

RR-F-221/1A
June 11, 1976
SUPERSEDING
Fed. Spec. RR-F-221/1
August 29, 1973

FEDERAL SPECIFICATION
FENCING WIRE (BARBED WIRE)
(DETAIL SPECIFICATION)

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers specific requirements for barbed wire.

1.2 Classification. Barbed wire shall be of the following types, as specified (see 6.1):

Type I	-	Zinc-coated.
II	-	Aluminum coated.
III	-	Aluminum clad
IV	-	Copper clad.
V	-	Plastic-coated.

2. APPLICABLE DOCUMENTS

1 The following documents, of the issues in effect on date of invitation for b. or request for proposal, form a part of this specification to the extent specified herein.

Federal Specifications:

FF-N-105	-	Nails, Brads, Staples and Spikes: Wire, Cut and Wrought.
QQ-S-781	-	Strapping, Steel, Flat and Seals.
RR-F-221/GEN	-	Fencing, Wire, Fence Posts and Accessories. (Barbed Wire, Woven Wire, and Netting). (General Specification).

Federal Standards:

Fed. Std. No. 123	-	Marking for Shipment (Civil Agencies).
Fed. Test Method Std. No. 151	-	Metals Test Methods.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

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Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
 MIL-STD-129 - Marking for Shipment and Storage.
 MIL-STD-163 - Steel Mill Products Preparation for Shipment and Storage.
 MIL-STD-731 - Quality of Wood Members for Containers and Pallets.

(Copies of Military Specifications and Standards required by suppliers 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 to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

A 90 - Methods of Test for Weight of Zinc-Coated (Galvanized) Iron and Steel Articles.
 A 428 - Method of Test for Weight of Coating on Aluminum-Coated Iron or Steel Articles.
 B 487 - Measuring Metal and Oxide Coating Thickness by Microscopical Examination of a Cross Section.
 B 499 - Measurement of Coating Thickness by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Tariff Order Section, 1616 P Street, N.W., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

3. REQUIREMENTS

3.1 Type I, zinc-coated.

3.1.1 Strand wire. Size of strand and barb wires and weight of zinc coating shall be in accordance with table I, and as specified (see 4.4.2 and 6.1). All wires shall be double strand unless otherwise specified.

TABLE I. Strand wire size and weight of zinc coating on strand wire and barbs

Steel wire gage	Nominal diameter zinc-coated wire 1/	Wire S-Strand B-Barbs	Minimum weight of coating of uncoated wire surface		
			Class 1	Class 2	Class 3
	Inch		oz/ft ²	oz/ft ²	oz/ft ²
12	0.106	S, B	0.30	0.50	0.80
12-1/2	.099	S, B	.30	.50	.80
13	.092	S	.30	.50	.70
13-1/2	.086	S, B	.25	.45	.65
14	.080	S, B	.25	.45	.65
15-1/2	.067	S	.15	.35	.50
16	.062	B	.15	.35	.50

1/ The drawn diameter of bright wire is controlled so that, after applying the protective coating, the wire conforms to the dimensions in this table and to the tolerance in 3.5.1.

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3.1.2 Barbed wire fabrication. Number of points, spacing, wire size, and shape of barbs shall be in accordance with table II, as specified (see 6.1).

TABLE II. Barbed wire fabrication, zinc coated

Strand, steel wire gage	Nominal diameter zinc-coated strand wire	Diameter of barbs, steel wire gage	Number of points	Spacing of barbs	Shape of barbs 1/
No.	Inch	No.		Inch	
12	0.106	14	4	4	Round
12-1/2	.099	12-1/2	2	4	Flat
12-1/2	.099	14	2	4	Half- round
12-1/2	.099	14	2	4	Round
12-1/2	.099	14	4	5	Half- round
12-1/2	.099	14	4	5	Round
13 2/	.092	13-1/2	4	6	Round
13-1/2	.086	14	2	4	Round
13-1/2	.086	14	4	5	Round
14 3/	.080	16	2	4	Round

1/ The gage of half-round and flat barbs is designated by the gage of the round wire from which the barbs are rolled.

2/ Single strand barbed wire.

3/ Temporary or electrified fencing.

3.2 Type II, aluminum coated. Aluminum coated barbed wire shall be in accordance with tables III and IV, as specified (see 6.1).

TABLE III. Size and construction of barbed wire

Steel wire gage	Nominal diameter of aluminum- coated wire in strand	Diameter of barbs, steel wire gage	Number of points	Spacing of barbs	Shape of barbs 1/
No.	Inch	No.		Inch	
12-1/2	0.099	14	2	4	Round
12-1/2	.099	14	4	5	Round
12-1/2	.099	14	4	5	Half- round
12-1/2	.099	12-1/2	2	4	Flat
14	.080	16	2	4	Round

1/ The gage of the half-round and flat barbs is designated by the gage of the round wire from which the barbs are rolled.

TABLE IV. Minimum weight of coating on a aluminum-coated barbed wire

Steel wire gage	Nominal diameter of aluminum- coated wire	Minimum weight of aluminum coating of uncoated wire surface
No.	Inch	oz/ft ²
12-1/2	0.099	0.19
12-1/2	.099	.30
14	.080	.17
14	.080	.25
16	.062	.13
16	.062	.19

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3.3 Types III and IV.

3.3.1 Strand wire.

3.3.1.1 Type III, aluminum clad. Nominal diameter of clad strand wire shall be 0.080 or 0.099 inch as specified (see 6.1). Tolerance on diameter of clad wire shall be plus or minus 0.002 inch. Thickness of aluminum shall be 0.004 inch minimum (see 4.4.4).

3.3.1.2 Type IV, copper clad. Nominal diameter of strand wire shall be 0.080 or 0.099 inch as specified (see 6.1). Tolerance on diameter of clad wire shall be plus or minus 0.002 inch. Unless otherwise specified (see 6.1), thickness of copper clad shall be 0.005 inch minimum (see 4.4.4).

3.3.2 Barbs on strand wires. Number of points, spacing, wire size and shape of barbs shall be in accordance with table III. Thickness of copper clad on barbs shall be 0.005 inch minimum, and the thickness of aluminum clad on barbs shall be 0.004 inch or greater.

3.4 Type V, plastic-coated. Plastic-coated barbed wire shall have plastic-coated strand wire and aluminum alloy barbs. Unless otherwise specified (see 6.1), plastic coat on strand wire shall be weather-resisting polyvinyl chloride, and color and thickness of the plastic material shall be at the manufacturer's option. Unless otherwise specified (see 6.1), type of aluminum alloy for barbs shall be at the manufacturer's option.

3.5 Tolerances.

3.5.1 Types I and II, wire, strand and barbs. The permissible variations from the nominal diameter of wire shall be ± 0.005 inch for zinc-coated wire and ± 0.004 inch for aluminum-coated wire.

3.5.2 Types I, II, III, IV, and V, spacing and length of barbs. The average spacing shall not exceed the spacing specified in tables II and III and no individual spacing shall vary from the specified spacing by more than 3/4 inch. The length of barbs shall be not less than 1/2 inch.

3.6 Types I, II, III, IV, and V.

3.6.1 Joints in strand wire. Splicing of individual strand wires by means of wrap joint or an electric butt weld is permissible. No more than three splices or joints shall exist in any 80-rod (1320 feet) spool.

3.6.2 Barbed wire spools. Single strand wire shall be furnished in an 80 rod (1320 feet) reelless pack. Double strand barbed wire shall be furnished on non-collapsible and non-returnable spools. When specified (see 6.1), each spool shall contain 80 rods (1320 feet), or 20 rods (330 feet) of barbed wire. Spools shall be constructed in such a manner that the entire spool of barbed wire can be dispensed without collapse of the spool.

3.6.3 Breaking strength. When tested in accordance with 4.4.5, zinc-coated, aluminum-coated, and plastic-coated barbed wire shall withstand the minimum loads in table V. Aluminum-clad, and copper-clad barbed wire strand shall withstand a minimum load of 1100 pounds-force (lbf) for 0.099 inch diameter and 720 lbf for 0.080 inch diameter strand wire or wires (see 6.1).

TABLE V. Breaking strength, zinc-coated, aluminum-coated, and plastic-coated strand wire or wires

Size, each strand wire, gage	Breaking strength minimum
No.	Lbf
12	950
12-1/2	950
13	590 <u>1/</u>
13-1/2	950
14	650
15-1/2	850

1/ Single (one) strand wire.

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Workmanship. Double wire strand shall be uniformly twisted and the barbs cut at an acute angle shall be sharp, well formed and tightly wrapped. Single strand wire shall be crimped approximately 0.060 inch deep with a pitch of approximately 0.60 inch and the barbs cut at an acute angle shall be sharp, well formed and tightly wrapped. Zinc-coated wire shall be free of bruised or scaled coating, blister and uncoated areas except ends of barbs. Aluminum and copper coatings, shall be free of flaking and shall completely cover the wire except at end of the barbs. Plastic coat on strand wire shall be free of cracks and openings to the base metal.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. (See RR-F-221/GEN).

4.2 Sampling.

4.2.1 Lot. Unless otherwise specified (see 6.1), a lot shall consist of 80-rod or 20-rod spools of each type of barbed wire offered for delivery at the same time.

4.2.2 Visual and dimensional examination, end item. Sampling for these characteristics shall be in accordance with level S-2 in MIL-STD-105.

4.2.3 Sampling for tests. Sampling for tests shall be in accordance with level S-1 of MIL-STD-105. The acceptable quality for tests shall be 4.0 percent defective.

4.3 Examination.

4.3.1 End item. Barbed wire selected in accordance with 4.2.2 shall be examined for defects listed in table VI. The Acceptable Quality Levels (AQL's), in accordance with MIL-STD-105, shall be 2.5 percent defective for major defects and 6.5 percent defective for the sum of major and minor defects.

TABLE VI. Classification of defects end item

Defects	Major	Minor
Type of barbed wire not as specified	X	
Length of barbs less than 1/2 inch	X	
Spacing and shape of barbs, number of points and wire size of strands and barbs not as specified	X	
Diameter of coated wire not within tolerance	X	
Barbs not sharp and not tightly wrapped	X	
Strand wire not uniformly twisted, except single wire strand		X
Barbed wire not on noncollapsible and nonreturnable spools, except single strand in reelless packs		X
Cracks or openings to base metal in plastic on plastic-coated strand wire	X	
Flaking or scaling of coating on wire	X	
Damage or defects affecting function or serviceability	X	
Damage or defects not affecting function or serviceability.		X

4.3.1.1 Size of wire. Measure the diameter of coated wire by averaging two diameter readings, measured to the nearest 0.001 inch taken at right angles to each other.

4.3.1.2 Length and spacing of barbs. On two wire strand, measure the length of barbs from the center of the two strand wires to the pointed ends of the barbs. For single wire strand, measure the length of barbs from the center of the strand wire to the pointed ends of barbs. Measure the space between individual barbs, from the edge of one barb at the strand to the corresponding edge of the adjacent barb, in a length of 25 feet of barbed wire and calculate the average spacing (see tables II and III and 3.5.2).

4.3.2 Inspection of preparation for delivery. The inspection level shall be S-2 with an AQL of 2.5 percent defective. Defects listed in table VII shall be examined for shipping load pallets fully prepared for delivery.

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TABLE VII. Classification of preparation for delivery defects

Examine	Defects
Packing	Not level specified.
Palletization of barbed wire	Pallet lumber not in accordance with figure 1. Nails and nailing pattern not in accordance with figure 1. Pallets not reinforced with nail-on strapping. Strapping not zinc-coated for level A. Pallet loading not in accordance with figure 2 or 3. Pallet strapping not in accordance with figure 2 or 3.
Marking	Illegible, incomplete or incorrect for level A or C.

4.4 Test methods.

4.4.1 Test specimens. Sufficient length of barbed wire shall be cut from the end of the spool to provide a length containing at least six spaced barbs.

4.4.2 Weight of zinc coating. Test for weight of zinc coating by one of the following methods, as specified (see 3.1.1 and table I).

- (a) Test by the stripping test procedure in ASTM A 90.
- (b) Quality control tests made on the wire prior to fabrication.

4.4.3 Weight of aluminum coating. Test for weight of aluminum coating by one of the following methods (see 3.2 and table IV):

- (a) Test in accordance with ASTM A 428.
- (b) Quality control tests made on the wire prior to fabrication.

4.4.4 Thickness of aluminum and copper cladding. Determine thickness of cladding by one of the following methods (see 3.3.1.1 and 3.3.1.2).

4.4.4.1 Measurement. Determine the thickness by taking half of the difference between the diameter of the clad wire and the diameter of the wire after removing the cladding or determine microscopically in accordance with ASTM E 487. Use the mean of two measurements at right angles to each other to determine thickness of the clad. Measure to the nearest 0.001 inch.

4.4.4.2 Magnetic. Determine thickness of cladding magnetically in accordance with ASTM E 429.

4.4.4.3 Thickness conversion from weight of coating. Calculate the thickness of aluminum cladding, by conversion, after determining the weight of coating in accordance with ASTM A 428. Calculate the thickness of copper cladding, by conversion, after determining the weight of copper coating (see 6.2).

4.4.5 Breaking strength. Secure specimen in either wedge grips or snubbing grips in a tensile testing machine. For two strand barbed wire, test both strand wires together (see 3.6.3 and table V).

4.5 Rejection and retest. Unless otherwise specified (see 6.1), rejection and retests shall be conducted in accordance with general section of Fed. Test Method Std. No. 151.

5. PREPARATION FOR DELIVERY

5.1 Packaging and packing. Packaging and packing shall be level A, B, or C, as specified (see 6.1).

5.1.1 Level A. Barbed wire shall be packaged and packed in accordance with the requirements in MIL-STD-163.

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5.1.2 Level B. Barbed wire shall be wound on metal spools and securely tied with wire.

5.1.3 Level C. Barbed wire shall be packed to assure carrier acceptance and safe arrival at destination in compliance with the Uniform Freight Classification rules and the National Freight Classification.

5.2 Palletization. Barbed wire packaged and packed as specified in 5.1 shall be palletized as shown in figure 2 or 3 as applicable utilizing pallets designed as illustrated in figure 1.

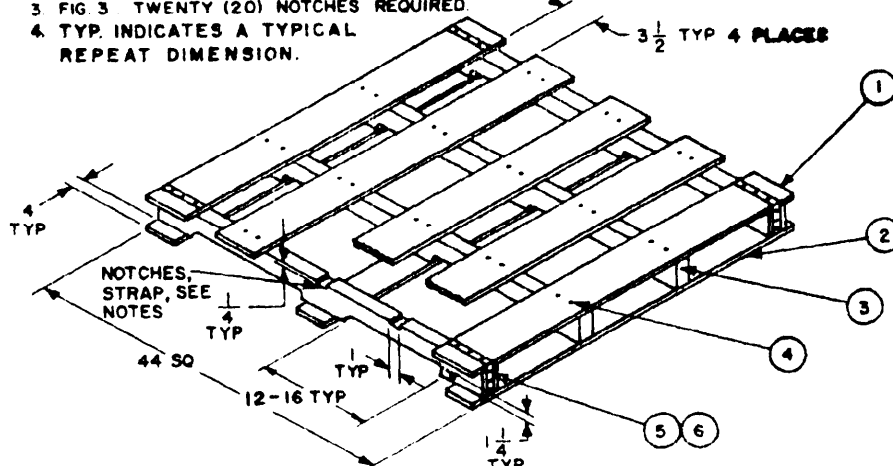
5.3 Marking. Marking shall be in accordance with 5.3.1 or 5.3.2, as specified (see 6.1).

5.3.1 Civil agencies. In addition to any marking required by the contract or order, spools of barbed wire and palletized loads shall be marked in accordance with Fed. Std. No. 123.

5.3.2 Military activities. In addition to any marking required by the contract or order, spools of barbed wire and palletized loads shall be marked in accordance with MIL-STD-129.

NOTES

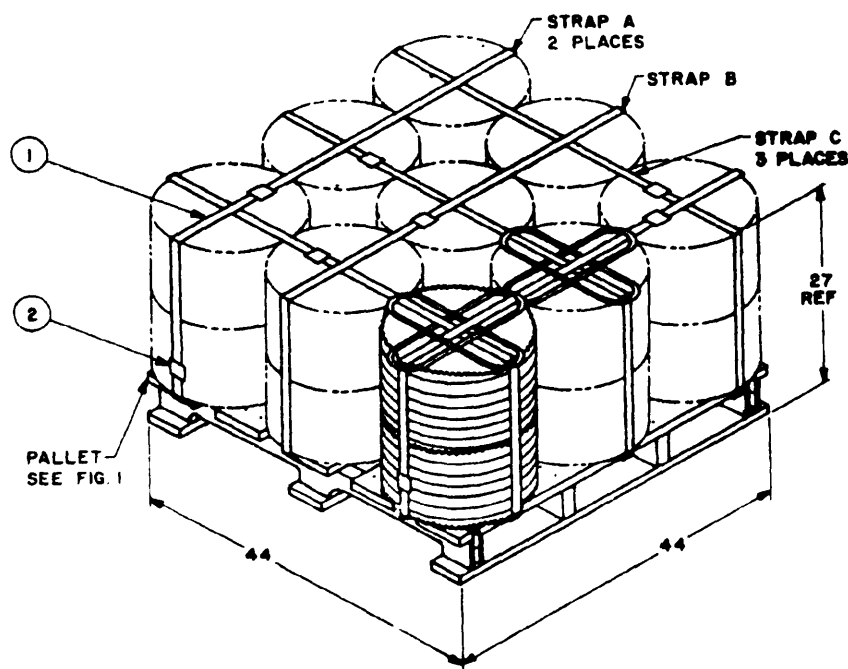
1. DIMENSIONS ARE INCHES
2. FIG. 2 FOUR (4) CENTER NOTCHES REQUIRED (20 NOTCHES OPTIONAL).
3. FIG. 3 TWENTY (20) NOTCHES REQUIRED.
4. TYP. INDICATES A TYPICAL REPEAT DIMENSION.



6	TYPE II, STYLE 4	24	NAILS, BOX, STD, FLAT HD, DIAMOND PT, STL, CEMENT COATED, 8d X 2-3/8 LG	FF-N-105
5	TYPE II, Finish A	4	STRAPPING, FLAT, NAIL ON, STL, 11/4 NOM SIZE X .035 NOM THK X 9 7/8 LG	QQ-S-781
4	TYPE II, STYLE 18	72	NAILS, PALLET, FLAT HD, DIAMOND PT, STL, ZN COATED, 9 GAUGE X 3 LG	FF-N-105
3	GROUP II, III OR IV, CL 2	4	WOOD, STRUCTURAL, 2 X 4 X 44 LG, CUT-OUT 1 1/4 DP X 16 LG EXCEPTIONS SAME AS ITEM 1	MIL-STD-731
2	GROUP II, III OR IV, CL 2	3	WOOD, STRUCTURAL, 1 X 4 X 44 LG EXCEPTIONS: SAME AS ITEM 1	MIL-STD-731
1	GROUP II, III OR IV, CL 2	5	WOOD, STRUCTURAL, 1 X 6 X 44 LG EXCEPTIONS: HEMLOCK UNACCEPTABLE, DOUGLAS-FIR MUST BE COAST-TYPE	MIL-STD-731
FIND NO.	PART OR IDENT NO.	QTY REQD	DESCRIPTION	SPECIFICATION
LIST OF MATERIAL				

FIGURE 1. Pallet construction

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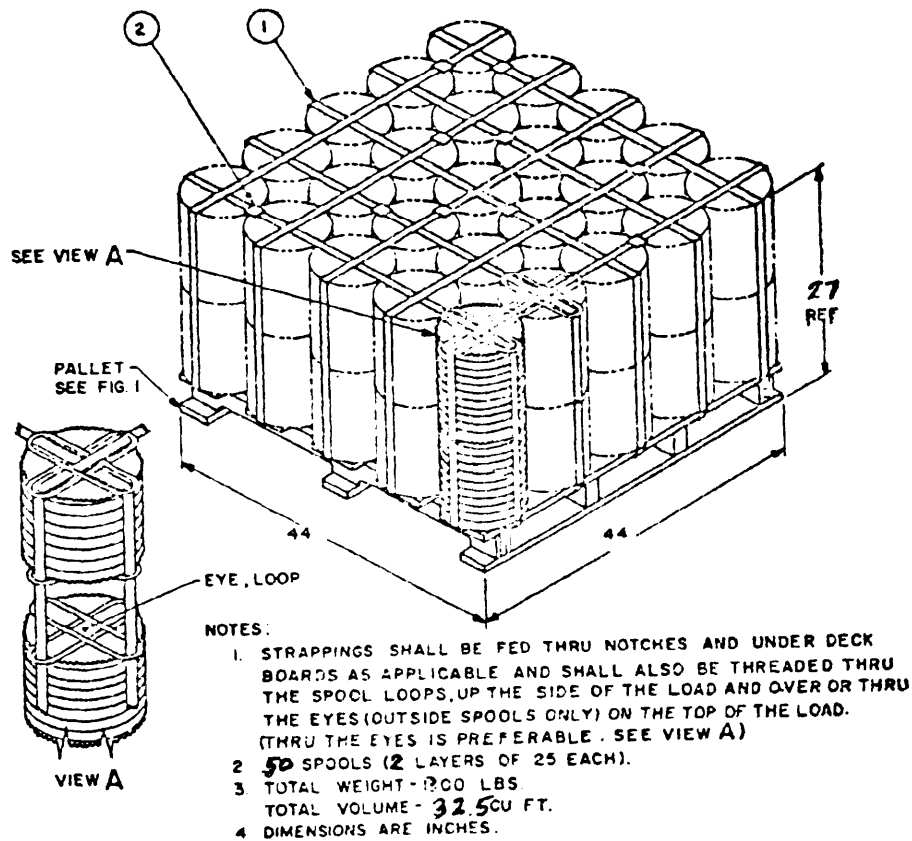
NOTES:

1. DIMENSIONS ARE INCHES.
2. STRAPPINGS (**A) SHALL BE LOOPED AROUND THE PALLET STRINGER AND SEALED (ITEM 2).
3. STRAPPING (**B) SHALL BE FED THRU CENTER NOTCHES.
4. STRAPPINGS (**C) SHALL BE FED UNDER DECK BOARDS.
5. SPOOLS SHALL BE ANCHORED WITH STRAPPING (ITEM 1) AS SHOWN.
6. 18 SPOOLS (2 LAYERS OF 9 EACH)
7. TOTAL WEIGHT-1900 LBS
TOTAL VOLUME- 31.7 CU FT

2		10	SEALS, 3/4 NOM SIZE	QQ-S-791
1	T-1, FB Gr. 2	AR	STRAPPING, FLAT, NAILESS, STL, ZN COATED, 3/4 NOM SIZE X .035 NOM THK	QQ-S-781
FIND NO.	PART OR IDENT NO.	QTY REQD	DESCRIPTION	SPECIFICATION
LIST OF MATERIAL				

FIGURE 2. Palletized unit load, 80 rod spools, 2 high

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2		ID	SEALS, 3/4 NOM SIZE	QQ-S-781
1	T-1, FB Gr. 2	AR	STRAPPING, FLAT, NAILLESS, STL, ZN COATED, 3/4 NOM SIZE X .035 NOM THK	QQ-S-781
FIND NO	PART OR IDENT NO	QTY REQD	DESCRIPTION	SPECIFICATION
LIST OF MATERIAL				

FIGURE 3. Palletized unit load, 20 rod spools, 2 high

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6. NOTES

6.1 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents.

- (a) Title, number, and date of this specification.
- (b) Type of coating on barbed wire (see 1.2).
- (c) Wire size and weight of zinc coating, when required (see 3.1.1 and table I).
- (d) Number of barb points, spacing, wire size and shape, when required (see 3.1.2 and table II).
- (e) Wire size and construction for aluminum-coating (see 3.2 and table III).
- (f) Number of barb points, spacing, wire size and shape, and weight of aluminum coating, when required (see 3.2 and table IV).
- (g) Diameter of aluminum-clad strand wire, number of barb points, spacing, wire size and shape, and thickness of aluminum clad, when required fabrication of aluminum-clad wire according to table III (see 3.3.1.1 and table III).
- (h) Diameter of copper-clad strand wire, number of barb points, spacing, wire size and shape, and thickness of copper clad, when required fabrication of copper-clad wire according to table III for aluminum coating (see 3.3.1.2 and table III).
- (i) Plastic-coated barbed wire (see 3.4).
- (j) Wire length (see 3.6.2).
- (k) Breaking load, when required (see 3.6.3).
- (l) Size of lot, if different from 4.2.1.
- (m) Selection of applicable level of packaging and packing (see 5.1).
- (n) Marking (see 5.3).

6.2 Thickness, aluminum and copper coats.

6.2.1 Aluminum clad barbed wire. Thickness of the aluminum clad can be determined using 1.0 oz/ft² equivalent to a clad thickness of 4.35 mils (0.00435 inch).

6.2.2 Copper clad barbed wire. Thickness of the copper clad can be determined using 1.0 oz/ft² equivalent to a clad thickness 1.35 mils (0.00135 inch).

MILITARY INTERESTS:

PREPARING ACTIVITY. GSA-FSS

Custodians:

CIVIL AGENCY COORDINATING ACTIVITIES.

Navy - YD
Air Force - 84

COMMERCE - NDS
HEW - FEC
INTERIOR - BFA
USDA - AFS

User interest:

Navy - MC, CG
Army - ME, CE

Military Coordinating Activities:

Navy - YD

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See Section 2 of this specification to obtain extra copies and other documents referenced herein. Price 35 cents each.