

Specification 5100-344b
August 1997
Superseding
Specification 5100-344a
June 1982

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SPECIFICATION FOR
PUMP, BELT DRIVEN, VEHICLE ENGINE

1. SCOPE.

1.1. Scope. The pump and components described in this specification are designed for use in initial attack in wildland firefighting operations. Capabilities include running attack, involving pumping while in motion. The pump is a positive displacement pump rated at minimum 150 psig (1034 kPag) discharge pressure with a flow of 10 gpm (37.9 Lpm) at a speed between 1000 to 1800 rpm. Pump components include a pump pulley, crankshaft-driven pulley, v-belt, clutch with controls to the truck dashboard, suction and discharge hoses with fittings, and a bypass relief valve. This pump is mounted on the chassis of 1/2 or 3/4 ton (2948 to 4092 kg) Gross Vehicle Weight pickup truck. Thread series designations are 3/4-inch 11-1/2 NH, 1 inch 11-1/2 NPSH and 1-1/2 inch 9 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 issue of these documents are those in effect on the date of the invitation for bids or request for proposals (see 6.2).

USDA Forest Service Standard

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

USDA Forest Service Drawing

F92-01 - Bypass Relief Valve and Outboard Suction

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

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.

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.

Rubber Manufacturers Association (RMA) Specification

Fire Engine Booster and Fire Extinguisher Hose

Address requests for copies to the Rubber Manufacturers Association, 1901 Pennsylvania Avenue NW, Washington, DC 20006.

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 the American National Standards Institute Inc., 11 West 42nd Street, New York, NY 10036.

American Society for Testing and Materials (ASTM)

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.

Society of Automotive Engineers (SAE)

J 1349 - Engine Power Test Code, Spark Ignition and Compression Ignition - Net Power Rating

Address requests for copies to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.

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. Qualified Products List Number. The bidder shall possess a currently valid notice of qualification with associated Qualified Products List (QPL) number obtained in accordance with 4.1. The date of issue on the QPL number shall precede the date on the invitation for bids.

3.2. Construction. The term pump or pump unit, when used hereafter, shall refer to a positive displacement pump with clutch and pulley.

3.2.1. Clutch. The clutch shall be a mechanical or electromagnetic type and shall be capable of being engaged or disengaged at engine idle speed up to 1000 rpm. The clutch shall be capable of running at higher speeds after engagement, and shall provide sufficient power and speed for continuous operation of the pump for up to 8 hours.

3.2.2. External Components. The pump unit shall also include a v-belt, crankshaft-driven pulley, clutch controls including operators controls on truck dashboard, suction and discharge hoses with fittings and a bypass relief valve as indicated in USDA Forest Service drawing F92-01. A mounting bracket is optional. See 6.2. All external components shall be supplied unconnected to the pump such that they may be installed by the Government on a Government vehicle.

3.2.2.1. Pump Connections. The pump inlet and outlet shall be a minimum 0.75 inch (19.05 mm) tapered internal threaded iron pipe thread. Fittings, adapters and hoses with thread designations of 3/4 inch 11-1/2 NH, 1 inch 11-1/2 NPSH and 1-1/2 inch 9 NH, and minimum 16 feet (4.9 m) length, shall be furnished that do not restrict flow or interfere with pump performance. Hoses shall be Type I, Class D, Rubber Manufacturers Association Fire Engine Booster and Fire Extinguisher Hose Specification. Hose clamps shall be adjustable. Fittings at both hose ends shall have internal threaded swivel tapered iron pipe threads.

3.2.2.2. Pressure Relief and Bypass. A pressure relief and bypass valve shall be provided for the pump discharge side. It shall be a separate unit from the pump that can be installed at a remote position near the tank. The valve shall be adjustable to at least 150 psig (1034 kPag).

3.2.3. Accessories. Any special tools necessary for maintenance and repair of the pump unit or external components shall be supplied with the pump unit. A metric tool kit shall be supplied by the manufacturer, if metric fasteners are used.

3.2.4. Operating and Maintenance Manual and Parts List. One set of operating and maintenance manuals and one parts list shall be supplied with the pump unit.

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. All pump materials including fittings and adapters shall be of a material appropriate for an air-water atmosphere.

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

3.4. Dimensions and Weights. The overall size of the pump, including the clutch and pulley, shall be able to fit in a space not to exceed 26 inches (660 mm) in length, 10 inches (254 mm) in width and 11 inches (279 mm) in height. Total weight of pump, clutch, pulleys (drive and driven), suction and discharge hoses, bypass valves and controls shall not exceed 65 pounds (29.5 kg).

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

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

3.5.4. Welding. All welds, to include welds on the pump frame, shall be thoroughly fused together with strength equal to or stronger than the adjacent material. All excess welds and splatters shall be cleaned.

3.5.5. Holes. Punched holes shall be used in lieu of drilled holes only when the punched holes are dimensionally equivalent to drilled holes. In addition, the material shall not become distorted from the punching process.

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. Surface Treatment. Aluminum alloy threaded surfaces shall be hard-coated in accordance with USDA Forest Service Standard 5100-190.

3.8. Marking. A durable decal or corrosion resistant metal nameplate shall be permanently attached to the pump. The decal or nameplate markings shall include the model, the serial number of the unit, the letters "FSS", the manufacturer's name or trademark, and address of the manufacturer. Controls, such as on and off switches, shall be clearly and permanently identified. Markings for the pump inlet and outlet threaded sections shall conform to requirements of USDA Forest Service Standard 5100-190.

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

3.10. Painting. All exposed surfaces of the pump unit shall be painted except for surfaces such as heated exhaust system components, plastic, glass, rubber, chrome and brass. Thoroughly clean the surface of grease and other foreign material with a high quality surface preparation reducer. Bare metal parts shall be coated with at least two coats of a high quality primer. Exposed galvanized surfaces shall be thoroughly washed with a surface etching solution then primed with a suitable galvanizing primer. Finish coating shall consist of two coats of top quality commercial gloss enamel. Painting shall be accomplished by spraying wherever practical. There shall be no runs, inadequate coverage, peeling, flaking, bubbling or other defects causing inferior coatings.

3.11. Performance.

3.11.1. Priming and Drafting. When tested in accordance with 4.7.3, the pump priming system shall be capable of pulling 17 inches Hg (58 kPa) vacuum and pump water within 30 seconds with a 10 foot (3.0 m) lift. The pump shall be able to continue drafting with a minimum of 17 inches Hg (58 kPa) vacuum after establishing initial prime. In addition, the pump priming system shall be capable of priming and pumping water at a 17 foot (5.1 m) lift.

3.11.2. Pump Performance Rating. When tested in accordance with 4.7.4, the pump shall be capable of producing a minimum of 10 gpm (37.85 Lpm) at 150 psig (1034 kPag) hydraulic pressure rotating at 1000 to 1800 rpm. During the test, there shall be no signs of leaks, failures, or reduction in performance. At the end of the 100 hours, the pump shall be inspected. There shall be no leaks from the threaded connection, permanent deformation, mechanical damage or structural failure. In addition, the shaft, cylinders, pistons, rollers, impellers and other pump components shall not show any signs of pitting or corrosion.

3.12. Metric Products. Metric dimensions are provided for information only, inch-pound units shall be the required units of measure for this specification. Thread series designations are indicated as 3/4-inch 11-1/2 NH, 1 inch 11-1/2 NPSH and 1-1/2 inch 9 NH. Since these are thread series designations, 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-pounds units, provided they fall within the tolerances specified using conversion tables contained in the latest revision of ASTM E380, and all other requirements of this standard are met.

4. INSPECTION SAMPLING AND TEST PROCEDURES.

4.1. Qualification Testing.

4.1.1. Manufacturer Submission for Qualification Tests. The prospective contractor shall provide, without cost to the Government:

- a. Five complete sets or one reproducible set of detailed dimensional drawings and specifications.
- b. One sample pump unit with performance data and operating and maintenance instructions.
- c. Certificates of conformance. See 4.6.
- d. The estimated test fee. Contact the Water Handling Project Leader at the USDA Forest Service, San Dimas Technology and Development Center (SDTDC), 444 East Bonita Avenue, San Dimas, CA 91773.
- e. A signed collection agreement. Contact the SDTDC Water Handling Project Leader for a copy of the form.

All of the above items shall be delivered to SDTDC to the attention of the Water Handling Project Leader.

The Government shall not be responsible for the submitted test samples.

4.1.2. Qualification Test. Qualification inspection and tests shall be conducted by the Government and at the expense of the contractor at a fee to be determined by the Government. If requested by the contractor, the Government will inform the contractor of date and place of inspection and tests. The contractor may send a representative (who has been designated in writing) to be present and observe the inspection and tests, but they will not be permitted to be a participant. Upon completion of tests, the sample will be retained by the Government. The Government shall not be obligated to continue testing a defective item once it is known to be defective or when it is considered to be in the best interest of the Government.

4.1.2.1. Test Failure. Qualification testing shall stop on a single failure and the test sample rejected. If a component part fails during the test, it may be replaced by the manufacturer, but the sample must be run until the replacement part has completed 100 hours of operation. Replaced components failing twice will constitute disqualification of the pump. The contractor will be informed as to the nature of the failure.

4.1.3. Notice of Qualification. Notice of Qualification shall be issued to the contractor upon the successful completion of qualification tests. Copies of qualification notices shall be provided to the General Services Administration. A copy shall be retained in the SDTDC file.

4.1.4. Notice of Failure to Qualify. The contractor shall be notified by letter of a failure to qualify, if the submitted pump unit does not meet the requirements of this specification.

4.1.5. Re-qualification. After qualification, if any changes are made in the product or where it is manufactured, the contractor shall notify SDTDC immediately in writing. The need for requalification shall be determined by the Government when there are changes to the product or this specification.

4.2. 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.

4.2.1. Inspection and Test Sites. 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.

4.2.2. 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. All inspection or testing of a sample shall stop upon a single failure and the sample rejected. The contractor will be informed as to the nature of the failure.

4.3. 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.

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

4.4.1. Lot. All pump units of the same type, presented together in one delivery shall be considered a lot for the purpose of inspection. A sample unit shall be one pump unit with external components.

4.4.2. Sampling for Visual and Dimensional Examination. Sampling for visual and dimensional examination shall be S-3, with an Acceptable Quality Level (AQL) of 1.0 percent defective.

4.4.3. Sampling for Lot Acceptance Tests. Sampling for lot acceptance testing shall be S-3 with an AQL of 1.0 percent defective.

4.5. Inspection and Tests.

4.5.1. Visual and Dimensional Examination. When selected in accordance with 4.4.2, each sample pump unit 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 1 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 1. Major and Minor Defects

Defect	Classification	
	Major	Minor
1. Pump and components not as required.	X	
2. Clutch not as required.	X	
3. Pressure relief and bypass valve not as required.	X	
4. Weight and dimensions not as required.	X	
5. Accessories not as required.	X	
6. Thread dimensions not within specified dimensions and failure to pass gage tests.	X	
7. Operating, maintenance manuals or parts list missing.		X
8. Painting not as required.		X
9. Illegible or improper markings.		X

4.5.2. Lot Acceptance Tests. Each of the samples selected in accordance with 4.4.3, shall be tested in accordance with 4.7, to determine conformance with requirements of this specification.

4.5.3. 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 4.4.3.

4.6. 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 3.3 and 3.7 (see 4.6.2 and 4.6.3).

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

4.6.2. Pump Material. In accordance with 3.3, the pump shall meet the indicated material physical property requirements.

4.6.3. Surface Treatment. In accordance with 3.7, aluminum alloy threaded surfaces shall meet the indicated requirements, when tested to the defined test methods.

4.7. Performance Testing. Samples shall be subjected to the following tests to determine if the samples meet the requirements of the specification. If the pump unit has not been previously broken-in by the contractor, it shall be subjected to a break-in period of at least 4 hours of varying speeds and loads.

4.7.1. 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 pump performance 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. Testing performed by the Government will be conducted using municipally supplied potable water.

4.7.2. Test Equipment. The pump unit shall be rigidly mounted on a test stand, consisting of an engine of sufficient horsepower and speed to run the pump. The engine shall have a variable speed differential, tachometer, flow meter, pressure gage and a vacuum gage. The flow rate, pressure and vacuum shall be measured and recorded.

4.7.3. Priming and Drafting Test. As required by 3.11.1, the pump priming system shall be tested to determine if a minimum 17 inches Hg (58 kPa) vacuum can be established and pump water within 30 seconds with a 10 foot (3.0 m) lift, when connected to a 16 foot (4.9 m) length of suction hose. The nominal diameter of the suction hose shall be the same as the pump inlet connection. A vacuum gage shall be connected to the suction inlet of the pump. The pump shall be operated at free discharge flow within the pump manufacturer's recommended operating speed for drafting. Draft depth will be adjusted to assure 17 inches Hg (58 kPa) vacuum before priming. The pump priming system shall be capable of priming and pumping water at a 17 foot (5.1 m) lift.

4.7.4. Performance Rating Test. As required by 3.11.2, the pump unit shall be run at various speeds to determine the performance rating. The pump shall be run at the speed (between 1000 to 1800 rpm) that produces 10 gpm (37.85 Lpm) at 150 psig (1034 kPag) with a discharge opening as recommended by the manufacturer for the 100 hours qualification test only. Performance data shall be corrected to standard sea level conditions at 29.92 inches Hg (51 kPa) vacuum and 60 °F (15.5 °C) in accordance with SAE J 1349. At the end of the 100 hours, the pump shall be inspected. There shall be no leaks from the threaded connection, permanent deformation, mechanical damage or structural failure. The shaft, cylinders, pistons, rollers, impellers, etc., within the pump shall not show any signs of pitting or corrosion. In addition, the pump shall be capable of a flow rate of 10 gpm (37.85 Lpm) at 150 psig (1034 kPag), within the required speed range.

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 pump and components described in this specification are designed for use in initial attack in wildland firefighting operations. Capabilities include running attack, involving pumping while in motion. The pump is a positive displacement pump rated at minimum 150 psig (1034 kPag) discharge pressure with a flow of 10 gpm (37.9 Lpm) at a speed between 1000 to 1800 rpm. Pump components include a pump pulley, crankshaft-driven pulley, v-belt, clutch with controls to the truck dashboard, suction and discharge hoses with fittings, and a bypass relief valve. This pump is mounted on the chassis of 1/2 or 3/4 ton (2948 to 4092 kg) Gross Vehicle Weight pickup truck.

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

- a. Title, number and date of this specification.
- b. Type of clutch, mechanical or electromagnetic, required (see 3.2.1)
- c. If a mounting bracket is required, the specific vehicle information is required. This information includes the make, model, number, year of the vehicle, number of cylinders, crankshaft and fan shaft diameters, power steering and air conditioning availability and gross vehicle weight rating.
- d. If certificates of conformance are acceptable in lieu of lot by lot testing (see 4.6).
- e. Packaging, packing and marking (see 5.1).
- f. Date of the invitation for bids or request for proposals (see 2.1).

6.3. Qualification. The contracting officer should verify that the bidder possesses a currently valid notice of qualification with associated Qualified Products List (QPL) number obtained in accordance with 4.1. This QPL shall have already been obtained with a date of issue prior to the date of invitation for bids.

6.4. Notice. When Government drawings, documents, 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 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 5100-344b, Pump, Belt Driven, Vehicle Engine**

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):

Remarks:

Submitted by: (Print or type name and address—Optional)

Telephone number: (Optional)

Date:

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USDA Forest Service
San Dimas Technology & Development Center
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