Specification 5100-380e
January 2007
Superseding
Specification 5100-380d
September 1996

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

SPECIFICATION FOR

VALVE, WYE

1. SCOPE.

1.1. Scope. The wye valve described in this specification is for branching two separate lines in wildland fire hose lays. The inlet end is a female threaded swivel and the outlet ends are male threaded adapters. Working pressure is up to 600 psig.

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

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

2.2. Nongovernment 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.

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.

American Society for Quality (ASQ)

ANSI/ASQ Z 1.4 - Sampling Procedures and Tables For Inspection by Attributes

Address requests for copies to American Society for Quality, P.O. Box 3005, Milwaukee, WI 53201-3005

ASTM International

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 or Rockwell Hardness of Plastics and Electrical Insulating Materials

Address requests for copies to ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

Nongovernment 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, samples shall be subjected to first article inspection in accordance with 4.4.2. During the term of the contract the contractor shall be required to notify the contracting officer in writing when a component or the component supplier changes in any way, when a major manufacturing process changes in any way, or when a manufacturing location changes. The contracting officer may at any time require the contractor to submit a new first article sample when substantive changes occur during the term of the contract.

3.2. Construction. The wye valve shall consist of a main body with a swiveled inlet and two evenly divided branch outlets. Each branch shall be independently gated with ball valves. The inlet end shall be a female threaded swivel and the outlet ends shall be male threaded adapters. Components shall be as shown in figure 1. Figure 1 is provided for information only and is not intended to designate a particular design or manufacturer.

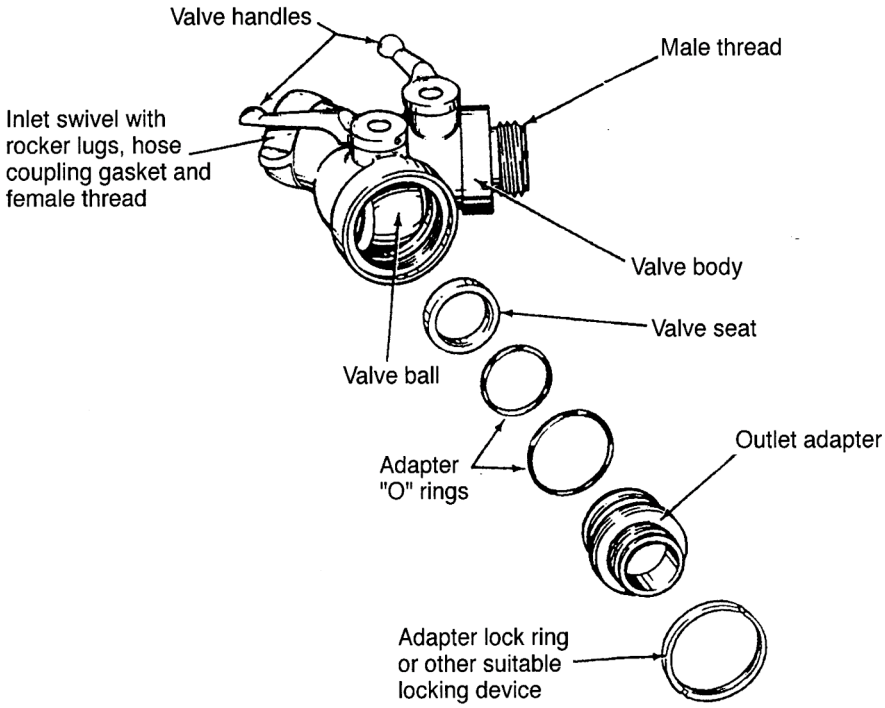

Figure 1. Wye valve configuration.

3.2.1. Valve and Components. The valve design shall include a system that shall allow for valve seat wear-leakage adjustments. The lock ring (or other locking device), outlet adapter, “O” rings, valve seat, and ball shall be removable for repair or replacement of damaged parts. Each valve shall have two positions set by mechanical stops, one closed and one fully open. There shall be 90 degrees of travel between these two positions.

3.2.2. Swivel. The inlet swivel shall be designed with a tolerance to permit free turning by a light twisting action before and after the proof-pressure testing, as required in 3.10.3.

3.2.3. Handles. The handles shall be parallel with the central axis of the outlet waterway when in the fully open position. The waterway shall not be obstructed in any way by the ball when fully open. Handles shall be removable for repair or replacement of damaged parts.

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, Swivel, Adapter and Lock Ring Material. The body, swivel, adapter, and adapter lock ring (or other locking device) material shall conform to the following:

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

b. Cast aluminum alloy, 356-T6, in accordance with ASTM B 26.

3.3.2. Ball-Shaft Material. Ball-shaft material shall be hard anodized extruded aluminum, in accordance with 3.3.1a or stainless steel.

3.3.3. Valve-Ball Material. Valve-ball material shall be an extruded aluminum alloy in accordance with 3.3.1a, stainless steel, or plastic.

3.3.3.1. Plastic Valve-Ball Material. If plastic valve-ball material is used, it shall meet the physical properties indicated in table 1.

Table 1. Plastic Valve Ball Material Physical Properties

Physical Properties	**Test Method**	**Value**
Tensile strength at yield	ASTM D 638	8000 psig minimum at 73 °F
Elongation at break	ASTM D 638	70 % maximum at 73 °F
Rockwell hardness	ASTM D 785	M78 minimum
Water absorption (24h immersion)	ASTM D 570	0.25% maximum at 73 °F
Flammability	ASTM D 635	1.1 in/min maximum

3.3.4. Handles. Handle material shall conform to the following:

a. Extruded aluminum, in accordance with 3.3.1a, or

b. Cast aluminum, in accordance with 3.3.1b.

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

3.3.6. Lubrication. If lubrication is used, a permanent type shall be applied which shall not require replacement except when repairing or replacing the balls or seals. The lubrication shall not collect dirt or grit that may cause damage to the balls or seals, or affect performance of the valve.

3.3.7. 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, provided all performance requirements of this specification are met.

3.4. Size, Dimension, and Weight. Wye valve sizes are in three combinations of one inlet and two outlets as indicated in figure 1 and table 2. The acquisition document will specify the inlet and outlet combination type A, B, or C. Wye valve dimensions and weights shall be as indicated in table 2.

Table 2. Wye Valve Dimensions and Weight

Type	Inlet and Outlet Combination Inlet Thread Series	Outlet Thread Series	Maximum Weight (lb)	Valve Waterway Size	(inch)
A	1 inch 11-1/2 NPSH	1 inch 11-1/2 NPSH	3.0	1.000	+0.030 -0.010
B	1-1/2 inch 9 NH	1 inch 11-1/2 NPSH	3.3	1.000	+0.030 -0.010
C	1-1/2 inch 9 NH	1-1/2 inch 9NH	5.0	1.500	+0.030 -0.010

3.4.1. Handle Dimensions. Handles shall be a minimum of 3.5 inches and a maximum of 5.0 inches in length, as measured from the pivot point to their extreme ends.

3.4.2. Dimensional Tolerance. Unless otherwise noted, the following tolerances apply: one place (x.x) +/- 0.1 inch; two places (x.xx) +/- 0.03 inch and three places (x.xxx) +/- 0.010 inch.

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 nonconformance 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.

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

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

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

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. Markings. Markings shall be in accordance with USDA Forest Service Standard 5100-190 and shall include the month and year of manufacture by a numeric designation (example – August 2006 shall be indicated by 8/06). In addition, markings shall include the letters "600 WP" and shall be visible from the top of the valve, ignoring any obstruction by the handles.

3.8. Surface Treatment. The aluminum-alloy 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. Valve Handle Dry Torque. When tested in accordance with 4.6.2, the torque required to open or close the branch handles of the valve ball in a dry condition shall not exceed 150 inch-pounds.

3.10.2. Valve Handle Wet Torque. When tested in accordance with 4.6.3, the torque required to open or close the branch handles of the valve ball while under 600 psig pressure shall not exceed 200 inch-pounds.

3.10.3. Proof Pressure. When tested in accordance with 4.6.4, the valve shall withstand a hydrostatic working pressure of 600 psig and a hydrostatic proof pressure of 1,200 psig, with no leaks, permanent deformation, mechanical damage, or structural failure. In addition, the swivel section shall turn freely before and after proof-pressure testing.

3.10.4. Handle Uniform Loading. When tested in accordance with 4.6.5, the wye valve handle shall be capable of withstanding a minimum uniform loading of 175 pounds applied at a rate of 2.0 inches per minute, at a cross section located 3.0 inches from the pivot axis.

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/her own or any 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 or tests set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1. 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 unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.2. Responsibility for Compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor 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 nonconforming material, either indicated or actual, nor does it commit the Government to accept nonconforming material.

4.3 Classification of Inspection. The inspection requirements specified herein are classified as follows:

a. First Article Inspection (paragraph 4.3.2).
b. Lot Acceptance Inspection (paragraph 4.3.3).

4.3.1. Lot. All wye valves of one type presented together in one delivery shall be considered a lot for the purpose of inspection. A sample unit shall be one wye valve.

4.3.2 Sampling for First Article Inspection. The contractor shall make available to the Government items from which a first article may be selected.

4.3.3 Sampling for Lot Acceptance Inspections and Tests. When inspection and testing is performed, sampling shall be in accordance with ANSI/ASQ Z 1.4. Sampling for inspection shall be performed on wye valves ready for delivery. The sample size shall be in accordance with special inspection level S-3.

4.4. Inspection and Tests.

4.4.1. Lot Inspection. When selected in accordance with paragraph 4.3.3, each sample item shall be inspected in accordance with table 3 to determine conformance with this specification. If the sample is found to have any major nonconformities, as identified in table 3, the lot shall not be accepted. Additionally, if the number of minor nonconformities (table 3) in the sample exceeds an AQL of 2.5 percent nonconforming, the lot shall not be accepted.

Table 3. Lot Acceptance Inspection and Testing.

Nonconformance	Paragraph	Classification Major	Minor
1. Configuration not as specified.	3.2	X	
2. Valve and components not as specified.	3.2.1	X	
3. Swivel does not turn freely.	3.2.2	X	
4. Handles not as specified.	3.2.3	X	
5. Visible indication of material incompatibility or corrosion.	3.3	X	
6. Materials not as specified (includes 3.3.1 through 3.3.5).	3.3	X	
7. Dimensions not as specified (includes 3.4.1).	3.4	X	
8. Weight not as specified.	3.4		X
9. Workmanship not as specified (includes 3.5.1 through 3.5.4).	3.5	X	
10. Threads, waterways, gaskets, gasket recesses and rocker lugs not as specified in 5100-190.	3.6	X	
11. Marking not as specified.	3.7		X
12. Surface finish not as specified.	3.9	X	

4.4.2. First Article Inspection. Unless otherwise specified in paragraph 6.3, the first articles submitted in accordance with paragraph 3.1 shall be inspected as specified in paragraph 4.4.1 (table 3) and in accordance with table 4. The presence of any nonconformity or failure to pass any test shall be cause for rejection of the first article submission.

4.4.2.1 First Article Inspection Package. The contractor shall submit to the Government along with the selected first articles, copies of:

a. All certificates of conformance, paragraph 4.5.
b. Company inspection records, paragraph 4.1.
c. All test results for the first article samples, paragraph 4.7.
d. All other information necessary to perform the inspections identified in tables 3 and 4.

Table 4. First Article Inspection.

Nonconformance	Paragraph	Classification Major	Minor
1. Certificates of conformance missing or incomplete.	4.5	X	
2. Valve handle dry torque test exceeds specified value.	3.10.1	X	
3. Valve handle wet torque test exceeds specified value.	3.10.2	X	
4. Sample does not withstand proof pressure or has leaks, permanent deformation, mechanical damage, structural failure, or inlet swivel does not turn freely before or after proof pressure test.	3.10.3	X	
5. Handle does not withstand minimum uniform loading.	3.10.4	X	

4.5. Certificate of Conformance. A Certificate of Conformance (COC) shall meet the requirements of USDA Forest Service Standard 5100-190. Where COCs are required, the Government reserves the right to determine the validity of certification. These COCs shall be based on the testing of component materials and may be performed by the component material supplier. The date on the COCs for all textile, natural rubber, and synthetic compounds shall not exceed 2 years prior to the current date. The contractor shall provide certificates of conformance for 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.5, and 3.8.

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 will be performed using municipally supplied potable water; this shall include, but is not limited to, torque 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. Qualification testing performed by the Government shall be conducted using municipally supplied potable water.

4.6.2. Dry-Valve Torque Test. As required by 3.10.1, the wye valve shall be dry and without hydrostatic pressure when dry torque tested. A calibrated torque wrench shall be installed in the place of each valve handle, and each valve opened and closed three times with no failures.

4.6.3. Wet-Valve Torque Test. As required by 3.10.2, the wye valve shall be connected to a water pressure source and 600 psig pressure shall be applied for wet-torque testing. The rate for applying pressure shall be not less than 300 psig per minute and not more than 600 psig per minute, i.e., a uniform rate over a 1 to 2 minute period. The ball valves shall be closed. A calibrated torque wrench shall be installed in the place of each valve handle and each valve opened and closed three times with no failures.

4.6.4. Proof-Pressure Test. As required by 3.10.3, the wye valve shall be tested for proof pressure. The swivel section shall turn freely before and after proof-pressure testing.

A hydrostatic pressure of 600 psig shall be applied and held for 3 minutes. The rate for applying hydrostatic pressure shall not be less than 300 psig per minute and not more than 600 psig per minute, i.e., a uniform rate over a 1 to 2 minute time interval. There shall be no leaks, permanent deformation, mechanical damage, or structural failure.

Increase the hydrostatic pressure to 1200 psig and hold for 3 minutes. The rate for increasing hydrostatic pressure shall not be less than 300 psig per minute and not more than 600 psig per minute, i.e., a uniform rate over a 1 to 2 minute time interval. There shall be no leaks, permanent deformation, mechanical damage, or structural failure.

Decrease the hydrostatic pressure to 600 psig and hold for 3 minutes. The rate for reducing hydrostatic pressure shall be not less than 300 psig per minute and not more than 600 psig per minute, i.e., a uniform rate over a 1 to 2 minute time interval. There shall be no leaks, permanent deformation, mechanical damage, or structural failure.

4.6.5. Handle Uniform Load Test. As required by 3.10.4, the wye valve handle shall be capable of withstanding a minimum uniform loading of 175 pounds applied at a cross section located 3.0 inches from the pivot axis. A wye-valve handle shall be subject to a uniform load test as follows:

a. The wye-valve handle shall be rigidly mounted in a test fixture, where it is supported at the pivot axis in a cantilever manner. The mounting of the wye-valve handle to the test fixture shall be in a mode identical to the handle mounting on the wye-valve body.

b. The handle shall be subjected to uniform loading to a minimum of 175 pounds. The rate for uniform loading shall be 2.0 inches per minute.

c. The load shall be applied parallel to the handle pivot axis, as a line contact at a cross section located 3.0 inches from the pivot axis. Structural failure shall be defined as an abrupt decrease in the uniform load value.

4.7 Test Results. The contractor shall have available copies of all test results performed to assure the quality or acceptability of the product submitted for acceptance. The test results shall also show the product's acceptable range or expected test result and the item's test value. All test equipment, which shall be used as media of inspection, shall be calibrated and current at the time of testing. Calibration shall be to a recognized State or Federal standard.

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 wye valve described in this specification is used in fire hose lays for branching into two separate lines with valve controls, used in wildland firefighting activities.

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

a. Title, number, and date of this specification.
b. Inlet and outlet combination types: Type A, Type B, Type C.
e. When first article samples are not required (see 3.1, 4.4.2, and 6.3).
d. If certificates of conformance are acceptable in lieu of lot by lot testing.
e. Packaging, packing, and marking (see 5.1).

6.3. First Article. When first article samples are required, they shall be inspected and approved under the appropriate provisions of Federal Acquisition Regulation 52.209. The contracting officer should include specific instructions regarding arrangements for selection, inspection, and approval of the first article.

6.4. Notice. When Government drawings, specifications, 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, CA 91773-3198.

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

Instructions: This form is provided to solicit beneficial comments that 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 that 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 5100-380e, Valve, Wye**
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): Reason for recommended change (s):
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USDA Forest Service
San Dimas Technology & Development Center
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