

NOTICE OF CHANGE
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MIL-STD-163C  
NOTICE 2  
7 November 1988

MILITARY STANDARD  
STEEL MILL PRODUCTS  
PREPARED FOR SHIPMENT AND STORAGE

TO ALL HOLDERS OF MIL-STD-163C:

1. THE FOLLOWING PAGES OF MIL-STD-163C HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
1	7 November 1988	1	7 July 1980
2	7 November 1988	2	7 July 1980
11	7 November 1988	11	10 May 1978
12	10 May 1978	(REPRINTED WITHOUT CHANGE)	
15	10 May 1978	(REPRINTED WITHOUT CHANGE)	
16	7 November 1988	16	10 May 1978
17	7 November 1988	17	10 May 1978
18	10 May 1978	(REPRINTED WITHOUT CHANGE)	
19	7 November 1988	19	10 May 1978
20	10 May 1978	(REPRINTED WITHOUT CHANGE)	
45	7 November 1988	45	7 July 1980
46	10 May 1978	(REPRINTED WITHOUT CHANGE)	
87	7 November 1988	87	10 May 1978
88	7 November 1988	88	10 May 1978

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-163C will verify that page changes and additions indicated above have been entered. This notice will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the Military Standard is completely revised or cancelled.

AMSC N/A

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AREA PACK

**MIL-STD-163C**  
**NOTICE 2**

**Custodians:**

Army - ME  
Navy - SA  
Air Force - 99

**Preparing activity:**

Army- ME  
Project PACK-0750

**Review activities:**

Army - MI, SM  
Navy - AS, YD  
DLA - IS

**User activities:**

Navy - OS, SH

MIL-STD-163C  
NOTICE 2

1. SCOPE

1.1 Scope. This standard describes the minimum requirements for materials, methods, containers, and procedures for the preservation, packing, and marking of steel mill products. Materials, methods and containers not listed in this standard will not be used without prior approval of the procuring activity. Quality assurance provisions are given in the appendix of this standard and forms a mandatory part of this standard.

1.2 Application. This standard is intended for use in new procurements and by military activities which physically process steel mill products for shipment and storage.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation form a part of this standard to the extent specified herein.

SPECIFICATIONS

FEDERAL

FF-N-105	- Nails, Wire; Brads and Staples.
NN-P-530	- Plywood; Flat Panel.
QQ-S-781	- Strapping, Steel, and Seals.
VV-L-800	- Lubricating Oil, General Purpose, Preservative, (Water Displacing, Low Temperature).
CCC-C-467	- Cloth, Jute (or Kenaf) Burlap.
PPP-B-621	- Boxes, Wood, Nailed and Lock-Corner.
PPP-D-723	- Drums; Fiber.
PPP-L-1607	- Lagging, Wood, Wirebound.
PPP-T-97	- Tape; Pressure-Sensitive Adhesive, Filament Reinforced.

MILITARY

MIL-P-3420	- Packaging, Materials, Volatile Corrosion Inhibitor Treated Opaque.
MIL-I-8574	- Inhibitor, Corrosion Volatile, Utilization.
MIL-C-16173	- Corrosion Preventive Compound, Solvent Cutback, Cold Application.
MIL-T-16286	- Tubes, Steel, Seamless, Marine Boiler Application.

Supersedes page 1 of Notice 1.

MIL-STD-163C

NOTICE 2

- |             |                                   |
|-------------|-----------------------------------|
| MIL-B-52489 | - Barbed Tape, Concertina.        |
| MIL-C-52950 | - Crates, Wood, Open and Covered. |

STANDARDS

FEDERAL

- |             |   |
|-------------|---|
| FED-STD-101 | - Preservation, Packaging and Packing Materials: Test Procedures. |
|-------------|---|

MILITARY

- |              |   |
|--------------|---|
| MIL-STD-129  | - Marking for Shipment and Storage.   |
| MIL-STD-731  | - Quality of Wood Members For Containers and Pallets.   |
| MIL-STD-1186 | - Cushioning, Anchoring, Bracing, Blocking, and Waterproofing; with Appropriate Test Methods. |

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

2.2 Other publications. The following documents form a part of this standard to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the issue of the DODISS specified in the solicitation. The issues of documents which have not been adopted shall be those in effect on the date of the cited DODISS.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- |      |   |
|------|---|
| A700 | - Practice of Packaging, Marking and Loading Method for Steel Products for Domestic Shipment. |
|------|---|

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

(Non-Government standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.

MIL-STD-163C

NOTICE 2

3. DEFINITIONS

3.1 Battens. A strip of wood attached to a container to reinforce it.

3.2 Binder. Any material used for securement.

3.3 Bundle. Two or more articles fastened together by suitable means usually without compression so as to form a shipping unit.

3.4 Crosspieces. Supports placed across the width of the unit or units for protection of the shipment in transit.

Supersedes page 2 of Notice 1.

MIL-STD-163C  
NOTICE 2

4.9.3.3 Blocking. Blocking of the box contents shall be in accordance with MIL-STD-1186.

4.9.3.4 Strapping. When ties are referred to as applied to boxes, they apply to flat bands or round wire steel strapping as specified in 4.7. All straps shall be applied perpendicular to the edges of the box and shall be drawn tight so as to sink into the wood at the edges. All strapping shall have a minimum joint efficiency of not less than 75 percent.

4.9.3.5 Bar boxes. The bar box shall be used for bars and cut length material. The ends are relatively small, whereas the length may be many feet. Side, top, and bottom section 9-1/2 inches or less in width shall be made of one piece, whenever possible. All ends are of two pieces, grains crossed, laminated. End thickness specified in Table II shall be the combined thickness of the two crossgrained pieces of each end.

4.9.3.5.1 Board splicing. When splicing box boards, the boards shall be butted and a splice board shall be applied which must extend on each side of the joint at least three times the width of the board being spliced. The splice board shall also equal the width and thickness of the box boards. Nails must be clinched. An alternate method is to laminate two thicknesses by nailing together and clinching the nails (see Figure 3). Splice boards are then not required. Wherever laminated parts are used, care should be exercised to prevent superimposed joints.

4.9.3.5.2 Box liners. Boxes shall be lined with waterproof paper or oil-resistant water-repellent paper as specified for the specific product in Section 5. The inside size of the box shall correspond with the length and cross-sectional area of the contents as nearly as possible. To prevent shifting of the contents, fillers shall be used to take up any voids (see Figure 2).

4.9.3.5.3 Strapping. Girthwise tension straps not less than 3/4 by 0.023 inch shall be used for reinforcement. For boxes weighing over 560 pounds, at least two nail-on straps shall be applied crosswise over each end and extending under the girthwise straps nearest the ends. Each such strap shall be nailed into ends at intervals not exceeding 3 inches and nails securing ends of straps shall be similarly spaced but no strap end shall be secured by less than two nails. Straps shall be secured to the ends, sides, tops, and bottoms with sixpenny nails except at points where only one thickness of lumber occurs, when a smaller nail shall be used. Girthwise straps shall be placed about 4 inches from each end and intermediate straps shall be used at not over 36 inch intervals where it is necessary to splice top or bottom boards girthwise straps place from 2 to 3 inches on both sides of the splice shall be provided (see Figure 2).

Supersedes page 11 of MIL-STD-163C

MIL-STD-163C

10 May 1978

4.9.3.6 Boxes for tubular products. Construction and strapping of boxes for tubular products shall be similar to bar boxes (4.9.3.5), except that lumber is as shown the Table III and end strapping is not required. Spacing of the bands shall not exceed 4 feet (see Figure 4).

4.9.3.7 Boxes for soils. Wood boxes for coils shall conform to Styles 2, 4, and 5 (see Figures 5a, 5b, 5c, and 6). Refer to Table IV for construction details.

4.9.3.7.1 Cleats. On Styles 2 and 5 the ends of cleats which are placed across the grains of the end boards shall be 1/16 inch from the inside surface of the top and bottom. The sides, top, and bottom shall extend over the cleats. When Style 2 is used, filler cleats must be placed vertically on ends to protect the longitudinal band. On Style 4 the cleat shall be placed across the grain of the end boards and shall extend within 1/8 inch of the outside surface of the top and bottom. Only the sides shall extend over the cleats. For loads over 560 pounds an additional cleat must be placed at center of each end.

4.9.3.7.2 Nailing. Size of nails shall be not less than shown in Table IV.

4.9.3.7.3 Strapping (minimum requirements). For weights of boxes not exceeding 560 pounds, four 12-1/2 gage round straps or four 5/8 by 0.020 inch flat bands shall be used to secure the top and bottom to the sides. Straps shall be not more than 4 inches from the ends. For weights of boxes over 560 pounds, three 1-1/4 by 0.035 inch bands (two girthwise and one longitudinal), shall be used (see Figures 5a, 5b, and 5c).

4.9.3.8 Boxes for tin plate and terne plate (short terne).

4.8.3.8.1 Construction. Each box shall be made with 13/16 inch sides and ends, with 3/8 inch top and bottom boards. Unless otherwise specified top and bottom boards shall be cut with short dimension of the box. Tops and bottoms made of plywood shall be 3-ply and not less than 5/32 inch in thickness and water-resistant (see Figure 7).

4.9.3.8.2 Nailing. Sides shall be attached to ends with bright nails not less than 1-3/4 inches long. Tops and bottom shall be nailed with bright nails not less than 1-3/8 inches long and spaced not more than 2-1/2 inches apart. When plywood is used for tops and bottoms nail spacing shall not exceed 3 inches.

MIL-STD-163C  
10 May 1978

4.9.7.2 Protectors. Steel protectors or cushions shall generally be used under all strapping on sheet packs or unit loads. Three common types are illustrated herein. Such protectors shall be of a minimum thickness of 20 gage. Protectors shall be either a strip of steel as in Figures 13a and 13b, or a type of formed clip as roughly illustrated in Figure 13c. Protectors, unless formed, shall be of minimum width of 3 inches. Protectors used over skid ends shall overlap the end as in Figure 13a.

4.9.7.2.1 Bottom protection. Flat sheet stock utilizing skid systems and skeleton platforms. Figures 14, 15, 16, 17, 26, and 27, shall have not less than a 5/32 inch thick piece of plywood, the same size as the load placed on the bottom of the sheet stock prior to securing the sheets to the skids or platform.

4.9.7.3 Lengthwise skids. The arrangement shown in Figure 14 is general for all cases utilizing lengthwise skids only. This skid system is suitable for the safe shipment of practically all sheets. Only two skids are illustrated, but the number actually used shall be as given in the specific details applying to each product.

4.9.7.4 Crosswise skids. Figure 15 illustrates the general arrangement for the use of skids at right angles to the long dimensions of the package. End skids shall be set approximately 5 to 10 inches in from the end of the package, spaced to allow sufficient clearance for fork trucks.

4.9.7.5 Lengthwise skids with cross bearing pieces. The arrangement shown in Figure 16 is general for packing wide sheets of light gages or long narrow (under 22 inches) sheets and strip of all gages, side by side on one set of skids. End protectors consisting of channels of a minimum thickness of 20 gage extending approximately the width of the unit, shall be used when the number of piles on the framework exceeds two. Cross bearing pieces shall extend at least 4 inches beyond the sides of the lengthwise skids and shall be equal in length to the full width of the unit. Cross bearing pieces shall vary in thickness from 1 to 2 inches and shall vary in spacing from a minimum of 12 inches in the clear to a maximum of 18 inches in the clear, depending on the load they will have to carry. End cross bearing pieces shall be nailed to the skids and placed at the extreme ends of the skids.

4.9.7.6 Skeleton platforms. Skeleton platforms (see Figures 16 and 17a) consist either of lengthwise skids with crosswise bearing pieces, or crosswise skids with lengthwise bearing pieces.

4.9.7.7 Metal packs for cut lengths. Types of metal packs are shown in Figure 18. Oiled material shall be wrapped with oil-resistant waterproof material. Material not oiled shall be wrapped with one layer of waterproof



MIL-STD-163C  
NOTICE 2

material. The wrapped lift is then enclosed, top, bottom, sides, and ends with light-gage metal. If the top protective sheet is composed of more than one piece it shall be made continuous with a lock-seam or lapped approximately 0 inches. In the pack illustrated as type A, figure 18, the sides and the ends shall be completely covered by the top and bottom pans, the top pan overlapping the bottom pan. The type B pack illustrated in Figure 18 is made with top and bottom protector sheets and with metal channels to protect the sides and ends.

4.9.7.7.1 Skids and strapping.

4.9.7.7.1.1 Strapping. Straps shall consist of 1-1/4 by 0.031 inch flat bands or 8-gauge high-tensile wire. If wire is used, corner protectors shall be applied unless the metal side and end protection is 20-gage or heavier. When 8-gauge high tensile wire is used instead of 1-1/4 by 0.031 bands, the number of straps indicated in 4.9.7.7.1.3 and 4.9.7.7.1.4 below shall be increased 50 percent. Straps shall be stapled to skids with corrosion-resistant staples. Material shall conform to 4.7.

4.7.7.1.2 Strapping. Straps shall consist of 1-1/4 by 0.031 inch flat bands or 8-gauge high-tensile wire. If wire is used, corner protectors shall be applied unless the metal side and end protection is 20-gage or heavier. When 8-gauge high tensile wire is used instead of 1-1/4 by 0.031 bands, the number of straps indicated in 4.9.7.7.1.3 and 5.9.7.7.1.4 below shall be increased 50 percent. Straps shall be stapled to skids with corrosion-resistant staples. Material shall conform to 4.7.

4.9.7.7.1.3 For lifts up to 120 inches long. Two lengthwise straps and skids shall be used for widths up to and including 48 inches. Two crosswise straps shall be used for lift lengths up to and including 84 to 120 inches.

4.9.7.7.1.4 For lifts over 120 inches long. Two lengthwise straps and skids shall be used for widths up to and including 48 inches; three crosswise straps shall be used for lengths up to 144 inches; for longer lengths add one strap for each additional 5 feet or fraction thereof. It is not practical to use lengthwise skids for lengths over 192 inches; for longer lengths skeleton platforms must be used.

4.9.7.8 Combination wood fiber-hardboard packs for cut lengths. This pack may be used at the contractor's option in lieu of metal packs for stainless steels as indicated under product designations. Types of combination wood fiber-hardboard packs are shown in figures 10, 11, and 21. Oiled material shall be wrapped with a layer of oil-resistant waterproof paper. Material not oiled shall be wrapped with one layer of waterproof paper. The paper, wrapped product is then enclosed, top, bottom, sides, and ends with a combination of wood fiber-hardboard materials. In the pack illustrated in figure 11, the sides, ends, and bottom shall be completely covered by wood and the top by fiber.

Supersedes page 16 of MIL-STD-163C

MIL-STD-163C  
NOTICE 2

4.9.8 Class 6 bundling. Steel products such as tubular products, rigid conduit, and electrical metallic tubing (EMT) are bundled for shipment. All pieces are tied into bundles with soft annealed wire or jute rope as specified under the product (see section 5).

4.9.9 Class 7 hand bundles.

4.9.9.1 General. Hand bundles of cut length steel products shall be strapped or tied with round wire or flat steel strapping. The minimum number of straps or ties shall be two. Except where short lengths of the product will not permit, the straps and ties shall be no less than 18 inches from each end. The weight of hand bundles shall not exceed 200 pounds.

4.9.9.1.1 Hand bundles. Hand bundles of coiled wire or coiled rod shall have a minimum of three straps or ties (see figures 22 and 43).

4.9.10 Class 8 secured lifts (without skids).

4.9.10.1 General. Lifts of steel products shall be strapped or tied in accordance with table V or as indicated under the specific steel product in section 5.

## MIL-STD-163C

## NOTICE 2

TABLE B. Girthwise Strapping Requirements for Billets, Slabs, Sheet Bar, and Bar Steel in Secured Lifts.

Length of lift (See Note 1)	Flat strapping 1-1/4" x 0.031" (See Note 2)	No. 5 Soft Rods (See Note 3)	8-Gage H-T Wire Strapping (See Note 2)
To 10 feet	3	3	5
Over 10 to 20 feet	4	4	6
Over 20 to 30 feet	5	5	8
Over 30 to 45 feet	6	6	9
Over 45 feet	7	7	11

## Notes:

1. Ties shall be secured not less than 18 inches from each end. All additional ties shall be evenly spaced between the end ties.

2. See 4.7.

3. The size of soft rod ties when used, also annealed wire ties for bundles, shall be as listed under the specified product.

4.9.10.2 Protectors. Light-gage steel protectors or heavy waterproof fiber cushions shall be used under straps and ties of sheet, plate, and coiled steel products where it is essential for protection of finish, shape, or the wrapping material under the strapping.

4.9.11 Class 9 metal-sheathed lifts (container without skids). Metal-sheathed lifts shall be constructed in cylindrical or rectangular cross section as shown in Figure 42. The sheet metal shall be 30-gage minimum thickness. Ends of Styles A and B lifts shall be of Group I or II woods, of minimum thickness of 2-1/2 inches and cut to snugly fit the inside dimensions of the lift. Traverse cross straps shall be nailed to the ends of Styles A and B lifts as indicated. Ends of Styles C and D lifts shall have their outer flaps folded a minimum of 12 inches over the container and be secured by a tensioned flat steel strap in accordance with Figure 42. Metal sheathed lifts fabricated of more than one piece of metal shall have the pieces interlocked or overlapped. Overlapped joints shall be spot welded or banded to prevent the end tube sections from sliding off.

4.9.12 Class 10 reels and spools.

## MIL-STD-163C

## NOTICE 2

4.9.12.1 Reels. Reels for steel products such as wire rope shall be constructed in a manner similar to that shown by figure 45. The steel product on the reel shall be protected by layers of greaseproof (if preserved) and waterproof paper that extends completely around the reel. The paper shall be tacked to the flanges of the reel. Reels shall be completely enclosed with wood lagging with boards touching each other or with the wirebound wood lagging conforming to PPP-L-1607, as applicable, applied in accordance with the appendix thereto. Lagging on reels 42 inches or larger in diameter shall conform to type I of PPP-L-1607. Lagging boards shall be the same thickness as the flange but not thicker than 2 inches lumber and shall be nailed to the outside of the flanges of the reel extending across each flange and secured with two 8 gauge high tensile round wire or 3/4 by 0.031 inch flapstraps drawn tight around the circumference. Lagging on reels less than 42 inches in diameter shall conform to type II of PPP-L-1607, and shall be secured with 13 gauge high tensile wire or 5/8 by 0.020 inch straps. Ties shall be stapled at intervals of approximately 15 inches.

4.9.12.2 Spools. Spools shall be standard commercial quality and type and size normally used for the steel products.

#### 4.9.13 Class 11 special containers.

4.9.13.1 General. Containers other than those listed in this standard which require special design or construction shall be constructed of material specified herein. The containers shall be subject to the approval of the technical agency concerned.

4.10 Air shipment. When metal plates, strips, sheets, bars, rods, angle stock, tubes, and pipe are to be shipped by air, they shall be packed in accordance with the following:

- (a) Plates, strips, and sheets shall be packed in snug-fitting boxes reinforced with metal straps (see figures 7, 8, 9, 10, and 11) or in metal packs (see figures 18, 34, 35, and 36).
- (b) Bars, rods, angle stock, tubes, and pipe shall be packed in snug-fitting class 2 crates with solid wood ends or class 1 boxes (see figures 2, 3, and 4).
- (c) Single pieces or bundles of steel stock shall have a snug-fitting wood cap secured over each end of single pieces and bundles. End caps shall be fabricated as shown in figure 46. Lumber and construction of end caps shall be as specified in 4.9.3.5 for bar boxes. Straps should be secured to end caps with staples. The caps shall be a minimum of 18 inches in length and a minimum of 2-1/2 inches square at the end. End caps shall be secured to each other by flat or round wire steel strapping (see 4.7).

MIL-STD-163C

10 May 1978

## 5. DETAILED REQUIREMENTS

5.1 Preservation and packing. Preservation and packing shall be Level A or Commercial as specified.

5.1.1 Level A. The steel mill products are arranged alphabetically in this section. Under each product, paragraph A contains the preservation requirements and paragraph B the packing requirements. In cases where the standard paragraph does not apply to given product, it is so noted. Containers specified herein for the packing of individual items shall be constructed in accordance with the requirements of 4.9.

5.1.1.1 Bars, alloy steel, cold finished; bar, alloy steel, centerless ground or rough-turned (including aircraft steel, stainless steel and shell steel).

A. Preservation. When specified, cold finished and centerless ground alloy bars shall be protected against corrosion with a single coat of Type A preservative (see Table I). Rough-turned bars shall be shipped without protective coating unless specified.

B. Packing. Rough-turned bars up to and including 1-1/2 inches in diameter and cold finished alloy steel bars and centerless ground bars shall be shipped in Class 1 wooden boxes or in Class 9 metal-sheathed lifts. Rough-turned bars over 1-1/2 inches in diameter shall be shipped in secured lifts (when specified, lifts shall be provided with an applicable type skid system). Weight of box of container shall be 2,240 pounds maximum and of lifts 6,000 pounds maximum.

- (1) For details of wooden box construction see 4.9.3 and Figure 2.
- (2) Metal-sheathed lifts (see 4.9.11 and Figure 42).
- (3) Secured lifts, shall be secured in accordance with Table V.

5.1.1.2 Bars, alloy steel, hot-rolled (including aircraft steel, stainless steel, and shell steel).

A. Preservation. When specified, brush, spray, or dip coat of Type A preservative shall be applied (see Table I).

B. Packing. Bars shall be shipped in secured lifts (when specified, lifts shall be provided with an applicable type skid system), or when specified, shall be boxed. Lifts and boxes shall contain bars of one size and quality only. Lifts shall be secured with flat bands, 1-1/4 by 0.031 inch, tension-tied 8-gage high-tensile wire, or hand-tied double wrapped No. 5 rods. (See schedule of ties, Table V.) Rounds, squares and similar shapes.

MIL-STD-163C  
APPENDIX  
10 May 1978

APPENDIX  
QUALITY ASSURANCE

10. Quality Assurance Provisions.

10.1 Scope. This appendix establishes the inspection methods and procedures necessary to achieve the desired quality assurance. This appendix is a mandatory part of this standard.

20. Referenced documents.

20.1 The following document, of the issue in effect on date of invitation for bids or request for proposal forms a part off this specification to the extent specified herein:

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
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30. Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements specified herein. The contractor may utilize 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 standard where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

30.1 Material inspection. The contractor is responsible for insuring that materials used are manufactured, examined, and tested in accordance with referenced documents or as specified herein.

40. Quality conformance inspection.

40.1 Inspection stages. Inspection shall be in two stages as follows:

- (a) The first stage shall include inspection of materials; preservation, wrapping, and blocking methods and processes; and the container construction requirements.
- (b) The second stage shall include inspection of the container closure requirements, markings after container closure, pallet construction, methods of securing to the pallet and pallet enclosure.

MIL-STD-163C  
NOTICE 2

5.2.1.2.2 Plates. Each quality plate (such as pressure vessel quality) shall be marked with the required marking for shipment. Each plate other than quality plate shall be marked with the required marking for shipment except that markings in 5.2.1.2.1 (a) and (b) need only be applied on two of the top plates of the shipment; when specified, the latter marking shall be applied to each plate.

5.2.2 Commercial packaging. Marking shall be as specified in ASTM A 700. In addition, the National Stock Number (NSN) or part number, quantity and unit of issue, contract or delivery order number, and address shall be shown.

## Custodians:

Army - ME  
Navy - SA  
Air Force - 99

## Preparing activity:

Army - ME  
Project PACK-0604

## Review activities:

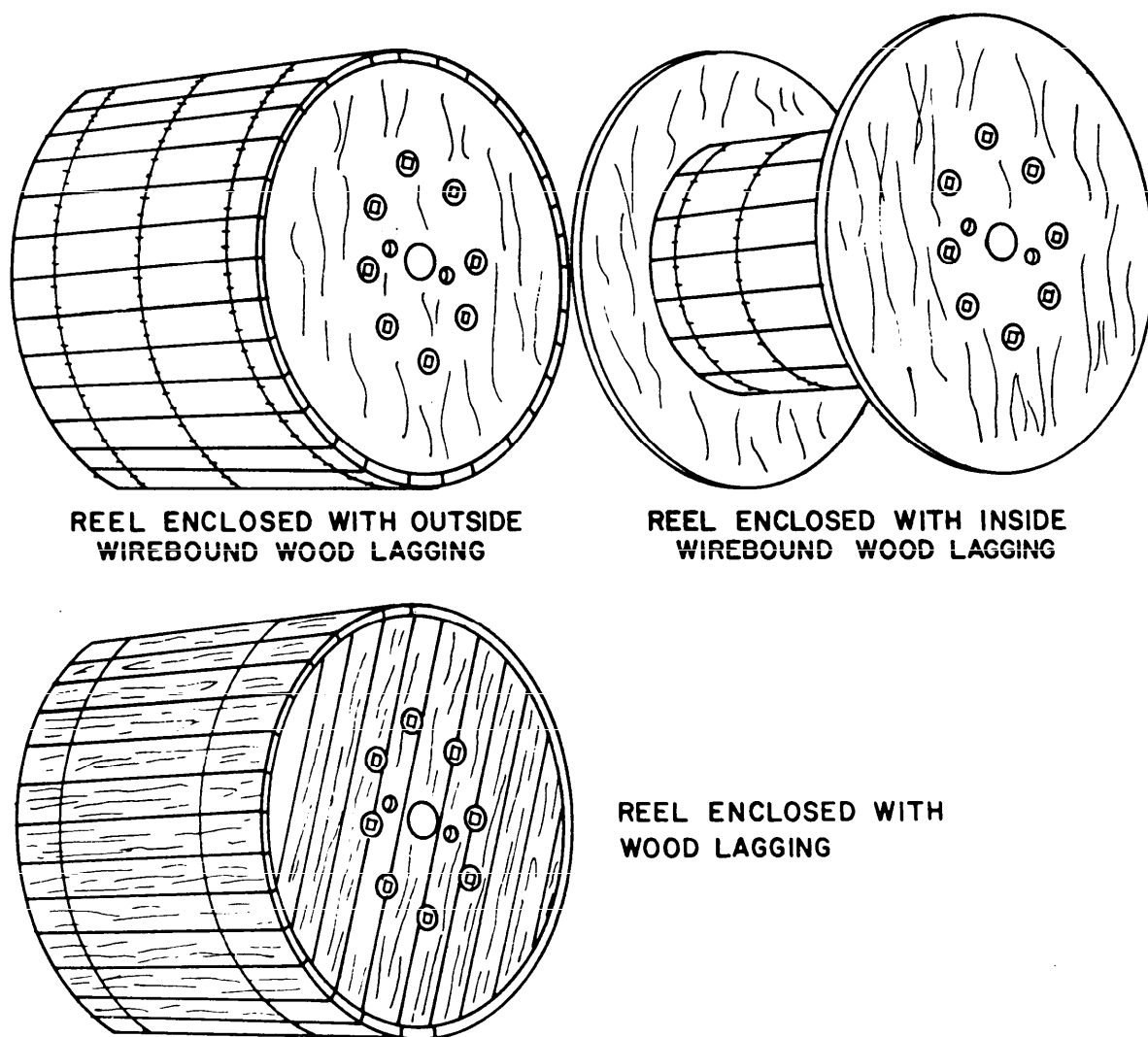
Army - MI, SM  
Navy - AS, YD  
DLA - IS

## User activities:

Navy - OS, SH

Supersedes page 45 of 10 May 1978

MIL-STD-163C  
NOTICE 2



**FIGURE 45. Typical reel of wire rope enclosed with wood lagging or wirebound wood lagging (see 4.9.12.1).**

X- 3318A



MIL-STD-163C  
NOTICE 2

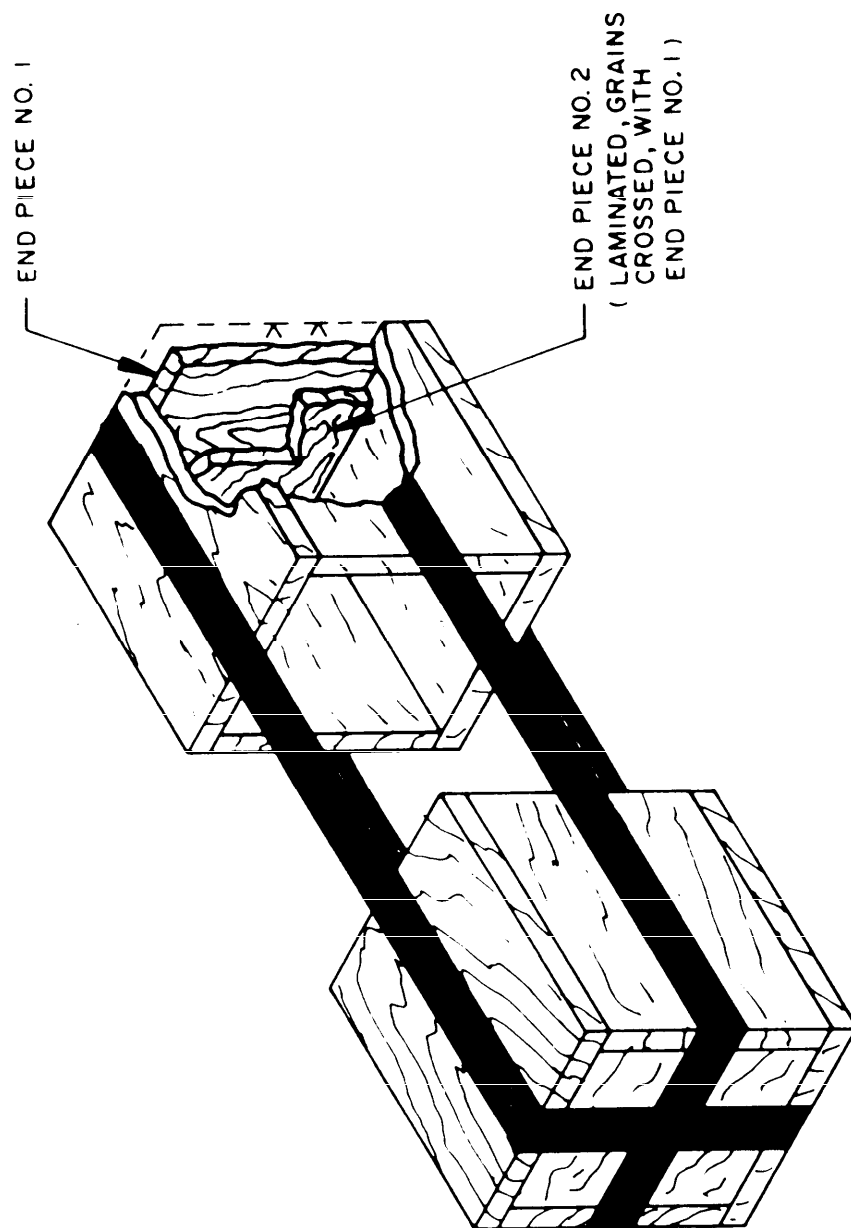


FIGURE 46. End caps for air shipment.

X-3319 A