

**Mster Control Systems, Inc.**  
**Interoffice Memorandum**

Date: 2001.09.14  
To: All M.C.S. Representatives  
CC: Wm. F. Stelter, B. R. Woerheide, D. P. Carrier, L. Di Maso, K. Meyer, B. Urbanik  
From: J. S. Nasby  
Re.: NFPA-20, 1999 Edition Code Change Summary.

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These are the changes that affect Fire Pump Controllers, Drivers, and Power Sources.

Section 6-2 on Power Supplies for Electric Fire Pumps has been extensively re-written and expanded.

- Paragraph 6-2 requires either a (single) reliable source or two independent sources.
- Paragraph 6-2.1 requires service power to be located and arranged to minimize damage from a fire within the premises and also from exposing hazards.
- Paragraph 6-2.2 basically requires the same protection for an on-site power plant facility.
- Paragraph 6-2.3: Where reliable power cannot be obtained from one of the power sources of 6-2.1 or 6-2.2, an addition source is also needed. Any of six listed choices is to be used. (1) an approved combination of two or more sources, (2) an approved source plus on-site standby gen-set, (3) and approved combination of two sources for campus-style installations, (4) an approved combination of one or more feeders plus an on-site standby gen-set also for campus-style installation, (5) a redundant engine driven fire pump, and (6) a redundant steam turbine driven fire pump.
- Paragraph 6-2.3 appendix gives guidance on defining reliability. (1) it should have infrequent power disruptions, (2) it should have a separate connection to the supply of the service disconnect, and (3) it should have conductors in 2 inches of concrete within the building.
- Paragraph 6-2.4 covers multiple power sources.
- Paragraph 6-2.4.1 requires that these must also be arranged so that if a fire, structural failure (building collapse), or operational accident that causes interruption of one source shall not cause interruption of the second source.
- Paragraph 6-2.4.2 requires on-site gen-sets also be located and protected from fire or other hazards.
- Paragraph 6-2.4.3 covers the special requirements for multi-building campus-style installations. These are usually medium voltage feeders, if approved by the local AHJ. There must be combinations of either feeders or power sources.
- Paragraph 6-2.4.4 requires the supply conductors to either terminate directly to a listed fire pump controller or transfer switch or to a disconnecting means and overcurrent protection complying with paragraphs 6-3.2.2.2 and 6-3.2.2.3. See below.

Section 6-3 covers Power Supply Lines (conductors) and is also extensively re-written.

- Paragraph 6-3.1 requires protection of fire pump circuits from fire, structural failure or operation accident (accidental disconnection, and etc.). The appendix strongly recommends running these circuits underground for protection.

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## Section 6-3.2 covers Power Supply Arrangements

- Paragraph 6-3.2.1 requires that the power supply for the fire pump not be disconnected when plant power is cut off. There is an exception for campus-style installations if they automatically ensure that alternate power is still available.
- Paragraph 6-3.2.2 requires that fire pump circuits shall be either directly connected or be supervised form inadvertent disconnection.
- Paragraph 6-3.2.2.1 covers the direct connection option which required the supply conductors to directly connect to a fire pump controller or combination controller with transfer switch.
- Paragraph 6-3.2.2.2 and 6-3.2.2.3 cover requirements for a supervised connection.
- Paragraph 6-3.2.2.2 allows a single disconnecting means and overcurrent protection device and it must connect to: (1) A listed fire pump controller, or (2) A listed fire pump power transfer switch, or (3) A listed combination fire pump controller and power transfer switch
- Paragraph 6-3.2.2.3 gives a long list of requirements for the subject disconnect and over current protection.
- Paragraph 6-3.2.2.3 (a) *Overcurrent Protective Device Selection*. Requires the overcurrent protective device(s) to hold the sum of the locked rotor current of the fire pump motor(s), any other connected loads indefinitely.
- Paragraph 6-3.2.2.3 (b) *Disconnecting Means*. The disconnecting means shall: (1) be listed as service entrance equipment, (2) be lockable in the closed position, (3) be located such that operation is unlikely,
- Paragraph 6-3.2.2.3 (c) *Disconnect Marking*. Requires that the disconnecting means be marked "Fire Pump Disconnecting Means."
- Paragraph 6-3.2.2.3 (d) *Controller Marking*. Requires a placard adjacent to the controller giving the location of the disconnecting means and its key, if locked.
- Paragraph 6-3.2.2.3 (e) *Supervision*. Requires the disconnecting means shall be supervised closed by one of the following methods: (1) Central station, proprietary, or remote station signal device (2) Local signaling service to sound an audible signal at a constantly attended location, (3) Locking of the disconnecting means in the closed position, (4) Sealing of disconnecting means and weekly recorded inspections if properly located.
- Paragraph 6-3.2.2.4 allows special short circuit coordination for campus-style installations.
- Paragraph 6-3.2.2.5 allows a dedicated transformer per Article 695-5 of the NEC when the supply voltage differs from the fire pump motor voltage.
- Paragraph 6-4 is one of the most important requirements in that it requires the voltage drop to be less than 15% under starting currents and less than 5% at 115% of FLA current. This is important for sizing of transformers, gen-sets and wiring.
- Paragraph 6-5.1.2 allows the use of direct current, medium voltage, large-horsepower (over 500 horsepower), single-phase, universal-type, or wound-rotor motors, where approved.
- Paragraph 6-6.5 still requires that circuit breakers in the gen-set emergency source to *not trip* on motor starting; but, no longer requires that such a breaker be present. This is because the presence of the breaker is covered in the NEC.

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Chapter 7 covers Electric Fire Pump Controllers.

- Paragraph 7-3.4.2 requires the controller to have metering for line voltage and motor current.
- Paragraph 7-4.5.3 adds an exception that allows the protection of a fire pump motor from single phase starting burn-out.
- Paragraph 7-4.5.3 also now requires that the controller detect when a motor is running by way of the committee statement that added the above exception. This requirement will be in print in the 2003 edition of the standard.
- Paragraph 7-5.2.1(e) requires a pressure recorder (recording device) be connected in the controller pressure sensing line. The standard does not require the recorder to be in the controller.
- Paragraph 7-5.2.5 covers protection of external signaling and demand circuits to the controller. The change allows circuitry that is not fault-tolerant to be used if such circuitry is protected from mechanical injury.

Chapter 8 covers Diesel Drive Engines.

- Paragraph 8-2.5.2.4(d & (e) now allows the battery capacity to be rated in "reserve capacity" rather than in "ampere-hours" to be compatible with modern truck and bus batteries.

Chapter 9 covers Diesel Engine Drive Fire Pump Controllers.

- Paragraph 9-4.4 requires the pressure recorder as before; but no longer requires it to be inside of the controller. It still must be able to run at least 24 hours in the absence of A.C. Power.
- Paragraph 9-5.2.5 mirrors the requirements of paragraph 7-5.2.5 above. It too allows circuitry that is not fault-tolerant to be used if such circuitry is protected from mechanical injury.
- Paragraph 9-5.3.1 add the requirement that any failure of the controllers automatic circuitry no affect the manual operation of the controller. E.G. the Manual Switch Positions and Start push button shall be independent of any automatic circuitry. Note that not all controller presently comply with this requirement.

There were a few other changes of an editorial nature that are not covered herein.

Further details are available in Bill Stelter's slide show presentation which can be viewed at:

<http://mastercontrols.com/AboutFPC/MCSIdI16.htm>