

Specification 5100-102f
August 2013

Superseding 5100-102e
January 2007

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SPECIFICATION FOR
COUPLINGS, FIRE AND SUCTION HOSE

Beneficial comments and suggestions related to this standard should be addressed using the comment sheet at the end of this document. Remarks may be sent via electronic mail <mailroom_wo_sdtde@fs.fed.us> or U.S. mail to the USDA Forest Service San Dimas Technology and Development Center, 444 E. Bonita Ave, San Dimas, CA 91773.

CHANGE DESCRIPTION RECORD

This is a complete revision. Numbered sections and appendixes no longer correspond to those in the previous revision. Major changes are listed below. Minor changes that do not modify the intent of the specification are not listed.

Change	Reason
Added definitions section and introduced a list of definitions	Clarity
Added Change Description Record	Provide continuity between updates
Added Table of Contents	Clarity
Moved and combined performance testing procedures from section 4 to section 3 with the performance requirements	Clarity
Updated formatting	Aesthetics
Updated references to the term “defect”, “defects”, and “defective”	Terms updated to reflect conformity with the industry standard cited for sampling and inspection procedures (ANSI/ASQ Z1.4)
Added to 3.1 to include explicit reference to specific certificates of conformance (COCs) required in accordance to 4.5.	The addition of the COC reference allows the reader to easily determine the COCs necessary for the First Article package without going back and forth between sections.
Eliminated Metric References.	Clarity
Updated weight requirements in table 1	Correction

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1. SCOPE.

1.1. Purpose and Applicability.

The couplings described in this specification are for use on USDA Forest Service fire hose and suction hose. Coupling 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.

1.2. Interpretations and Definitions.

1.2.1. Interpretation.

To carry out the provisions of this document, the word shall is to be understood as mandatory.

1.2.2. Definitions.

AQL: Acceptance Quality Limit (per ANSI/ASQ Z1.4).

NPSH: National Pipe Straight Hose Thread Series.

NH: National Hose Thread Series.

Defect: A departure of a quality characteristic from its intended level or state that occurs with a severity sufficient to cause an associated product or service not to satisfy intended normal, or foreseeable, usage requirements (per ANSI/ASQ Z1.4).

Nonconformity: A departure of a quality characteristic from its intended level or state that occurs with severity sufficient to cause an associated product or service not to meet a specification requirement (per ANSI/ASQ Z1.4).

S-3: Sample size special inspection level (per ANSI/ASQ Z1.4).

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 in effect on the date of the invitation for bids or request for proposals (section 6.1).

USDA Forest Service Standard

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

USDA Forest Service Specification

5100-184 - Suction Hose

5100-185 - Hose, Rubber, High Pressure, 3/4 Inch Waterway

5100-186 - Fire Hose, Cotton-Synthetic, Lined, Woven Jacket, 1 Inch and 1-1/2 Inch

5100-187 - Fire Hose, Lightweight Synthetic, Lined, Woven Jacket, 1 Inch and 1-1/2 Inch

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 <mailroom_wo_sdtcd@fs.fed.us>.

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 in effect on the date of the invitation for bids or request for proposals.

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

American Society for Quality (ASQ)

ANSI/ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes.

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

American Society for Testing and Materials (ASTM)

B 16 - Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines

B 124 - Copper and Copper-Alloy Forging Rod, Bar and Shapes

B 135 - Seamless Brass Tube

B 145 - Leaded Red Brass and Leaded Semi-red Brass Sand Castings

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.

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 4.4.1. 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 require the contractor at any time to submit a new first article sample when substantive changes occur during the term of the contract. The contractor shall provide certificates of conformance for all materials used in 3.3.1, 3.3.2, 3.3.3, 3.3.4, and 3.8, in accordance with 4.5.

3.2. Construction.

The hose coupling shall consist of the male and female sections, swivel, and swivel gasket. Hose coupling sizes are 1 inch 11-1/2 NPSH, 1-1/2 inches 9 NH, and 2-1/2 inch 7-1/2 NH. 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.

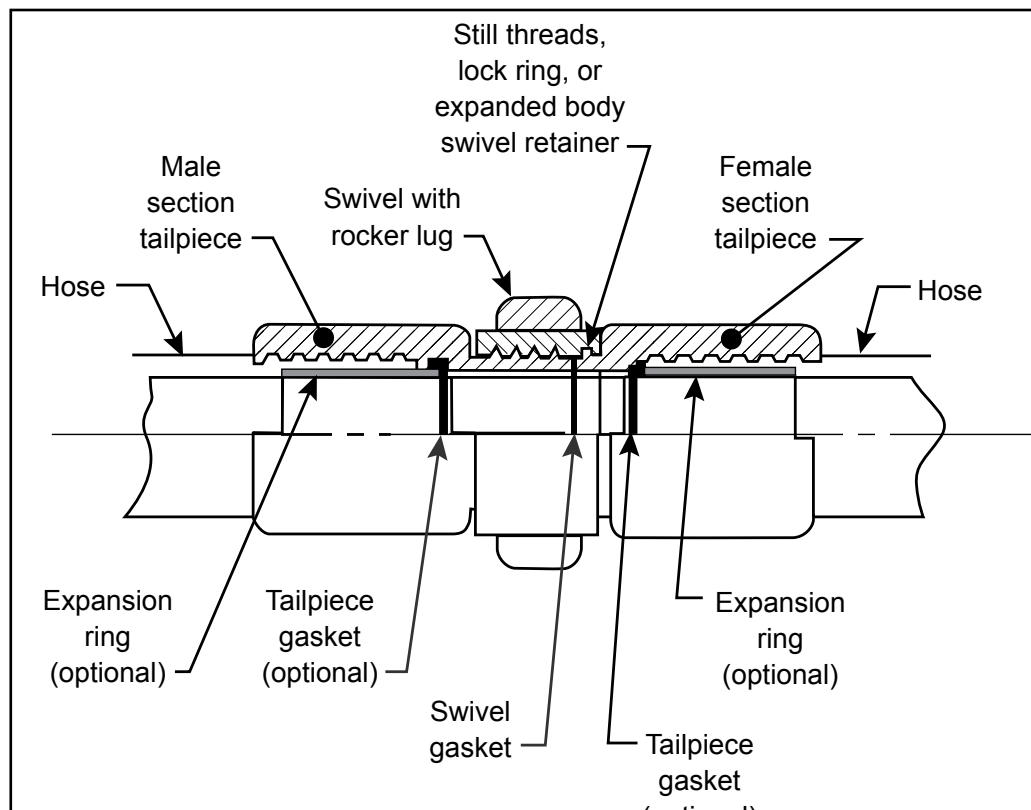


Figure 1—Coupling configuration.

3.2.1. Coupling Tailpiece Sections.

The male and female tailpiece sections shall not have any ridges or grooves running across the serration of the inside walls. The rim of the tailpieces shall be smooth and well rounded without any sharp edges.

3.2.2. Coupling Swivel.

A swivel shall be installed on the female tailpiece. The swivel shall be designed with a tolerance to permit free turning by a light twisting action before and after the tension tests of 3.10.1. The 2-1/2 inch 7-1/2 NH coupling shall have three rocker lugs.

3.2.3. Optional Coupling Expansion Ring and Tailpiece Gasket.

The use of expansion rings and associated tailpiece gaskets are optional.

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. Coupling Tailpiece and Swivel Section Material.

Tailpiece and swivel section material shall conform to the following:

- a. Copper alloy, 377, in accordance with ASTM B 124 or
- b. Copper alloy, 360 or 365, in accordance with ASTM B 16 or
- c. Copper alloy, 836, 838, 844, or 848, in accordance with ASTM B 145.

3.3.2. Expansion Ring Material.

If expansion rings are used, they shall be made of a noncorrosive material, suitable for a water environment.

3.3.3. Tailpiece Gasket Material.

If expansion rings with associated tailpiece gaskets are used, tailpiece gasket material physical properties shall meet the requirements of USDA Forest Service Standard 5100-190.

3.3.4. Swivel Gasket Material.

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

3.3.5. 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.

3.4.1. Weight.

The maximum weight for a complete set of male and female hose couplings without hose shall be as indicated in table 1.

Table 1—Coupling maximum weight

Thread Series Designation	Maximum Weight (oz)
1 inch 11-1/2 NPSH	25
1-1/2 inch 9 NH	28
2-1/2 inch 7-1/2 NH	112

3.4.2. Dimensions.

Coupling dimensions shall be in accordance with USDA Forest Service Standard 5100-190.

3.4.2.1. Expansion Ring and Tailpiece Gasket.

If an expansion ring and tailpiece gasket are used, the expansion ring shall be sized to fit within the inside diameter of hose and coupling tailpiece, and the diameter shall not be less than the waterway specified in USDA Forest Service Standard 5100-190 after expansion. The tailpiece gasket shall conform to the minimum inner diameter for gaskets specified in USDA Forest Service Standard 5100-190, and the tailpiece gasket outer diameter shall accurately fit the recess provided and shall have a minimum thickness of 0.188 inch.

3.4.3. Dimensional Tolerance.

Unless otherwise noted, the following tolerances apply: one place (x.x) \pm 0.1 inch, two places (x.xx) \pm 0.03 inch, and three places (x.xxx) \pm 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 nonconformity, 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. Cast Components.

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

3.5.3. Extruded Components.

Extruded sections shall be free from laps, sharp die marks, cracks, or other defects.

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.

All finished surfaces of alloys, except casting alloys, shall be hardened to not less than 45 and not 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. Coupling Set Tensile Strength Testing.

Samples shall be subjected to the following tests to determine if the samples meet the requirements of this specification. A new sample shall be used for each separate test.

3.10.1.1. Coupling Set With Hose Requirement.

Coupling sets submitted as part of a first article submission for 5100-184 suction hose are exempt from this requirement.

The sample hose with male and female coupling sections shall be connected together (male to female and with the swivel gasket in place) and installed on a tension-testing machine. A tensile load shall be applied up to 2,000 pounds per 1.0 inch of nominal hose diameter. The rate for applying the tensile load shall not exceed 2.0 inches per minute.

There shall be no permanent deformation, mechanical damage, or structural failure. In addition, the swivel section shall turn freely before and after tensile strength testing.

3.10.1.2. Coupling Set without Hose Requirement.

The coupling samples without hose will be connected together (male to female and with the swivel gasket in place). Mandrels shall be installed on each end of the couplings. The couplings and mandrels shall be installed on a tension-testing machine. A tensile load shall be applied up to 1,200 pounds per 1.0 inch of nominal hose diameter. The rate for applying the tensile load shall not exceed 0.25 inch per minute.

There shall be no permanent deformation, mechanical damage, or structural failure. In addition, the swivel section shall turn freely before and after tensile strength testing.

3.11. Metric Products.

Inch-pound units shall be the required units of measure for this specification. Thread series designation are indicated as 1 inch 11-1/2 NPSH, 1-1/2 inch 9 NH and 2-1/2 inch 7-1/2 NH. 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. 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. Inspection records of the examination and tests shall be kept complete and available to the Government.

4.1.1. 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 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'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 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 (section 4.3.2).
- b. Lot Acceptance Inspection (section 4.3.3).

4.3.1. Lot.

All coupling sets of one type and size presented together in one delivery shall be considered a lot for the purpose of inspection. A sample unit shall be one coupling set.

4.3.2. Sampling for First Article Inspection.

The contractor shall make items available to the Government for the selection of first article samples. The first article shall consist of three coupling sets.

4.3.2.1. First Article Samples for 5100-185, 5100-186, or 5100-187 Fire Hose.

If coupling sets are submitted as part of a first article submission for 5100-185, 5100-186, or 5100-187 fire hose, one of the coupling sets shall be installed on fire hose 18.0 inches +/- 0.5 inch long. The other two coupling sets shall be submitted without fire hose.

4.3.2.2. First Article Samples for 5100-184 Suction Hose.

If coupling sets are submitted as part of a first article submission for 5100-184 suction hose, none of the coupling sets shall be installed on suction hose.

4.3.3. Sampling for Lot Acceptance Inspections and Tests.

Sampling for inspection shall be performed on coupling sets ready for delivery. When inspection and testing is performed, sampling shall be in accordance with ANSI/ASQ Z 1.4, at special inspection level S-3 with an AQL of 2.5 percent noncompliant.

4.4. Inspection and Tests.

4.4.1. First Article Inspection.

Unless otherwise specified in 6.2, the first articles submitted in accordance with 3.1 shall be inspected as specified in table 3 and in accordance with table 2. The presence of any nonconformity, whether major or minor, or failure to pass any test shall be cause for nonacceptance of the first article submission. All inspection and testing of the first article sample(s) shall stop upon a single failure. The contractor shall be informed as to the nature of the failure, but the Government is not obligated to continue testing an item once it is known to be noncompliant or when it is considered in the best interest of the Government.

4.4.1.1. First Article Inspection Package.

The contractor shall submit to the Government along first articles selected in accordance with 4.3.2, copies of:

- a. All certificates of conformance (section 4.5).
- b. Company inspection records (section 4.1).
- c. All test results for the first article samples (section 4.6).
- d. All other information necessary to perform the inspections identified in table 2.

Table 2—First article inspection

Nonconformance	Section	Classification Major	Classification Minor
1 Certificates of conformance missing or incomplete.	4.5	X	
2. Coupling set tensile strength less than required.	3.10.1	X	

4.4.2. Lot Inspection.

When selected in accordance with 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	Section	Classification Major	Classification Minor
1. Hose coupling set not complete	3.2	X	
2. Tailpiece sections have ridges or grooves across inside wall serrations, or tailpiece rims not smooth and well rounded, or rims have sharp edges	3.2.1	X	
3. Swivel too loose or too tight	3.2.2	X	
4. Visible indication of material incompatibility or corrosion	3.3	X	
5. Materials not as specified	3.3	X	
6. Weight not as specified	3.4.1		X
7. Workmanship not as specified	3.5	X	
8. Threads, waterways, gaskets, gasket recesses, and rocker lugs not as specified	3.6	X	
9. Marking not as specified	3.7		X
10. Surface finish not as specified	3.8	X	

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 testing of 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 in 3.3.1, 3.3.2, 3.3.3, 3.3.4, and 3.8.

4.6. 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.

5.1. Packaging, Packing, and Marking.

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

6. NOTES.

6.1. Acquisition Requirements.

Acquisition documents shall specify the following:

- a. Title, number, and date of this specification.
- b. If a first article sampling and inspection is not required (sections 3.1, 4.4.1, 6.2).
- c. Size of each type of connection or fitting required
- d. If certificates of conformance are acceptable in lieu of lot-by-lot testing.
- e. Packaging, packing, and marking (section 5.1).

6.2. 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).

6.3. Notice.

When Government drawings, documents, or other data are used for any purpose other than in connection with a related Government procurements operation, the United States Government thereby incurs neither responsibility nor any obligation whatsoever.

6.4. Preparing Activity.

USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198 <mailroom_wo_sdtcd@fs.fed.us>.

SUBMIT