Specification 5100-383b
August 1997
Superseding
Specification 5100-383a
May 1982

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

SPECIFICATION FOR

VALVE, FOOT, WITH STRAINER

1. SCOPE.

1.1. Scope. The foot valve with strainer described in this specification, is designed to maintain prime when the pump is temporarily turned off. This is achieved by retaining water in the suction hose at the pump discharge, when used with Forest Service firefighting centrifugal pumps. The foot valve includes a main body with an internal threaded connection, a poppet type valve, a strainer with a screen and removable cover. The strainer is installed on the inlet side of the valve, to prevent clogging and damage to the pump. The foot valve is also used on water ejectors for siphoning water from tanks, lakes, streams or similar water sources. The thread series designations are 1 inch 11-1/2 NPSH, 1-1/2 inch 9 NH and 2-1/2-inch 7-1/2 NH.

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 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 Avenue, 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 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.

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 - Specifications for Free-cutting Brass, Rod, Bar, and Shapes for Use in Screw Machines

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

B 584 - Standard Specification for Copper Alloy Sand Castings for General Applications

D 618 - Standard Method of Conditioning Plastics, Electrical Insulating Materials for Testing

D 635 - Test for Flammability of Self-supporting Plastics

D 638 - Test for Tensile Properties of Plastics

D 695 - Standard Method of Test for Compressive Properties of Rigid 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 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. Construction. The foot valve and strainer thread series are 1 inch 11-1/2 NPSH, 1-1/2 inch 9 NH or 2-1/2 inch 7-1/2 NH. It shall consist of a main body with a spring-loaded valve, valve poppet, poppet spring, and a detachable strainer. The valve poppet shall have a minimum of 3 prongs for alignment. See Figure 1 for configuration. Figure 1 is provided for information only and is not intended to designate a particular design or manufacturer.

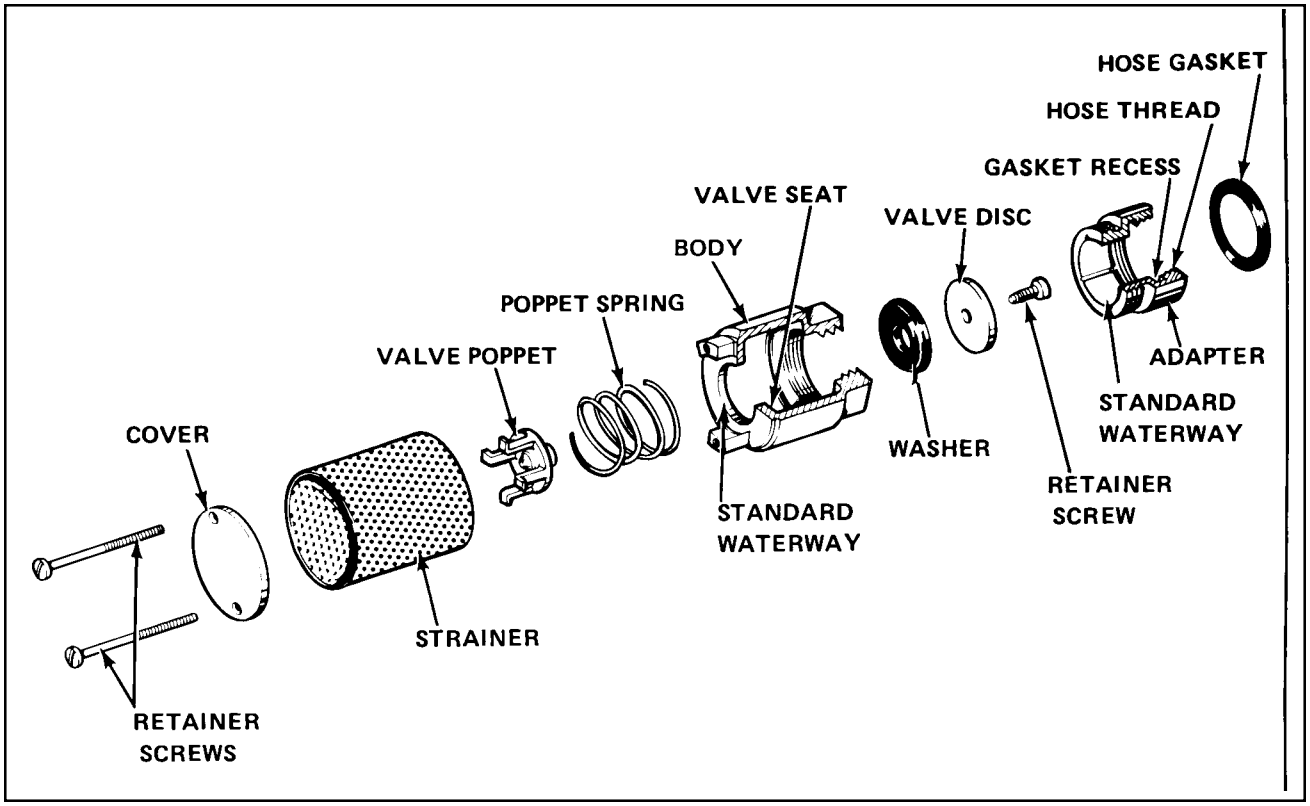

Figure 1. Foot valve and strainer configuration.

3.2.1. Strainer. The minimum strainer hole diameter and hole area shall be as follows:

a. 0.080 ± 0.005 inch (2.032 ± 0.127 mm) for the 1 inch 11-1/2 NPSH and the 1-1/2 inch 9 NH strainers.

b. 0.085 ± 0.005 inch (2.159 ± 0.127 mm) for the 2-1/2 inch 7-1/2 NH strainer.

c. The total area of the holes shall not be less than the waterway opening.

3.2.2. Gasket. A gasket shall be installed in the internal threaded connection.

3.2.3. Adapter. The adapter shown in Figure 1 may be an integral part of the main body providing gasket recess and threads conform with other requirements of this specification. Fastening of cover and strainer may be by other means providing they are removable

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. Body, Strainer, and Cover Material. The body, strainer cover, and adapter material shall be made of brass, or aluminum alloy, as indicated below. The strainer, valve disc, and retainer screws shall be made of stainless steel.

a. Free-cutting brass rod, in accordance with ASTM B 16 or

b. Cast brass, copper alloy, No. 836, 838, or 844, in accordance with ASTM B 584 or

c. Cast aluminum alloy, 40E 356-T6, in accordance with ASTM B 26 or

d. Extruded aluminum alloy, 6061-T6, in accordance with ASTM B 221 and B 241 or

e. Forged aluminum alloy, 6061-T6, in accordance with Federal Specifications QQ-A-367 or

f. Extruded aluminum alloy, 6262-T9, in accordance with Federal Specifications QQ-A-225 and QQ-A-225/10.

3.3.2. Valve Poppet and Disc Material. The valve poppet and disc material shall be made of plastic or materials indicated in 3.3.1.

3.3.2.1. Plastic Material Physical Properties. When tested in accordance with 4.5.4, if the valve poppet and disc are made of plastic materials, they shall possess the physical properties shown in Table 1. Plastic poppet and disc material failing to meet these requirements shall be rejected.

Table 1. Plastic Material Physical Properties

Physical Properties	Values
Compressive strength	16,000 psi 110,345 kPa at 10 percent deflection
Flammability	1.0-1.1 inch 25.4-27.9 mm per minute range
Tensile strength	8,000 psi 55,172 kPa at a minimum @ 73° F (23° C)
Rockwell hardness	R120 maximum

3.3.2.2. Temperature Capacities. When tested in accordance with 4.5.5, the valve poppet and disc plastic materials shall be capable of withstanding temperature range of -30.0° to +195.0° F (-34.44° to +90.55° C), without showing any signs of melting, becoming brittle, or deteriorating in any way.

3.3.3. Gasket Material. When tested in accordance with 4.5.6, 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. Weights and Dimensions. Weights and dimensions shall be as shown in Table 2.

Table 2. Weights and Dimensions

Thread Series Designation	Weight Maximum		Overall Length Maximum		Overall Diameter Maximum	
	lb	oz (kg)	inch	(mm)	inch	(mm)
1 inch 11-1/2 NPSH	1.0	(0.454)	5.75	(146.0)	2.00	(50.8)
1-1/2 inch 9 NH	2.0	(0.907)	6.44	(163.5)	2.63	(66.7)
2-1/2 inch 7-1/2 NH	6.0	(2.722)	9.38	(238.1)	3.88	(98.4)

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, Gasket Recesses, and Rocker Lugs. All threads, waterways, gaskets, gasket recesses and rocker lugs 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.

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 Versus Vacuum Testing. When tested in accordance with 4.6.2., minimum flow rate at 15 inches of mercury vacuum shall be as indicated below:

Table 3. Flow Rate Requirement at 15 inches Mercury Vacuum

Thread Series Designation	Minimum Flow Rate	
	gpm	lpm
1 inch 11-1/2 NPSH	50.0	189.4
1-1/2 inch 9 NH	70.0	265.2
2-1/2 inch 7-1/2 NH	200.0	757.6

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 1 inch 11-1/2 NPSH, 1-1/2 inch 9 NH and 2-1/2-inch 7-1/2 NH. 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 shall 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 shall 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 ensuring 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 valves presented together in one delivery shall be considered a lot for the purpose of inspection.

4.3.2. Sampling for Visual and Dimensional Examination. Sampling for visual and dimensional examination shall be S-2, 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-2 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 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 4 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 4. Major and Minor Defects

Defect	Classification	
	Major	Minor
1. Foot valve and strainer are not complete.	X	
2. Hardcoating not as required.	X	
3. Thread dimensions not within specified tolerances and failure to pass gage tests.	X	
4. Weight and dimensions not as required.	X	
5. Material not as required.	X	
6. Workmanship 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 shall 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, 3.3.2.1, 3.3.2.2, 3.3.3 and 3.8 (see 4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.6 and 4.5.7).

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. Body, Strainer, and Cover Material. As required by 3.3.1, body, strainer, and cover material components shall meet the indicated material physical property requirements listed, when tested to defined test methods. A separate Certificate of Conformance shall be submitted for each different material used.

4.5.3. Valve Poppet or Disc Material. As required by 3.3.2, the valve poppet or disc material shall meet the indicated material physical property requirement listed.

4.5.4. Plastic Valve Poppet or Disc Physical Properties Tests. As required by 3.3.2.1, if the valve poppet or disc are made of plastic material, a sample shall be tested in accordance with the test methods indicated in Table 5.

Table 5. Plastic Valve Poppet or Disc Physical Properties Test Methods

Physical Property	ASTM Test Method
Compressive Strength	D 695
Flammability	D 635
Tensile Strength	D 638
Rockwell Hardness	D 785

4.5.5. Temperature Capacities Test. As required by 3.3.2.2, if the valve poppet or disc are made of a plastic material, a test sample shall be subjected to temperatures of -30° and +195° F (-34.4° and +90.5° C) for 24 hours at each temperature, in accordance with ASTM D 618.

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

4.5.7. 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. 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 versus vacuum 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 shall be conducted using municipally supplied potable water.

4.6.2. Flow Rate Versus Vacuum Test. As required by 3.10.1, the foot valve and strainer shall be tested for flow rate versus vacuum drop across the valve and strainer.

4.6.2.1. Test Setup. The foot valve shall be connected to a short length of steel pipe of the same nominal outlet diameter. The foot valve intake shall be positioned between 12 to 14 inches (305 to 356 mm) below the surface of the water. A short length of pipe shall be placed vertically and shall extend out of the water at least 6 inches. A piezo ring or straight ink inside flush pressure tap shall be installed into the pipe at the location where the pipe exits the water and a vacuum gage shall be attached. If a line is inserted between the pressure tap and the vacuum gage, the line shall be cleared of all water prior to each reading.

4.6.2.2. Test Method. A calibrated flow meter device or the weight versus time test method shall be used to measure flow. The device(s) used to measure flow shall have an inaccuracy not greater than +\- 1.0 %. Water shall be drawn through the foot valve by a pump producing a vacuum of 15 inches of mercury , with the test setup as described. The minimum flow rate shall be as indicated in Table 3.

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 foot valve with strainer described in this specification, is designed to maintain prime when the pump is temporarily turned off. This is achieved by retaining water in the suction hose at the pump discharge, when used with USDA Forest Service firefighting centrifugal pumps. The strainer is installed on the inlet side of the valve, to prevent clogging and damage to the pump. The foot valve is also used on water ejectors for siphoning water from tanks, lakes, streams or similar water sources.

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, 4.4.3, and 6.3).
c. Thread series designation required.
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 (see 5.1).
f. Date of the invitation for bids or request for proposals (see 2.1).

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, 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 whatsoever.

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 5100-383b, Valve, Foot with Strainer**

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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USDA Forest Service
San Dimas Technology & Development Center
ATTN: Water Handling Project Leader
444 East Bonita Avenue
San Dimas, California 91773-3198

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