

INCH-POUND

MIL-N-24408D(SH)
5 February 1993
SUPERSEDING
MIL-N-24408C(SH)
13 November 1991

MILITARY SPECIFICATION

NOZZLES, FIRE HOSE, COMBINATION AQUEOUS FILM FORMING FOAM, WATER SPRAY, ADJUSTABLE PATTERN (SHIPBOARD USE)

*This specification is approved for use by the Naval Sea Systems Command,
Department of the Navy, and is available for use by all departments and
agencies of the Department of Defense.*

1. SCOPE

1.1 Scope. This specification covers fire hose nozzles which are for use with aqueous film forming foam (AFFF) sea water solution or sea water/fresh water only either in straight stream or adjustable spray patterns.

1.2 Classification.

1.2.1 Nozzle type, size and capacity. The nozzle type, size and capacity shall be identified by a code as follows:

Type I - Bail handle operated

Code T1-1 - Size 1-1/2 inch pistol grip with free swivel coupling - 95 gallons per minute (gal/min)
Code T1-2 - Size 1-1/2 inch pistol grip with free swivel coupling - 125 gal/min
Code T1-3 - Size 2-1/2 inch with free swivel coupling - 250 gal/min

Type III - Bail handle operated

Code T3-1 - Size 3/4 inch pistol grip with free swivel coupling - and settings for 12, 23, and 30 gal/min

Beneficial comments (recommendation, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, SEA 05Q42, Naval Sea Systems Command, 2531 National Center Bldg 3, Washington, DC 20362-5160.

AMSC N/A

FSC 4210

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2. APPLICABLE DOCUMENTS**2.1 Government documents.**

2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS**FEDERAL**

PPP-F-320	Fiberboard, Corrugated and Solid Sheet Stock (Container Grade), and Cut shapes
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WW-C-621	Coupling Assembly, Fire, Woven Jacketed, Rubber or Fabric-Lined and Unlined
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MILITARY

MIL-P-116	Preservation, Method of
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MIL-H-775	Hose, Hose Assemblies; Rubber, Plastic, Fabric, Or Metal(Including Tubing) And Associated Hardware: Packaging Of
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MIL-I-17563	Impregnants for Aluminum, Copper, Iron, Magnesium and Zinc Alloy Castings
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MIL-L-19140	Lumber and Plywood Fire-Retardant Treated
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MIL-F-24385	Fire Extinguishing Agent, Type 6, Aqueous Film Forming Foam (AFFF) Liquid Concentrate, for Fresh and Sea Water
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MIL-R-83248	Rubber, Fluorocarbon Elastomer, High Temperature Fluid and Compression Set Resistant
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STANDARDS

FEDERAL

FED-STD-H28/10 American National Hose Coupling and Fire-Hose Coupling
Threads

FED-STD-151 Metals; Test Methods

MILITARY

MIL-STD-2073-1 DOD Material Procedures for Development and Application of
Packaging Requirements

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government drawing. The following other Government drawing forms a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

810-4444647 Navy Fire Hose Spanner Wrench

(Application for copies should be addressed to Commander, Portsmouth Naval Shipyard, Code 202.2, Portsmouth, NH 03801.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1964 Standard for Spray Nozzles (Shutoff and Tip)

(Application for copies should be addressed to the National Fire Protection Association, Batterymarch Park, Quincy MA.)

MIL-N-24408D(SH)**AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

A 313	Standard Specification for Chromium Nickel Stainless and Heat Resisting Steel Spring Wire (DoD adopted)
A 580	Standard Specification for Stainless and Heat Resisting Steel Wire (DoD adopted)
B 62	Standard Specification for Composition Bronze or Ounce Metal Castings (DoD adopted)
B 127	Standard Specification for Nickel-Copper Alloy (UNS N0. 4400) Plate, and Sheet, and Strip
B 134	Standard Specification for Brass Wire (DoD adopted)
B 150	Standard Specification for Aluminum Bronze Rod, Bar, and Shapes (DoD adopted)
B 197	Copper Beryllium Alloy Wire (DoD adopted)
B 446	Nickel Chromium Molybdenum Columbium Alloy, Rod and Bar (DoD adopted)
B 505	Standard Specification for Copper Base Alloy Continuous Castings
B 584	Standard Specification for General Application For Copper Alloy Sand Castings
D 2000	Standard Classification System for Rubber Products in Automotive Applications (DoD adopted)
D 3951	Standard Practice for Commercial Packaging (DoD adopted)
D 4020	Standard Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials (DoD adopted)
D 4066	Standard Specification for Nylon Injection and Extrusion Materials (PA)
D 4181	Standard Specification for Acetal (POM) Molding and Extrusion Materials (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

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SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

J462 Cast Copper Alloys, Standard

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

B 18.3 Socket, Cap, Shoulder and Set Screws (DoD adopted)

(Application for copies should be addressed to the American National Standards Institute, Inc., 4030 Broadway, New York, NY 10018.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other information services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.4), four samples shall be subjected to first article inspection in accordance in with 4.4.

3.2 Materials. The materials for each part shall be made as specified herein. Material not definitely specified shall be of the best commercial grade and suitable for the purpose intended. The use of aluminum or any ferrous material is prohibited except that stainless steel in accordance with 3.2.1 is permitted. Material shall be selected to reduce erosion and corrosion and prevent galling, seizing, or excessive wear of component parts. Materials, gaskets, and seals in contact with AFFF shall be compatible with the fluid. Acceptance or approval of any individual material shall not be construed as a guaranty of the acceptance of the finished product.

3.2.1 Stainless steel. Stainless steel shall be a 300 series in accordance with ASTM A 313, or ASTM A 580.

3.2.2 Brass wire. Brass wire shall conform to copper alloy 260 in accordance with ASTM B 134.

3.2.3 Identifying of materials and finishes. The contractor shall identify the specific material, material finish or treatment for use with components and sub-components, and shall make information available and provide copies to the contracting officer or designated representative. The information shall be provided by identifying the above requirements on an exploded view of the nozzle.

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3.2.4 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification.

3.3 Construction.

3.3.1 Description. The purpose of these nozzles is to extinguish and control, without attachments, fires as encountered on board navy ships. Nozzle design shall be appropriate to operating conditions, that is all features shall be operable by one hand of the operator while the other hand is holding the nozzle or hose. Nozzles shall be capable of developing discharge flow patterns varying from straight stream to a wide angle fog. Fog patterns shall be enhanced with an impinging action by means of not less than one and not greater than two fixed concentric rows of teeth around the discharge orifice except for the type III nozzle which may use a ring of spinning teeth. Fog patterns shall be a uniform cone with no waterless gaps in the pattern. Straight stream, narrow angle fog and wide angle fog positions shall be stopped by detents. A flush mechanism shall be incorporated into the nozzle and shall pass a specified sized ball through the nozzle. Nozzle ball shut-off seats shall be self-adjusting or shall be adjustable without disassembly of the nozzle. Ball shut-offs shall be operated by two trunnions, one on each side of the ball and attached to the bail handle. Nozzle couplings shall be of a free swivel type. The nozzle shall consist of the following components and design:

- a. Nozzle body
- b. Free swivel coupling
- c. Ball shut-off
- d. Ball shut-off seat
- e. Bail handle to operate the ball shut-off
- f. Bumper
- g. Seals
- h. Pistol grip (except for 2-1/2 inch size)
- i. Constant flow in all positions (except flush)
- j. Positive detents in the specified positions
- k. Flushing mechanism.

3.3.2 Nozzle body and internal components. The nozzle body, and all parts that are internal and in contact with the fluid flow, unless otherwise specified, shall be of bronze in accordance with alloy 836 of ASTM B 62 or ASTM B 505, alloy 642 of ASTM B 150, or alloy 932 of SAE J462.

3.3.2.1 Type III nozzle. The type III nozzle shall be chromed on the exterior surface including the coupling using chromic acid (CrO_3) using a low electric process.

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3.3.3 Ball shut-off. Ball shut-off shall be made of acetal resin material and shall conform to ASTM D 4181. Contaminant or filler shall be not greater than 0.01 percent by weight. Material shall have a Rockwell M scale of 80.

3.3.4 Ball shut-off seat. Ball shut-off seats shall be made of ultrahigh molecular weight polyethylene, 100 percent virgin material, in accordance with ASTM D 4020. Contaminant or filler shall not be greater than 0.01 percent by weight. Nozzle design shall include either seats on the inlet and outlet side of the ball or a single seat on the outlet side of the ball.

3.3.5 Bumper. A bumper shall be provided at the discharge end of the nozzle for protection against physical damage. The bumper shall be made of Urethane Thermoplastic and shall conform to 2BG821B31F17, Shore A, of ASTM D 2000.

3.3.6 O-ring seals. O-ring seals shall be made of Viton, (rubber, fluorocarbon, elastomer), conforming to Shore A 70 durometer and be made in accordance with MIL-R-83248.

3.3.7 Bail handle. Handle shall be made of Urethane Thermoplastic and shall conform to 2BG540B31F17, Shore D, of ASTM D 2000, or shall be made of bronze in accordance with alloy 836 of ASTM B 62 or alloy 876 of ASTM B584. The widest inside clearance of the bail handle shall be not less than 3 inches. In an open or shut position, clearance between the bail handle and the nozzle body shall be not less than 3/4 inch. Deflection of the handle shall not be greater than 1/2 inch during any test (rough usage excepted). There shall be no permanent distortion of the handle after completion of any test.

3.3.8 Pistol grip. Pistol grip shall be made of Ethylene Propylene (with a bronze or stainless steel insert) and shall conform to 2CE814A16B15F19, Shore A, of ASTM D 2000; Nylon in accordance with PA162 of ASTM D4066(PA); or shall be made of bronze in accordance with alloy 836 of ASTM B 62. The pistol grip shall not exceed 6-1/2 inches in length. The measurement shall be taken from the centerline of the inlet coupling to the bottom of the pistol grip along a perpendicular to the center axis. There shall be four finger notches uniformly spread over the lower 4-1/2 to 5 inches of the forward end of the pistol grip. The smallest perimeter in the lower two thirds of the pistol grip shall be 4-1/2 inches + or - 1/4 inch.

3.3.9 Pattern adjustments. Pattern adjustments shall be accomplished by rotation of a pattern adjustment sleeve at the discharge end of the nozzle.

3.3.10 Pattern position. Pattern position markings shall be at straight stream, 30 degrees (narrow fog), and 90 degrees (wide fog) settings. There shall be a mechanism to provide for a dedicated "hold in position feature" (detent) at each of the three pattern settings.

3.3.11 Free swivel coupling. The coupling shall be capable of turning readily by hand when connecting the nozzle to a hose; i.e., a spanner wrench shall not be required to tighten the coupling to prevent leakage past the gasket.

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3.3.12 Detent rotational control. The nozzle shall be provided with detents. Detents shall be located at straight stream, narrow angle fog, and wide angle fog setting. The purpose of the detents is to signal to the operator through feel when the nozzle pattern is in straight stream, narrow angle fog or wide angle fog. When rotating the pattern adjustment sleeve the detent shall operate automatically in all positions.

3.3.13 Couplings. Coupling threads shall be 11-1/2 threads per inch (NPSH thread) or 9 threads per inch (NH thread) for size 1-1/2 inch nozzles, as specified in the order/contract; 7-1/2 threads per inch (NH thread) for size 2-1/2 inch nozzles; and 11-1/2 threads per inch (NH - GHT thread) for size 3/4 inch nozzles. Hose threads shall be in accordance with FED-STD-H28/10. Type I nozzle couplings shall be of bronze in accordance with alloy 836 of ASTM B 62 or ASTM B 505. Type III nozzle couplings shall be in accordance with alloy 642 of ASTM B 150, or alloy 932 of SAE J462, or alloy 836 of ASTM B 62 or ASTM B 505.

3.3.14 Screws. Socket, cap, shoulder and set screws shall be in accordance with ANSI B 18.3. Material shall be stainless steel of the 300 series in accordance with ASTM A 313, or ASTM A 580. All screws shall be used with Loctite 262, 271, 277 or equal properly applied to cleaned threads. Pin fastener material shall be beryllium copper.

3.3.15 Gaskets. Internal thread connections (coupling) shall be furnished with a rubber gasket. Gaskets shall be fabricated from Buna N rubber conforming to Shore A 65-75 durometer. Gasket and gasket recess dimensions shall be in accordance with FED-STD-H28/10.

3.3.16 Lugs- knurling. Coupling lugs shall be provided for type I nozzles and be constructed for use with spanner wrenches conforming to Drawing 810-4444647. Two lugs spaced 180 degrees apart shall be provided on each coupling and be similar in configuration to style I of WW-C-621. Type III nozzle couplings shall be of a knurled surface design.

3.3.17 Gallonage calibration. Gallonage calibration spacers and shims or any other devices (including threaded calibration setting components), if used, shall be permanently affixed and tamper proof by applying locking compound to threaded connectors and rendering screw slots, allen head holes, etc unusable.

3.3.18 Springs. External springs shall be copper beryllium alloy wire in accordance with alloy 172 of ASTM B 197. Internal springs shall be Inconel in accordance with alloy 625 of ASTM B 446 or Monel in accordance with alloy 440 of ASTM B 127.

3.4 Nozzle weight. Nozzle weight shall be as follows:

- Type I, size 1-1/2 inch - 9.0 lbs. or less
- Type I, size 2-1/2 inch - 13.0 lbs. or less
- Type III, size 3/4 inch - 7.0 lbs. or less

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3.5 Marking for designation. The following information shall be stamped, engraved, or cast on each nozzle :

- a. Manufacturer's name.
- b. Rated capacity in gal/min.
- c. National stock number (NSN) of the assembly.
- d. Thread designation (on coupling).
- e. Pattern position symbols.
- f. Flush position.



Note: letters, numbers and or symbols for items b and e shall be not less than 3/8" in height and raised not less than 1/32" or sunk not less than 1/64" ; for items d and f, height shall be not less than 1/4" with the same raised or sunk criteria.

3.6 Workmanship. All parts and assemblies of the nozzles including castings, forgings, molded parts, stampings, bearings, and machined surfaces shall be clean and free from sand, dirt, fins, pits, sprues, scales, flux, and other foreign material. All exposed edges shall be rounded or chamfered. Welding of castings is prohibited.

3.7 Special tools. No special tools shall be required nor supplied for maintenance of equipment covered by this specification (maintenance is cleaning, lubricating, and changing of coupling gaskets which must be capable of being performed without disassembly). Special tools are defined as those tools which are not listed in the Federal Supply Catalog. (Copies of this catalog may be consulted in the office of the Defense Contract Administration Services (DCAS) or at any Federal Government Agencies Procurement Office.)

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification at any time where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 through 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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4.2.1 Classification of inspections. The inspections specified herein are classified as follows:

- a. Quality conformance inspection (see 4.3)
- b. First article inspection (see 4.4)

4.2.2 Test temperature. Unless otherwise specified herein, inspections and tests shall be accomplished at ambient temperature .

4.2.3 Test fluid. Unless otherwise specified, tests shall be conducted with fresh water.

4.3 Quality conformance inspection. Quality conformance inspection shall consist of tests specified in table I (see 6.3).

TABLE I. *Quality conformance tests.*

Test	paragraph
Material inspection	4.5
Visual and dimensional examination	4.6
High pressure flow	4.7.5
Operating force	4.7.6
Flush mechanism	4.7.7
Gallorage and service designation	4.7.8
Operating characteristics	4.7.9
Leakage test	4.7.10
Nozzle pattern	4.7.11
low pressure pattern (Type III only)	4.7.11.3
Detent rotational control	4.7.12.1
Detent rotational force requirements	4.7.12.2
Free swivel coupling	4.7.13

4.3.1 Sampling for quality conformance tests. As a minimum, the government shall randomly select a sample quantity of completed nozzles in accordance with table II and subject them to the tests specified in table I. Each nozzle in the lot shall be subjected to the gallorage and service designation test in accordance with 4.7.8. If one or more defects are found in any sample, the entire lot represented by the sample shall be rejected. If a lot is rejected, the contractor has the option of screening 100% of the lot for the defective characteristic(s) or providing a new lot which shall be tested in accordance with the sampling plan contained herein.

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TABLE II. *Sampling for quality conformance*

Lot Size	Sample Size	2 - 8ALL
9 - 300	10% - 8 MINIMUM	
301 - 10000	5% - 30 MINIMUM	

4.3.2 Quality conformance report. When specified in the contract or order, a test report shall be prepared (see 6.3).

4.4 First article inspection. Four samples shall be subjected to the first article inspection as shown in table III.

TABLE III *First article inspection.*

Test	paragraph
Material inspection	4.5
Visual and dimensional examination	4.6
Salt spray	4.7.1
High temperature	4.7.2
Low temperature	4.7.3
Rough usage	4.7.4
High pressure flow	4.7.5
Operating force	4.7.6
Flush mechanism	4.7.7
Gallorage and service designation	4.7.8
Operating characteristics	4.7.9
Leakage test	4.7.10
Nozzle pattern	4.7.11
Low pressure pattern (type III only)	4.7.11.3
Detent rotational control	4.7.12.1
Detent rotational force requirements	4.7.12.2
Free swivel coupling	4.7.13

4.4.1 First article samples. After completion of first article testing, two nozzles from the samples subjected to the first article test shall be turned over to the contracting officer or designee for retention until completion of the contract. First article samples shall be permanently marked (i.e. steel stamped) with a government logo, along with the date that the first article testing was completed.

4.5 Material inspection. Material certification shall verify that the materials used in the fabrication of the nozzles are in accordance with the requirements of paragraphs 3.3.2 through 3.3.18.

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4.6 Visual and dimensional examination. Each first article sample (see 4.4), and each sample selected in accordance with 4.3.1, shall be visually and dimensionally examined to determine conformance with this specification. Defects shall be classified as shown in table IV. Detection of any defects in any sample shall result in rejection of the entire lot represented by the sample. The Government reserves the right to scrap any rejected lot containing defects in accordance with table IV when it is determined by Government inspection personnel that the material is unfit for use and cannot be economically reworked or repaired. Scrapped material shall be identified and controlled to preclude its subsequent use in a contract item unless approved by the Government.

TABLE IV. *Classification of defects.*

101	Dimensions incorrect, affecting proper operation
102	Material not as specified
103	Components not as specified
104	Workmanship not as specified
105	Components missing, damaged
106	Threads not as specified
107	Improper assembly
108	Parts loose or damaged
109	Identification marking missing, incorrect, or illegible

4.7 Sequence of tests. Tests as identified in tables I and III shall be performed in the following order on each of the samples.

4.7.1 Salt spray. Nozzles shall be subjected to a salt spray for a period of 120 hours (with the inlet and outlet of the nozzle open) in accordance with paragraphs 4.1 through 4.9 in method 812.1 of FED-STD-151. Any damage to the nozzles which affects the performance of any of the other tests shall constitute failure of the test.

4.7.2 High temperature. The nozzle shall be subjected to high temperature tests by conditioning the nozzle at 160 degrees Fahrenheit (°F) for one hour immediately followed by tests of moving parts. All moving parts of the nozzle shall be operated for five cycles with only momentary dwell time between cycles. Any sticking, binding, or other malfunction shall constitute failure of this test.

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4.7.2.1 High temperature tests. Within 3 minutes after being removed from the heating source, the nozzle shall be subjected to the rough usage tests of 4.7.4.

4.7.3 Low temperature. Nozzles shall be subjected to low temperature tests by conditioning the nozzle at minus five degrees Fahrenheit for one hour immediately followed by tests of moving parts. All moving parts of the nozzle shall be operated for five cycles with only momentary dwell time between cycles. Any sticking, binding, or other malfunction shall constitute failure of this test.

4.7.3.1 Low temperature tests. Within 3 minutes after being removed from the cooling source, the nozzle shall be subjected to the rough usage test of 4.7.4.

4.7.4 Rough usage. Nozzles shall be subjected to rough usage tests by being dropped onto a hard, smooth, flat, horizontal concrete slab, from a height of 5 feet. The test shall be conducted on the tip with the nozzle in the wide angle fog position. The test shall be repeated on the handle, pistol grip, if applicable, and on the threaded coupling with the nozzle in the straight stream position. A threaded protector may be added to the coupling. The protector shall not exceed past the coupling. Any damage which affects operating efficiency shall constitute failure of this test.

4.7.5 High pressure flow. The nozzle shall be flow tested for leakage and physical integrity at an inlet pressure of 250 psi. The nozzle shall be held by a mechanical mounting device, the ball shut off fully open, and in straight stream pattern. The nozzle shall be flowed for 3 minutes at 250 psi inlet pressure with the ball shut off being cycled to off for an instant 25 times during the test. Leakage or failure of mechanical integrity shall constitute failure of this test. Impregnant sealing, if used, shall be in accordance with MIL-I-17563.

4.7.6 Operating force. Nozzles shall be flowing at 100 lb/in² nozzle inlet pressure and the force required to close and open the ball shut off shall be measured. The force required to open and close the ball shut off shall be not greater than 15 pounds. The force shall be measured at the extremity of the bail handle. Nonconformance shall constitute failure of this test.

4.7.7 Flush mechanism. With type I nozzle in flush position, a 9/32-inch ball shall be dropped into the inlet. With type III nozzle in flush position, a 5/32-inch ball shall be dropped into the inlet. Inability to pass the ball through the nozzle shall constitute failure of this test.

4.7.8 Gallonage and service designation. Flow rate tolerances shall be as specified in table V. The tolerance shall be in any pattern position at 100 lb/in² nozzle inlet pressure except for flush position. Tests shall be conducted in straight stream, narrow angle fog, and wide angle fog. Nonconformance shall constitute failure of this test.

4.7.9 Operating characteristics. First article nozzles shall be tested with type 6 aqueous film forming foam (AFFF) conforming to MIL-F-24385 to determine conformance with table V. Test fluid concentration shall be 6% AFFF and 94% water. The contractor is responsible for all environmental requirements that must be complied with when testing with AFFF. First article and quality conformance nozzles shall be tested using fresh water to determine conformance with Table V (reach test exempted for quality conformance tests). The range of the nozzle shall be that distance beyond

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which 85 percent of the net water pattern falls. In addition to the requirements specified in table V, type III nozzles shall have a reach of 11 feet at a pressure of 20 lbs/in² and a flow rate of 13 gal/min plus 15 percent minus 0 percent. Nonconformance shall constitute failure of this test.

TABLE V.

Operating characteristics (gallage and stream reach in feet)

Gallage rating	95 gal/min	125 gal/min	250 gal/min	30 gal/min
Gallage tolerance	+ 7 Minus 0	+ 10 Minus 0	+ 25 Minus 0	+ - 10%
Reach in feet	100	100	110	55

4.7.10 Leakage test.

4.7.10.1 High pressure leakage test. The nozzle shall be tested for leakage through the coupling swivel and the ball shut-off. A mounting device for the purpose of this test shall hold the coupling only. No other support or containment of the nozzle is allowed. The nozzle shall be pressurized to 500 lb/in² inch and held for 1 minute. The ball shut off shall then be cycled opened and closed and held closed for another 1 minute after attaining 500 lb/in². This cycle shall be accomplished twenty five times for first article and once for quality conformance tests. Leakage through the ball shut-off assembly, coupling assembly, or failure of the mechanical integrity of the nozzle shall constitute failure of this test.

4.7.10.2 Low pressure leakage test. The nozzle shall be tested for leakage at low pressure through the ball shut-off after 4.7.10.1 has been conducted. The ball shut off shall be cycled opened and closed. The nozzle shall then be pressurized between 2 to 5 lb/in² and held for 5 minutes. Leakage through the ball shut-off or through the seats shall constitute failure of this test.

4.7.11 Nozzle pattern.

4.7.11.1 Pattern adjustments. Rotational travel between straight stream and wide angle fog patterns shall be not less than 90 degrees or greater than 180 degrees of counter clockwise rotation while facing the inlet of the nozzle.. Nonconformance shall constitute failure of this test.

4.7.11.2 Pattern position. Pattern position markings shall be at straight stream, 30 degrees (narrow fog), and 90 degrees (wide fog) settings. There shall be a mechanism to provide for a dedicated "hold in position feature" (detent) at each of the three pattern settings. Rotation of the pattern adjustment shall be within the torque values listed in 4.7.12. When nozzle patterns are set at other than the three "hold in position" points, the pattern shall not change /drift during flow, no external forces being applied. This test shall be conducted at 100 psi. Nonconformance shall constitute failure of this test.

4.7.11.3 Low pressure pattern. The type III nozzle full pattern development shall be demonstrated at 20 psi. The fog pattern shall be a uniform cone with no waterless gaps in the

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pattern. Nonconformance shall constitute failure of this test.

4.7.12 Nozzle detents.

4.7.12.1 Detent rotational control. The operational torque required to change the pattern settings shall be not greater than 20 in-lb and be not less than 10 in-lb when starting the pattern change from a detent. Nonconformance shall constitute failure of this test.

4.7.12.2 Detent rotational force requirements. Detent rotational force measurements shall be measured by the procedures set forth in NFPA 1964. The contractor may use an alternate procedure or device for measuring torque if approved by the government.

4.7.13 Free swivel coupling. The nozzle shall not turn at the coupling when changing flow patterns, no other external forces applied, when operating the nozzle at 100 lb/in². Nonconformance shall constitute failure of this test.

4.8 Inspection of packaging. Sample packs and the inspection of preservation, packing, and marking for shipment, stowage, and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisitions. For the extent of applicability of the packaging or preparation for delivery requirements of reference documents listed in section 2, see 6.5.)

5.1 Packing requirements. The requirements for packaging shall be in accordance with the documents specified in 5.1.1 through 5.3.

5.1.1 Navy fire-retardant requirements. When specified, (see 6.2) the use of fire retardant materials will be in accordance with 5.1.1.1 through 5.1.1.3.

5.1.1.1 Treated lumber and plywood. When specified, (see 6.2) all lumber and plywood including laminated veneer material used in shipping container and pallet construction, members, blocking, bracing, and reinforcing shall be fire-retardant treated material conforming to MIL-L-19140 as follows:

- | | |
|----------------|---|
| Levels A and B | – Type II – Weather resistant
Category 1 – General use |
| Level C | – Type I – Non-weather resistant
Category 1 – General use. |

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5.1.1.2 Fiberboard. Unless otherwise specified (see 6.2), fiberboard use in construction of class-domestic, non-weather resistant fiberboard and cleated fiberboard boxes including interior packing forms shall meet the flame spread index and the specific optic density requirements of PPP-F-320 and amendment thereto.

5.1.1.3 Cushioning and wrapping materials. The use of excelsior, newspaper, shredded paper (all types), and similar hygroscopic or nonneutral materials and all types of loose fill materials for packaging (preservation and packaging) applications such as cushioning, fill, stuffing, and dunnage is prohibited. Materials selected for cushioning and wrapping shall have properties (characteristics) for resistance to fire. Cushioning or wrapping materials as applicable, shall be provided to prevent item and package damage, and to prevent free movement of the container contents.

5.1.2 Preservation. Preservation shall be level A, C, or commercial as specified (see 6.2).

5.1.2.1 Level A. Nozzles shall be individually unit protected in accordance with method III of MIL-P-116. Cushioning or wrapping materials shall conform to the material specified in MIL-H-775. Nozzles destined for shipboard stowage shall be cushioned or wrapped with fire-retardant materials as noted under the special requirements for cushioning and wrapping materials specified in MIL-H-775. Loose-fill cushioning material shall not be used.

5.1.2.2 Unit and intermediate containers. Unit containers, and when specified (see 6.2), intermediate containers, shall conform to the unit and intermediate containers specified in MIL-H-775.

5.1.2.3 Level C. Nozzles shall be individually unit protected as specified for Level A, except that unit and intermediate containers may be of the domestic non-waterproof type of class.

5.1.2.4 Commercial. Nozzles shall be individually unit protected in accordance with ASTM D 3951.

5.2 Packing. Nozzles preserved as specified in 5.1 shall be packed level A, B, C, or commercial as specified (see 6.2), in accordance with MIL-S-196.

5.3 Marking. In addition to any special marking required (see 6.2), unit, intermediate and exterior shipping containers for levels A, B, and C shall be marked in accordance with MIL-STD-2073-1, Appendix F and the applicable container specification and appendix thereto. Commercial packs shall be marked in accordance with ASTM D 3951.

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6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The nozzles covered by this specification are intended for use with AFFF solution, fresh water or salt water for combating class "A" fires (such as wood, paper, textiles, and so forth), class "B" fires (flammable liquid and grease), and class "C" electrical fires. The nozzles emit straight stream or variable spray patterns.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2)
- c. When first article testing is required (see 3.1)
- d. Coupling thread type for 1-1/2 inch size nozzle (see 3.3.9)
- e. Level of preservation-packaging and packing required (see 5.1)
- f. Special marking required (see 5.3).
- g. Part or identifying number (PIN) (see 6.6)
- h. Engineering drawings (see Appendix)

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) shall be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) shall be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Reference paragraph	DID number	DID title	Suggested tailoring
3.3.1	DI-DRPR-80651	Engineering Drawings	Level II
4.3.1.2	DI-NDTI-80809	Test, reports	Test, Report

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The above DID's were those cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 First article. When a first article inspection is required, the items shall be a first article sample. The first article should consist of four units. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.5 Sub-contracted material and parts. The packaging requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.6 Part or identifying number (PIN). The PIN for the nozzles covered by this specification should consist of a general prefix followed by a specific design designator. The prefix shall consist of the letter "M" and the basic number of this specification. The design designator shall consist of a code specifying the type, size and capacity of the nozzle as shown in the following example:

	<u>M</u>	<u>24408</u>	<u>T1-2</u>
Basic number of this specification			
Type, size, and capacity			
(see 1.2.1)			

6.7 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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6.8 Subject term (key word) listing.

Salt spray
Pistol grip
Rough usage
Low and high temperature test
Operating force
Detent rotational control
Free swivel coupling
Ball shut-off
Pattern adjustment
Gallage calibration

Preparing activity:
Navy – SH
(Project 4210-N465)

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APPENDIX

ENGINEERING DRAWINGS TECHNICAL CONTENT REQUIREMENTS

10. SCOPE

10.1 Scope. This appendix covers the technical content requirements that shall be included on drawings when required by the contract or order. This appendix is mandatory only when data item description DI-DRPR-80651 is cited on the DD Form 1423.

20. APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30. DRAWINGS

30.1 Drawings. When required by the contract or order, drawings shall contain the following information:

- a. Preliminary drawings sufficient to permit evaluation of the design and materials to determine conformance to the requirements of this specification.
- b. Detail assembly drawings including the information required by (a) above, plus the following information:
 - (1) Overall dimensions
 - (2) Bill of materials listing specification, grade, condition, and any other data required to identify the properties of the materials.
 - (3) Detail drawings of all parts and subassemblies necessary for maintenance of the nozzle system components. Subassembly parts which cannot be acquired or serviced individually shall be identified as a single part.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:		1. DOCUMENT NUMBER MIL-N-24408D(SH)	2. DOCUMENT DATE (YYMMDD) 5 February 1993
3. DOCUMENT TITLE Nozzles, Fire Hose, Combination Aqueous Film Forming Foam, Water Spray, Adjustable			
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)			
5. REASON FOR RECOMMENDATION			
6. SUBMITTER			
a. NAME (Last, First, Middle Initial)		b. ORGANIZATION	
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
a. NAME Commander Naval Sea Systems Command Attn: SEA 05Q42		b. TELEPHONE (Include Area Code) (1) Commercial (703) 602-6020 (2) AUTOVON (AV) 332-6020	
c. ADDRESS (Include Zip Code) 2531 National Center Building 3 Washington, DC 20362-5160		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	