

## Contractor's Material and Test Certificate for **U**nderground Piping

**PROCEDURE**

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. 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)			
	ADDRESS			
	INSTALLATION CONFORMS TO ACCEPTED PLANS		<input type="checkbox"/> YES	<input type="checkbox"/> NO
EQUIPMENT USED IS APPROVED IF NO, STATE DEVIATIONS		<input type="checkbox"/> YES	<input type="checkbox"/> NO	
INSTRUCTIONS	HAS PERSON IN CHARGE OF FIRE EQUIPMENT BEEN INSTRUCTED AS TO LOCATION OF CONTROL VALVES AND CARE AND MAINTENANCE OF THIS NEW EQUIPMENT? IF NO, EXPLAIN		<input type="checkbox"/> YES	<input type="checkbox"/> NO
	HAVE COPIES OF APPROPRIATE INSTRUCTIONS AND CARE AND MAINTENANCE CHARTS BEEN LEFT ON PREMISES? IF NO, EXPLAIN		<input type="checkbox"/> YES	<input type="checkbox"/> NO
LOCATION	SUPPLIES BUILDINGS			
UNDERGROUND PIPES AND JOINTS	PIPE TYPES AND CLASS		TYPE JOINT	
	PIPE CONFORMS TO _____ STANDARD		<input type="checkbox"/> YES	<input type="checkbox"/> NO
	FITTINGS CONFORM TO _____ STANDARD IF NO, EXPLAIN		<input type="checkbox"/> YES	<input type="checkbox"/> NO
	JOINTS NEEDING ANCHORAGE CLAMPED, STRAPPED, OR BLOCKED IN ACCORDANCE WITH _____ STANDARD IF NO, EXPLAIN		<input type="checkbox"/> YES	<input type="checkbox"/> NO
TEST DESCRIPTION	<p><b>FLUSHING:</b> Flow the required rate until water is clear as indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blow-offs. Flush at flows not less than 390 GPM (1476 L/min) for 4-inch pipe, 680 GPM (3331 L/min) for 6-inch pipe, 1560 GPM (5905 L/min) for 8-inch pipe, 2440 GPM (9235 L/min) for 10-inch pipe, and 3520 GPM (13323 L/min) for 12-inch pipe. When supply cannot produce stipulated flow rates, obtain maximum available.</p> <p><b>HYDROSTATIC:</b> Hydrostatic tests shall be made at not less than 200 psi (13.8 bars) for two hours or 50 psi (3.4 bars) above static pressure in excess of 150 psi (10.3 bars) for two hours.</p> <p><b>LEAKAGE:</b> New pipe laid with rubber gasketed joints shall, if the workmanship is satisfactory, have little or no leakage at the joints. The amount of leakage at the joints shall not exceed 2 qts. per hr. (1.89 L/h) per 100 joints irrespective of pipe diameter. The leakage shall be distributed over all joints. If such leakage occurs at a few joints the installation shall be considered unsatisfactory and necessary repairs made. The amount of allowable leakage specified above may be increased by 1 fl oz per in. valve diameter per hr. (30 mL/25 mm/h) for each metal seated valve isolating the test section. If dry barrel hydrants are tested with the main valve open, so the hydrants are under pressure, an additional 5 oz per minute (150 mL/min) leakage is permitted for each hydrant.</p>			
FLUSHING TESTS	NEW UNDERGROUND PIPING FLUSHED ACCORDING TO _____ STANDARD BY (COMPANY) IF NO, EXPLAIN		<input type="checkbox"/> YES	<input type="checkbox"/> NO
	HOW FLUSHING FLOW WAS OBTAINED <input type="checkbox"/> PUBLIC WATER <input type="checkbox"/> TANK OR RESERVOIR <input type="checkbox"/> FIRE PUMP		THROUGH WHAT TYPE OPENING <input type="checkbox"/> HYDRANT BUTT <input type="checkbox"/> OPEN PIPE	
	LEAD-INS FLUSHED ACCORDING TO _____ STANDARD BY (COMPANY) IF NO, EXPLAIN		<input type="checkbox"/> YES	<input type="checkbox"/> NO
	HOW FLUSHING FLOW WAS OBTAINED <input type="checkbox"/> PUBLIC WATER <input type="checkbox"/> TANK OR RESERVOIR <input type="checkbox"/> FIRE PUMP		THROUGH WHAT TYPE OPENING <input type="checkbox"/> Y CONN. TO FLANGE <input type="checkbox"/> OPEN PIPE & SPIGOT	

Figure 8-1(b) Part 1.

HYDROSTATIC TEST	ALL NEW UNDERGROUND PIPING HYDROSTATICALLY TESTED AT _____ PSI FOR _____ HOURS		JOINTS COVERED <input type="checkbox"/> YES <input type="checkbox"/> NO
LEAKAGE TEST	TOTAL AMOUNT OF LEAKAGE MEASURED _____ GALS. _____ HOURS		
	ALLOWABLE LEAKAGE _____ GALS. _____ HOURS		
HYDRANTS	NUMBER INSTALLED	TYPE AND MAKE	ALL OPERATE SATISFACTORILY <input type="checkbox"/> YES <input type="checkbox"/> NO
	WATER CONTROL VALVES LEFT WIDE OPEN IF NO, STATE REASON		<input type="checkbox"/> YES <input type="checkbox"/> NO
CONTROL VALVES	HOSE THREADS OF FIRE DEPARTMENT CONNECTIONS AND HYDRANTS INTERCHANGEABLE WITH THOSE OF FIRE DEPARTMENT ANSWERING ALARM		<input type="checkbox"/> YES <input type="checkbox"/> NO
	DATE LEFT IN SERVICE		
REMARKS			
SIGNATURES	NAME OF INSTALLING CONTRACTOR		
	TESTS WITNESSED BY		
	FOR PROPERTY OWNER (SIGNED)	TITLE	DATE
	FOR INSTALLING CONTRACTOR (SIGNED)	TITLE	DATE
ADDITIONAL EXPLANATION AND NOTES			

Figure 8-1(b) Part 2.

**8-5\* Hydraulic Design Information Sign.** 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. The sign shall include the following information:

- Location of the design area or areas.
- Discharge densities over the design area or areas.
- Required flow and residual pressure demand at the base of riser.
- Occupancy classification or commodity classification and maximum permitted storage height and configuration.
- Hose stream demand included in addition to the sprinkler demand.

**8-6 Circulating Closed Loop Systems.** Discharge tests of sprinkler systems with nonfire protection connections shall be conducted using system test connections described in 2-7.2. Pressure gauges shall be installed at critical points and readings taken under various modes of auxiliary equipment operation. 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.

## Chapter 9 Marine Systems

**9-1 General.** This chapter outlines the deletions, modifications, and additions that are necessary for marine application. All other requirements of this standard shall apply to merchant vessel systems except as modified by this chapter.

**9-1.1** The following definitions shall be applicable to this chapter.

**A-Class Boundary.** A boundary designed to resist the passage of smoke and flame for 1 hr when tested in accordance with ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*.

**B-Class Boundary.** A boundary designed to resist the passage of flame for 1/2 hr when tested in accordance with ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*.

**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.

**Heat-Sensitive Material.\*** A material whose melting point is below 1700°F (926.7°C).

**Heel.** The inclination of a ship to one side.

**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.

**International Shore Connection.\*** A universal connection complying with ASTM F1121, to which shoreside fire-fighting hoses are to be connected.

**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 min, the average temperature of the unexposed side does not rise more than 250°F (193°C) above the original temperature, nor does the temperature at any one point, including any joint, rise more than 405°F (225°C) above the original temperature.

**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.

**Survival Angle.** The maximum angle to which a vessel is permitted to heel after the assumed damage required by stability regulations is imposed.

**Type 1 Stair.** A fully enclosed stair that serves all levels of a vessel in which persons may be employed.

**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.

**9-1.2\* Occupancy Classifications.** Marine environment classifications shall be in accordance with 1-4.7.

**9-1.3\*** Partial installation of automatic sprinklers shall not be permitted.

*Exception No. 1:* 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-hr-rated assembly.

*Exception No. 2:* Where specific sections of this standard permit the omission of sprinklers.

## 9-2 System Components, Hardware, and Use.

**9-2.1\*** A sprinkler orifice shall not be less than a nominal  $\frac{3}{8}$  in. (9.5 mm) in size. Sprinklers shall have a discharge coefficient greater than 2.9. The minimum operating pressure of any sprinkler shall be 10 psi (68.9 kPa).

**9-2.2\*** Sprinkler piping penetrations shall be designed to preserve the fire integrity of the ceiling or bulkhead penetrated.

### 9-2.3 Spare Sprinklers.

**9-2.3.1** The required stock of spare sprinklers shall be carried for each type of sprinkler installed onboard the vessel. Where fewer than six sprinklers of a particular type are installed, 100 percent spares shall be kept in stock. Where

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

**9-2.3.2** 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.

### 9-2.4 System Pipe and Fittings.

**9-2.4.1** All the materials listed in Tables 2-3.1 and 2-4.1 shall be acceptable for use except Brazing Filler Metal (AWS A5.8). Where ferrous materials are subjected to salt water, the materials shall be protected against corrosion by hotdip galvanizing or by the use of extra heavy schedule material.

**9-2.4.2** Maximum design pressure for copper and brass pipe shall not exceed 250 psi (1722 kPa).

**9-2.4.3** Materials other than those meeting the requirements of Table 2-3.1 or Table 2-4.1 shall be permitted to be installed in wet automatic sprinkler systems in accordance with their listing, subject to the following restrictions:

(a) Portions of a system that are constructed from heat-sensitive materials shall be installed behind a marine thermal barrier.

(b)\* Piping materials shall be listed for the intended service and installed according to the listing requirements.

### 9-2.5 Pipe Support.

**9-2.5.1\*** Pipe supports shall comply with the following:

(a) Pipe supports shall be designed to provide adequate lateral, longitudinal, and vertical sway bracing. The design shall account for the degree of bracing, which varies with the route and operation of the vessel. Bracing shall be designed to ensure that:

1. Slamming, heaving, and rolling will not shift sprinkler piping, potentially moving sprinklers above ceilings, bulkheads, or other obstructions.

2. Piping and sprinklers will remain in place at a steady heel angle at least equal to the maximum required damaged survival angle.

(b) Pipe supports shall be welded to the structure. Hangers that can loosen during ship motion or vibration, such as screw-down-type hangers, shall not be permitted.

*Exception to (b):* Hangers that are listed for seismic use shall be permitted to be used in accordance with their listing.

**9-2.5.2** Sprinkler piping shall be supported by the primary structural members of the vessel such as beams, girders, and stiffeners.

**9-2.5.3\*** The components of hanger assemblies that are welded directly to the ship structure are not required to be listed.

**9-2.5.4\*** U-hook sizes shall be no less than that specified in Table 2-6.4.1.

### 9-2.6 Valves.

**9-2.6.1\*** All indicating, supply, and zone control valves shall be supervised open from a central safety station.

**9-2.6.2** Drain and test valves shall meet the applicable requirements of 46 CFR 56.20 and 56.60.