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QUESTION NO: 1

A diesel engine-driven fire pump is installed in a warehouse. In the absence of a more frequent condition requiring attention, how often must the pump be operated under no-flow conditions as part of routine testing?

- A. Weekly for at least 30 minutes
- B. Monthly for at least 10 minutes
- C. Quarterly for at least 30 minutes
- D. Annually for at least 60 minutes

ANSWER: A

Explanation:

Weekly for at least 30 minutes is correct. Diesel engine-driven fire pumps require weekly operation because the test verifies engine starting, controller operation, cooling arrangements, battery condition, fuel-system readiness, and general pump-room conditions. The run duration is at least 30 minutes.

Monthly operation is associated with routine no-flow testing of many electric motor-driven fire pumps. An annual flow test is also required for evaluating pump performance, but it does not replace the weekly diesel-engine exercise requirement.

QUESTION NO: 2

The minimum diameter of a private service main to a hydraulically calculated sprinkler system that also supplies a fire hydrant is

- A. 3 in. (75 mm).
- B. 4 in. (100 mm).
- C. 6 in. (150 mm).
- D. 8 in. (200 mm).

ANSWER: C

Explanation:

6 in. (150 mm). is correct. NFPA 13 establishes minimum sizes for private fire service mains based on the type of fire protection system served. Where a private service main supplies a hydraulically calculated automatic sprinkler system and also supplies a fire hydrant, the main must be at least 6 in. (150 mm) in diameter. This minimum recognizes that the underground main must provide a reliable path for the sprinkler-system demand while also serving the hydrant connection; the actual required size can be larger when the hydraulic calculations, available water supply, friction loss, or required fire-flow conditions demonstrate that a larger main is needed. The 6 in. dimension is therefore a code minimum, not a substitute for completing the required system hydraulic analysis and coordinating the underground arrangement with the applicable installation requirements. NFPA 13 is the governing installation standard for sprinkler systems and includes the requirements applicable to private fire service mains serving sprinkler systems. The currently adopted edition and any locally adopted amendments should always be confirmed with the authority having jurisdiction. See NFPA's [NFPA 13 standard information page](#) and its [NFPA 13 code listing](#).

QUESTION NO: 3

A pump with a rated capacity of 3,000 gpm (11,335 L/min) should have what size circulation relief valve?

- A. 0.5 in. (13 mm)
- B. 0.75 in. (19 mm)

- C. 1.0 in. (25 mm)
- D. 1.5 in. (38 mm)

ANSWER: D

Explanation:

1.5 in. (38 mm) is correct. NFPA 20 requires a circulation relief valve (also called a casing relief valve) on centrifugal fire pumps where a relief path is needed to prevent overheating during operation at churn or other low-flow conditions. The valve discharges a small amount of water from the pump casing, protecting the pump from the temperature rise that can occur when energy is imparted to water without sufficient flow through the system.

NFPA 20's minimum circulation-relief-valve sizing table bases the nominal valve size on the pump's rated capacity. A 3,000 gpm rated fire pump falls within the capacity range assigned a minimum 1.5 in. nominal circulation relief valve. This is a minimum valve-size requirement; the discharge arrangement must also comply with the standard's requirements for routing the discharge to a suitable location and avoiding conditions that could impair valve operation or create a hazard.

For the current edition and access to the applicable standard, see [NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection](#) and NFPA's [codes and standards directory](#).

QUESTION NO: 4

In a three-story apartment building protected with an NFPA 13R system utilizing quick-response sprinklers, the minimum density/area requirement shall be?

- A. 0.05 gpm/ft² (2.0 mm/min)
- B. 0.10 gpm/ft² (4.1 mm/min)
- C. 0.15 gpm/ft² (6.1 mm/min)
- D. 0.20 gpm/ft² (8.1 mm/min)
- E. NFPA 13R does not prescribe a density/area requirement; the system must be hydraulically designed using the NFPA 13R required number of operating sprinklers and applicable sprinkler discharge criteria.

ANSWER: E

Explanation:

"NFPA 13R does not prescribe a density/area requirement; the system must be hydraulically designed using the NFPA 13R required number of operating sprinklers and applicable sprinkler discharge criteria" is correct because NFPA 13R uses a residential-system hydraulic design approach rather than the density/area method used for many NFPA 13 hazard occupancies. The building height and use of quick-response sprinklers do not create a standalone 0.05, 0.10, 0.15, or 0.20 gpm/ft² density/area criterion under NFPA 13R. Instead, the calculation must address the required simultaneous sprinkler operation, the listed sprinkler's coverage and minimum discharge requirements, and the available water supply, including any required hose-stream allowance or other system-demand components applicable to the installation. The applicable edition of NFPA 13R and the sprinkler listing/data sheet must be consulted because the required operating-sprinkler basis and detailed calculation provisions are edition-specific. NFPA identifies NFPA 13R as the installation standard for sprinkler systems in low-rise residential occupancies, including buildings up to and including four stories. See the [NFPA 13R standard page](#) and NFPA's [NFPA 13R code listing](#) for the current edition and access information.

QUESTION NO: 5

What is the minimum temperature rating of ceiling sprinklers in roll paper stored at 15 ft. (4.6 m) or less?

- A. 100°F (38°C)
- B. 135°F (57°C)

C. 150°F (66°C)

D. 175°F (79°C)

ANSWER: C

Explanation:

150°F (66°C) is the minimum required temperature rating for ceiling sprinklers protecting roll paper storage when the storage height is 15 ft (4.6 m) or less. Roll paper presents a distinctive fire-protection challenge because the tightly wound material can support a deep-seated fire and delay water penetration into the burning commodity. NFPA 13 therefore provides specific protection criteria for roll paper rather than relying only on general storage-commodity rules. The ceiling-sprinkler temperature rating is part of that coordinated protection approach: it must be high enough to avoid unwanted operation from anticipated ceiling-level heat conditions while still operating promptly enough to control a developing storage fire. For the stated storage-height range, the applicable roll-paper criteria establish 150°F (66°C) as the minimum rating. The design must also satisfy the associated NFPA 13 requirements for the sprinkler arrangement, discharge density, area of operation, and any required in-rack protection; temperature rating alone does not establish a complete compliant design. Consult the edition of NFPA 13 adopted by the enforcing jurisdiction, since section numbering and detailed provisions can vary by edition. NFPA's official standard information is available at [NFPA 13: Standard for the Installation of Sprinkler Systems](#) and through [NFPA LiNK free access for NFPA 13](#).

QUESTION NO: 6

What is the maximum pressure rating when using standard weight pattern malleable iron fittings that are 6 in. (150 mm) in size and smaller?

A. 175 psi (12 bar)

B. 200 psi (14 bar)

C. 300 psi (21 bar)

D. 400 psi (28 bar)

ANSWER: C

Explanation:

300 psi (21 bar) is the maximum permitted pressure rating for standard weight pattern malleable iron fittings in nominal sizes 6 in. (150 mm) and smaller when used in accordance with NFPA 13 requirements for threaded fittings. This limit is important when selecting fittings for sprinkler-system piping because the fitting pressure capability must be suitable for the system's maximum working pressure, including the pressures associated with system operation and hydrostatic testing as applicable. "Standard weight pattern" identifies the fitting construction category addressed by the NFPA installation requirements; it is not simply a general indication that any malleable iron fitting may be used at that pressure. The 300 psi limit applies specifically to the stated fitting type and size range, so the installer and designer must confirm both the nominal fitting size and the manufacturer's/listing information before use. NFPA 13 is the governing installation standard for sprinkler systems and provides the applicable material and component-use requirements. The fitting product standard associated with threaded malleable iron fittings is ASME B16.3, which establishes dimensional and material requirements for this class of fittings. See [NFPA 13](#) and [ASME B16.3](#).

QUESTION NO: 7

A water-storage tank must supply a sprinkler demand of 2,200 gpm (8,327 L/min) and a hose-stream allowance of 250 gpm (946 L/min) for 90 minutes. If the available usable tank volume is 300,000 gal (1,135,624 L), how much water remains after meeting the required demand and duration?

A. 45,000 gal (170,343 L)

B. 67,500 gal (255,514 L)

- C. 75,000 gal (283,906 L)
- D. 79,500 gal (300,904 L)

ANSWER: D

Explanation:

79,500 gal (300,904 L) is correct. The combined required flow is 2,450 gpm: 2,200 gpm sprinkler demand plus 250 gpm hose-stream allowance. Over 90 minutes, the required volume is 220,500 gal: 2,450 gpm × 90 minutes. Subtracting this required volume from the available 300,000 gal leaves 79,500 gal. The hose-stream allowance is included because it is part of the required water-supply demand.

QUESTION NO: 8

An existing sprinkler system in a 25 ft (1.5 m) tall building is found to be designed using K-8.0 (115) high temperature control mode density/area (CMDA) sprinklers with a design criteria of 0.35 gpm/ft² (13.3 mm/min) over 2000 ft² (186 m²). What is the maximum storage height permitted for double-row rack storage with 8 ft (2.4 m) aisles of a nonencapsulated Class IV commodity?

- A. 15.5 ft (4.7 m)
- B. 16.5 ft (5.0 m)
- C. 18.5 ft (5.6 m)
- D. 20.5 ft (6.2 m)

ANSWER: B

Explanation:

16.5 ft (5.0 m) is the maximum permitted storage height for the stated arrangement and sprinkler-system design criteria. NFPA 13's CMDA storage-protection criteria are selected by correlating the commodity classification, storage arrangement, aisle width, storage height, ceiling height, sprinkler temperature rating, sprinkler K-factor, and density/area demand. Here, the relevant condition is nonencapsulated Class IV commodity in double-row rack storage with 8 ft aisles, protected from the ceiling by K-8.0 high-temperature CMDA sprinklers at 0.35 gpm/ft² over 2,000 ft². Applying that combination to the applicable NFPA 13 storage-protection table limits the storage height to 16.5 ft (5.0 m). The result is a maximum allowable storage height, not merely a practical target height; storage higher than this value would require evaluation using a different applicable protection scheme or revised design criteria. The ceiling height must also be considered with the required clearance between the top of storage and the sprinkler deflectors. NFPA 13 is the governing installation standard for this determination; the applicable edition and adopted local requirements should be confirmed for an existing installation. See [NFPA 13: Standard for the Installation of Sprinkler Systems](#) and [NFPA Codes and Standards](#).

QUESTION NO: 9

A sprinkler system employing automatic sprinklers that are attached to a piping system that contains air that might or might not be under pressure, with a supplemental detection system installed in the same areas as the sprinklers, is known as a:

- A. Dry System
- B. Preaction System
- C. Wet System

ANSWER: B

Explanation:

Preaction System is correct because the wording matches the NFPA 13 definition of a preaction sprinkler system. This type of system uses closed, automatic sprinklers connected to piping that normally contains air, which may or may not be pressurized. It also requires a supplemental detection system that protects the same general area as the sprinkler system. When the detection system operates, it releases a preaction valve, allowing water to enter the sprinkler piping. Water is then discharged only through sprinklers that have individually operated from sufficient heat.

This arrangement provides an additional initiating event before water enters the sprinkler piping, making it appropriate where avoiding unintended water discharge is especially important. Common applications include facilities containing valuable records, sensitive electronic equipment, museum collections, or other contents vulnerable to water damage. Depending on the preaction arrangement selected, sprinkler operation and detection-system operation can be configured to meet the protection objective and level of water-discharge assurance needed for the hazard.

The terminology and essential characteristics are established in NFPA 13, *Standard for the Installation of Sprinkler Systems*. See the official NFPA 13 standard information page at [NFPA 13](#) and NFPA's overview of sprinkler-system resources at [NFPA sprinkler systems](#).

QUESTION NO: 10

High piled storage includes all storage of Group A plastic in excess of what height?

- A. 5 ft (1.5 m)
- B. 6 ft (1.8 m)
- C. 8 ft (2.4 m)
- D. 12 ft (3.7 m)

ANSWER: B

Explanation:

6 ft (1.8 m) is correct. NFPA 13 distinguishes ordinary Class I through Class IV commodities from high-hazard commodities when defining high-piled storage. Group A plastics are high-hazard commodities because of their high heat-release rate and potential for rapid fire growth. Under the NFPA 13 definition of high-piled storage, storage of a high-hazard commodity is high-piled when it exceeds 6 ft (1.8 m) in height. This threshold is lower than the threshold used for Class I through Class IV commodities, reflecting the more severe fire characteristics of Group A plastics.

Identifying Group A plastic storage above this height as high-piled is important because it directs the designer and authority having jurisdiction to apply the applicable NFPA 13 storage protection criteria. Those criteria evaluate the commodity classification, storage arrangement, storage height, ceiling height, and sprinkler system configuration to establish an appropriate level of protection. The definition is therefore a starting point for correctly classifying the storage hazard, rather than merely a general description of a tall storage arrangement. See NFPA's [NFPA 13 standard information](#) and the [NFPA 13, 2022 edition information](#).