

Specification 5100-242d  
October 1998  
Superseding  
Specification 5100-242c  
March 1981

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
SPECIFICATION FOR  
NOZZLE, SCREW TIP, 1-1/2 INCH INLET

1. SCOPE.

1.1. Scope. The nozzle described in this specification includes 3/4 1-1/2 NH threaded straight stream tips with bore diameters of 3/16 inch (4.8 mm), 1/4 inch (6.4 mm), and 3/8 inch (9.5 mm) and is designed for use with 1-1/2 inch 9 NH threaded fire hose. A tip-carrying device is provided on the nozzle to hold two extra tips.

2. APPLICABLE DOCUMENTS.

2.1. Government Documents. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those in effect on the date of the invitation for bids or request for proposals (see 6.2).

USDA Forest Service Standard

5100-190 - Threads, Gaskets, Rocker Lugs, Connections and Fittings, Fire Hose

USDA Forest Service Specification

5100-244 - Nozzle Tips, Straight-Stream and Spray

Federal Specifications

QQ-A-367 - Aluminum Alloy Forgings

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 these documents are those in effect on the date of the invitation for bids or request for proposals.

American National Standards Institute Inc. (ANSI)/American Society For Quality Control (ASQC)

Z 1.4 - Sampling Procedures and Tables for Inspection by Attributes.

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Beneficial comments, recommendations, additions, deletions and any pertinent data that may be used in improving this document should be addressed to: USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas CA 91773-3198 by using the Specification Comment Sheet at the end of this document or by letter.

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Address requests for copies to the American National Standards Institute Inc., 11 West 42nd Street, New York, NY 10036.

American Society for Testing and Materials (ASTM)

- B 16 - Free-Cutting Brass, Rod, Bar, and Shapes for Use in Screw Machines
- B 26 - Aluminum-Alloy Sand Castings
- B 145 - Leaded Red Brass and Leaded Semi-Red Brass Sand Castings
- B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
- B 241 - Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
- D 256 - Tests for Impact Resistance of Plastics and Electrical Insulating Materials
- D 638 - Test for Tensile Properties of Plastics
- D 785 - Test for Rockwell Hardness of Plastics and Electrical Insulating Materials
- E 380 - Practice for Use of the International System of Units

Address requests for copies to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

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

2.3. Order of Precedence. In the event of conflict between the text of this document and the reference 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. Unless otherwise specified, first article inspection shall be performed on a product sample(s), in accordance with 4.4.3.

3.2. Construction. The nozzle construction shall include a single inlet, tapering down to a single outlet on a concentric axis. The nozzle inlet shall be 1-1/2 inch 9 NH internal thread, with a gasket recess and gasket installed. The outlet shall be a 3/4 inch 11 1/2 NH external thread. See Figure 1 for configuration. Figure 1 is provided for information only and is not intended to designate a particular design or manufacturer.

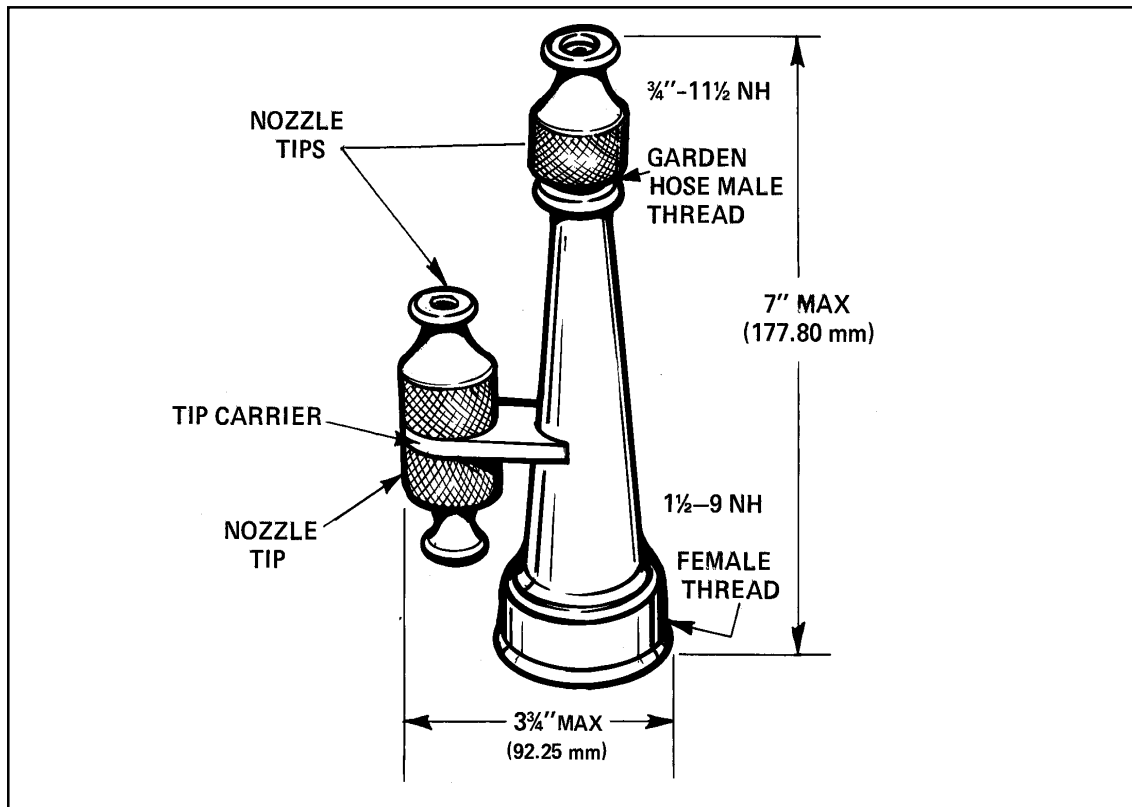


Figure 1. Nozzle with tips.

3.2.1. Straight Stream Tips. Straight stream tips with an internal thread series designation of 3/4 11-1/2 NH, and with bore diameters of 3/16 inch (4.8 mm), 1/4 inch (6.4 mm), and 3/8 inch (9.5 mm) shall be provided. Tips shall be in accordance with USDA Forest Service Specification 5100-244. Gaskets shall be installed in all tips.

3.2.2. Tip Carrier. A nozzle tip carrier shall be located approximately midway between the inlet and outlet projecting outward at 90 degrees from the nozzle axis and have 3/4 inch 11-1/2 NH external threaded mounts for mounting two spare tips.

3.3. Materials. Where more than one type of material is used in various components, there shall be no incompatibility between materials which may cause corrosion.

3.3.1. Nozzle Material. Nozzle material shall be metal or plastic and shall conform to the following requirements.

3.3.1.1. Metal Material. Metal nozzle material shall conform to the following:

- a. Free-cutting brass rod, in accordance with ASTM B 16 or
- b. Cast brass, copper alloy No. 836, in accordance with ASTM B 145 or
- c. Cast aluminum alloy, 40E, in accordance with ASTM B 26 or
- d. Extruded aluminum alloy, 6061-T6, in accordance with ASTM B 221 and ASTM B 241 or
- e. Forged aluminum alloy, 6061-T6, in accordance with Federal Specification QQ-A-367.

3.3.1.2. Plastic Material. Nozzles and tips made of Polycarbonate plastic material shall meet minimum physical properties indicated in Table 1, when tested in accordance with 4.5.4.

Table 1. Plastic Material Physical Properties

Physical Properties	Values
Tensile Strength at Yield	8000 psig at 73 °F (5.6 kg/mm <sup>2</sup> at 22.8°C)
Rockwell Hardness	M 70 , R 115
Impact Strength	12.0 ft-lb/in (53.4 Nm/m)

3.3.2. Gasket Material. Gasket material and physical properties shall meet the requirements of USDA Forest Service Standard 5100-190.

3.3.3. Recoverable Materials. The contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR), provided all performance requirements of this specification are met.

3.4. Dimensions and Weights. The overall length and width shall be as shown in Figure 1. The nozzle without tips shall not weigh more than 2 pounds (0.91 kg).

3.4.1. Dimensional Tolerance. Unless otherwise noted, the following tolerances apply: one place (x.x) +/- 0.1 inch (2.5 mm); two places (x.xx) +/- 0.01 inch (0.25 mm) and three places (x.xxx) +/- 0.010 inch (0.254 mm).

3.5. Workmanship. Workmanship shall be equal to the best commercial practices consistent with the highest engineering standards in the industry and shall be free from any defect which may impair serviceability or detract from the product's appearance.

3.5.1. Symmetry. The nozzle body shall be symmetrical and concentric to 0.030 inch (0.762 mm), except for the nozzle tip carrier.

3.5.2. Forged or Extruded Components. Forged and extruded sections shall be free from laps, sharp die marks, cracks or other defects.

3.5.3. Cast Components. Cast parts shall be fine-grained, free from blowholes, pinholes, pits, porosity, hard spots, shrinkage, cracks or other defects.

3.5.4. Plastic Components. All plastic parts shall be fully and completely formed from the mold. There shall be no blisters, pinholes, pits, sink marks, crazing, wrinkles, voids, foreign material, cracks or other defects in the plastic material.

3.6. Threads, Waterways, Gaskets, and Gasket Recesses. All threads, waterways, gaskets and gasket recesses shall be in accordance with USDA Forest Service Standard 5100-190.

3.7. Marking. Markings shall be in accordance with USDA Forest Service Standard 5100-190.

3.8. Surface Treatment. Aluminum alloy surfaces, to include threaded surfaces, shall be hardcoated in accordance with USDA Forest Service Standard 5100-190. Copper alloy surfaces, to include threaded surfaces, shall be hardened to not less than 45 or more than 70 on the Rockwell B scale.

3.9. Surface Finish. The finish for all surfaces, to include threaded surfaces, shall be in accordance with USDA Forest Service Standard 5100-190.

3.10. Performance.

3.10.1. Flow Rate. When tested in accordance with 4.6.2, the minimum nozzle discharge flow rate at 100 psig (689 kPag) nozzle inlet pressure shall be 74.0 +/- 3.0 gpm (280 +/- 11 Lpm).

3.10.2. Proof Pressure. When tested in accordance with 4.6.3, the nozzle shall withstand 600 psig (4137 kPag) hydrostatic pressure with no leaks, permanent deformation, mechanical damage or structural failure.

3.11. Metric Products. Metric dimensions are provided for information only, inch-pound units shall be the required units of measure for this specification. The thread series designations are indicated as 3/4 inch 11-1/2 NH and 1-1/2 inch 9 NH. Since these are thread series designations, not an indication of a specific dimension, the metric equivalents are not given. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within the tolerances specified using conversion tables contained in the latest revision of ASTM E 380, and all other requirements of this specification are met.

#### 4. INSPECTION, SAMPLING AND TEST PROCEDURES.

4.1. General Inspection and Tests. Unless otherwise specified in the contract or purchase order, the contractor is responsible for performance of all inspection requirements prior to submission for Government acceptance inspection and tests. The contractor may utilize their own facilities or any commercial laboratory acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government.

4.1.1. Inspection and Test Site. The Government shall conduct lot acceptance inspection and tests to determine compliance with the specification. If lot acceptance and tests are conducted at locations other than the manufacturing facilities, the contracting officer will specify location and arrangements. In the case of on-site inspections at the contractor facility, the contractor shall furnish the inspector all reasonable facilities for their work. During any inspection, the inspector may take from the lot one or more samples and submit them to an independent test laboratory approved by the Government or to a Government test facility for inspection and tests.

4.1.2. Testing With Referenced Documents. The contractor is responsible for insuring that components and materials used were manufactured, examined and tested in accordance with referenced specifications and standards. The Government reserves the right to perform any of the inspections or tests set forth in this section where such action is deemed necessary to assure supplies and services conform to prescribed requirements.

4.2. Responsibility for Compliance. All items shall meet all requirements of sections 3 and 4. 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 this 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 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.

4.3. Sampling for Inspection. When inspection is performed, sampling shall be in accordance with ANSI/ASQC Z 1.4.

4.3.1. Lot. All tips of one size presented together in one delivery shall be considered a lot for the purpose of inspection. A sample unit shall be one tip.

4.3.2. Sampling for Visual and Dimensional Examination. Sampling for visual and dimensional examination shall be S-3, with an Acceptable Quality Level (AQL) of 2.5 percent defective.

4.3.3. Sampling for Lot Acceptance Tests. Sampling for lot acceptance testing shall be S-3 with an AQL of 2.5 percent defective.

4.4. Inspection and Tests.

4.4.1. Visual and Dimensional Examination. When selected in accordance with 4.3.2, each sample nozzle tip shall be visually and dimensionally examined to determine conformance with this specification. Visual or dimensional defects shall be classified as major or minor. A defect not listed in Table 2 shall be classified as a minor defect. If the number of defects in any sample exceeds the indicated AQL, the lot shall be rejected.

Table 2. Major and Minor Defects

Defect	Classification	
	Major	Minor
1. Material not as required.	X	
2. Inlet and outlet not axially in alignment.	X	
3. Nozzle assembly not complete.	X	
4. Dimensions or weight not as required.	X	
5. Thread dimensions not within specified tolerances and failure to pass gage tests.	X	
6. Workmanship and finish not as required.	X	
7. Threads not smooth and not free of imperfections.		X
8. Illegible or improper marking.		X

4.4.2. Lot Acceptance Tests. Each of the samples selected in accordance with 4.3.3, shall be tested in accordance with 4.6, to determine conformance with requirements of this specification.

4.4.3. First Article Inspection. Unless otherwise specified (see 6.2), the first article sample(s) indicated in 3.1, shall be inspected as specified in 4.4.1 and 4.6. All inspection and testing of the first article sample(s) shall stop upon a single failure and the sample(s) rejected. The contractor will be informed as to the nature of the failure, but the Government shall not be obligated to continue testing a defective item, once it is known to be defective or when it is considered in the best interest of the Government.

4.4.4. Quality Conformance Inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with ANSI/ASQC Z 1.4. The inspection level and AQL shall be as specified in 4.3.3.

4.5. Certificate of Conformance. A Certificate of Conformance shall meet the requirements of USDA Forest Service Standard 5100-190. Where certificates of conformance are required, the Government reserves the right to verify test any such items to determine the validity of certification. These certificates shall be based on the testing of component materials and may be performed by the component material supplier. The contractor shall provide certificates of conformance for all materials used in 3.3.1, 3.3.2 and 3.8. (see 4.5.2 and 4.5.3)

4.5.1. Certificates of Conformance in Lieu of Testing. Unless otherwise specified, certificates of conformance may be acceptable in lieu of testing of end items.

4.5.2. Nozzle Material. As required by 3.3.1, nozzle material shall meet the indicated material physical property requirement listed, when tested to defined test method.

4.5.3. Gasket Material Test. As required by 3.3.2, gasket material physical properties shall meet the requirements of USDA Forest Service Standard 5100-190.

4.5.4. Plastic Material Test. As required by 3.3.1.2, Polycarbonate plastic material shall meet the indicated physical property requirements listed in Table 1, when tested to the test methods indicated in Table 3.

Table 3. Plastic Physical Properties Test Methods

Physical Properties	ASTM Test Methods
Tensile Strength	D 638
Rockwell Hardness	D 785
Impact Strength	D 256

4.5.5. Surface Treatment. As required by 3.8, aluminum alloy surfaces, to include threaded surfaces, shall be hardcoated in accordance with USDA Forest Service Standard 5100-190. Copper alloy surfaces, to include threaded surfaces, shall be hardcoated to meet the indicated physical property requirement.

4.6. Performance Testing. Samples shall be subjected to the following tests to determine if the samples meet the requirements of this specification.

4.6.1. Fluid Medium. All testing requiring the use of a fluid medium shall be performed using municipally supplied potable water; this shall include, but is not limited to, flow rate testing and pressure testing. If the contractor does not have access to a municipal water supply, the testing shall be performed using any clear fresh water normally available for firefighting. First article testing performed by the Government will be performed using municipally supplied potable water.

4.6.2. Flow Rate Test. As required by 3.10.1, the nozzle shall be tested for flow rate. The nozzle shall be connected to a water pressure source. The discharge pressure shall be increased to 100 psig. The rate of flow shall be determined by using a calibrated flow meter or by discharging the water into a weigh tank and calculating the flow.

4.6.3. Proof Pressure Test. As required by 3.10.2, the nozzle shall be tested for proof pressure by attaching it to a water pressure source. A blank (plugged discharge end) orifice shall be installed on the 3/4 inch discharge end. A hydrostatic pressure of 600 psig (4137 kPag) shall be applied and held for three minutes. The rate for applying hydrostatic pressure shall not be less than 300 psig (2068 kPag) per minute and not more than 600 psig (4137 kPag) per minute, i.e., at a uniform rate over a one to two minute time interval. There shall be no leaks, permanent deformation, mechanical damage or structural failure.

## 5. PACKAGING, PACKING AND MARKING.

5.1. Packaging, Packing and Marking. The packaging, packing and marking shall be as specified in the contract or order.

## 6. NOTES.

6.1. Intended Use. The nozzle described in this specification is for use with USDA Forest Service fire hose for use in wildland firefighting.

6.2. Acquisition Requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. If first article sampling and inspection is not required (see 3.1, 4.4.3, and 6.3).
- c. Number of each type of nozzle tips required. If no tips are required, the number is zero.
- d. If certificates of conformance are acceptable in lieu of lot by lot testing (see 4.4.2 and 4.5).
- e. Packaging, packing and marking instructions. (5.1.)

6.3. First Article. When a first article sample(s) is required, the sample(s) shall be inspected and approved in accordance with the First Article clauses set forth in the solicitation. Specific instructions shall be included regarding arrangements for selection, inspection, and approval of the first article sample(s).

6.4. Notice. When Government drawings, specifications, or other data are used for any purpose other than in connection with a related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatever.

6.5. Preparing Activity. USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas CA 91773-3198.



**United States Department of Agriculture, Forest Service  
Standardization Document Improvement Proposal**

**Instructions:** This form is provided to solicit beneficial comments which may improve this document and enhance its use. Contractors, government activities, manufacturers, vendors, or other prospective users of this document are invited to submit comments to the USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, California 91773-3198. Attach any pertinent data which may be used in improving this document. If there is additional documentation, attach it to the form and place both in an envelope addressed to the preparing activity. A response will be provided when a name and address are included.

**Note:** This form shall not be used to submit request for waivers, deviation, or for 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.

Standard Number and Title: **Specification 5100-242d, Nozzle, Screw Tip, 1-1/2 inch Inlet**

Name of Organization and Address:

\_\_\_\_\_ Vendor                      \_\_\_\_\_ User                      \_\_\_\_\_ Manufacturer

1. \_\_\_\_\_ Has any part of this document created problems or required interpretation in procurement use?  
       \_\_\_\_\_ Is any part of this document too rigid, restrictive, loose or ambiguous? Please explain below.

Give paragraph number and wording:

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Reason for recommended change(s):

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