MILITARY SPECIFICATION

ROLLERS, BEARING, NEEDLE, FERROUS, SOLID

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.

1. SCOPE

1.1 Scope. This specification covers the procurement requirements for solid ferrous needle bearing rollers.

1.2 Classification. The rollers shall be of the following types, as specified in the contract or order (see 6.2) :

Type I – Spherical end.
Type II – Flat end.
Type III – Ball end.
Type IV – Crankpin end,
Type V – Conical end.
Type VI – Trunnion end.
(See figure I).

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS

FEDERAL

QQ-S-781 – Strapping, Flat; steel.

PPP-B-585 – Boxes, Wood, Wire-bound.

PPP-B-591 –Boxes, Fiberboard, Wood-Cleated.

PPP-B-601 – Boxes, Wood, Cleated-Plywood.

PPP-B-621 – Boxes, Wood, Nailed and Lock-Corner.

PPP-B-636 - Boxes, Fiber.

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MIL-P-116 – Preservation, Methods of.

MIL-L-10547 –Liners, Case, Waterproof.

STANDARDS

FEDERAL

Fed. Std. No. 66 — Steel: Chemical Composition and Hardenability.

Fed. Test Method Std. No. 151–Metals; Test Methods.

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MIL-STD-8 –Dimensioning and Tolerancing.

MIL-STD-10 – Surface Roughness, Waviness, and Lay.

MIL-STD-105 – Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129 – Marking for Shipment and Storage.

MIL-STD-430 – Macrograph Standards for Steel Bars Billets, and Blooms.

FSC 3110

(Copies of specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

CONSOLIDATED CLASSIFICATION COMMITTEE

Consolidated Freight Classification Rules.

(Application for copies should be addressed to the Consolidated Classification Committee, 202 Chicago Union Station, Chicago 6, Illinois.)

AMERICAN SOCIETY FOR TESTING MATERIALS

Carbon-Chromium Ball – and Roller-Bearing Steels, ASTM Designation A295-46T.

(Application for "copies should be addressed to the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Penn.)

3. REQUIREMENTS

3.1 Material. Unless otherwise specified in the contract or order (see 6.2), the rollers shall be manufactured from chrome alloy steel conforming to-the chemical composition of steel number E50100, E51100, or E52100 of Federal Standard No. 66. The steel shall be homogeneous in structure, free from pipes, seams, laminations, bursts, flakes, excessive segregation, and other detrimental defects. The steel shall have an austenite grain size of 7 or finer. The rollers shall be free from surface decarburization.

3.1.1 Inclusion rating. The chrome alloy steel shall not exceed the inclusion rating specified for billets for wire and rods used in the manufacture of balk and rollers, as specified in American Society for Testing Materials (A.S.T.M.) Standard A295-46T.

3.2 Hardness. The rollers shall have a uniform hardness of 60 to 64 Rockwell C or equivalent.

3.3 Construction and dimensions. The rollers shall be of the type, diameter and length specified in the contract or order (see 6.2) and shall be of solid construction. An illustration of the types of rollers covered herein is shown in Figure 1. Unless otherwise specified in the contract or order (see 6.2), dimensions and tolerances governing the formation of the ends of the roller shall be in accordance with commercial practice. Dimensions and tolerances shall be interpreted in accordance with Standard MIL-STD-8.

3.3.1 Diameter. The diameter of the roller shall be within plus .0000 inch to minus .0002 inch of the value specified in the contract or order (see 6.2).

3.3.2 Length.

3.3.2.1 Types I, III, V and VI. The length of the roller shall be within plus .000 inch to minus .020 inch of the value specified in the contract or order (see 6.2).

3.3.2.2. Type II. The length of the roller shall be within plus .000 inch to minus .006 inch of the value specified in the contract or order (see 6.2).

3.3.2.3 Type IV. The length of the roller shall be within plus .000 inch to minus .010 inch of the value specified in the contract or order (see 6.2).

3.4 Surface finish.

3.4.1 Visual appearance. The cylindrical surface of the roller shall be free from scratches, pits, rust, indications of soft spots, and other surface imperfections.

3.4.2 Surface roughness. The surface roughness of the roller diameter shall not exceed 8 microinches Roughness Height Average (R.H.A.). Surface roughness shall be interpreted in accordance with Standard MIL-STD-10.

Type I - Spherical ends

Type II - Flat ends

Type III - Ball ends

Type IV - Crankpin ends

Type V - Conical ends

Type VI - Trunnion ends

Figure 1 - Types of Rollers.

4. QUALITY ASSURANCE PROVISIONS

4.1 Unless otherwise specified herein the supplier is responsible for the performance of all inspection requirements prior to submission for Government inspection and acceptance. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. Inspection records of the examinations and tests shall be kept complete and available to the Government as specified in the contract or order (see 6.2).

4.2 Lot. A lot shall consist of all of the rollers of the same type, diameter, length, and material, manufactured under essentially the same conditions, and submitted for acceptance at the same time,

4.3 Sampling.

4.3.1 For examination. A sample of rollers shall be selected from each lot by the inspector in accordance with the procedures of Standard MIL-STD-105, Appendix, inspection level L5, acceptable quality level (A.Q.L.) LO percent defective.

4.3.2 For tests. A sample of rollers shall be selected from each lot by the inspector in accordance with the procedures of Standard MIL-STD-105, Appendix, inspection level L4 for lots of less than 501 rollers and inspection level L3 for lots of 501 rollers or more.

4.4 Lot acceptance inspection.

4.4.1 Examination.

4.4.1.1 Dimensional and visual. The Sample rollers, selected in accordance with 4.3.1, shall be dimensionally and visually examined to determine compliance with 3.3 and 3.4.1 respectively. Any unit of the sample containing one or more defects shall be rejected. Lot acceptance shall be in accordance with 4.3.1.

4.4.1.2 Surface roughness. The sample rollers, selected in accordance with 4.3.1, shall be examined to determine compliance with 3.4.2. Any unit of the sample which does not comply with the requirements specified in 3.4.2 shall be rejected. Lot acceptance shall be in accordance with 4.3.1.

4.4.2 Tests.

4.4.2.1 Hot acid etch test. The sample rollers, selected in accordance with 4.3.2, shall be etched for a minimum period of 15 minutes in a solution of 50 percent hydrochloric acid and 50 percent water. The temperature of the solution shall be 160°F to 180°F. After etching, the sample rollers shall be examined. at a magnification of 4 diameters. If any unit of the sample contains one or more defects, such as cracks, seams, laps, pits or other detrimental defects (see 3.1 and 3,4.1), the lot shall be rejected.

4.4.2.2 Decarburization test. The sample rollers, selected in accordance with 4.3.2, shall be totally immersed in 5 percent Nital solution (concentrated nitric acid in alcohol) for a minimum period of 30 seconds. The temperature of the solution shall be 75°F to 85°F. If any unit of the sample exhibits areas of white to Light grey, the lot shall be rejected.

4.4.2.3 Hardness test. The sample rollers, selected in accordance with 4.3.2, shall be tested for compliance with 3.2. The test procedures shall be in accordance with Federal Test Method Standard No. 151. The rollers shall be subjected to the test on flats of sufficient width and material of sufficient thickness to give a true reading. For rollers less than 1/16 inch in diameter, an appropriate superficial hardness method shall be used. If any unit of the sample does not comply with the requirements of 3.2, the lot shall be rejected.

4.4.3 Inspection of muter-id. The material used in the manufacture of the rollers furnished under this specification shall have been inspected in accordance with and passed the following examination and tests.

4.4.3.1 Chemical analysis. A chemical analysis shall be made on each heat of steel. 'The samples for analysis shall be selected from the billets, bars, or wire used in the manufacture of the rollers. The chemical analysis shall be conducted in accordance with method No. 111 of Federal Test Method Standard No. 151. The chemical composition determined by the above procedures shall be within the check analysis tolerances specified in Federal Standard No. 66 for the applicable steel number (see 3.1).

4.4.3.2 Macro-examination. A macro-examination shall be made on each heat of steel. The samples for examination shall be selected from the billets for the wire or rods used in the manufacture of the rollers. The samples shall be selected in accordance with method 321 of Federal Test Method Standard No. 151. The macro-examination shall be conducted in accordance with Standard MIL STD-430. The quality and cleanliness of the steel as indicated by the results of the macro-examination, shall be equal to or better than macrographs A3–B2-C2 of Standard MIL-STD-430 with defects D1 thru D8 unacceptable.

4.4.3.3 Austenitic grain size test. An austenitic grain size test shall be made on each heat of steel. The samples for test shall be selected from the billets for the wire or rods used in accordance with procedures D or E of method 311 of Federal Test Method Standard No. 151. The austenitic grain size determined by the above procedures shall be within the range specified in 3.1.

4.4.3.4 Inclusion rating test. An inclusion rating test shall be made on each heat of steel. The samples for test shall be selected from the billets for the wire or rods used in the manufacture of the rollers. The test shall be conducted in accordance with the inclusion rating test specified in A.S.T.M. Standard A295-46T. The inclusion rating determined by the above procedures shall conform to the requirements specified in 3.1.1.

4.4.4 Preservation, packaging, packing, and marking. The inspector shall ascertain that the preservation, packaging, packing, and marking of rollers furnished under this specification are in accordance with the requirements of Section 5. Examination of packing and marking requirements not covered by referenced specifications shall be in accordance with Standard MIL-STD-105, A.Q.L. 4.0 percent defective.

4.4.4.1 Classification of defects. For packing and marking requirements not covered by referenced specifications, the following classification of defects shall apply:

a. Closure and sealing of caseliner incorrect.

b. Closure of shipping container incorrect.

c. Strapping not specified type and class or incorrectly applied when required.

d. Gross weight of shipping container exceeds limit specified.

e. Marking missing, illegible or incorrect.

4.5 Disposition of rejected rollers. The disposition of rejected rollers shall be in accordance with the provisions of Standard MIL-STD-105.

5. PREPARATION FOR DELIVERY

5.1 The rollers shall be prepared for shipment in accordance with Levels A, B, or C as specified in the contractor order (see 6.2).

5.2 Preservation and packaging.

5.2.1 Level A.

5.2.1.1 Cleaning and de-magnetization. The rollers shall be cleaned and de-magnetized. The cleaning process shall be in accordance with process C-5 of Specification MIL-P-116.

5.2.1.2 Drying. The rollers shall be dried in accordance with process D-1, D-2, or D-3 of Specification MIL-P-116.

5.2.1.3 Preservative. Unless otherwise specified in the contract or order (see 6.2), the rollers shall be coated with a preservative conforming to type P-6 or immersed in a preservative conforming to type P-17, of Specification MIL-P-116 (see 5.2,1.4).

5.2.1.4 Unit packaging. The rollers shall be unit packaged in accordance with method 1A-8 or 1A-6 of Specification MIL-P-116, as specified in the contractor order (see 6.2). Unless otherwise specified (see 5.2.1.3), type P-6 preservative shall be used for method 1A–8 packaging and type P-17 preservative shall be used for method 1A-6 packaging. The unit package shall contain rollers of the same material, type, diameter and length. The number of rollers per unit package shall be as specified in the contract or order (see 6.2).

5.2.1.5 Intermediate packaging. Rollers unit packaged in accordance with method 1A-8 (see 5.2.1,4) shall repackaged in fiberboard boxes conforming to type I or H, class 1 of Specification PPP-B-636. Suitable cushioning shall be provided to prevent movement within the boxes. The boxes shall be closed and sealed in accordance with the appendix thereto. The intermediate package shall contain rollers of the same material, type, diameter and length. The gross weight of the intermediate package shall riot exceed 10 pounds.

5.2.2 Level B. Not applicable,

5.2.3 Level C. Cleaning, drying, preservation, and packaging shall be in accordance with the manufacturer's commercial practice, provided that such practicers adequate to insure receipt of the undamaged item at the destination.

5.3 Packing.

5.3.1 Level A. Rollers packaged as specified in 5.2 shall be packed in wirebound wood boxes conforming to class 3 of Specification PPP-B-585, wood-cleated fiberboard boxes conforming to overseas type of Specification PPP-B-591, cleated-plywood boxes conforming to overseas type of Specification PPP-B-601, or nailed and lock-corner wood boxes conforming to class 2, style 2 or 4 of Specification PPP-B–621. The gross weight of the boxes shall not exceed 200 pounds. Suitable blocking, bracing, and cushioning shall be provided to prevent movement within the boxes. The boxes shall be closed and sealed in accordance with the applicable box specification and appendix thereto. Flat steel strapping shall be type 1, class B of Specification QQ-S-78l . Unless otherwise specified in the contract or order (see 6.2), the boxes shall be fitted with a waterproof case liner conforming to type 1, grade A or B, class 2 of Specification MIL-L-10547, with seams and closures sealed in accordance with the appendix thereto. The boxes shall contain rollers of the same type, diameter, and length,

5.3.2 Level B. Rollers packaged as specified in 5.2 shall be packed in wirebound wood boxes conforming to class 1 of Specification PPP–B-585, wood-cleated fiberboard boxes conforming to domestic type of Specification PPP-B-591, cleated-plywood boxes conforming to domestic type of Specification PPP–B-601, or nailed and lock-corner wood boxes conforming to class 1, style 2 or 4 of Specification PPP-B-621. Except as specified above, level B packing shall conform to the requirements of 5.3.1.

5.3.3 Level C. Rollers packaged as specified in 5.2 shall be packed to afford protection against damage during direct shipment from the supply source to the first receiving activity for immediate use. Containers shall comply with Consolidated Freight Classification Rules or other common carrier regulations applicable to the mode of transportation.

5.4 Markings. In addition to any special markings required by the contract or order (see 6.2), interior packages, and shipping

containers shall be marked in accordance with Standard MIL-STD-129. The markings shall include the type, diameter, and length of rollers. The markings on the unit package shall include the type of preservative used for preservation (see 5.2.1.3).

6. NOTES

6.1 Intended use. The rollers covered in this specification are intended for use in bearings and bearing applications. This specification covers the procurement requirements for Standard MS 19065.

&2 Ordering data. Procurement documents should specify the following:

a. Title, number and date of this specification.

b. Type of rollers required (see 1.2),

c. Material required, if different than 3.1.

d. Diameter and length of rollers required (see 3.3).

e. Quantity required.

f. Dimensions and tolerances governing formulation of roller ends, if different than 3.3.

g. Inspection records required (see 4.1).

h. Required levels of packaging and packing (see 5.1).

i. Preservative required, if different than 5.2.1,3 and 5.2.1.4.

j. Method of unit packaging required (see 5.2.1.4).

k. Number of rollers per unit package (see 5.2.1.4).

1. When case liner is not required (see 5.3.1).

m. Special marking, if required (see 5.4).

Custodians:
Army-Ordnance Corps
Navy-Bureau of Naval Weapons
Air Force

Preparing activity:
Navy-Bureau of Naval Weapons