
- 10. Indicate the generator % regulation if other than 40%. _____(93.0207)
- 11. All wiring from the controllers to the pump motors shall be in a rigid metal conduit, intermediate metal conduit, electric metallic tubing, liquid-tight flexible metal conduit, liquid-tight flexible nonmetal conduit type LFNC-B, MC cable with impervious covering, or type MI cable. _____(695.6(D))
- 12. Fire pump controller shall not be used as a junction box to supply other equipment. _____(695.6(I)(6))
- 13. The pressure maintenance pump(s) shall not be connected to the fire pump controller. _____(695.1(B)(2), 695.6(E), NFPA 20-2013, Sec. 10.3.4.6)
- 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 20-2013, Sec. 10.8.1.2, 700.5, 701.5)
- 16. The transfer switch shall not have integral short circuit or overcurrent protection. _____(NFPA 20-2013, 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. _____(700.12)
- 18. On-site standby generator systems shall meet the requirements of Level 1, Type 10, Class X systems of NFPA 110, *Standard for Emergency and Standby Power Systems* (The alternate power source is available within 10 seconds and required fuel supply). _____(LABC Chapter 27, NFPA 20-2013 Sec. 9.6.2.1)
- 19. The service entrance conductors shall terminate into a service rated controller. _____(NFPA 20-2013 sec. 10.1.2.4)
- 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 required fuel supply required for other demands for other load. (NFPA 20-03 sec. 9.6.2.3, LABC Chapter 27)
- 21. All fire pump control wiring shall be in a rigid metal conduit, intermediate metal conduit, liquid-tight flexible metal conduit Type B, MC cable with impervious covering, or type MI cable. _____(695.14(E))
- 22. Control conductors installed between the fire pump power transfer switch and the standby generator supplying the fire pump during normal power loss shall be kept entirely independent of all other wiring. _____(695.14(F))
- 23. 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)(3)(e))
 - 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.
- 25. A fire pump shall have its own dedicated transformer. _____(695.5)

CALCULATIONS

- 1. Over current protection for fire pump source(s) other than on-site standby generator(s) shall be set to carry indefinitely the locked rotor current of fire pump(s), the pressure maintenance pump(s) (when provided as part of system), and the full load current of the associated fire pump accessory equipment. _____(695.4(B)(2)(a))
- 2. The fire pump system shall have a maximum total voltage drop as specified below: _____(695.7)
 - 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) and other transformer voltage drop shall be included in this calculation.

- 3. Except as noted, 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. 100% of 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 to carry 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 when connected to this power supply. _____ (695.5(B))
- 5. Provide a coordination study for the fire pump overcurrent protective device(s) installed in multibuilding campus-style complex feeder source circuits. _____ (695.4(C)(3))
- 6. The feeder source transformer shall not be less than 125% of the sum of the fire pump motor(s) and pressure maintenance pump(s) motor loads, and 100 percent of the remaining pump associated load supplied by the transformer. In addition, it shall be sized for all other loads supplied by the same transformer where these loads are calculated in accordance with Article 220, including any applicable demand factors. _____ (695.5(C))
- 7. The feeder source transformer size, the feeder size, and the associated overcurrent protective device(s) shall be coordinated such that overcurrent protection is provided for the transformer in accordance with 450.3 and for the feeder in accordance with 215.3, and such that the overcurrent protective device(s) is selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s), the pressure maintenance pump motor(s), the full-load current of the associated fire pump accessory equipment, and 100 percent of the remaining loads supplied by the transformer. _____ (695.5(C)(2))
- 8. Transformer regulation shall be adequate to meet the 5% running and 15% starting voltage drop limitations. _____ (695.7, NFPA 20-2013, sec. 9.4.1, 9.4.4)
- 9. 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 & 10, NFPA 20-2013, Sec. 10.1.2.2.1)
- 10. 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))
- 11. Wye-start, delta-run connected motor feeder conductors shall be sized as follows: (430.22(C))
 - 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 72% of the motor full load current.
- 12. 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)(2)(b), 110.9, 110.10)
- 13. 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))
- 14. 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(s). _____ (695.3(D)(1))

NOTES ON PLANS

- 1. The transfer switch shall be electrically operated and mechanically held. _____
_____(NFPA 20-2013, Sec. 10.8.3.3)
- 2. The transfer switch shall not contain any short circuit or over current protective devices. ____
_____(NFPA 20-2013, Sec. 10.8.3.11)
- 3. The pump, transfer switch and the controller shall be specifically listed for fire pump service.
_____(690.10)
- 4. Controllers of each unit of multiple pump units shall be equipped with a sequential timing device to prevent any motor from starting simultaneously. If water requirements call for more than one pumping unit to operate The pumps shall start at intervals of 5 to 10 seconds from each other. _____ (NFPA 20-2013, Secs. 10.5.2.5.1, 10.5.2.5.3)
- 5. Fire pump(s) shall be supplied from a dedicated transformer. _____
_____(695.5, NFPA 20-2013, Sec. 9.2.2(5))
- 6. Fire pump controller or t shall not be used as a junction box to supply other equipment.
_____(695.6(I)(6), NFPA 20-2013, Secs. 10.3.4.5.1, 9.7(6))
- 7. The transfer switch shall not supply power to any load other than the fire pump. _____
_____(NFPA 20-2013, 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 20-2013, Sec. 10.3.6)
- 12. Controller motor protection shall be limited to locked rotor and short circuit protection only.
_____(NFPA 20-2013, 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 or electronic pressure sensor having independent high and low calibrated adjustments in the controller circuit. The controller shall also be operable as non-automatic controller. _____ (NFPA 20-2013, Secs. 10.5.2.1.1.1, 10.5.1.3)
- 14. Connections ahead of the main service disconnect(s) shall not be within the same cabinet, enclosure, or vertical switchboard section as the main disconnect. _____ (695.3(A)(1))
- 16. The disconnecting means for the normal power source shall be identified as suitable for use as service equipment. _____ (695.4(B)(3)(a)(1))