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SUPERSEDING
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MILITARY SPECIFICATION

LINE, SHOT, NYLON, FOR LINE-THROWING GUNS

This specification is approved for use by all the departments and agencies of the Department of Defense.

1. SCOPE

*1.1 This specification covers the nylon shot line for line-throwing guns.

2. APPLICABLE DOCUMENTS

*2.1 The following documents of the issues in effect on the date of invitation for bids or request for proposals form a part of this specification to the extent specified herein.

SPECIFICATIONS

Federal

*PPP-B-636	Boxes, Shipping, Fiberboard

Military

*MIL-B-22191	Barrier Materials, Transparent, Flexible, Heat Sealable
*MIL-P-0026514	Polyurethane Foam, Rigid or Flexible, For Packaging

FSC 4020

STANDARDS

Federal

*FED-STD-191	Textile Test Methods
*FED-STD-595	Colors

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
*MIL-STD-726	Packaging Requirements Code

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

3. REQUIREMENTS

3.1 **Materials.** The material used in the shot line shall be a first quality polyamide product (nylon).

3.2 **Construction.** The finished line shall consist of a sleeve braided around a core.

3.2.1 **Core.** The core shall be even and regular in twist and shall consist of a minimum of one end. This end shall be manufactured between the limits of 3-by 3-ply, 210-denier yarn and 5-by 3-ply, 210-denier yarn. The end shall be twisted with a minimum of 13 turns "S" in the first operation and then reverse twisted with a minimum of 7 turns "Z" in the final 3 ply. The core shall be water shrunk for 60 minutes at 200° ± 2° F. It may be slightly colored for the purpose of manufacturing identification. However, the coloring substance shall not cause any harmful effects on the service, use, or storage of the nylon line.

3.2.2 **Sleeve.** The sleeve shall be made on a 16-carrier braiding machine. The single end of the 3-ply, 210-denier yarn shall be twisted with a minimum of eight turns "S" in the first operation and then reverse twisted with a minimum of five turns "Z". After the twisting, the ply yarn shall be shrunk for 30 minutes at 160° ± 2° F. The sleeve shall have 18 picks ± 1 pick per inch.

3.2.3 **Stretching.** The yarns used in the manufacture of the line shall not be subjected to a stretching operation.

3.3 **Finish.**

*3.3.1 **Dyed cord.** The cord shall be dyed international orange using acid dyestuffs. The shade shall match color number 12197 orange of FED-STD-595. The color shall have good fastness to light and shall show no fading after 40 hours exposure to a fadeometer. The color shall show no bleeding onto white nylon after 30 minutes in water at 100° F.

3.3.2 **Water-repelling treatment.** The cord shall be treated for water repellency to reduce the rate of moisture absorption. The material used shall be Migasol P. J., a product of CIBA-GEIGY Co., Inc., New York, N.Y., or equal. The treatment shall not reduce the pliability of the cord, nor immediately nor ultimately affect the minimum physical requirements specified herein. The treatment shall be of sufficient amount to cause the cord to float on distilled or sea water for 24 hours.

3.4 **Physical requirements.** The nylon line shall meet the following physical requirements:

Continuous length of each shot line, feet	555 ± 15
Weight, yardage per pound	190 min. - 250 max.
Picks per inch	17 min. - 19 max.
Strength, static load, pounds	125 min.
Elongation, between limits of, percent	20 to 35
Shrinkage, percent	3 max.

3.5 **Spindle.** Each finished line shall be wound on a smooth, polished, semihard wood, tapered spindle of the following size:

Diameter of large end	1 inch
Diameter of small end	3/4 inch
Total length	5-1/2 inches

*A hole may be drilled through the spindle. The ends shall be cut to fit the Mk 1 Mod 1 Line Rewinding Machine used by the Navy.

*3.6 **Winding.** The winding of the line on the spindle shall be the same as that wound by the Mk 1 Mod 1 Line Rewinding Machine, which is approximately two turns of line in a length of 4-1/2 inches. The winding shall be wound in such a manner that the spindle may be removed easily. The coil shall retain its shape with the spindle removed. The line shall pay out freely from the inside of the coil when fired from the line-throwing gun.

*3.7 **Workmanship.** The workmanship shall be in accordance with high grade commercial practice covering this class of work. The finished product shall be smooth, uniform, free from knots or kinks, and there shall be no broken or loose ends projecting from the surface of the line. There shall be no other manufacturing imperfections which will affect the serviceability of the line.

4. QUALITY ASSURANCE PROVISIONS

*4.1 **Responsibility for inspection.** Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his 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 set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 **Sampling.** Unless otherwise specified and when applicable, the sampling plans and procedures used in the determination of the acceptability of products submitted by a supplier shall be in accordance with the provisions of MIL-STD-105.

4.3 **Selection of test samples.** For the purpose of selecting samples and performing tests hereunder, the term "lot" shall be used to designate consecutive quantities of 100 finished shot lines. Sample selection of 5-foot unit lengths shall be made from each lot as required for the tests of 4.4.1 through 4.4.7. Each shot line shall be of sufficient length to permit removal of at least a 5-foot test sample without reducing the remaining total continuous length in the shot line below 550 ± 15 feet. Also, in addition to the above samples, one completed shot line coil shall be taken from each lot.

4.4 **Test methods.**

4.4.1 **Strength.** A minimum load of 125 pounds shall be applied to samples selected in accordance with MIL-STD-105, code letter C, acceptable quality level (AQL) 4.0 percent. This load shall be applied at a slow rate to the line having a free length of approximately 24 inches. The full static load of 125 pounds shall be suspended by the line under the test for a period of not less than 10 minutes without breaking.

4.4.2 **Elongation.** A 5-inch gauge length shall be marked off between the support and the applied load on the line to be tested with the line under an initial load of one-half pound. This test sample shall not have been subjected to a load greater than one-half pound before applying gauge marks as above. These marks may be followed with a measuring instrument as tension is increased to the maximum load of 125 pounds and suspended for a period of 10 minutes as specified in 4.4.1. This test shall be performed in conjunction with the test specified in 4.4.1. Calculate the percentage increase in distance between these marks as follows:

$$\text{Percentage increase} = \frac{(b-a)}{a} 100$$

where

a = initial length between marks, inches
b = final length between marks, inches.

The elongation shall be within the limits specified in 3.4 with acceptance criteria as described in 4.4.1.

4.4.3 **Shrinkage.** Samples selected in accordance with MIL-STD-105, code letter C, AQL 4.0 percent, shall be tested for shrinkage as follows: Apply a static load of 10 pounds to the line at a slow rate. Mark off a 40-inch gauge length on the line between the support and the static load. Then remove the load from the line and immerse the sample line in a fresh water bath for a period of 15 minutes, with the water temperature maintained at 200 ± 2° F. Remove the line from the water bath and again apply a static load of 10 pounds. Measure the distance between gauge marks again. Calculate the percentage in distance between these marks as follows:

$$\text{Percentage decrease} = \frac{(c-d)}{c} 100$$

where

c = initial length between marks, inches
d = final length between marks, inches.

The shrinkage shall be within the limits specified in 3.4.

4.4.4 **Picks per inch.** The picks per inch of line in the sleeve shall be counted with the line under a tension of one-half pound. The picks per inch shall be within the limits specified in 3.4. Samples selected in accordance with MIL-STD-105, code letter C, AQL 4.0 percent, shall be used to determine lot acceptance for this test.

4.4.5 **Yardage per pound.** The yardage per pound of line shall be determined with the line under tension not to exceed 2 pounds, then this length of line weighed. Calculate the yardage per pound from such data. Samples selected in accordance with MIL-STD-105, code letter C, AQL 4.0 percent, shall be used for determining the lot acceptance for this test. The yardage per pound of line shall be within the limits specified in 3.4.

4.4.6 **Function test.** Coils shall be selected and tested in accordance with MIL-STD-105, code letter E, AQL 1.5 percent, in order to determine that it will retain its shape and the line will pay out properly from the coil. The coil shall retain its shape after removal from the wood spindle. Under normal atmospheric conditions, hold the coil approximately 3 feet above a surface with the large diameter of the spindle hole pointing downward; then give the line an initial start by pulling downward on the free end of the line from the center of the coil. After about 30 feet has paid out, the remaining line shall pay out freely from the coil by the force of gravity. Continue to hold the coil in this position until the line has completely paid out.

4.4.7 **Length of shot line.** The line tested under 4.4.6 shall be measured with the line under no tension to determine the total continuous length of line per shot line coil. The total length shall be within the limits specified in 4.3 with the sample judged at an AQL of 1.5 percent. After measurement for determining the total length, this line may be rewound into a production shot line and returned to the lot from which it was taken.

*4.5 **Additional tests.** If it is found that it is necessary to make additional tests or select additional samples not previously specified that should be made in the process of manufacture, the procedure therefore will be determined by the procuring activity. Unless otherwise specified, FED-STD-191 may be referred to as a guide for the general physical and chemical methods for testing textiles.

4.6 **Rejection.** Failure of a test sample in any test specified herein shall be cause for rejection of the lot from which the test sample was taken. Rejected lines and used samples shall be returned to the initial nylon manufacturer for reprocessing of the nylon thread.

4.7 **Retesting of rejected lots.** Rejected lots may be offered again for acceptance provided the contractor has repaired or removed all nonconforming nylon line. Samples from such resubmitted lots shall be selected and examined to determine compliance with this specification.

5. PREPARATION FOR DELIVERY

*5.1 **Packaging.** Each spool of line shall be packaged in accordance with MIL-STD-726, method IC, modified as follows: The line shall be packaged in a transparent barrier bag made of material conforming to MIL-B-22191, type II. A single thickness may be used for items weighing up to 10 pounds, and at least two thicknesses shall be used for items weighing more than 10 pounds. Each package shall have a polyurethane foam ring placed on the protruding end of the wooden spindle to prevent puncturing of the transparent barrier bag. This cushioning ring shall be 3 inches in diameter with a 1-inch-diameter hole in the center and shall be 1 inch thick. The ring shall be made of polyurethane foam conforming to MIL-P-0026514, type I, class 2, grade A.

*5.2 **Packing.**

5.2.1 **For domestic shipment.** The line, packaged in transparent barrier bags as described in 5.1, shall be packed in a corrugated fiberboard box conforming to PPP-B-636, domestic class, as specified in the contract or purchase order.

*5.2.2 **For overseas shipment.** The line, packaged in transparent barrier bags as described in 5.1, shall be packed in a corrugated fiberboard box conforming to PPP-B-636, weather-resistant class, as specified in the contract or purchase order.

5.3 **Marking.** In addition to any special marking required by the contract or purchase order, packages, intermediate packages, and shipping containers shall be marked in accordance with MIL-STD-129.

*6. **NOTES**

*6.1 **Ordering data.** Procurement documents should specify the following:

a. Number, title, and date of this specification
b. Quantity
c. Sampling if other than 4.2
d. Packing (see 5.2)
e. Special marking, if required (see 5.3)

*6.2 The margins of this specification are marked with asterisks to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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