# Stationary Fire Pumps and Standpipe Systems Handbook

Sixth Edition


**Edited by**

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With the complete text of the following:
2019 edition of NFPA® 20, *Standard for the Installation of Stationary Pumps for Fire Protection*
2016 edition of NFPA® 14, *Standard for the Installation of Standpipe and Hose Systems*
2019 edition of NFPA® 291, *Recommended Practice for Fire Flow Testing and Marking of Hydrants*
2019 edition of NFPA® 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*


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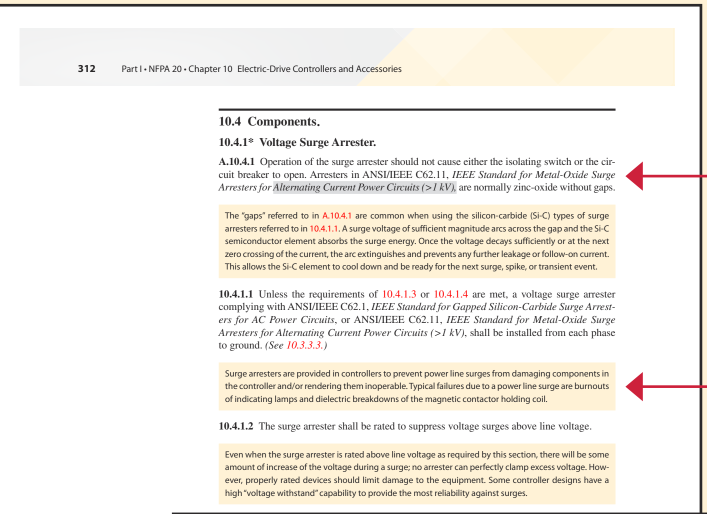

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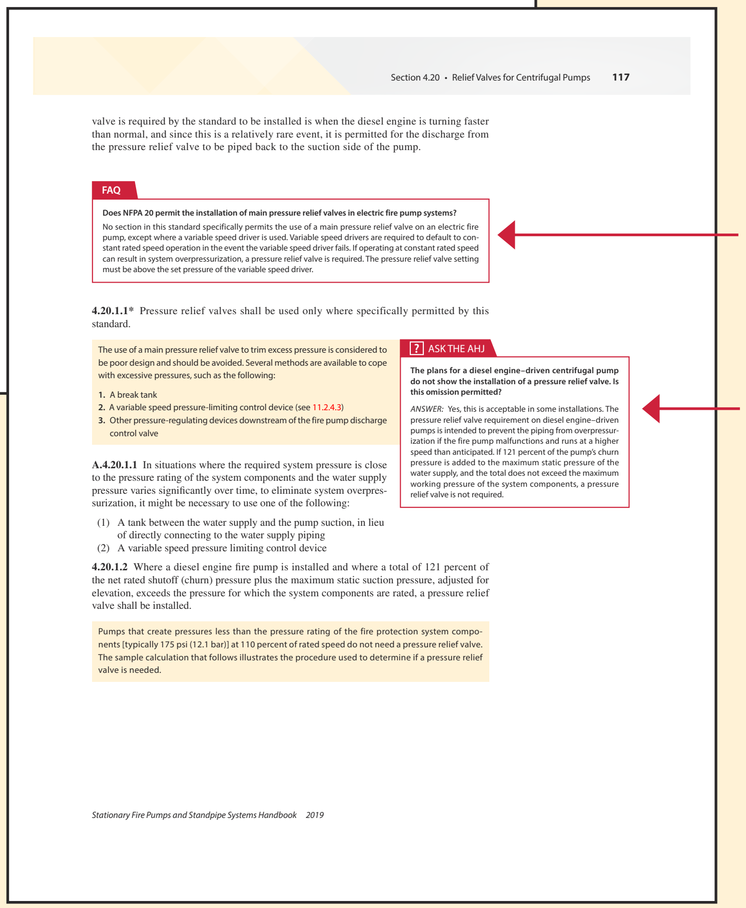

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Ask the AHJ questions offer snapshots of typical situations faced by authorities having jurisdiction.

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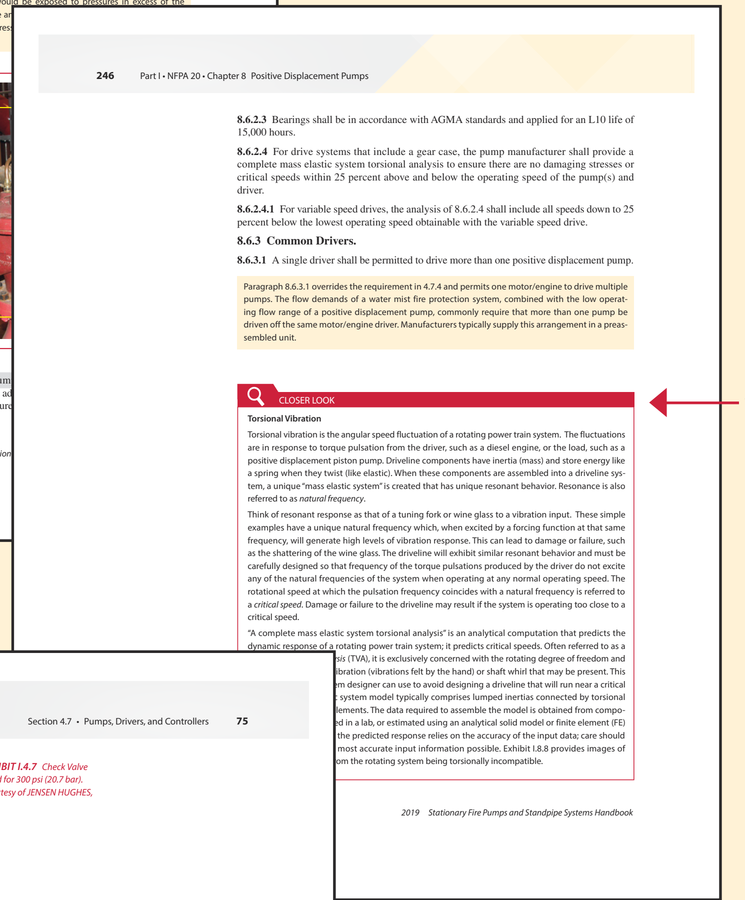

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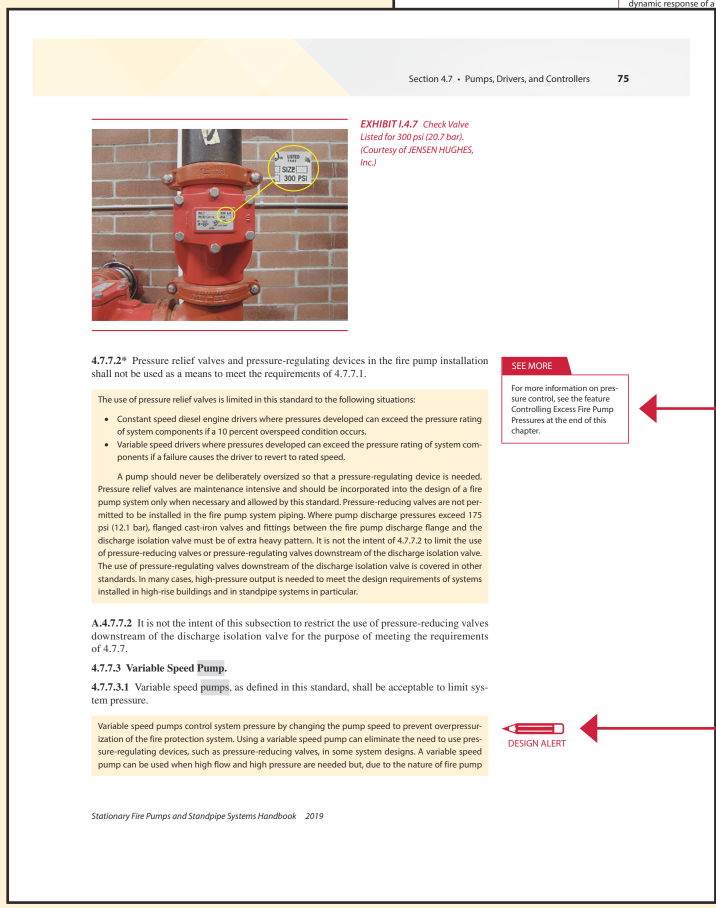

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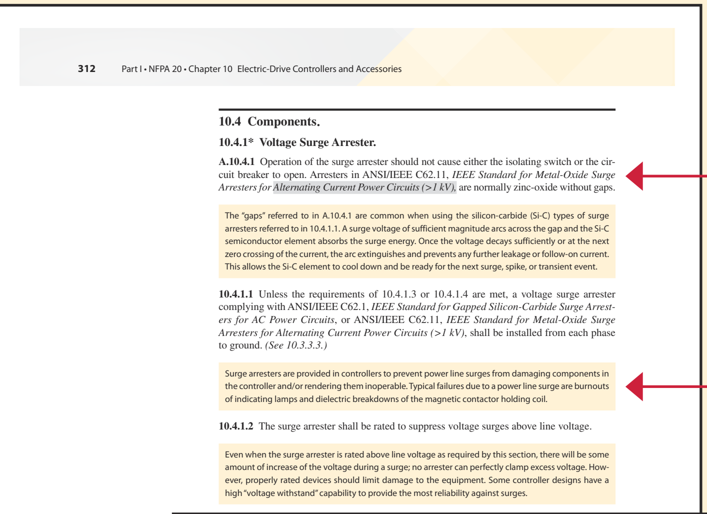

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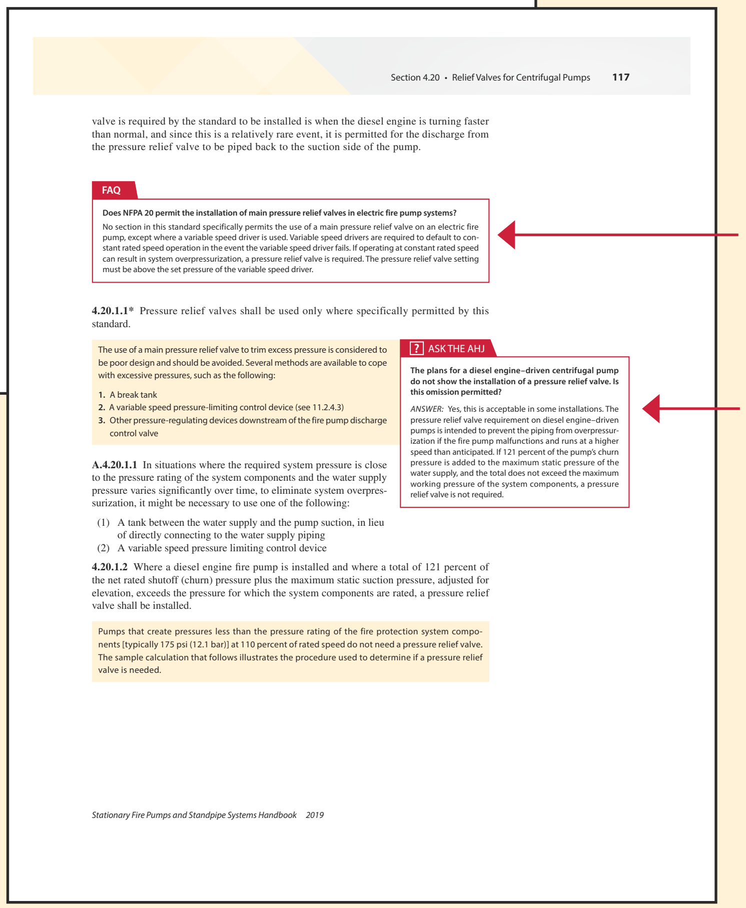

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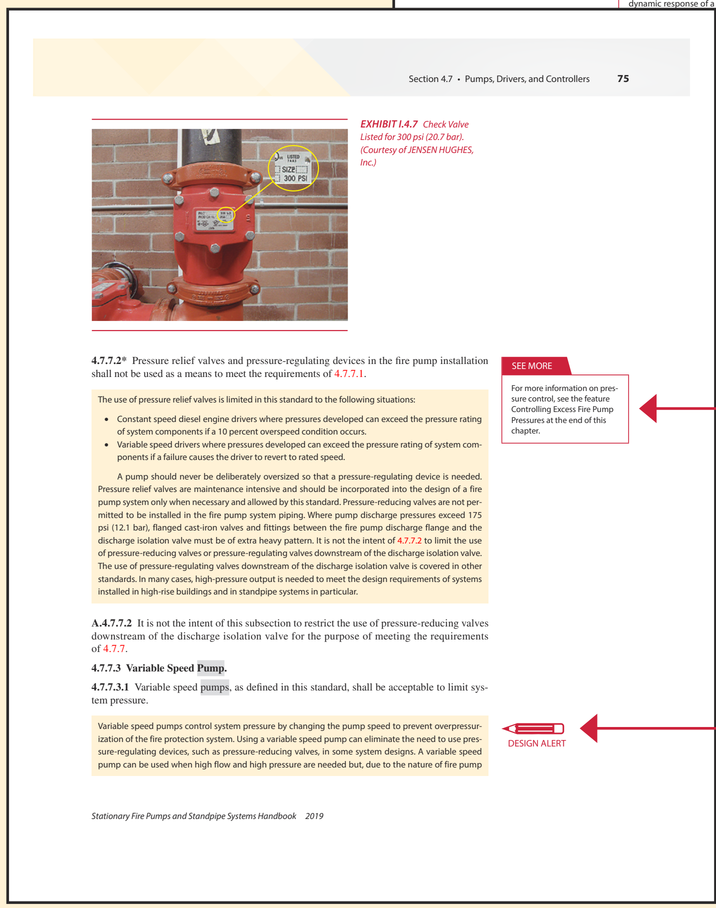

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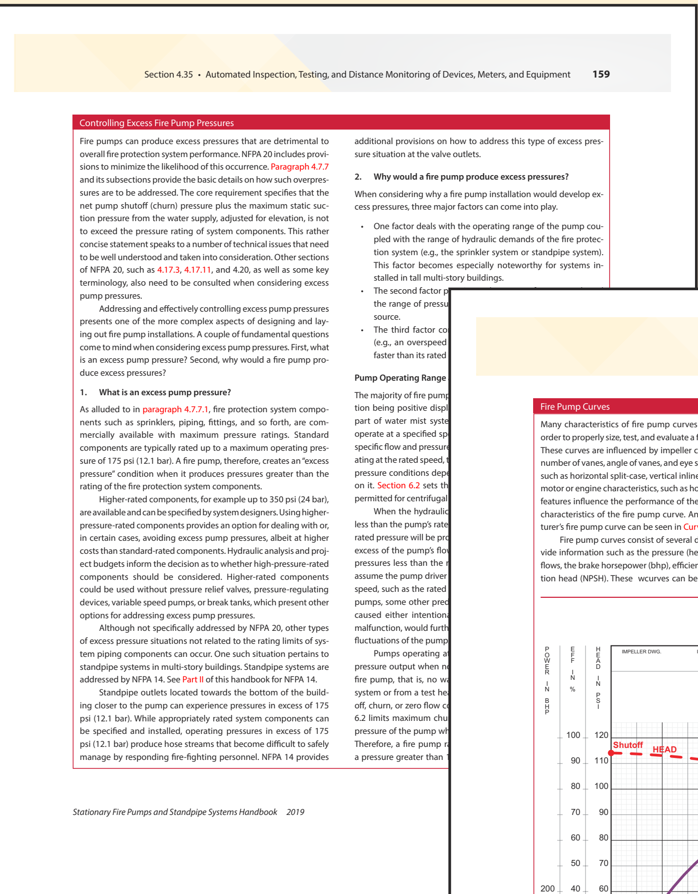
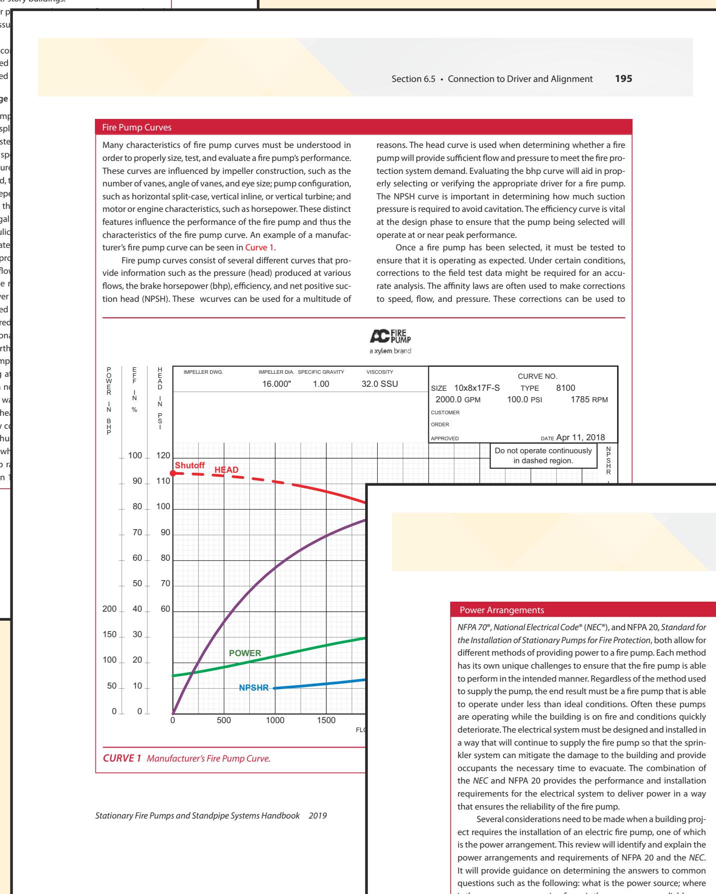
CHAPTER 4




CHAPTER 6




CHAPTER 9

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Power Arrangements

*NFPA 70®*, *National Electrical Code®* (*NEC®*), and NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, both allow for different methods of providing power to a fire pump. Each method has its own unique challenges to ensure that the fire pump is able to perform in the intended manner. Regardless of the method used to supply the pump, the end result must be a fire pump that is able to operate under less than ideal conditions. Often these pumps are operating while the building is on fire and conditions quickly deteriorate. The electrical system must be designed and installed in a way that will continue to supply the fire pump so that the sprinkler system can mitigate the damage to the building and provide occupants the necessary time to evacuate. The combination of the *NEC* and NFPA 20 provides the performance and installation requirements for the electrical system to deliver power in a way that ensures the reliability of the fire pump.

Several considerations need to be made when a building project requires the installation of an electric fire pump, one of which is the power arrangement. This review will identify and explain the power arrangements and requirements of NFPA 20 and the *NEC*. It will provide guidance on determining the answers to common questions such as the following: what is the power source; where is the power source coming from; is the power source reliable; can a generator be used as a primary source of power; what are the power arrangement options; will auxiliary power be needed; and what are the auxiliary power options? It will also explain overcurrent protection and transformers as they relate to the power supply for a fire pump.

**PERMISSIBLE POWER ARRANGEMENTS**

Where does the user begin in order to determine acceptable power arrangements for electric-driven fire pump installations? Power arrangements for fire pump installations are covered in Chapter 9 of NFPA 20 and Article 695 of the *NEC*. NFPA 20 provides three power arrangements: Arrangement A, Arrangement B, and Arrangement C (see Figure A.9.2 of NFPA 20). The following paragraphs will discuss some of the unique nuances of these arrangements and how NFPA 20 and the *NEC* tie together.

**Arrangement A**

Arrangement A is the first power supply arrangement referenced in Figure A.9.2 of NFPA 20 and shows a fire pump controller connected directly to the utility service. This means there are no disconnects, OCPDs, or transformers between the utility and the fire pump controller. For example, if a fire pump motor is rated for 480V three-phase power, the fire pump would be connected to a service with the same voltage characteristics, meaning that the utility would have to have 480V three-phase power available at the point where the service conductor supplying the fire pump controller connects to the utility. In general, most electric-driven fire pumps require three-phase power. This can cause complications where a utility provider only has single-phase power available and often raises the question, "Can a phase converter be used on a fire pump installation?" It is important to note that if a utility only provides single-phase service it is not permissible to use a phase converter to run a three-phase fire pump motor, in accordance with 9.1.7 of NFPA 20. Subsection 9.1.7 simply states that phase converters shall not be used to supply power to a fire pump. This means that where a single-phase power source is available, a single phase fire pump motor must be installed.

The utility service connection in Arrangement A may be to a transformer owned by the utility (as opposed to a transformer owned by the building owner, as shown in Arrangement B), or to the building service entrance conductors ahead of the building service disconnect. Since there is no OCPD between the utility service connection and the fire pump controller in this arrangement, the controller becomes the fire pump service disconnect and is equipped with the OCPD. This disconnect must be suitable for use as service equipment. It is important to note that this arrangement could present a risk to service personnel. To de-energize the fire pump controller, disconnection of the service by the utility is necessary. Depending on the configuration, the disconnection of power by the utility may or may not disconnect power for the building service as well. Due to the possibility of disconnecting power to the entire building, service work on fire pump controllers is often performed while the controller is energized. Paragraph 14.2.6.1.5 of NFPA 20 requires that personal protective equipment (PPE) be worn in accordance with *NFPA 70E, Standard for Electrical Safety in the Work Place*, or equivalent. Although NFPA 20 applies to new installations, the requirements of *NFPA 70E* or equivalent should be followed whenever necessary energized electrical work is performed.

**Arrangement B**

Arrangement B is the second power supply arrangement referenced in Figure A.9.2 of NFPA 20 and shows a fire pump controller connected to the utility service via an OCPD and an on-site transformer. Where voltage from the supply is different than the voltage required by the fire pump, the addition of a transformer (owned by the building owner) to step down or up the voltage supplied by the utility is required.

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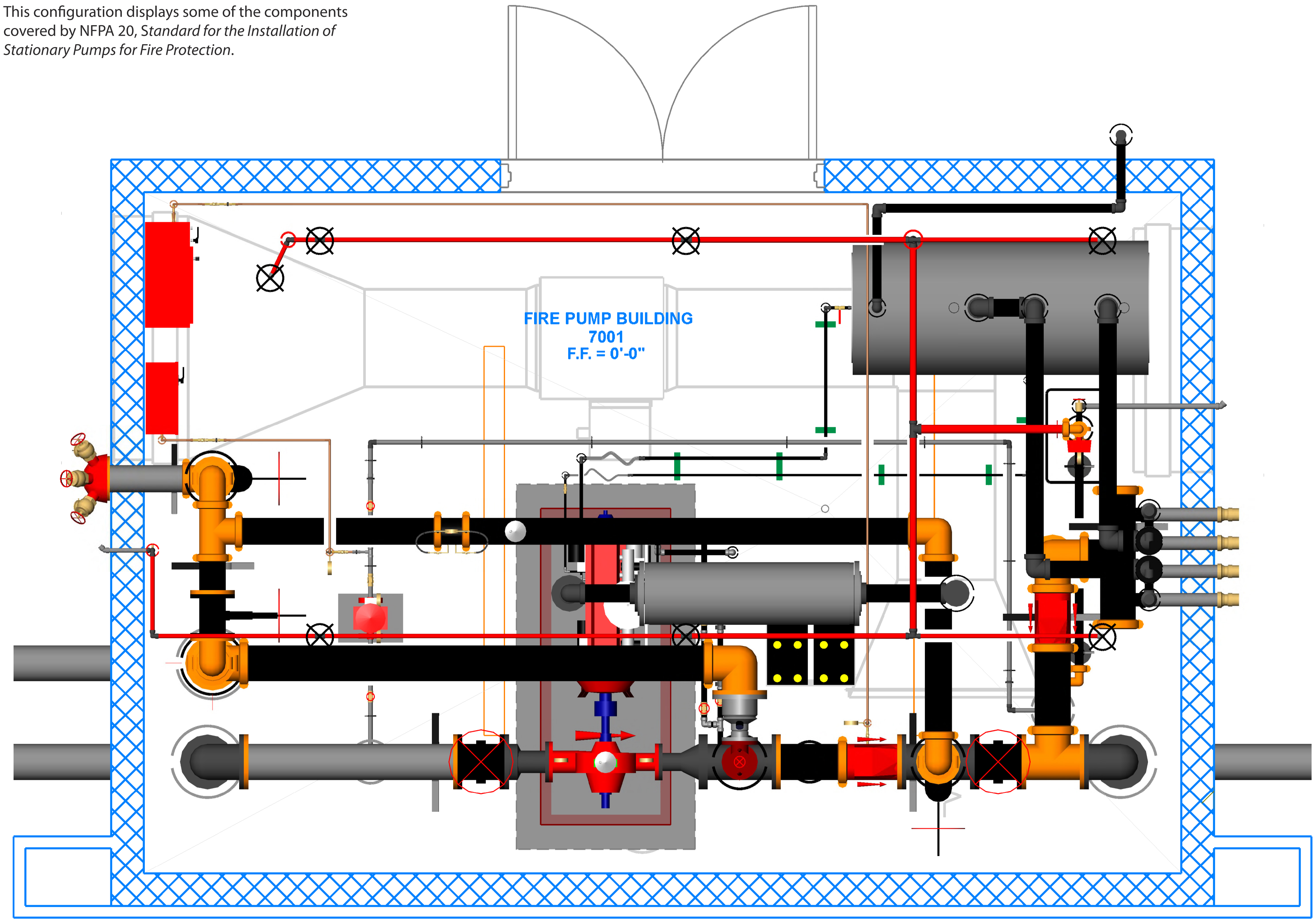
# Fire Pump Room Plan

This configuration displays some of the components covered by NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*.



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