



Sprinkler System Permits

Modifications to Existing Systems

The installation, relocation or modification of an existing system falls under 3 categories based on scope. They are:

4 heads or less: No permit or inspection is required

5 heads to 19 heads: A permit is required and the system will be inspected for proper head installation, piping securement and visible leaks. Inspection must occur prior to ceiling cover approval.

20 heads or more: A permit is required and the system will be inspected for proper head installation, piping securement, visible leaks and a witnessed Hydrotest per NFPA 13 2013 Edition Section 25. Inspection must occur prior to ceiling cover approval. Witnessed hydrotesting requires an inspection to be called in **2 business days** or more in advance. The initial pressure will be witnessed by the District inspector. The inspector will return after more than 2 hours has elapsed to verify that there is no loss of pressure in the system.

New Systems

A permit is required and the system will be inspected for proper head installation, piping securement, visible leaks and a witnessed Hydrotest per NFPA 13 Version 2013 Sec. 25. Inspection must occur prior to ceiling cover approval.

Witnessed hydrotesting requires an inspection to be called in **2 business days** or more in advance. The initial pressure will be witnessed by the District inspector. The inspector will return after more than 2 hours has elapsed to verify that there is no loss of pressure in the system.

Requirements for all systems

The annual required testing and inspection documentation for the entire sprinkler system will be reviewed during the permit inspection process. Final approval will not be provided on a Sprinkler System Permit without current (less than 12 months) testing certification per NFPA 13 2013 Edition.



Flexible Hose Installations

Flexible hose installations are currently limited to a maximum of 2' as measured from the end of the rigid pipe to the base of the sprinkler head. Under no circumstances are flexible hose and head assemblies allowed to be used when the pendant can drop to a vertical position (when unsecured) lower than 84" as measured from the floor walking surface to the pendant.

For flexible head installations using a ceiling grid system as its securement, a full set of ceiling plans must be submitted with the Sprinkler permit showing ceiling construction, typical installation detail and product specifications demonstrating that the product and installation meets or exceeds ASTM C635 and C636 standards.

A **Ceiling Grid Inspection** *will be required* for Sprinkler System Permits using flexible hose systems.

NFPA® 13

Standard for the Installation of Sprinkler Systems

2013 Edition



NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization



- (1) A connection to an approved public or private waterworks system in accordance with 24.2.2
- (2) A connection including a fire pump in accordance with 24.2.3
- (3) A connection to a water storage tank at grade or below grade installed in accordance with NFPA 22 and filled from an approved source
- (4) A connection to a pressure tank in accordance with 24.2.4 and filled from an approved source
- (5) A connection to a gravity tank in accordance with 24.2.5 and filled from an approved source
- (6) A penstock, flume, river, lake, pond, or reservoir in accordance with 24.2.6
- (7)*A source of recycled or reclaimed water where the building owner (or their agent) has analyzed the source of the water and the treatment process (if any) that the water undergoes before being made available to the sprinkler system and determined that any materials, chemicals, or contaminants in the water will not be detrimental to the components of the sprinkler system it comes in contact with

24.2.2* Connections to Waterworks Systems.

24.2.2.1 A connection to a reliable waterworks system shall be an acceptable water supply source.

24.2.2.2* The volume and pressure of a public water supply shall be determined from waterflow test data or other approved method.

24.2.3* Pumps. A single automatically controlled fire pump installed in accordance with NFPA 20 shall be an acceptable water supply source.

24.2.4 Pressure Tanks.

24.2.4.1 Acceptability.

24.2.4.1.1 A pressure tank installed in accordance with NFPA 22 shall be an acceptable water supply source.

24.2.4.1.2 Pressure tanks shall be provided with an approved means for automatically maintaining the required air pressure.

24.2.4.1.3 Where a pressure tank is the sole water supply, an approved trouble alarm shall also be provided to indicate low air pressure and low water level with the alarm supplied from an electrical branch circuit independent of the air compressor.

24.2.4.1.4 Pressure tanks shall not be used to supply other than sprinklers and hand hose attached to sprinkler piping.

24.2.4.2 Capacity.

24.2.4.2.1 In addition to the requirements of 24.1.2, the water capacity of a pressure tank shall include the extra capacity needed to fill dry pipe or preaction systems where installed.

24.2.4.2.2 The total volume shall be based on the water capacity plus the air capacity required by 24.2.4.3.

24.2.4.3* Water Level and Air Pressure.

24.2.4.3.1 Pressure tanks shall be kept with a sufficient supply of water to meet the demand of the fire protection system as calculated in Chapter 23 for the duration required by Chapter 11, Chapter 12, or Chapter 22.

24.2.4.3.2 The pressure shall be sufficient to push all of the water out of the tank while maintaining the necessary residual pressure (required by Chapter 23) at the top of the system.

24.2.5 Gravity Tanks. An elevated tank installed in accordance with NFPA 22 shall be an acceptable water supply source.

24.2.6 Penstocks, Flumes, Rivers, or Lakes. Water supply connections from penstocks, flumes, rivers, lakes, or reservoirs shall be arranged to avoid mud and sediment and shall be provided with approved double removable screens or approved strainers installed in an approved manner.

Chapter 25 Systems Acceptance

25.1 Approval of Sprinkler Systems and Private Fire Service Mains.

The installing contractor shall do the following:

- (1) Notify the authority having jurisdiction and the property owner or the property owner's authorized representative of the time and date testing will be performed
- (2) Perform all required acceptance tests (*see Section 25.2*)
- (3) Complete and sign the appropriate contractor's material and test certificate(s) (*see Figure 25.1*)
- (4) Remove all caps and straps prior to placing the sprinkler system in service

25.2 Acceptance Requirements.

25.2.1* Hydrostatic Tests.

25.2.1.1 Unless permitted by 25.2.1.2 through 25.2.1.8, all piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi (13.8 bar) and shall maintain that pressure without loss for 2 hours.

25.2.1.2 Portions of systems normally subjected to system working pressures in excess of 150 psi (10.4 bar) shall be tested as described in 25.2.1.1, at a pressure of 50 psi (3.5 bar) in excess of system working pressure.

25.2.1.3 Where cold weather will not permit testing with water, an interim air test shall be permitted to be conducted as described in 25.2.2. This provision shall not remove or replace the requirement for conducting the hydrostatic test as described in 25.2.1.1.

25.2.1.4 Modifications affecting 20 or fewer sprinklers shall not require testing in excess of system working pressure.

25.2.1.5 Where addition or modification is made to an existing system affecting more than 20 sprinklers, the new portion shall be isolated and tested at not less than 200 psi (13.8 bar) for 2 hours.

25.2.1.6 Modifications that cannot be isolated, such as relocated drops, shall not require testing in excess of system working pressure.

25.2.1.7 Loss shall be determined by a drop in gauge pressure

25.2.1.8* The test pressure shall be read from a gauge located at the low elevation point of the system or portion being tested. The pressures in piping at higher elevations shall be permitted to be less than 200 psi (13.8 bar) when accounting for elevation losses. Systems or portions of systems that can be isolated shall be permitted to be tested separately.

25.2.1.9* Additives, corrosive chemicals such as sodium silicate, or derivatives of sodium silicate, brine, or similar acting chemicals shall not be used while hydrostatically testing systems or for stopping leaks.

Contractor's Material and Test Certificate for Aboveground Piping											
PROCEDURE Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by the property owner or their authorized agent. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.											
A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.											
Property name						Date					
Property address											
Plans	Accepted by approving authorities (names) WEST CO. EMS + FIRE										
	Address 223 HENRY AVE. MANCHESTER MO 63011										
	Installation conforms to accepted plans						<input type="checkbox"/> Yes		<input type="checkbox"/> No		
Equipment used is approved						<input type="checkbox"/> Yes		<input type="checkbox"/> No			
If no, explain deviations											
Instructions	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment?										
							<input type="checkbox"/> Yes		<input type="checkbox"/> No		
	If no, explain										
Location of system	Have copies of the following been left on the premises?										
	1. System components instructions						<input type="checkbox"/> Yes		<input type="checkbox"/> No		
	2. Care and maintenance instructions						<input type="checkbox"/> Yes		<input type="checkbox"/> No		
	3. NFPA 25						<input type="checkbox"/> Yes		<input type="checkbox"/> No		
Sprinklers	Supplies buildings										
	Make		Model		Year of manufacture		Orifice size	Quantity		Temperature rating	
Pipe and fittings	Type of pipe _____										
	Type of fittings _____										
Alarm valve or flow indicator	Alarm device						Maximum time to operate through test connection				
	Type		Make		Model		Minutes		Seconds		
Dry pipe operating test	Dry valve					Q. O. D.					
	Make		Model		Serial no.	Make		Model	Serial no.		
	Time to trip through test connection ^{a,b}		Water pressure		Air pressure	Trip point air pressure		Time water reached test outlet ^{a,b}		Alarm operated properly	
			psi		psi	psi		Minutes		Seconds	
	Without Q.O.D.									Yes	
	With Q.O.D.									No	
If no, explain											

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^a Measured from time inspector's test connection is opened.

^b NFPA 13 only requires the 60-second limitation in specific sections.

FIGURE 25.1 Contractor's Material and Test Certificate for Aboveground Piping.

Deluge and preaction valves	Operation <input type="checkbox"/> Pneumatic <input type="checkbox"/> Electric <input type="checkbox"/> Hydraulics							
	Piping supervised <input type="checkbox"/> Yes <input type="checkbox"/> No				Detecting media supervised <input type="checkbox"/> Yes <input type="checkbox"/> No			
	Does valve operate from the manual trip, remote, or both control stations? <input type="checkbox"/> Yes <input type="checkbox"/> No							
	Is there an accessible facility in each circuit for testing? <input type="checkbox"/> Yes <input type="checkbox"/> No						If no, explain	
	Make	Model	Does each circuit operate supervision loss alarm?		Does each circuit operate valve release?		Maximum time to operate release	
		Yes	No	Yes	No	Minutes	Seconds	
Pressure-reducing valve test	Location and floor	Make and model	Setting	Static pressure		Residual pressure (flowing)		Flow rate
				Inlet (psi)	Outlet (psi)	Inlet (psi)	Outlet (psi)	Flow (gpm)
Backflow device forward flow test	Indicate means used for forward flow test of backflow device: _____ When means to test device was opened, was system flow demand created? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A							
Test description	<p>Hydrostatic: Hydrostatic tests shall be made at not less than 200 psi (13.6 bar) for 2 hours or 50 psi (3.4 bar) above static pressure in excess of 150 psi (10.2 bar) for 2 hours. Differential dry pipe valve clappers shall be left open during the test to prevent damage. All aboveground piping leakage shall be stopped.</p> <p>Pneumatic: Establish 40 psi (2.7 bar) air pressure and measure drop, which shall not exceed 1½ psi (0.1 bar) in 24 hours. Test pressure tanks at normal water level and air pressure and measure air pressure drop, which shall not exceed 1½ psi (0.1 bar) in 24 hours.</p>							
Tests	All piping hydrostatically tested at _____ psi (____ bar) for _____ hours						If no, state reason	
	Dry piping pneumatically tested <input type="checkbox"/> Yes <input type="checkbox"/> No							
	Equipment operates properly <input type="checkbox"/> Yes <input type="checkbox"/> No							
	Do you certify as the sprinkler contractor that additives and corrosive chemicals, sodium silicate or derivatives of sodium silicate, brine, or other corrosive chemicals were not used for testing systems or stopping leaks? <input type="checkbox"/> Yes <input type="checkbox"/> No							
	Drain test	Reading of gauge located near water supply test connection: _____ psi (____ bar)				Residual pressure with valve in test connection open wide: _____ psi (____ bar)		
Underground mains and lead-in connections to system risers flushed before connection made to sprinkler piping								
Verified by copy of the Contractor's Material and Test Certificate for Underground Piping. <input type="checkbox"/> Yes <input type="checkbox"/> No						Other Explain		
Flushed by installer of underground sprinkler piping <input type="checkbox"/> Yes <input type="checkbox"/> No								
If powder-driven fasteners are used in concrete, has representative sample testing been satisfactorily completed? <input type="checkbox"/> Yes <input type="checkbox"/> No						If no, explain		
Blank testing gaskets	Number used		Locations				Number removed	
Welding	Welding piping <input type="checkbox"/> Yes <input type="checkbox"/> No							
	If yes . . .							
	Do you certify as the sprinkler contractor that welding procedures used complied with the minimum requirements of AWS B2.1, ASME Section IX <i>Welding and Brazing Qualifications</i> , or other applicable qualification standard as required by the AHJ?						<input type="checkbox"/> Yes <input type="checkbox"/> No	
	Do you certify that all welding was performed by welders or welding operators qualified in accordance with the minimum requirements of AWS B2.1, ASME Section IX <i>Welding and Brazing Qualifications</i> , or other applicable qualification standard as required by the AHJ?						<input type="checkbox"/> Yes <input type="checkbox"/> No	
Do you certify that the welding was conducted in compliance with a documented quality control procedure to ensure that (1) all discs are retrieved; (2) that openings in piping are smooth, that slag and other welding residue are removed; (3) the internal diameters of piping are not penetrated; (4) completed welds are free from cracks, incomplete fusion, surface porosity greater than ¼ in. diameter, undercut deeper than the lesser of 25% of the wall thickness or ½ in.; and (5) completed circumferential butt weld reinforcement does not exceed ⅜ in.?						<input type="checkbox"/> Yes <input type="checkbox"/> No		

FIGURE 25.1 Continued

Cutouts (discs)	Do you certify that you have a control feature to ensure that all cutouts (discs) are retrieved? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Hydraulic data nameplate	Nameplate provided <input type="checkbox"/> Yes <input type="checkbox"/> No	If no, explain	
Sprinkler contractor removed all caps and straps? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Remarks	Date left in service with all control valves open		
Signatures	Name of sprinkler contractor		
	Tests witnessed by		
	The property owner or their authorized agent (signed)	Title	Date
	For sprinkler contractor (signed)	Title	Date
Additional explanations and notes			
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FIGURE 25.1 *Continued*

25.2.1.10 Piping between the exterior fire department connection and the check valve in the fire department inlet pipe shall be hydrostatically tested in the same manner as the balance of the system. After repair or replacement work affecting the fire department connection, the piping between the exterior and the check valve in the fire department inlet pipe shall be isolated and hydrostatically tested at 150 psi (10.3 bar).

25.2.1.11 When systems are being hydrostatically tested, tests shall be permitted to be conducted with pendent or horizontal sidewall sprinklers or plugs installed in fittings. Any plugs shall be replaced with pendent or horizontal sidewall sprinklers after the test is completed.

25.2.1.12 When deluge systems are being hydrostatically tested, plugs shall be installed in fittings and replaced with open sprinklers after the test is completed, or the operating elements of automatic sprinklers shall be removed after the test is completed.

25.2.1.13 Provision shall be made for the proper disposal of water used for flushing or testing.

25.2.1.14* Test Blanks.

25.2.1.14.1 Test blanks shall have painted lugs protruding in such a way as to clearly indicate their presence.

25.2.1.14.2 The test blanks shall be numbered, and the installing contractor shall have a recordkeeping method ensuring their removal after work is completed.

25.2.1.15 When subject to hydrostatic test pressures, the clapper of a differential-type valve shall be held off its seat to prevent damaging the valve.

25.2.2 Dry Pipe and Double Interlock Preaction System(s) Air Test.

25.2.2.1 In addition to the standard hydrostatic test, an air pressure leakage test at 40 psi (2.8 bar) shall be conducted for 24 hours. Any leakage that results in a loss of pressure in excess of 1½ psi (0.1 bar) for the 24 hours shall be corrected.

25.2.2.2 Where systems are installed in spaces that are capable of being operated at temperatures below 32°F (0°C), air or nitrogen gas pressure leakage tests required in 25.2.2 shall be conducted at the lowest nominal temperature of the space.

25.2.3 System Operational Tests.

25.2.3.1 Waterflow Devices. Waterflow detecting devices including the associated alarm circuits shall be flow tested through the inspector's test connection and shall result in an audible alarm on the premises within 5 minutes after such flow begins and until such flow stops.

25.2.3.2* Dry Pipe Systems.

25.2.3.2.1 A working test of the dry pipe valve alone and with a quick-opening device, if installed, shall be made by opening the inspector's test connection.

25.2.3.2.2* The test shall measure the time to trip the valve and the time for water to be discharged from the inspector's test connection. All times shall be measured from the time the inspector's test connection is completely opened.

25.2.3.2.2.1* Dry systems calculated for water delivery in accordance with 7.2.3.6 shall be exempt from any specific delivery time requirement.

25.2.3.2.3 The results shall be recorded using the contractor's material and test certificate for aboveground piping (see Figure 25.1).

25.2.3.3 Deluge and Preaction Systems.

25.2.3.3.1 The automatic operation of a deluge or preaction valve shall be tested in accordance with the manufacturer's instructions.

25.2.3.3.2 The manual and remote control operation, where present, shall also be tested.

25.2.3.4 Main Drain Valves.

25.2.3.4.1 The main drain valve shall be opened and remain open until the system pressure stabilizes.

25.2.3.4.2* The static and residual pressures shall be recorded on the contractor's material and test certificate (see Figure 25.1).

25.2.3.5 Operating Test for Control Valves. All control valves shall be fully closed and opened under system water pressure to ensure proper operation.

25.2.4 Pressure-Reducing Valves.

25.2.4.1 Each pressure-reducing valve shall be tested upon completion of installation to ensure proper operation under flow and no-flow conditions.

25.2.4.2 Testing shall verify that the device properly regulates outlet pressure at both maximum and normal inlet pressure conditions.

25.2.4.3 The results of the flow test of each pressure-reducing valve shall be recorded on the contractor's material and test certificate (see Figure 25.1).

25.2.4.4 The results shall include the static and residual inlet pressures, static and residual outlet pressures, and the flow rate.

25.2.5 Backflow Prevention Assemblies.

25.2.5.1 The backflow prevention assembly shall be forward flow tested to ensure proper operation.

25.2.5.2 The minimum flow rate shall be the system demand, including hose stream allowance where applicable.

25.2.6 Exposure Systems. Operating tests shall be made of exposure protection systems upon completion of the installation, where such tests do not risk water damage to the building on which they are installed or to adjacent buildings.

25.3 Circulating Closed Loop Systems.

25.3.1 For sprinkler systems with non-fire protection connections, additional information shall be appended to the contractor's material and test certificate for aboveground piping shown in Figure 25.1 as follows:

- (1) Certification that all auxiliary devices, such as heat pumps, circulating pumps, heat exchangers, radiators, and luminaires, if a part of the system, have a pressure rating of at least 175 psi or 300 psi (12.1 bar or 20.7 bar) if exposed to pressures greater than 175 psi (12.1 bar).
- (2) All components of sprinkler system and auxiliary system have been pressure tested as a composite system in accordance with 25.2.2.

- (3) Waterflow tests have been conducted and waterflow alarms have operated while auxiliary equipment is in each of the possible modes of operation.
- (4) With auxiliary equipment tested in each possible mode of operation and with no flow from sprinklers or test connection, waterflow alarm signals did not operate.
- (5) Excess temperature controls for shutting down the auxiliary system have been properly field tested.

25.3.2 Discharge tests of sprinkler systems with non-fire protection connections shall be conducted using system test connections described in 6.9.1.

25.3.3 Pressure gauges shall be installed at critical points and readings shall be taken under various modes of auxiliary equipment operation.

25.3.4 Waterflow alarm signals shall be responsive to discharge of water through system test pipes while auxiliary equipment is in each of the possible modes of operation.

25.4 Instructions. The installing contractor shall provide the property owner or the property owner's authorized representative with the following:

- (1) All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed
- (2) NFPA 25

25.5* Hydraulic Design Information Sign.

25.5.1 The installing contractor shall identify a hydraulically designed sprinkler system with a permanently marked weatherproof metal or rigid plastic sign secured with corrosion-resistant wire, chain, or other approved means. Such signs shall be placed at the alarm valve, dry pipe valve, preaction valve, or deluge valve supplying the corresponding hydraulically designed area.

25.5.2 The sign shall include the following information:

- (1) Location of the design area or areas
- (2) Discharge densities over the design area or areas
- (3) Required flow and residual pressure demand at the base of the riser
- (4) Occupancy classification or commodity classification and maximum permitted storage height and configuration
- (5) Hose stream allowance included in addition to the sprinkler demand
- (6) The name of the installing contractor

25.6* General Information Sign.

25.6.1 The installing contractor shall provide a general information sign used to determine system design basis and information relevant to the inspection, testing, and maintenance requirements required by NFPA 25.

25.6.1.1 Such general information shall be provided with a permanently marked weatherproof metal or rigid plastic sign, secured with corrosion-resistant wire, chain, or other acceptable means.

25.6.1.2 Such signs shall be placed at each system control riser, antifreeze loop, and auxiliary system control valve.

25.6.2 The sign shall include the following information:

- (1) Name and location of the facility protected
- (2) Occupancy classification
- (3) Commodity classification

- (4) Presence of high-piled and/or rack storage
- (5) Maximum height of storage planned
- (6) Aisle width planned
- (7) Encapsulation of pallet loads
- (8) Presence of solid shelving
- (9) Flow test data
- (10) Presence of flammable/combustible liquids
- (11) Presence of hazardous materials
- (12) Presence of other special storage
- (13) Location of auxiliary drains and low point drains on dry pipe and preaction systems
- (14) Original results of main drain flow test
- (15) Name of installing contractor or designer
- (16) Indication of presence and location of antifreeze or other auxiliary systems
- (17) Where injection systems are installed to treat MIC or corrosion, the type of chemical, concentration of the chemical, and where information can be found as to the proper disposal of the chemical

Chapter 26 Marine Systems

26.1 General.

26.1.1 Chapter 26 outlines the deletions, modifications, and additions that shall be required for marine application. The applicability of Chapter 26 shall be determined by the authority having jurisdiction.

26.1.2 All other requirements of this standard shall apply to merchant vessel systems except as modified by this chapter.

26.1.3 The following definitions shall be applicable to this chapter (*see Section 3.10*):

- (1) *A-Class Boundary* — A boundary designed to resist the passage of smoke and flame for 1 hour when tested in accordance with ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*.
- (2) *B-Class Boundary* — A boundary designed to resist the passage of flame for ½ hour when tested in accordance with ASTM E 119.
- (3) *Central Safety Station* — A continuously manned control station from which all of the fire control equipment is monitored. If this station is not the bridge, direct communication with the bridge shall be provided by means other than the ship's service telephone.
- (4)* *Heat-Sensitive Material* — A material whose melting point is below 1700°F (926.7°C).
- (5) *Heel* — The inclination of a ship to one side.
- (6) *Heel Angle* — The angle defined by the intersection of a vertical line through the center of a vessel and a line perpendicular to the surface of the water.
- (7) *International Shore Connection* — A universal connection to the vessel's fire main to which a shoreside fire-fighting water supply can be connected.
- (8)* *Marine System* — A sprinkler system installed on a ship, boat, or other floating structure that takes its supply from the water on which the vessel floats.
- (9)* *Marine Thermal Barrier* — An assembly that is constructed of noncombustible materials and made intact with the main structure of the vessel, such as shell, structural bulkheads, and decks. A marine thermal barrier shall meet the requirements of a B-Class boundary. In addition, a marine thermal barrier shall be insulated such

that, if tested in accordance with ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, for 15 minutes, the average temperature of the unexposed side does not rise more than 250°F (121°C) above the original temperature, nor does the temperature at any one point, including any joint, rise more than 405°F (207°C) above the original temperature.

- (10) *Supervision* — A visual and audible alarm signal given at the central safety station to indicate when the system is in operation or when a condition that would impair the satisfactory operation of the system exists. Supervisory alarms shall give a distinct indication for each individual system component that is monitored.
- (11) *Survival Angle* — The maximum angle to which a vessel is permitted to heel after the assumed damage required by stability regulations is imposed.
- (12) *Type 1 Stair* — A fully enclosed stair that serves all levels of a vessel in which persons can be employed.
- (13) *Marine Water Supply* — The supply portion of the sprinkler system from the water pressure tank or the sea suction of the designated sprinkler system pump up to and including the valve that isolates the sprinkler system from these two water sources.

26.1.4* Occupancy Classifications. Marine environment classifications shall be in accordance with Section 5.1.

26.1.5* Partial Installations.

26.1.5.1 Partial installation of automatic sprinklers shall not be permitted, unless the requirements of 26.1.5.2 or 26.1.5.3 are met.

26.1.5.2 Spaces shall be permitted to be protected with an alternative, approved fire suppression system where such areas are separated from the sprinklered areas with a 1 hour-rated assembly.

26.1.5.3 The requirements of 26.1.5.1 shall not apply where specific sections of this standard permit the omission of sprinklers.

26.2 System Components, Hardware, and Use.

26.2.1* Sprinklers shall have a K-factor of K-2.8 (40) or greater.

26.2.2* Sprinkler piping penetrations shall be designed to preserve the fire integrity of the ceiling or bulkhead penetrated.

26.2.3 Spare Sprinklers.

26.2.3.1 The required stock of spare sprinklers shall be carried for each type of sprinkler installed onboard the vessel.

26.2.3.2 Where fewer than six sprinklers of a particular type are installed, 100 percent spares shall be kept in stock.

26.2.3.3 Where applicable, at least one elastometric gasket shall be kept in the cabinet for each fire department connection that is installed onboard the vessel.

26.2.3.4 The cabinet containing spare sprinklers, special wrenches, and elastometric gaskets shall be located in the same central safety station that contains the alarm annunciator panel(s) and supervisory indicators.

26.2.4 System Pipe and Fittings.

26.2.4.1* When ferrous materials are used for piping between the sea chest and zone control valves, these materials shall be

protected against corrosion by hot dip galvanizing or by the use of Schedule 80 piping.

26.2.4.2 Maximum design pressure for copper and brass pipe shall not exceed 250 psi (17.2 bar).

26.2.5 Pipe Support.

26.2.5.1* Pipe supports shall comply with the following:

- (1) Pipe supports shall be designed to provide adequate lateral, longitudinal, and vertical sway bracing.
- (2) The design shall account for the degree of bracing, which varies with the route and operation of the vessel.
- (3) Bracing shall be designed to ensure the following:
 - (a) Slamming, heaving, and rolling will not shift sprinkler piping, potentially moving sprinklers above ceilings, bulkheads, or other obstructions.
 - (b) Piping and sprinklers will remain in place at a steady heel angle at least equal to the maximum required damaged survival angle.
- (4) Pipe supports shall be welded to the structure.
- (5) Hangers that can loosen during ship motion or vibration, such as screw-down-type hangers, shall not be permitted.
- (6) Hangers that are listed for seismic use shall be permitted to be used in accordance with their listing.

26.2.5.2 Sprinkler piping shall be supported by the primary structural members of the vessel such as beams, girders, and stiffeners.

26.2.5.3* The components of hanger assemblies that are welded directly to the ship structure shall not be required to be listed.

26.2.5.4* U-hook sizes shall be no less than that specified in Table 9.1.2.4.

26.2.6 Valves.

26.2.6.1* All indicating, supply, and zone control valves shall be supervised open from a central safety station.

26.2.6.2 Drain and test valves shall meet the applicable requirements of 46 CFR 56.20 and 56.60.

26.2.6.3 Valve markings shall include the information required by 46 CFR 56.20-5(a).

26.2.7 Fire Department Connections and International Shore Connections.

26.2.7.1* A fire department connection and an International Shore Connection shall be installed.

26.2.7.2 The requirements for a fire department connection in 26.2.7.1 shall not apply to vessels that operate primarily on international voyages.

26.2.7.3 Connections shall be located near the gangway or other shore access point so that they are accessible to the land-based fire department.

26.2.7.4 Fire department and International Shore Connections shall be colored and marked so that the connections are easily located from the shore access point (i.e., gangway location) and will not be confused with a firemain connection.

26.2.7.5 An 18 in. × 18 in. (0.46 m × 0.46 m) sign displaying the symbol for fire department connection as shown in Table 5.2.1 of NFPA 170 shall be placed at the connection so that it is in plain sight from the shore access point.

