NFSA NATIONAL FIRE SPRINKLER ASSOCIATION
The Voice of the Fire Sprinkler Industry

TechNotes

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This issue of TechNotes was written by Jeff Dunkel, PE, Fire Protection Engineer at the NFSA (National Fire Sprinkler Association).

Updates to the 2022 Edition of NFPA 20

The 2022 edition of NFPA 20 has recently been published by the NFPA. This edition of Technotes discusses a number of changes in the latest edition of NFPA 20 that are important to everyone in the fire sprinkler industry. This summary will explain the changes that are most important in the opinion of the author and will not be a list of every change to the standard. The goal of this TechNotes is to help everyone understand the major items with respect to the design, installation, inspection, and maintenance of fire pumps.

Vertical Fire Protection Zone (3.3.81)

The definition of a vertical fire protection zone was modified for, a vertical fire protection zone to be dependent only on the elevation pressure. The previous editions defined a fire protection zone as portions of the systems supplied by the same pump and/or tank, however this definition did not recognize other methods to regulate pressure such as a pressure reducing valves. A typical vertical fire protection zone can be isolated without affecting other zones in the same building and can have multiple water supplies for that single zone. With this change the only pressure difference within a specific zone is a function of the elevation change within that zone.

Fire Pump Suction Line Pressure (4.16.3.2)

Section 4.16.3.1 requires a minimum suction line pressure of 0 psi; section 4.16.3.2 provides an exception for this suction line pressure when the pump supply comes from a storage tank in which case the pressure can drop to a minimum of -3 psi. This pressure applies at the 150% flow of the fire pump when the fire water supply from the tank has been depleted. The purpose in allowing the -3 psi for a tank supply is to allow for the friction loss in the suction line from the tank to pump at 150% of the pump flow. The previous editions allowed this exception only when the base of the fire water

supply tank was at or above the same elevation of the fire pump, however the base of the tank in relation to the fire pump is not a relevant factor. This section has been modified to apply when the water level, after supplying the most demanding system for the required duration is at or above the centerline of the fire pump.

Pressure Stabilization (4.21.1.2.1; 8.4.4.2; 10.10.9.4.1; 11.2.4.3.5.1)

Sections 4.21.1.2.1 (applicable to pumps in series), 8.4.4.4.2 (applicable to water mist pumps), 10.10.9.4.1 (applicable to variable speed pump controllers), and 11.2.4.3.5.1 (applicable to diesel engine driven pumps) were modified to provide specific criteria that was not included in previous editions. In previous editions these sections simply stated, “The discharge pressure shall be permitted to restabilize whenever the flow condition changes” and did not provide a time limit required to do so. The changes in this edition require pressure stabilization to occur in a minimum of 20 seconds once the flow condition has changed.

Test Header Supply Line Size (4.22.3.4)

Table 4.28 provides minimum line sizing based on the flow rate of the fire pump. Previous editions required the line size to be increased to the next larger size when the pipe between the pump and the hose header valve exceeded 15 ft, or the pipe could be sized base on hydraulic calculations based on a total flow of 150 percent of the flow rated flow rate of the fire pump. The 2022 edition of NFPA 20 has added a third requirement; Where the line between the hose valve header and the connection to the pump discharge pipe contains more than four fittings that create a change in direction, the next larger pipe size shall be used. This requirement was added because excess fittings can increase friction loss in the same way a pipe length longer than 15 ft will. In either case, pipe length in excess of 15 ft or pipe fittings that change the flow direction in excess of 4 fittings this line can be sized by conducting hydraulic calculations.

Automated Inspection and Testing (4.35.1)

In order to conform to the new allowance of automated inspection and testing which have been added to NFPA 13 and NFPA 25 this section has been added in this edition of NFPA 20. While remote inspection and testing is now allowed, equipment to do so is not typically listed for use on a fire protection system. Section 4.35.1.2 was added to allow the use of non-listed components when those components do not affect the fire pump's performance. Without this clarification automated inspection and testing may not be achievable even though it is allowed. Previous editions recognized automated inspection and testing and clarified in the annex material that non-listed components could be used, this change simply moves these allowances into the body of the code.

Distance Monitoring (4.35.2)

Like Section 4.35.1 for automated inspection and testing, this section has been added to accommodate distance monitoring now permitted by NFPA 13 and NFPA 25. In addition, 4.35.2.2 has been added to allow non-listed components to be used when those components do not affect the performance of the fire pump. Just like automated inspection and testing these allowances were previously located in the annex material, this change moves those allowances into the body of the code.

Chapter 6 Application (6.1.1)

The modifications provided to Section 6.1.1 through Section 6.1.1.4 are not a change; they are a clarification of the scope of Chapter 6. The previous editions listed that the requirements of Chapter 6 applied to centrifugal fire pumps of the overhung impeller design and the impeller between bearings design. This modification has simply a series of grammatical changes to clarify the scope of Chapter 6. The rearrangement of these sections matches the format of Chapter 7 and provides more consistency between the chapters. Chapter 6 applies only to pumps of the overhung-impeller design and the impeller-between-bearings design.

Chapter 8 Application (8.1.1)

Similar to the Chapter 6 modification, the scope of Chapter 8 was also clarified to only apply to positive displacement pumps. The only purpose to this modification was to provide consistency with other chapters in NFPA 20.

Pump Performance (8.4.4.1)

This section which is applicable to water mist positive displacement pumps has been modified like the pressure stabilization change listed above. Previous editions required the pump controller to manage the performance of all pumps. Language has been added in this edition to require the pumps to maintain a stable pressure (±10 percent) within 20 seconds after any demand to start and maintain that performance throughout the entire range of operation. This change provides actual parameters to be met in lieu of vague criteria provided previously.

Variable Speed Bypass Operation (10.10.3.1)

In previous editions, bypass operations were required to initiate when the system pressure remained below the set pressure for 15 seconds. The 2022 edition requires bypass operations to activate when the system pressure falls within 10 percent of the rated pressure for 15 seconds only when the variable frequency drive (VFD) is not at line frequency, which is an indication of fault. This provides both more detailed criteria for the bypass activation and allows the low-pressure bypass to be set at lower when the VFD is operating at line frequency. Annex Section A. 10.10.3.1.1 was added to provide guidance for the low pressure setting which should be between the rated pressure and 90 percent of the system pressure when the pump is operating at 150 percent flow. The low-pressure setting should never be at or below the maximum anticipated suction pressure since that pressure could prevent the bypass operation from activated when required. Once bypass operations are activated the controllers no longer perform as a variable speed pump, instead they revert to a standard constant speed pump arrangement.

Diesel Fuel Tank Capacity (11.4.1.3.1; 11.4.1.3.1.1)

The standard method used to determine the required fuel supply for a diesel fire pump has been solely based on the horsepower rating of the fire pump. Prior to the 2022 edition the fuel tanks were required contain a minimum 1 gallon of fuel per horsepower, plus 5 percent for volume expansion and 5 percent of sump capacity. At the time the intention was to provide a minimum 8 hours of fuel supply and it was determined that 1 gallon per horsepower provided an adequate and simple means to achieve this goal. The 2022 edition has provided two options for fuel tank supply calculation, the first

of which is based on the fuel consumption of the actual engine. Section 11.4.1.3.1, now the primary method for tank capacity calculation, requires the fuel supply tanks to be sized for a minimum of 12 hours of engine run time based on the fuel supply rate requirements of the engine, the section has maintained the additional 5 percent for expansion and 5 percent for sump. Section 11.4.1.3.1.1 was added to maintain the option to size of the tanks based on the horsepower rating of the engine but only when the actual fuel supply rate requirement is not known. The primary reason for this modification was to provide a more realistic fuel supply for the more efficient engines used in today's fire pumps. Examples were provided in the revision cycle to show the horsepower criteria in previous editions was too conservative for some engines, however it may not be the case for all engines. The horsepower criteria does provide a conservative fuel supply for larger pumps however smaller pumps the new criteria based on the fuel consumption rate may provide a lower fuel capacity requirement. A comparison of the two criteria is shown in the table below.

	DIESEL PUMP #1	DIESEL PUMP #2
POWER RATING (HP)	312	35
FUEL CONSUMPTION (GAL/HR)	15.3	4.4
TANK CAPACITY PER 11.4.1.3.1 (GAL)	202.4	58.2
TANK CAPACITY PER 11.4.1.3.1.1 (GAL)	344.0	38.6

Layout Technician Training

Layout Technician Training

The purpose of the layout technician course is to take a person with basic knowledge of math, physical science and drafting skills and teach them to be productive basic sprinkler layout and detailing technicians. All of the work elements necessary for NICET Level II Certification will be covered by the course including sprinkler selection, sprinkler spacing and location, obstructions to

sprinklers, water supplies (public mains, tanks and pumps), hydraulic calculation of sprinkler systems, and standpipe system layout and calculation.

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Feb 9 - Feb 17, 2022

Register Here

New EOD Process

Starting on July 15, 2020, the NFSA has a new EOD process where members can submit questions, track the progress, and view their EOD cases. The step by step process is detailed in TechNotes #442.

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