

Specification 5100-241d
October 2000
Superseding
Specification 5100-241c
September 1996

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SPECIFICATION FOR
NOZZLE, SHUTOFF

1. SCOPE.

1.1. Scope. The nozzle described in this specification is a shutoff nozzle with a 1 inch 11-1/2 NPSH inlet and 3/4 inch 11-1/2 NH outlet with a ball shutoff valve, designed for use in the application of water in wildland firefighting activities. The working pressure is up to 600 psig (4137 kPag).

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 issues 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 Specification

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

USDA Forest Service Standard

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

Federal Specifications

QQ-A-225 - Aluminum and Aluminum Alloy Bar, Rod, Wire or Special Shapes; Rolled, Drawn, or Cold Finished; General Specification for

QQ-A-225/10 - Aluminum Alloy Bar, Rod, and Wire; Rolled, Drawn, or Cold Finished, 6262

QQ-A-367 - Aluminum Alloy Forgings

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, San Dimas, CA 91773-3198 by using the Specification Comment Sheet at the end of this document or by letter.

Copies of federal specifications are available from General Services Administration, Federal Supply Service Bureau, Specification Section, Suite 200, 470 East L'Enfant Plaza SW, Washington DC 20407.

Copies of USDA Forest Service Specifications and Standards are available from USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198.

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 requests for proposals.

American National Standards Institute (ANSI)/American Society for Quality Control (ASQC)

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

Address requests for copies to American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

American Society for Testing and Materials (ASTM)

- B 26 - Aluminum-Alloy 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 570 - Test Method for Water Absorption of Plastics
- D 635 - Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
- D 638 - Test Method for Tensile Properties of Plastics
- D 785 - Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials

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

Institute of Electrical and Electronics Engineers (IEEE)/American Society of Testing and Materials (ASTM)

SI 10 - Standard for Use of the International System of Units (SI): The Modern Metric System

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 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. Unless otherwise specified, first article inspection shall be performed on a product sample(s), in accordance with 4.4.3.

3.2. Nozzle Construction. The nozzle shall be the lever or knob type with rotating ball or rotating cylinder valve. The nozzle may be extruded, forged, machined or cast. The body length shall not exceed 3.4 inches (86.4 mm), from the end of the inlet to the end of the outlet. See Figure 1 for configuration. Figure 1 is provided for information only and is not intended to designate a particular design or manufacturer.

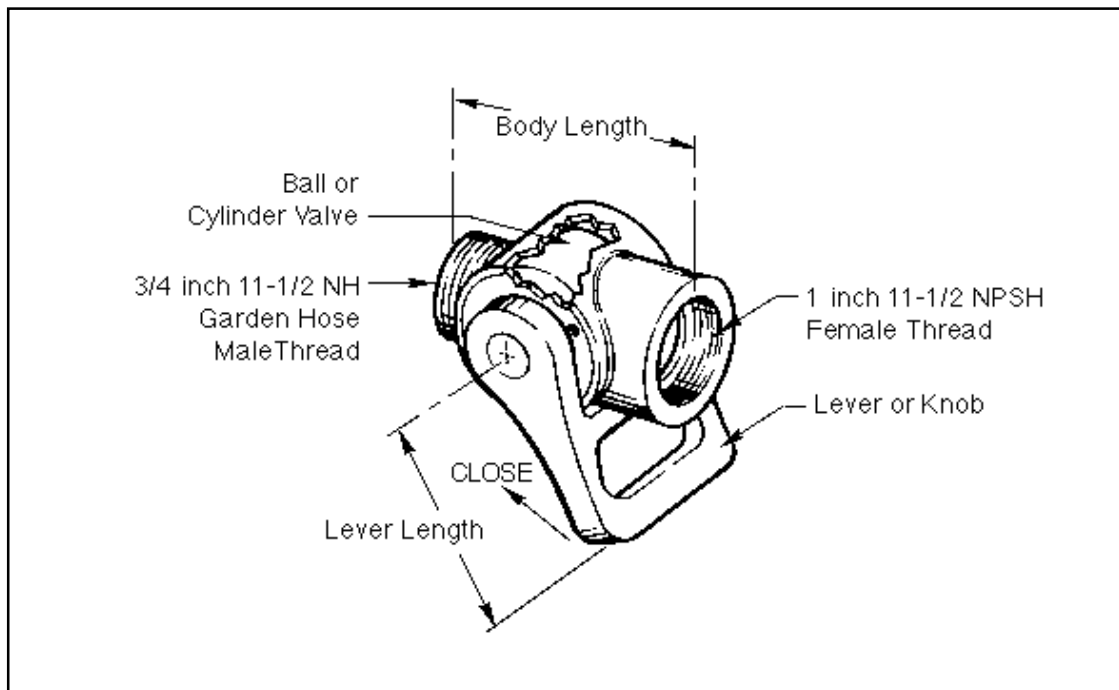


Figure 1. Shutoff nozzle configuration.

3.2.1. Inlet and Outlet. The inlet end shall have a 1 inch 11-1/2 NPSH female thread, a gasket and gasket recess. The outlet shall have a 3/4 inch 11-1/2 NH garden hose male thread. The inlet and outlet shall be axially in alignment.

3.2.2. Lever or Knob. A lever or knob shall be provided to open and close the nozzle. The waterway shall not be obstructed in any way by the ball when fully open.

3.2.2.1. Lever. If a lever is used, the lever shall not protrude more than 4.0 inches (101.6 mm) from the central axis of the valve, with a minimum length of 3.25 inches (82.6 mm). The lever or body shall be marked to indicate "Open" and "Closed" or "On" and "Off".

3.2.2.2. Knob. If a knob is used, the diameter shall not be less than 2.5 inches (63.5 mm) and not more than 3.0 inches (76.2 mm). The valve body shall be marked “Open” and “Closed” or “On” and “Off”.

3.2.3. Stops. Stops shall be provided at the “Open” and “Closed” or “On” and “Off” positions. The “Closed” position of the lever shall be toward the discharge outlet. The “Off” position of the knob indicator shall be perpendicular at 90 degrees from the main body.

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 Body Materials. The nozzle body material shall conform to the following:

- a. Extruded aluminum alloy, 6061-T6, in accordance with ASTM B 221 and B 241 or
- b. Forged aluminum alloy, 6061-T6, in accordance with Federal Specification QQ-A-367 or
- c. Aluminum alloy, 6262-T9, in accordance with Federal Specifications QQ-A- 225 and QQ-A-225/10 or
- d. Cast aluminum alloy, 356-T6, in accordance with ASTM B 26.

3.3.2. Ball (or Cylinder) and Seat Material. The ball (or cylinder) and seat material shall be stainless steel, hard anodized aluminum alloy or plastic. If a plastic ball (or cylinder) and seat are used, they shall meet the minimum physical properties, as indicated in Table 1, when tested in accordance with 4.5.3 and 4.5.3.1.

Table 1. Plastic Ball (or Cylinder) and Seat Material Physical Properties

Physical Properties	Values
Tensile strength at yield	8800 psi at 73 °F (60.7 MPa at 22.8 °C)
Elongation at break	60% at 73 °F (22.8 °C)
Rockwell hardness	M 80
Water absorption (24 hour immersion)	0.22% at 73 °F (22.8 °C)

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

3.3.4. 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 Weight. Maximum weight of the shutoff nozzle shall be 19 ounces (539 g).

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. All metal part sections shall be symmetrical and concentric to 0.030 inch (0.762 mm).

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.

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

3.7. Marking. Nozzle markings shall be in accordance with the USDA Forest Service Standard 5100-190. In addition, the body or lever (see 3.2.2.1 and 3.2.2.2) shall be marked to indicate "Open" or "Closed" or "On" and "Off". The body shall be marked "600 WP".

3.8. Surface Treatment. Aluminum alloy surfaces, to include threaded surfaces, shall be hardcoated in accordance with USDA Forest Service Standard 5100-190.

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. Torque Test. When tested in accordance with 4.6.2, the torque required to open and close the nozzle, under 600 psig (4137 kPag) pressure, shall not exceed 50 inch-pounds (5.65 Newton-meter).

3.10.2. Proof Pressure. When tested in accordance with 4.6.3, the nozzle shall withstand 1200 psig (8274 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. Thread series designation is indicated as 3/4 inch 11-1/2 NH and 1 inch 11-1/2 NPSH. Since this is a thread series designation, not an indication of a specific dimension, the metric equivalent is 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 IEEE/ASTM SI 10, and all other requirements of this specification are met.

4. SAMPLING, INSPECTION 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's 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 shutoff nozzles of one size presented together in one delivery shall be considered a lot for the purpose of inspection. A sample unit shall be one shutoff nozzle.

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 1.5 percent defective.

4.3.3. Sampling for Lot Acceptance Tests. Sampling for lot acceptance testing shall be S-3 with an AQL of 1.5 percent defective.

4.4. Inspection and Tests.

4.4.1. Visual and Dimensional Examination. When selected in accordance with 4.3.2, each sample shutoff nozzle 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 3 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 3. Major and Minor Defects

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

4.4.2. Lot Acceptance Tests. Each of the sample nozzles selected in accordance with 4.3.3, shall be tested in accordance with section 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. Certificates of conformance shall be submitted in accordance with the requirements in USDA Forest Service Standard 5100-190. The contractor shall provide Certificates of Conformance for all materials used in 3.3.1, 3.3.2, 3.3.3 and 3.8 (see 4.5.2, 4.5.3, 4.5.3.1, 4.5.4 and 4.5.5).

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

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

4.5.3. Ball (or Cylinder) and Seat Material. As required by 3.3.2, ball (or cylinder) and seat material shall be stainless steel, hard anodized aluminum alloy or plastic.

4.5.3.1. Plastic Ball (or Cylinder) and Seat Physical Properties Tests. As required by 3.3.2, when a plastic ball (or cylinder) and seat are used in the valve, a material sample shall be tested for physical properties in accordance with the ASTM Test Methods indicated in Table 4.

Table 4. Plastic Ball (or Cylinder) and Seat Material Physical Properties Test Method

Physical Properties	ASTM Test Method
Tensile Strength	D 638
Elongation	D 638
Rockwell hardness	D 785
Water absorption	D 570

4.5.4. Gasket Material Test. As required by 3.3.3, gasket material physical properties shall meet the requirements of USDA Forest Service Standard 5100-190.

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.

4.6. Test Procedure. 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 torque and proof 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 fire fighting. First article testing performed by the Government will be conducted using municipally supplied potable water.

4.6.2. Torque Test. As required in 3.10.1, torque testing shall be conducted with the nozzle connected to a water pressure source.

4.6.2.1. Torque Test with Blank Orifice Tip. A blank orifice (plugged discharge end) shall be installed on the discharge/outlet of the nozzle, with the shutoff valve open. A hydrostatic pressure of 600 psig (4137 kPag) shall be applied. The rate for applying the hydrostatic pressure shall be not 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 1 to 2 minute time interval. Using a calibrated torque wrench, measure the amount of torque in inch-pounds/Newton-meters required to open and close the nozzle. Three open/close cycles shall be performed with no failures.

4.6.2.2. Torque Test with Tip. A 3/8 inch (9.53 mm) straight stream nozzle tip will be installed on the discharge/outlet of the nozzle, with the shutoff valve closed. The straight stream nozzle shall be as described in Forest Service Specification 5100-244. An inlet opening pressure of 600 psig (4137 kPag) shall be applied. The rate for applying the nozzle inlet pressure shall be not 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 1 to 2 minute time interval. Using a calibrated torque wrench, measure the amount of torque in inch-pounds/Newton-meters required to open and close the nozzle. Three open/close cycles shall be performed with no failures.

4.6.3. Proof Pressure Test. As required in 3.10.2, the shutoff nozzle shall be tested for proof pressure by attaching the sample to a water pressure source. A blank orifice (plugged discharge end) shall be installed on the discharge/outlet of the nozzle. A hydrostatic pressure of 1200 psig (8274 kPag) shall be applied and held for 3 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 2 to 4 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 a shutoff nozzle with a 1 inch 11-1/2 NPSH inlet and 3/4 inch 11-1/2 NH outlet with a ball shutoff valve, for use in the application of water in wildland firefighting activities.

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

- a. Title, number, and date of this specification.
- b. If a first article sampling and inspection is not required (see 3.1 and 4.4.3).
- c. If certificates of conformance are acceptable in lieu of lot by lot testing (see 4.4.2 and 4.5).
- d. Packaging, packing and marking (see 5.1).

6.3. First Article. When a first article sample(s) is required, it 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, specification, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever.

6.5. Preparing Activity. USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, California 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 of use 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 5100-241d, Nozzle, Shutoff**

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:

Recommended change (s):

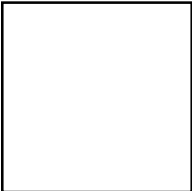
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USDA Forest Service
San Dimas Technology & Development Center
Attn: Water Handling Project Leader
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