

NAVSEA
STANDARD ITEM

FY-18 (CH-1)

ITEM NO: 009-08

DATE: 07 MAR 2017

CATEGORY: I

1. SCOPE:

1.1 Title: Shipboard Fire Protection and Fire Prevention; accomplish

2. REFERENCES:

2.1 NFPA Standard 312, Standard for Fire Protection of Vessels During Construction, Conversion, Repair, and Lay-up

2.2 NFPA Standard 1962, Standard for the Care, Use, and Service Testing of Fire Hose Including Couplings and Nozzles

2.3 29 CFR Part 1915, Occupational Safety and Health Standards for Shipyard Employment

2.4 NFPA Standard 14, Standard for Installation of Standpipe and Hose Systems

2.5 NFPA Standard 1961, Standard on Fire Hose

2.6 NFPA Standard 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

3. REQUIREMENTS:

3.1 Plan and execute all work to minimize the use of temporary firefighting systems. When the scope of work allows, the ship's firemain system shall provide the ship's firefighting capability.

3.1.1 Firemain system repairs or modifications that reduce the coverage or damage control capability of the ship's firemain shall be coordinated through the use of jumpers and/or temporary fire hose manifold stations in affected areas to restore firefighting capabilities.

3.1.2 Use of temporary firefighting systems shall be approved by the SUPERVISOR.

3.2 Provide fire protection in accordance with 2.1 through 2.4.

3.3 Establish, document, implement, and maintain a Shipboard Temporary Fire Protection Plan **when temporary fire protection is needed**. The plan shall include, at a minimum, the following elements:

3.3.1 Fire pump manual(s), operating instructions, and performance specifications

3.3.2 Temporary firefighting and dewatering equipment inventory

3.3.3 List of each ship compartment (by space number) and corresponding uniquely numbered temporary fire hose manifold station(s) providing coverage to that compartment

3.3.4 Identification of which hoses/pipes are charged/not charged

3.3.5 Diagram of temporary firemain system, to include the following elements:

3.3.5.1 Diameter, length, and connection path of each distribution hose/pipe (See Note 4.3)

3.3.5.2 Location of each temporary fire hose manifold station and its elevation relative to the fire pump(s).

3.3.5.3 Connection locations to shore side water supply.

3.4 Submit one legible copy, in hard copy or approved transferrable media of the initial Shipboard Temporary Fire Protection Plan to the SUPERVISOR for approval and posting no later than 10 days prior to placing any section of the ship's firemain out of service.

3.4.1 Submit one legible copy, in hard copy or approved transferrable media of an updated Shipboard Temporary Fire Protection Plan prior to any modification to the plan after initial approval.

3.5 Train ship's force on the Shipboard Temporary Fire Protection Plan at least one day prior to securing ship's firemain and no later than one day prior to entering dry dock, graving dock, or marine railway.

3.6 Provide temporary fire protection equipment as follows:

3.6.1 Each fire hose shall be:

3.6.1.1 Manufactured with National Hose/National Pipe Straight Hose (NH/NPSH) fittings (NH for 2 and one-half inch and larger hoses, and NPSH for one and one-half inch couplings to ensure compatibility with shipboard equipment).

3.6.1.2 Inspected and service-tested in accordance with 2.2 within 90 days prior to being placed in service for the first time and annually thereafter.

3.6.1.3 Cotton or synthetic double jacketed manufactured to the requirements of 2.5 or in accordance with MIL-H-24606B.

3.6.2 Each fire hose nozzle shall be:

3.6.2.1 One and one half inch combination straight stream and spray pattern nozzles, conforming to MIL-N-24408, rated for 125 gallons per minute (GPM) at 100 pounds per square inch (PSI).

3.6.2.2 Pre-connected to the end of each handline hose and maintained operational. (See Note 4.4)

3.6.3 Each temporary fire hose manifold station shall:

3.6.3.1 Be provided in sufficient numbers such that all parts of the ship, including the interior of temporary structures, can be reached by a 10 foot fog stream from at least 2 each, 100 foot lengths of one and three-quarters inch handline hose. |

3.6.3.2 Have at minimum, 3-valved outlets of one and one-half inches NPSH in size.

3.6.3.3 Have distribution hoses of sufficient size to meet a minimum of 95 GPM and 60 PSI residual nozzle pressure at the end of each one and three-quarters inch handline hose.

3.6.3.4 Have 2 each, 100 foot lengths of one and three-quarters inch handline hose manufactured with one and one-half inch NPSH couplings pre-connected to temporary fire hose manifold station valve outlets and faked on racks nearby.

3.6.3.5 Have pressure gages installed with a 0 - 250 (+/- 50) PSI range.

3.6.3.6 Have a 0 - 250 (+/- 50) PSI range calibrated gage installed on the hydraulically most remote temporary fire hose manifold station. (See Note 4.2).

3.6.3.7 Have operating instructions posted on each temporary manifold station with sources of water identified. Instructions must endure the repair process, stay attached, and be legible the entire time the station is on board.

3.6.4 Each primary fire pump shall:

3.6.4.1 Have functioning auto start capability.

3.6.4.2 Provide GPM flow specified in Attachment A uninterrupted at a minimum of 150 PSI measured at the most remote shore side outlet providing firemain water to the ship.

3.6.4.3 Maintain constant pressure automatically without manually manipulating valves.

3.6.5 Each back-up fire pump shall:

3.6.5.1 Be equivalent to primary fire pump(s), powered from a source(s) different than that powering the primary fire pump(s), and be pre-installed in the temporary fire protection system.

3.6.6 Ensure when ship's firemain system cannot be used, portable fire pump(s) capable of providing a total of 500 GPM at 100 PSI shall be on board the ship during berth shifts, transits to and from Naval facilities, dockings, undocking's. The pump shall be connected to the ship's firemain system or the temporary firemain system prior to ship movement.

3.6.7 Ensure all engine driven equipment providing emergency services (firefighting water, power, and lighting) are equipped with a functioning audible low fuel level alarm capable of producing a continuous 110dBA (+0/-25 decibel) signal.

3.6.8 When connection of the shore supply to the ship's Firemain Shore Connection fitting is not possible. Ensure a tri-gate hose connection compatible with the ship's portable fire pumps is used to connect to the ship's fire plugs, to permit ship's firemain to remain in service while also acting as shore firemain connection.

3.6.9 Provide and install distribution hoses connected to the ship's permanent firemain or temporary firemain in sufficient number to deliver the fire protection capacity specified Attachment A. This shall be determined by dividing the water supply capacity from Attachment A (plus cooling and flushing loads) by the hose line capacity for the chosen distribution hose/pipe diameter. (See Note 4.1 for example).

3.6.9.1 The number of hoses connected to the ship from the shore shall not be reduced when the ship's firemain becomes operational unless the permanently installed pumping capacity of the ship can meet the entire fire protection water supply requirement of Attachment A plus cooling and flushing loads.

3.6.10 Unpressurized 2 and one-half inch drop lines, supplied from a temporary hose manifold station, with a 2 and one-half inch **NH** by one and one-half inch NPSH by one and one-half inch NPSH hose fittings may be utilized to provide coverage to the lowermost compartments (tanks and voids) that are inaccessible with a 100 feet of handline hose, approved by the SUPERVISOR.

3.6.11 Equip temporary firemain systems with a minimum of 2 isolation valves from shore side supply prior to entry to the temporary firemain system. Place additional isolation valves in the remainder of the

temporary firemain system so that the maximum distance between any 2 adjoining valves does not exceed 200 feet.

3.7 Provide emergency fire protection equipment as follows:

3.7.1 Install a temporary fire alarm system on the quarterdeck configured to send a signal directly to the cognizant fire department, shipyard/Naval facility fire department, or a continuously manned location within the shipyard/Naval facility where trained personnel can take immediate action to transmit an alarm.

3.7.1.1 Temporary fire alarm devices placed aboard ship shall be a fire alarm pull box, non-dial telephone, or as approved by the SUPERVISOR.

3.7.1.2 Provide a telephone on the quarterdeck, in addition to the temporary fire alarm system, as an alternate means of calling the cognizant fire department, shipyard/Naval facility fire department, or a continuously manned location within the shipyard/Naval facility where trained personnel can take immediate action to transmit an alarm.

3.7.1.3 Conspicuously post the emergency reporting procedures at the quarterdeck.

3.7.1.4 Test the temporary fire alarm system daily. Repair or replace defective or inoperative equipment immediately. Submit one legible copy, in hard copy or approved transferrable media, of the test report for the temporary fire alarm system, when requested by the SUPERVISOR.

3.7.2 Provide dewatering equipment to include a sufficient number of pumps capable of providing 100 GPM minimum each and a total dewatering capability equal to at least one-half of the supply GPM specified in Attachment A.

3.8 Develop and implement a written Fire Safety and Emergency Fire Response Plan in accordance with 2.3. In addition to the requirements of 2.3, the plan shall identify:

3.8.1 Each integrated fire protection system in effect during the performance of the maintenance availability.

3.8.2 Each fire prevention program used, along with the types and frequency of tests of equipment and devices.

3.8.3 Details of all communication links (telephones, drop boxes, alarms, horns) location, testing interval, and interface with shore side response systems.

3.8.4 Each normal and emergency source of electric power, firefighting water, lighting, testing interval, and interface with shore side response systems.

3.8.5 Each location of all normal and emergency backup support equipment to be used in support when combating a fire, and the equipment's testing cycle.

3.8.6 Each organization to be used, designation of responsibility for all shifts, training, anticipated response times, and interface with shore side response units.

3.8.7 Ensure general procedures for directing contractor employees on fire reporting, fire responses, firefighting actions, personnel accountability, and prolonged firefighting responsibilities.

3.8.8 Provision for portable communication devices for contractor use during firefighting operations between site, fire, and contractor's/shipyard's operations center.

3.9 Submit one legible copy, in hard copy or approved transferrable media of the Fire Safety and Emergency Fire Response Plan to the SUPERVISOR no later than 10 days prior to commencement of work.

3.9.1 Submit one legible copy, in hard copy or approved transferrable media of an updated Fire Safety and Emergency Fire Response Plan prior to any modification to the plan after initial approval.

3.10 Ensure access to temporary and Ship's Force firefighting equipment is not obstructed or restricted.

3.11 Provide fire reporting devices in Dry dock, graving dock, or marine railway as follows:

3.11.1 Fire reporting devices shall be clearly identified and located at each manifold station and each exit serving the dry dock, graving dock, or marine railway.

3.11.2 Fire reporting device separation shall not exceed 200 feet horizontally along the dry dock, graving dock wall, or marine railway or 100 feet from either end of the dry dock, graving dock, or marine railway.

3.11.3 Modifications to locations of fire reporting devices for ships docked side by side, must be approved by the SUPERVISOR.

3.12 Provide water for firefighting to the ship through sufficiently sized hoses or pipes to carry capacities specified by Attachment A. These requirements shall be in addition to water required for flushing and cooling.

3.12.1 Maintain a minimum of 100 PSI residual and static pressure uninterrupted for the entire availability and during testing, measured at each temporary fire hose manifold station.

3.13 Locate each temporary fire distribution hose and each fire hose manifold station to minimize exposure to areas of the ship where flooding due to a ruptured hose would cause damage.

3.14 Conduct an orientation brief to Ship's Force no later than 5 days of the availability start to include the following:

3.14.1 Procedures to rapidly secure temporary systems (e.g., air, electrical power, and ventilation) under Ship's Force control.

3.14.1.1 Train Ship's Force personnel on the procedures to operate temporary firefighting systems, if installed. Provide written operating procedures/instructions to Ship's Force on each type of firefighting system. Provide information and physical training aids for all versions of quick disconnect fittings used in conjunction with temporary services.

3.14.2 Procedures to operate temporary firefighting equipment.

(I) (G) "TEMPORARY FIREMAIN OPERATIONAL TEST"

3.15 Conduct an operational test of both shore side supply and shipboard distribution of firefighting water through the temporary firemain system prior to taking down ships firemain. 3.15.1 and 3.15.2 shall be tested concurrent with acceptance criteria met simultaneously.

3.15.1 Discharge firefighting water from 4 each one and three-quarters inch handline hoses from the two most hydraulically remote temporary fire hose manifold stations on the ship that share the same distribution hose (four nozzles total). Discharge firefighting water from each hose simultaneously for 60 seconds prior to measurement start in order to obtain steady state flow conditions. Once at steady state, test firefighting water flow for a minimum of 60 seconds. Measure and record flowrate and residual nozzle pressure at each nozzle by in-line flow meter and calibrated nozzle pressure gage. The elevation of each nozzle tested shall be equal to or greater than the elevation of the temporary fire hose manifold station providing water to that nozzle. Accept/Reject Criteria: Temporary pumps shall automatically start. Maintain a minimum of 95 GPM and a minimum of 60 PSI residual pressure while flowing simultaneously at each nozzle for a minimum of 60 seconds. Pressure and flowrate shall be constant, maximum nozzle pressure variation allowed during 60 seconds is **+25/-0** PSI.

3.15.1.1 When nozzle(s) cannot be tested at the same or higher elevation as the temporary fire hose manifold station(s), add 4.5 PSI

to residual nozzle pressure acceptance criteria per 10 foot drop in elevation from the station(s).

3.15.2 Measure and record residual pressure at the shore side supply outlet(s) providing water to those temporary fire hose manifold stations tested in 3.15.1 while simultaneously discharging the 4 nozzles tested in 3.15.1. Accept/Reject Criteria: Maintain a minimum of 150 PSI residual pressure at the shore side supply outlet(s).

3.15.3 Accomplish a retest of 3.15.1 and 3.15.2 if the system is modified after initial test and the criteria of either 3.15.3.1 or 3.15.3.2 are met.

3.15.3.1 After any temporary firemain system modification, where the previously tested hydraulically most remote stations are no longer the hydraulically most remote.

3.15.3.2 After any temporary firemain system modification, where the available residual pressure at the most hydraulically remote stations is reduced.

(V) (G) "MONTHLY TEMPORARY FIREMAIN OPERATIONAL TEST"

3.16 Conduct an operational test of temporary firemain discharge water monthly from the most hydraulically remote temporary fire hose manifold station to verify valves are not secured and/or obstructions in the piping system are not present. Verify that all control valves in the temporary firemain system are in the intended open/closed position. Accept/Reject Criteria: Maintain a minimum of 95 GPM and a minimum of 60 PSI residual pressure while flowing one nozzle for a minimum of 30 seconds.

(I) (G) "PERIODIC SHORE SIDE WATER SUPPLY VALIDATION"

3.17 Conduct validation of shore side water supply flow and pressure prior to availability start date, each time the vessel shifts berths, and annually thereafter should the contract extend beyond one year. Measure and record flow and residual pressure using a calibrated in-line flow meter and calibrated pressure gage. Accept/Reject Criteria: Minimum water supply specified in Attachment A plus flushing and cooling loads is available at the shore side firemain supply outlet(s) and with a minimum of 150 PSI residual pressure.

3.18 Provide a recirculation capability where weather and flow conditions are such that freezing may occur. Freeze protection equipment shall be functional when temperatures drop below 40 degrees F.

3.19 Use of aluminum piping in a temporary saltwater firemain system is prohibited.

3.20 Provide a representative, whose purpose is to coordinate and be responsible for the management of all project temporary services, including services provided by other maintenance activities.

3.21 The following applies to routing of temporary services through installed ship hull openings, both exterior and interior, designed for personnel ingress and egress:

3.21.1 Doorways/Hatches: Temporary services shall be routed within the topmost area of the opening, such that the unobstructed opening of any doorway/hatch with services run shall be at least fifty (50) inches high and twenty-six (26) inches wide.

3.21.2 Vertical Ladders: Temporary services shall be routed to allow safe access. Route services so that personnel may transit the hatch. Services shall not be routed within four (4) inches on either side of the ladder. Services routed behind the ladder shall not interfere with safe access to the ladders and rungs.

3.22 In the event temporary services cannot be routed through interior and exterior installed shipboard personnel openings in accordance with the direction provided above, additional access cuts shall be utilized for routing of temporary services or personnel access and egress. Deviation from this requirement must be adjudicated by the SUPERVISOR.

3.22.1 Submit one legible copy, in hard copy or approved transferrable media, of each approved deviation to the SUPERVISOR.

3.23 Submit one legible copy, in hard copy or approved transferrable media, of a consolidated drawing in the format of a damage control diagram, depicting all services entering the ship to the SUPERVISOR within 2 days of availability start date.

3.23.1 The drawing shall be updated weekly, or immediately to reflect significant changes, and shall be suitable for use by emergency responders for isolation of services during an emergency.

3.23.2 At a minimum, the drawing shall include:

3.23.2.1 Type and description of service.

3.23.2.2 Shore side shut-off points.

3.23.2.3 Route of service through the ship.

3.23.2.4 Location of quick disconnect fittings.

3.23.2.5 Identification of critical temporary services and any cautions for critical services.

3.23.2.6 Status of hull openings and access cuts and identification and location of closure materials.

3.23.2.7 De-watering capabilities.

3.23.2.8 Designated fire zone boundaries.

3.23.2.9 Critical temporary services and their shore side shut-off points shall be highlighted.

3.24 Install quick disconnect fittings (QDF) within 6 feet of hull penetrations used for personnel access to facilitate the deployment of smoke control curtains. Where it is necessary to support a service between a QDF and the designated boundary or hull penetration, the type of support shall not prevent rapid clearing of services from the opening.

3.24.1 For hull openings used for services only, a QDF is not required, provided the opening is fitted with an air and smoke control curtain that remains in place around the services.

3.24.1.1 Curtains shall be made of fire retardant fabric in accordance with 2.6.

3.25 Temporary enclosures erected around hull access openings shall be constructed with openings and removable covers to accommodate standard smoke control ventilation fans (e.g., damage control box fans). If the enclosure is constructed with ventilation fans installed, the fans shall be equipped with reverse air flow capability.

3.26 Ensure that adequate protection is provided during installation, operation, and removal of temporary services. For fluid systems, spray protection shall be installed at each mechanical joint of a temporary system that is inside of the hull of the vessel, in the vicinity of shore power or electrical equipment, or in the vicinity of hull openings to prevent fluids other than air spray on ship's equipment. Spray protection shall consist of adequate see through sheeting (minimum 5 mils thickness) around each joint secured by several wraps of tape allowing view of the component as much as possible. Anti-chafing protection shall be installed around services in particular areas (i.e., hatches, high traffic areas, vicinity of sharp objects) where there is a high risk of damage.

4. NOTES:

4.1 Example equation for DDG-51 Class with 200-foot hose:

Parameters for the example:

Attachment A = 1000 GPM for DDG

Sample Cooling and flushing load: 250 GPM

Attachment B = 200 GPM for 200-foot hose of 2 and one-half inch hose

$$\frac{(\text{Attachment A} + \text{Cooling and Flushing Load})}{\text{Attachment B}} = \# \text{ of hoses required}$$

$$\frac{(1000\text{gpm} + 250\text{ gpm})}{200\text{gpm}} = 6.25\text{ hoses}$$

Requires 7 (rounded up to next whole number) 2 and one-half inch hoses to supply firefighting and cooling load.

4.2 "Hydraulically Remote" is defined as an area/location that will encounter the highest pressure loss, from both flow friction and elevation change, while encountering maximum possible flowrate.

4.3 Distribution Hose is defined any hose or pipe that transports water to the temporary hose manifold stations or ship's firemain.

4.4 Handline Hose is defined as the hose(s) that transports water from the temporary hose manifold station to the hose fire nozzle.

4.5 Air and smoke control curtains are not intended to provide an air tight seal of the hull opening. The curtains are to ensure that emergency responders can control the flow of air and smoke through the opening to allow for de-smoking of compartments, and minimize "chimney" effects.

4.6 A "quick disconnect" is a coupling or connecting device/system designed to permit easy and immediate separation of lines without the use of tools and to ensure the contents do not escape.

ATTACHMENT A
FIRE PROTECTION WATER SUPPLY REQUIREMENTS

<u>SHIP CLASS</u>	<u>SHIP TYPE</u>	<u>FLOW (GPM) *</u>
AD	Destroyer Tender	1,500
ADG	Degaussing Ship	500
AE	Ammunition Ship	1,500
AF	Store Ship	1,500
AFS	Combat Store Ship	1,500
AG	Miscellaneous Auxiliary Ship	1,500
AGEH	Hydrofoil Research Ship	500
AGF	Miscellaneous Flagship	2,000
AGFF	Frigate Research Ship	1,000
AGM	Missile Range Instrumentation Ship	1,500
AGMR	Major Communications Relay Ship	1,500
AGOR	Oceanographic Research Ship	500
AGP	Gunboat Support Ship	2,000
AGS	Surveying Ship	1,000
AH	Hospital Ship	1,000
AK	Cargo Ship	1,500
AKS	Store Issue Ship	1,500
AKR	Vehicle Cargo Ship	1,500
ANL	Net Laying Ship	500
AO	Oiler	1,500
AOE	Fast Combat Support Ship	1,500
AOG	Gasoline Tanker	1,000
AOR	Fleet Replenishment Oiler	1,500
AP	Transport Ship	1,000
APB	Self-propelled Barracks Ship	500
AR	Repair Ship	1,500
ARB	Battle Damage Repair Ship	500
ARC	Cable Repair and Laying Ship	1,000
ARG	Internal Combustion Engine Repair Ship	1,500
ARL	Landing Craft Repair Ship	1,000
ARS	Salvage Ship	500
ARSD	Salvage Lifting Ship	500
ARVA	Aircraft Repair Ship	1,000
ARVE	Aircraft Engine Ship	1,000
ARVH	Helicopter Tender	1,500
AS	Submarine Tender	1,500
ASR	Submarine Rescue Ship	600
ATA	Ocean Tug	500
ATF	Ocean Tug Fleet	500
ATS	Salvage and Rescue Tug	500
AVM	Guided Missile Ship	1,500
CV, CVN	Aircraft Carrier	3,000
CG	Guided Missile Cruiser	1,000

ATTACHMENT A
 FIRE PROTECTION WATER SUPPLY REQUIREMENTS (Con't)

<u>SHIP TYPE</u>		<u>FLOW (GPM) *</u>
DDG	Guided Missile Destroyer	1,000
FFG	Guided Missile Frigate	1,000
FFR	Radar Picket Frigate	1,000
IX	Unclassified Miscellaneous	1,500
LCC	Amphibious Command Ship	1,000
LCS	Littoral Combat Ship	1,000
LHA**	Amphibious Assault Ship	2,500
LHD**	Amphibious Assault Ship	2,500
LKA	Amphibious Cargo Ship	1,500
LPD***	Amphibious Transport Dock	1,500
LSD***	Landing Ship Dock	2,000
YRB	Repair and Berthing Barge	500
YRBM	Repair, Berthing and Messing Barge	500
YRBL	Repair, Berthing and Messing Barge (large)	500
LST	Landing Ship Tank	1,500
MCM	Mine Counter Measures Ship	750
PC	Patrol Coastal	500
PCH	Hydrofoil Patrol Craft	500
PG	Patrol Combatants	500
PGH	Hydrofoil Gunboat	500

* All flows are from the pier or dry dock outlet and are available at adequate residual pressures from those systems in compliance with present design criteria for dry docks and piers as reflected in NAVFAC design manuals (UFC 4-213-10, UFC 4-213-12, UFC 4-152-01, UFC 4-150-02, and UFC 4-150-06).

** Includes supply to operate 2 hangar sprinkler groups and 2, 2 and one-half-inch hose lines.

*** Includes supply to operate one sprinkler group and 2, 2 and one-half-inch hoses.

Attachment B

Hose Capacity (GPM)*

SIZE (in.)	LENGTH (100ft.)	LENGTH (150ft.)	LENGTH (200ft.)	LENGTH (250ft.)
2 ½	300 GPM	225 GPM	200 GPM	175 GPM
3 ½	750 GPM	600 GPM	500 GPM	450 GPM
4	1000 GPM	825 GPM	700 GPM	650 GPM
Notes: *Based on 20 PSI total friction loss				