

INCH-POUND

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SUPERSEDING
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MILITARY SPECIFICATION

CRATES, SHIPPING, WOOD, OPEN, WIREBOUND

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification and appendix herein cover open, wirebound wooden shipping crates of slatted construction for net weight not exceeding 1,000 pounds.

1.2 Classification. The wirebound crates shall be of the following types, classes, styles, grades, and processes as specified (see 6.2).

- | | | |
|---------|---|-------------------|
| Type I | - | Overwrap, no ends |
| Type II | - | Conventional |
| Class 1 | - | Wired ends |
| Class 2 | - | Batten ends |

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5018 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8115

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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- Type III - Upright, all mechanical handling,
two way entry
- Class 1 - Interlocking base
- Class 2 - Flush base
- Class 3 - Channel base
- Style 1 - Twisted wire closure
- Style 2 - Looped wire closure
- Grade A - Heavy Duty
- Grade B - Light Duty
- Process 1 - No preservative treatment required
- Process 2 - Preservation treatment required (see 3.6 and 6.2)

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

- A-A-55057 - Panels, Wood/Wood-Based; Construction and
Decorative
- FF-N-105 - Nails, Brads, Staples and Spikes: Wire,
Cut and Wrought

STANDARDS

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection
by Attributes
- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-731 - Quality of Wood Members for Containers
and Pallets

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(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

U.S. DEPARTMENT OF COMMERCE

PS 1 - Product Standard for Construction and Industrial Plywood

(Copies are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-0001.)

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 the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN PLYWOOD ASSOCIATION (APA)

APA PRP-108 - Performance Standards and Policies for Structural-Use Panels

(Application for copies should be addressed to the American Plywood Association, 7011 South 19th Street, P.O. Box 11700, Tacoma, WA 98411.)

HARDWOOD PLYWOOD MANUFACTURERS ASSOCIATION (HMPA)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/HMPA HP-1 1992 - Interim Standard for Hardwood Plywood

(Application for copies should be addressed to the Hardwood Plywood Manufacturer's Association, 1825 Mideal Faraday Drive, P.O. Box 2789, Reston, VA 22090-2789.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

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

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takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Materials.

3.1.1 Plywood. When plywood is used in the fabrication of open wirebound crates, it shall conform to A-A-55057 types A, B, and C, and shall conform to the minimum commercial standard grades in table I. The thickness of plywood shall be as specified in table IV. Plywood will not be permitted for vertical faceboards on type III crates unless it is a minimum of 8 inches in width.

TABLE I. Plywood

Crate grade	Type A PSI	Type B APA PRP-108	Type C, ANSI/HPMA HP Type 1, Grade 3
A or B	Construction and Industrial Plywood Exposure 1	Structural Use Plywood Exposure 1	Hardwood Plywood Exterior Glue

3.1.2 Wood. Wood members shall be made from lumber conforming to MIL-STD-731, except as otherwise specified herein. The wood species shall conform to group I, II, III, or IV of MIL-STD-731, as applicable.

3.1.2.1 Moisture content. The moisture content of solid wood members (at time of construction) shall conform to MIL-STD-731, except that the moisture content of cleats, battens and sawed face boards shall be not less than 9 percent nor greater than 18 percent, and the moisture content of veneer shall be not less than 9 percent nor greater than 15 percent.

3.1.2.2 Grain divergence. Cross grain shall conform to MIL-STD-731. The divergence of grain in cleats, battens, skids, and liners shall be as specified for structural members. In sawed or veneer face boards, the divergence of grain shall be in accordance with nonstructural members.

3.1.2.3 Wane. Wane shall conform to MIL-STD-731, except that wane along any edge of a cleat, batten, or skid will be permitted for the full length of the member, provided it does not exceed 3/8 inch in either direction from the edge of the member.

3.1.2.4 Checks, splits, and shake. Checks, splits, and shake shall conform to MIL-STD-731 except as follows:

3.1.2.4.1 Cleats, battens, and skids. Checks, splits, and shake that do not penetrate the thickness and do not exceed 1/8 inch in width at surface point of member will be permitted.

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3.1.2.4.2 Liners. Checks, splits, and shake occurring through the full thickness that are longer than 1/2 the length of the liner and which exceed 1/8 inch in width shall not be permitted.

3.1.2.4.3 Sawed or veneer boards. Checks and splits at the end of a member shall be permitted if the checks or splits do not interfere with the specified fabrication, stitching, or nailing pattern and do not exceed 1/4 of the length of the piece.

3.1.2.5 Knots. Knots allowable in wood members of wirebound crates shall conform to MIL-STD-731 except as follows:

3.1.2.5.1 Cleats, battens, and liners. The diameter of any knot or knot-hole shall not exceed 1/4 the width or depth of the cleat or batten and shall not be closer than 1-1/4 inch from the end of the member. No knot or knothole in any liner shall exceed 1/2 inch in diameter and shall not be closer than 1-1/4 inches from the end of the liner.

3.1.2.5.2 Sawed or veneer boards.

3.1.2.5.2.1 Sound knots. Sound knots shall not exceed 1-1/2 inches in diameter, nor exceed 1/3 the width of the board, nor be closer than 1 inch to any edge. Knot clusters shall not exceed 2 inches in diameter nor exceed 1/3 the width of the board, whichever is less.

3.1.2.5.2.2 Loose knots and knotholes. Loose knots and knotholes shall not exceed 1-1/8 inches in diameter, nor exceed 1/3 the width of the board, nor be closer than 1-inch to any edge of the board. There shall be not more than one loose knot or knothole per face board between adjacent binding wires. A knot cluster which contains a loose knot or knothole shall not exceed 2 inches in diameter nor exceed 1/3 the width of the board, whichever is less. Not less than 1/2 inch of clear wood shall separate loose knot or knothole from another knot of the cluster.

3.1.3 Wire, binding. Binding wires shall be galvanized, annealed, carbon steel wire. Wire used for style 1 closures (see figure 7) shall conform to the applicable ductility test in 4.3.2 and shall result in a closure conforming to the appendix of this specification. Wire used for style 2 closures (see figure 8) shall show no fracture after loop is completed. The galvanized coating on wire shall not flake or peel when tested in accordance with 4.3.1.

3.1.4 Staples. Staples shall be either divergent or convergent and shall be fabricated from low carbon steel round wire and shall be galvanized. The galvanized coating shall be smooth and shall not flake or peel after testing in accordance with 4.3.1.

3.1.5 Nails. Nails of the types herein specified shall conform to FF-N-105.

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3.2 Design.**3.2.1 Type and class.**

3.2.1.1 Type I crates. Type I crates shall be designed for type I loads only (see 6.1.4.1) and shall conform to figure 1. Each section of the wire bound blank shall have face boards at the extreme ends of the cleats.

3.2.1.2 Type II crates. Type II crates shall be designed for type I and type II loads only (see 6.1.4.1, 6.1.4.2 and 6.2). Each section of the wirebound blank shall have face boards at the extreme ends of the cleats (see figure 2).

3.2.1.2.1 Class 1. Type II, class 1 crates shall conform in design to figure 2 and 2A. Each crate shall have liner ends. Thickness of liner boards and end boards shall be not less than the thickness required for the blank, except that the thickness of the liner board shall not exceed 1/4 inch. The gage of wire for the liner ends shall be 14 gage.

3.2.1.2.2 Class 2. Type II, class 2 crates shall conform in design to figure 2A and 3. Each crate shall have batten ends and the ends shall have batten adjacent to each long cleat of the assembled crate. Battens shall run parallel to the long cleats. The thickness of end boards shall be not less than the thickness required for the blank. When 1-1/8 inch square cleats are required, the minimum thickness of the battens shall be not less than 1 inch. Other battens shall have a minimum width of 1-3/8 inches and minimum thickness of 3/4 inch.

3.2.1.3 Type III crates. Type III, class 1, 2, or 3 crates shall be designed for any type load (see 6.1.4 through 6.1.4.3, and 6.2). Each section of the wirebound blank shall have face boards at the extreme ends of the cleats. Each section of the blank, where possible, shall have one or more diagonals forming a minimum angle of 14° with vertical members. Diagonals may be omitted for crates up to 500 pounds for type I or II loads only. Each base shall have sufficient boards, battens or skids to provide a minimum of 40 percent coverage of the base. The minimum width of boards on bases shall be 3-3/8 inches, except nonbearing intermediate members may be a minimum of 1-1/2 inches in width.

3.2.1.3.1 Class 1. Design type III, class 1 crates shall conform to figure 4.

3.2.1.3.2 Class 2. Design of type III, Class 2 crates shall conform to figure 5.

3.2.1.3.3 Class 3. Design of type III, class 3 crates shall conform to figure 6.

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3.2.2 Styles.

3.2.2.1 Style 1. Style 1 crates shall use the twisted wire closure conforming to figure 7. The ends of girth wire shall extend at least 2-1/4 inches beyond the edge of the slat.

3.2.2.2 Style 2. Style 2 crates shall use the looped wire closure conforming to figure 8. The length of looped fasteners on girth wire shall be such as to make satisfactory closure (see 40).

3.2.3 Grades.

3.2.3.1 Grade A. Grade A, heavy duty crates shall conform to grade A requirements specified in tables I through IX, inclusive.

3.2.3.2 Grade B. Grade B, light duty crates shall conform to grade B requirements specified in tables I through IX, inclusive.

3.2.4 Approval of special designs. When the weight of the contents require a crate not provided for in this specification, the design of the crate shall be approved by the appropriate Government procurement agency.

3.3 Construction. Construction specified herein shall apply to types I, II, and III crates.

3.3.1 Wirebound blank.

3.3.1.1 Cleats. Cleats shall be of group II, III, or IV woods (see 3.1.2). Each cleat shall be a single piece of wood without any joints. The ends of cleats shall be mitered or mortised and tenoned, except butt end cleats shall be used for type III, class 1 crates. The width and thickness of edge cleats shall be as specified on the applicable figure. The tolerance on the width and thickness of cleats shall be +1/8 or -1/32 inch. The distance between intermediate cleats, when required, shall not exceed the dimensions indicated in table II. Any of the sizes of cleats specified in table III may be used for intermediate cleats, when required. Tolerances on width and thickness of intermediate cleats shall be +1/8 or -1/32 inch. Intermediate cleats are not required on type I crates.

TABLE II. Requirements and spacing for rows of intermediate cleats, Grades A and B use 1/

Thickness of faceboards required for blank (Inches)	Maximum distance between cleats	
	Type II load (Inches)	Type III load (Inches)
Less than 1/4	22	16
1/4	26	20

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TABLE II. Requirements and spacing for rows of intermediate cleats, Grades A and B use 1/ (cont'd)

Thickness of faceboards required for blank (Inches)	Maximum distance between cleats	
	Type II load (Inches)	Type III load (Inches)
Less than 5/16	28	22
Over 5/16	32	27

1/ No intermediate cleats required for type I load.

TABLE III. Sizes of cleats for intermediate rows, Grades A and B use

Width (Inches)	Thickness (Inch)
2-3/4	3/8
2-1/4	1/2
1-3/4	5/8
1-1/4	3/4
13/16	3/4

3.3.1.2 Face and end boards. Face and end boards shall be limited to the woods permitted in 3.1.2. The thickness of face and end boards shall be as required by table IV. Plywood, as specified in 3.1.1, of the thickness specified for wood in table IV, shall be permitted. When plywood ends are used in type II, class 1 crates, the direction of the grain for the outer plies shall be vertical. When plywood ends are used in type II, class 2 crates, the direction of the grain, of the outer plies, shall be horizontal. When plywood is used as face boards and end boards other than specified herein, the direction of the grain of the outer plies shall run parallel to the length of the boards. No part of any wood face board shall be less than 95 percent of the specified thickness for face or end boards less than 1/4 inch thick. For wood face or end boards 1/4 inch thick or more, the tolerance shall be +1/8 or -1/32 inch. No part of any plywood face or end boards shall be less than 95 percent of the thickness specified.

TABLE IV. Face board and end board thickness

Weight of contents (Pounds)		Type I crate		Type II crate		Type III crate		
Exceeding	Not exceeding	Group I wood $\frac{1}{2}$ / (Inches)	Group II, III, IV wood (Inches)	Group I wood $\frac{1}{2}$ / (Inches)	Group II, III, IV wood (Inches)	Group I wood (Inches)	Group II, III wood (Inches)	Group IV wood (Inches)
Grade A use:								
0	125	3/8	7/32	3/8	7/32		7/32	3/16
125	200		1/4		1/4		1/4	7/32
200	300						5/16	1/4
300	500						5/16	5/16
500	1,000						3/8	3/8
Grade B use:								
0	125	5/16	1/6	5/16	1/6	3/8	7/32	3/16
125	200	3/8	3/16	3/8	3/16		1/4	7/32
200	300						5/16	1/4
300	500						5/16	5/16
500	1,000						3/8	3/8

1/ The following species of group I woods of the same thickness permitted for group II and group III woods may be used: cottonwood, cypress, magnolia, fir (true firs), and spruce.

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3.3.1.3 Binding wires. Binding wires shall be applied mechanically and shall be continuous around the girth of the crate. Wire shall conform to 3.1.3. The gage of wire and maximum spacing between wires shall be as specified in table V. The minimum number of wires shall be as specified in table VI. Where possible, a binding wire shall be stapled over each intermediate cleat.

TABLE V. Gage and spacing of binding wires for all uses

Weight of contents (pounds)		Gage of wire <u>1/</u>	Maximum spacing (inches)	
Exceeding	Not exceeding	Grade A and B	Grade A	Grade B
0	125	15	9	11
125	200	14	9	11
200	700	13	9	11
700	1,000	12 Over cleats	10	12
		13 Over faceboard only		

1/ The gage of wire over cleats and intermediate wires shall be the same except as noted, or 700 to 1,000 lbs. loads.

TABLE VI. Minimum number of binding wires for both Grade A and Grade B

Length along face board cleat to cleat (Inches)	Minimum number of binding wires
Through 18	3
18-1/16 through 27	4
27-1/16 through 36	5
36-1/16 through 50	6
50-1/16 through 60	7
60-1/16 through 70	8
Over 70	9

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3.3.1.4 Staples for securing face boards to cleats or liners. Staples shall conform to 3.1.4, and table VII and VIIa.

TABLE VII. Minimum length and gage of staples - Grade A or B crates

Size of edge cleat (Inches)	Thickness of faceboards (Inches)	Length and gage of staples					
		Group II wood cleats (Inches)	Group II wood cleats (Gage)	Group III wood cleats (Inches)	Group III wood cleats (Gage)	Group IV wood cleats (Inches)	Group IV wood cleats (Gage)
13/16 x 7/8	7/32 to 3/8	1-1/4	16	1-1/4	16	1-1/8	16
1-1/8 x 1-1/8	Up to 1/4	1-1/2	15	1-1/2	14	1-1/4	14
1-1/8 x 1-1/8	5/16 to 3/8	1-1/2	15	1-1/2	14	1-3/8	14

TABLE VIIa. Minimum length and gage of staples - Grade A or B crates

Combined thickness of faceboard and intermediate cleat or liner (Inch)	Length and gage of staples			
	In boards only		In boards and over wires	
	(Inches)	(Gage)	(Inches)	(Gage)
3/16	3/8	20	7/16	20
1/4	3/8	20	7/16	20
5/16	7/16	18	7/16	18
3/8	1/2	18	9/16	18
1/2	11/16	18	3/4	18
3/4	7/8	16	7/8	16

3.3.1.5 Stapling over binding wires into cleats. Each binding wire shall be fastened by staples driven over binding wires, through face boards and through the cleats, and shall be long to produce a smooth clinch. Staples shall not be deformed or protrude from the sides of the cleats. The distance from the end of cleats at each corner to the first staple shall not exceed 1-5/8 inches. For the ends of the type II, class 1 crates, staples shall pass through the liner and the end face board and shall be clinched. The length and diameter of staples shall conform to requirements specified in tables VII and VIIa.

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3.3.1.5.1 Stapling over binding wires into face board only. Each binding wire shall be fastened by staples driven over binding wires into and through the face boards and clinched. Staples shall be spaced not more than 2 inches apart and not less than two staples per face board. Staples shall conform to the requirements specified in tables VII and VIIa.

3.3.2 Tops.

3.3.2.1 Battens for tops of the type III crates. Each top shall have a batten adjacent to and parallel to two opposite cleats of the blank. When possible, the top battens shall run parallel to the longest dimension of the top. When the distance between battens exceeds 14 inches, one or more intermediate batten shall be required. The distance between an intermediate batten adjacent to a cleat or between two intermediate battens shall not exceed 14 inches. Group I wood battens shall be not less than 1-3/4 inches wide. Group II, III, and IV wood battens shall be not less than 1-3/8 inch wide. Battens shall be not less than 3/4 inch thick. No part of any batten shall be more than 1/32 inch below or 1/8 inch above the specified thickness nor more than 1/16 inch below or 1/8 inch above the specified width.

3.3.2.2 Face boards. Face boards for tops of types II and III crates shall conform to table IV.

3.3.2.3 Assembly of tops. Face boards on tops of types II and III crates shall be fastened to each batten with staples not less than 16 gage, cement-coated or chemically-etched nails not less than 14-1/2 gage, or with clinched, uncoated nails. The length of the fastening for face boards 5/16 inch or less in thickness shall be not less than the thickness of the face boards 3/4 of the thickness of the battens. The points of the fasteners shall not protrude from the battens unless clinched. Face boards exceeding 5/16 inch thickness shall be attached to batten with nails having a minimum clinch of 1/8 inch or with staples having length equal to the combined thickness of face board and batten plus 1/4 inch. Face boards not exceeding 3-7/8 inches in width shall be fastened to each batten with not less than two nails or staples. Face boards exceeding 3-7/8, but not exceeding 5-5/8 inches in width shall be fastened to each batten with not less than three nails or staples. Face boards 5-5/8 to 7-1/2 inches in width shall be fastened to each batten with not less than four nails or staples. Nails or staples shall be spaced in accordance with commercial practice. Staples shall conform to 3.1.4 and nails shall conform to 3.1.5.

3.3.3 Base

3.3.3.1 Batten Base.

3.3.3.1.1 Battens. Battens shall be fabricated of group II, III, or IV wood. No part of any batten shall be more than 1/32 inch below the specified thickness nor more than 1/16 inch below the specified width (see figures 2A and 3). Each end shall have a batten adjacent to and parallel to two

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opposite cleats of the blank. Where possible, battens shall be adjacent to longer cleats. When the distance between battens to cleats exceeds 14 inches, one or more intermediate battens shall be required. The distance between an intermediate batten and a batten adjacent to a cleat or between intermediate battens shall not exceed 14 inches.

3.3.3.1.2 Boards. Boards conforming to 3.1.1 and 3.1.2, of thickness specified in table VIII, shall be used for the bases. The tolerance on base boards shall be $+1/8$ inch or $-1/32$ inch on thickness and $\pm 1/8$ inch on width.

3.3.3.1.3 Assembly of base. Face boards on base shall be fastened to battens or stringers with staples not less than 15 gage or with nails not less than 13 gage. The length of the nails used shall be such as to produce a clinch of $1/8$ inch minimum. When the combined thickness of deck board and stringer exceeds 2 inches, drive screws or ring nails shall be used, of such length as to penetrate not less than $3/4$ of the thickness of the stringer. When height of stringer is greater than $1-5/8$ inches, a clinch shall not be required, but the minimum length of the nail shall be such that $3/4$ of the shank shall penetrate into the skid. When the nails are not clinched, they shall be drive screw or ring shanked. When clinched, the length of the staples or nails shall be equal to the combined thickness of board and batten, plus a minimum of $1/8$ inch. Boards shall be fastened to battens or skids with the number of fasteners per joint as specified below:

<u>Face boards width</u>	<u>Number of fasteners</u>
1-3/4 inches	1
2-5/8 inches, not exceeding 3-7/8 inches	2
3-7/8 inches, not exceeding 5-5/8 inches	3
5-5/8 inches, not exceeding 7-1/2 inches	4

Nails or staples shall be spaced in accordance with commercial practice. Two rows of fasteners shall be required for $3-5/8$ inch wide stringers. Staples shall conform to 3.1.4 and nails shall conform to 3.1.5.

TABLE VIII. Thickness of sawed lumber for base boards, type III crates, all type loads

<u>Weight of contents</u> <u>(Pounds)</u>	<u>Wood groups II, III, IV</u> <u>Grade A or B</u> <u>(Inches)</u>
0-125	3/8
125-200	5/8
200-300	3/4

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TABLE VIII. Thickness of sawed lumber for base boards, type III crates, all type loads (cont'd)

Weight of contents (Pounds)	Wood groups II, III, IV grade A or B (Inches)
300-500	7/8
500-1,000	1-1/8

3.3.3.2 Stringer base (runners).

3.3.3.2.1 Stringers. Stringers shall be made from woods specified in 3.1.2 and shall have a thickness of not less than 1-5/8 inches. Stringers shall extend a minimum of 1/8 inch beyond the side panels of the assembled blanks. The size and spacing between stringers shall be as specified in table IX.

TABLE IX. Stringers (runners) - width and thickness, Grade A or B 1/

Weight of contents (Pounds)	Width (Inches)	Thickness (Inches)	Maximum spacing (Inches)
0-400	2-3/8	1-5/8	20
400-700	2-3/8	1-5/8	17
500-1,000	2-3/8	2-5/8	14

1/ Minimum dimensions of stringers (runners) for type II, class 2 crates with weight of contents exceeding 200 pounds, but not exceeding 500 pounds, and for type III crates with contents not exceeding 1,000 pounds.

3.4 Dimensions. Dimensions of crates furnished shall be inside measurements, as specified (see 6.2), and shall be cited in the sequence of length, width, and depth. The length dimension shall be the distance between the end panels of the crate; the width dimensions shall be the distance between the side panels of the crate; and the depth dimension shall be the distance between the top and base panels of the crate. Dimensions shall be measured between the inner-most surfaces of opposite panels, see applicable figure.

3.5 Marking for identification. Marking for identification shall be applied by the manufacturer and shall include box-maker's name and address or trademark and address, specification compliance data, type, class, style, and grade, maximum allowable weight of contents and type of load (see 6.1 through 6.1.4.3).

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3.5.1 Preservative identification. The letters "PA" shall be annotated on all Grade A boxes when treated with PQ 56 (copper-8-quinolinolate) preservative in accordance with 3.7. The letters "PB" shall be annotated on all Grade A boxes when treated with M-GARD W550 (zinc naphthenate emulsifiable) preservative in accordance with 3.6 (see 6.3).

3.6 Preservative treatment. When process 2 is specified, the entire crate or parts of the unassembled crate shall be completely immersed or flushed for a minimum of one minute in a solution of water repellent wood preservative PQ56 reduced with water down to 1.8 percent copper-8-quinolinolate solution (see 6.1.3) or sprayed with an emulsion of wood preservative M-GARD W550 (zinc naphthenate) reduced with water down to 3 percent zinc as a metal (see 6.1.3) over dried surfaces. Care shall be exercised, to ensure complete coverage of all surfaces. After treatment the crates shall be dried. The crates shall show evidence of discoloration when tested in accordance with 4.3.3. For overseas shipment, process 2 must be used (see 6.2).

3.7 Material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this document.

3.8 Workmanship. The end item shall conform to the quality of product established by this document and the occurrence of defects shall not exceed the applicable acceptable quality levels.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. 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 the 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.

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4.1.2 Responsibility for dimensional requirements. Unless otherwise specified in the contract or purchase order, the contractor is responsible for ensuring that all specified dimensions have been met. When dimensions cannot be examined on the end item, inspection shall be made at any point, or at all points in the manufacturing process necessary to ensure compliance with all dimensional requirements.

4.2 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.2.1 Component and material examination. In accordance with 4.1, components and materials shall be examined in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.2.1.1 Components and materials testing. Tests shall be performed on representative samples from each lot of materials and components used in fabrication of the end item for the characteristics listed in table X. The number of sample units to be tested, randomly selected throughout the lot of the applicable component or material, shall be as indicated in table X. When testing for moisture content of wood, using the moisture meter method, the average of the three determinations taken on each sample unit shall represent the moisture content (percent) for the unit. All tests for characteristics noted in table X shall be reported on the results of each sample unit tested. Any sample unit failing to meet the specified requirement of tolerance range shall be cause for rejection of the lot.

TABLE X. Testing of components and materials

Component	Character- istic	Basic spec. rgmt. para.	Test methods	Number determinations per sample unit	Results reported to nearest	Sample unit	Sample size
Cleats, battens, sawed faceboards, and veneer board	Moisture content	3.1.2.1	MIL-STD-731 Oven method	1, after con- stant weight is attained	Percent	1 piece, not less than 9 square inches, weighing not less than 20 grams	5
			Moisture meter method 4.2.1.1	3	Percent	1 piece	5
Binding wire	Ductility	3.1.3	4.3.2	1	Pass or fail	2 piece wire	5
Coating of binding wire	Adherence	3.1.3	4.3.1	1	Pass or fail	1 piece, 3 yds	5
Coating of stapling wire	Adherence	3.1.4	4.3.1	1	Pass or fail	1 piece, 3 yds	5

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4.2.2 End item visual examination. The end items shall be examined for the defects listed in table XI. The lot size shall be expressed in units of crates of the same type, class, style, grade, and size, and in units of bundles or palletized unit loads of knocked-down crates, as applicable. The sample unit shall be one completely assembled or knocked-down crate with skid when applicable. The inspection level shall be I and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for minor defects.

TABLE XI. End item visual defects

Examine	Defect	Category	
		Major	Minor
Material	Wood group or combination of species not as specified		201
Cleats, battens, liners and skids	Fractures, cracked, or damaged	101	
	Bark or wane on cleat exceeding 3/8 inch from any edge of member		202
	Bark or wane on batten exceeding 3/8 inch from any edge		203
	Any through check, split or shake longer than width of the member	102	
	Knots or knot holes in cleats and battens exceeding 1/4 the width or depth of cleat or batten and closer than 1-1/4 inch from the end	103	
	Knot or knot hole in liner exceeding 1/2 inch in diameter or closer than 1-1/4 inch from the end		204
	Slope of grain exceeds 1 inch in 10 inches of length	104	
	Cleat not single piece of wood	105	
	Ends of cleat not mitered or mortised and tenoned (not applicable to type III, class 1 crate)		205
	Cleats not butt ended on type III, class 1 crates	106	
Face boards	Sound knot exceeding 1-1/2 inch in diameter or exceeding 1/3 the width of board	107	
	Loose knots or knot holes exceeding 1-1/8 inch in diameter or more than one per face between adjacent binding wires	108	
	Sound knots closer than 1 inch to any edge of the board	109	

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TABLE XI. Classification of defects (cont'd)

Examine	Defect	Category	
		Major	Minor
Face boards (cont'd)	Not sawed lumber, veneer or plywood	110	
	Knot clusters exceed two inches in diameter or exceed 1/3 of the width of the board	111	
	Decay in wood	112	
	Slope of grain exceeds 1 inch in 8 inches length in sawed lumber or veneer	113	
	Thickness of face boards less than specified (see table III)	114	
	Grain of end face boards not vertical for type II, class 1 crates		206
	Grain of end face boards not horizontal for type II, class 2 crates	115	
	Grain of plywood face boards not parallel to length of board	116	
Construction crate	Not type, class, style, or grade specified	117	
	Any design or construction detail, including location of cleats, skids and battens, not as specified, except as otherwise classified herein (figures 1-7)	118	
Binding wire and fasteners	Binding wire not continuous around girth of box	119	
	Fasteners and binding wires less than minimum number specified	120	
	Binding wires not fastened with staples as specified	121	
	Staples or nails not spaced as specified, or not clinched where required	122	
	Nails not cement coated or chemically etched when not clinched	123	
	Staples or nails not fully driven	124	
	Staple or nail points protruding	125	
Closures	Ends of girth wire extends less than 2-1/4 inches beyond edge of slats (figure 7)	126	

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TABLE XI. Classification of defects (cont'd)

Examine	Defect	Category	
		Major	Minor
Closures (cont'd)	Loop closures and looped fasteners not as specified (figure 8)		207
Face board coverage	Total face board coverage less than 50 percent on each face, as applicable	127	
Marking for identification	Not legible or not as specified	128	
Workmanship	Out of square	129	
	Binding wire loose	130	
	Missing component	131	
	Not clean		208

4.2.3 End item dimensional examination. The end items shall be examined for conformance to the dimensions specified in applicable figures. Any dimensions not within the specified tolerance shall be classified as a defect. The lot size shall be expressed in units of crates of the same type, class, style, grade, and size, and in units of bundles or palletized unit loads of knocked-down crates, as applicable. The sample unit shall be one completely assembled or knocked-down crate with skid when applicable. The inspection level shall be S-1 and the AQL, expressed in terms of defects per hundred units, shall be 2.5.

4.2.4 End item testing. When applicable, one sample unit shall be selected at random from the each lot and tested in accordance with 4.3.3. Any test failure shall be cause for rejection of the lot.

4.2.5 Examination of preparation for delivery. The end items shall be examined for the defects listed in table XII. The lot size shall be expressed in units of bundles or palletized unit loads of knocked-down crates, as applicable. The sample unit shall be one bundle of knocked-down crates or one palletized unit load when unit loads are specified. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units, shall be 1.0 for major defects and 4.0 for minor defects.

TABLE XII. Preparation for delivery defects

Examine	Defect	Category	
		Major	Minor
Bundle	Number of crates more than specified or identified quantity		201

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TABLE XII. Preparation for delivery defects (cont'd)

Examine	Defect	Category	
		Major	Minor
Bundle (cont'd)	Not neatly, uniformly, and securely bundled	101	
Unit loads (when specified)	Not palletized as specified	102	
Strapping	Less than three straps	103	
	Less than 5/8 inch width or 0.020 inch thick	104	
	Not flat steel strapping	105	
	Loose or not securely sealed	106	
Size of load	Not as specified	107	
Marking of bundles or palletized unit loads	Markings not placed on tags	108	
	Markings omitted, incomplete, incorrect, illegible, of improper size, location, sequence or method of application	109	

4.3 Test methods.

4.3.1 Adherence of galvanized coating on wire. The following tests shall be performed to determine the adherence of the galvanized coating on wire. The wire shall be wrapped in a closed helix for at least two complete turns, at a rate of not more than fifteen turns per minute, around a cylindrical mandrel 3/16 inch in diameter. After this operation, the coating shall not flake or be removed by rubbing bare fingers over the wire on the mandrel.

4.3.2 Ductility of binding wire. Two pieces of binding wire shall be clamped in a vise and a twisting tool applied to the free ends of wire. The wire shall be twisted by the tools as specified below:

<u>Gage of wire</u>	<u>Amount of complete turns</u>
16	2-1/2
15	2
14	2
13	1-1/2
12	1-1/2

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After completing the specified amount of turns, the tools shall be removed and the wire shall show no fracture when examined under a magnifying lens of minimum 3.0 x power. A typical twisting tool is illustrated in figure 7.

4.3.3 Preservative tests.

4.3.3.1 PQ 56 (copper-8-quinolinolate) preservative test. Two drops of a formulation containing 10 parts, by weight, of sodium diethyl-dithiocarbamate trihydrate (see 6.3.3) and 90 parts, by weight, of distilled water shall be applied to the wood surface. An immediate dark brown coloration and the spreading of drops shall indicate the presence of PQ 56 treatment. An alternate method is to spray, over the dried wood surface, a solution of dissolved 0.5 grams chrome azurol S concentrate (see 6.3.4) and 5.0 grams of sodium acetate in 80 mL of distilled water, and diluted further to 500 mL total distilled water. A deep blue color reveals the presence of copper (from copper-8-quinolinolate).

4.3.3.2 M-GARD W550 (zinc naphthenate emulsifiable) preservative test. Prepare daily a solution of 0.1 gram of dissolved dithizone (diphenylthiocarbazone) (see 6.3.5) in 100 mL of chloroform and spray evenly over dried wood. A pink color indicates the presence of zinc. (NOTE: the pink color fades with light.) An alternate method is to prepare a mixture of 10 mL each of three stock solutions and pour them into an atomizer (sprayer). The first stock solution is comprised of 1 gram of potassium ferricyanide dissolved in 100 mL of distilled water. The second solution is made of 1 gram of potassium iodide dissolved in 100 mL of distilled water with a starch indicator. The starch indicator solution is made from a paste of 1 gram of soluble starch in about 5 mL of distilled water which is added to 100 mL of distilled water and boiled for one minute with constant stirring, and then cooled. (NOTE: This solution is subject to biodegradation and should not be used longer than three days.) Spray the mixture evenly over the dried wood surface. The solution will cause the treated wood to turn a deep blue immediately, and the untreated part will retain its original color.

5. PACKAGING

5.1 Level C packaging and packing.

5.1.1 Bundling. Unless otherwise specified (see 5.1.2), wirebound crates shall be shipped knocked down to occupy a minimum amount of space and, where practicable, shall be tied with wire or metallic or nonmetallic strapping in bundles of not more than 10.

5.1.2 Unit loads. When specified (see 6.2), knocked-down wirebound crates shall be shipped as a palletized unit load. The unit load shall be made of individual crates or bundles of 10 individual wirebound crates stacked to occupy a minimum amount of space. The load shall be strapped to the pallet with a minimum of three 5/8 inch by 0.020 inch flat steel straps drawn to the

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maximum tension and sealed securely. Size of palletized load shall be such as to permit loading of minimum carload quantities by rail or truck. Palletized unit loads shall not exceed 2,000 pounds.

5.2 Marking. In addition to any special marking required by the contract or purchase order, shipments shall be marked in accordance with MIL-STD-129, utilizing tags (see 6.2).

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Crates covered by this specification are intended for use in the domestic and overseas shipment of general material and supplies (other than fresh fruits and vegetables, dressed poultry and uncanned meats) not requiring the protection provided by boxes and particularly where light weight containers are desired. The engineering design of crates includes the consideration of normal stresses imposed on loaded crates by stacking, handling, fork lift trucks, as well as stresses on members encountered by drops. Use should be confined to the weight of contents limitations of the several types.

6.1.1 Grades.

6.1.1.1 Grade A. Grade A crates covered by this specification are primarily intended for rigorous shipment, repeated handling, protected and unprotected storage, and possible extreme climatic conditions. Grade A crates should meet all requirements for overseas shipment.

6.1.1.2 Grade B. Grade B crates covered by this specifications are primarily intended for normal shipping, handling, and storage requirements where the additional strength of the grade A crate is not required.

6.1.2 Types.

6.1.2.1 Type I crates. Type I crates provide an economical means of overwrapping an item or fiberboard box to gain additional protection and stacking strength in shipment, handling, and storage. Type I crates can be palletized for high stacking.

6.1.2.2 Type II crates. Type II crates are intended for use with type I and II loads (see 6.1.4.1 and 6.1.4.2), and where ends are desirable for additional protection of the end item. Class 1 crates with wired ends are easily assembled. Class 1 and class 2 crates are identical, except for the batten type end which provides additional resistance to stacking loads, particularly for crates of larger width. Batten type ends may be held in place behind the cleat framework of the crate by the load or nailed in place as desired.

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6.1.2.3 Type III crates. Type III crates are intended for type I, II, or III loads (see 6.1.4 through 6.1.4.3), but are primarily designed for type 3 loads which lend no support to the faces of the crate. Variations of base construction permit a latitude of choice or preference, depending on the item to be packed and the desired method of assembling the wirebound blank to the base. Crates are intended for items such as refrigeration components, engines, machinery, or like equipment. Items packed in type III crates would typically be bolted to the base. In conjunction with, or in lieu of bolting, metal strapping, wood blocks, braces, or combinations of methods shall be used to prevent movement of load within the crate.

6.1.3 Process for preservation. The wood preservation used for process 2 crates will normally provide adequate protection against decay when adverse storage conditions will not exceed two years.

6.1.4 Types of loads. Type of load determined weight and size limitation applicable. The type of load falls in one of the following categories:

6.1.4.1 Type I (easy load). Articles of moderate density, packed in and completely filling one, and only one fiberboard box, which, in turn, completely fills and supports all the faces of the outer shipping crate into which it is packed; or a single article of moderate density which contacts and completely supports all the faces of the shipping crate and has sufficient strength, even through not crated, to withstand the forces encountered in transportation and handling, but required physical protection of the crate to prevent scratching or marring.

6.1.4.2 Type II (average load). Contents are moderately concentrated articles which may either be packed directly into the outer shipping crate or subjected to an intermediate stage of packing, such as wrapping or packing in a chipboard or fiberboard box or protected by other types of suitable interior packing. The contents or interior packing provide support for all the faces of the shipping crate.

6.1.4.3 Type III (difficult load). Contents are articles which are highly concentrated, require a high degree of protection, or do not support the shipping crate.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Type, class, grade, style, and process required (see 1.2).
- c. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- d. Type of load for type II and III crates (see 3.2.1.2 and 3.2.1.3).
- e. Inside dimensions (see 3.4).
- f. Quantity of crates required (see 5.1.1).

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- g. When knocked down wirebound crates are shipped as a palletized unit load (see 5.1.2).
- h. Weight of contents (see 5.1.2).
- i. Special marking when required (see 5.2).
- j. Whether process 2 preservative treatment is required for overseas shipment.
- k. Type of preservative required (see 3.6).
- l. When cushioning conforming to PPP-C-1752 is required (see 10.2 of appendix).

6.3 Solution information.

6.3.1 PQ 56 (copper-8-quinolinolate). Product may be obtained from ISK Biotech, Industrial Biosides Division, 6075 Poplar Avenue, Suite 306, Memphis, TN 38119 or equivalent manufacturer.

6.3.2 M-GARD W550 (zinc naphthenate emulsifiable). Product may be obtained from OMG, Inc., 2301 Scranton Road, Cleveland, OH 44113 or equivalent manufacturer.

6.3.3 Sodium diethyldithiocarbamate trihydrate. Product may be obtained from J.T. Baker, Inc., 222 Red School Lane, Phillipsburg, NJ 08865 or equivalent manufacturer.

6.3.4 Chrome azurol S. Product may be obtained from Eastman Fine Chemical, Laboratory & Research Products, Building 701, Rochester, NY 14652-3512 or equivalent manufacturer.

6.3.5 Dithizone (diphenylthiocarbazone). Product may be obtained from Mallinckrodt, Inc./Mallinckrodt Specialty Chemicals Co., Science Products Division, 675 Mc Donnell Boulevard, P.O. Box 5840, St. Louis, MO 63134 or equivalent manufacturer.

6.4 Subject term (key word) listing.

Binding wire
 Batten
 Cleats
 Preservative wired ends
 Sawed
 Staples
 Veneer
 Wired ends
 Wooden

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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Custodians:

Army - GL
Navy - SA
Air Force - 69

Preparing activity:

Army - GL
(Project 8115-0531)

Review activities:

Army - ME, SM, WC, WV
Air Force - 70, 71, 82
DLA - GS

User activities:

Navy - MC
Air Force - 80

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APPENDIX

REQUIREMENTS FOR ASSEMBLING AND CLOSURE
OF WIREBOUND CRATES

10. SCOPE

10.1 Scope. This appendix covers requirements for assembling and closing wirebound crates. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

10.2 Ordering data. When commodities are furnished or shipped in crates conforming to this specification, they shall be cushioned, blocked, braced, or bolted to prevent movement within the crate. Articles having fragile legs or bases shall be suspended or supported within the crate. Articles with highly finished surfaces shall be cushioned, braced, or bolted to provide sufficient clearance between surfaces of the article and crate members to prevent marring, chipping, or other injury in transit. Articles subject to damage or deterioration from exposure to the elements shall be completely covered, before crating, with barrier material conforming to PPP-B-1055. The position of the intermediate cleats and base boards shall be located considering item to be packed and requirements for blocking, bracing, or bolting. When specified (see 6.2), cushioning conforming to PPP-C-1752 shall be used to protect the contents.

20. APPLICABLE DOCUMENTS

20.1 Government documents.

20.1.1 Specifications. The following specifications form a part of this appendix to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto.

SPECIFICATIONS

FEDERAL

- PPP-B-1055 - Barrier Material, Waterproofed, Flexible
- PPP-C-1752 - Cushioning Material Packaging Polyethylene Foam

30. ASSEMBLING OF CRATES

30.1 Type I. Apply wirebound overwrap to carton and twist wires or closure loops in accordance with 40.

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APPENDIX (cont'd)

30.2 Type II.

30.2.1 Class 1. Class 1 crates shall be assembled by bending the looped end wires at right angles to the end, passing the loops through the notches in the cleats, and bending back the looped wire over and around the girth wire (see figure 9).

30.2.2 Class 2. Class 2 crates shall be assembled by nailing or stapling the end boards to the inside of each side cleat. Nails shall be not less than 0.075 inch diameter (14-1/2 gage) and staple shall be not less than 0.0625 inch diameter (16 gage). The length of each fastener shall be not less than the thickness of the end boards plus three quarters of the thickness of the cleats. The points of fasteners shall not protrude. The average spacing of fasteners shall not exceed 2-1/2 inches.

30.3 Type III.

30.3.1 Class 1 (figure 4). The front and back bottom cleats shall lock in under the overhanging base boards. The top battens shall recess down inside the top cleats of the blank. Nail diameters shall be as specified in 30.2.2. Drive not less than two 2-1/2 inch drive screw nails adjacent to the wire, through the bottom cleat of the front and back sections, into the adjacent skid of the base. Drive not less than one 2-1/2 inch drive screw nail through the face board and cleat, at the center of each side section, into the adjacent base board or center skid. Secure the top by driving not less than two 2-1/2 inch drive screw nails through each top cleat into the adjacent batten of the top.

30.3.2 Class 2 (figure 5). The bottom side cleats shall abut the base members. The bottom cleats of the front and back sections shall rest on top of the base skids. The top battens shall recess down inside the top cleats of the blank. The nailing requirement of 30.3.1 shall apply.

30.3.3 Class 3. All the bottom cleats of the wirebound blank shall recess into a channel provided by the overhanging top and bottom base boards. Top battens shall recess down inside the top cleats of the blank. The nailing requirements of 30.3.1 shall apply.

40. CLOSING OF CRATES

40.1 Style 1. Style 1 twisted wire closures shall be closed by using special hand tools available from any crate supplier. For best performance it is essential the correct twist be achieved. Closure shall conform to requirements of figures 7 and 8.

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APPENDIX (cont'd)

40.2 Style 2. Style 2 looped closures shall be closed by bringing the cleats at the closing edge together and inserting the narrow loop through the wide loop and bending it horizontally against the side of the crate. Style 2 loop closure shall be closed with a Sallee Closer as shown on figures 7 and 9. If a tool other than a Sallee Closer; for example, hammer, is used it should be determined that the closure is similar in all respects regarding tightness of wire, fold over of loop and radius of bends of the wire. That portion of the wire loop which is bent horizontally shall be essentially parallel to the side of the crate and the end of the narrow loop shall be not more than 1/4 inch away from the side of the crate.

50. INSPECTION PROCEDURES

50.1 Conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

50.1.1 Examination of assembly and closure. The crates shall be examined for the defects listed in table XIV. The lot size shall be expressed in units of assembled and closed crates. The sample unit shall be one completely assembled and closed crate. The inspection level shall be S-4 and the AQL, expressed in terms of defects per hundred units, shall be 4.0 for major defects and 10.0 for total (major and minor combined) defects.

TABLE XIV. Assembly and closure defects

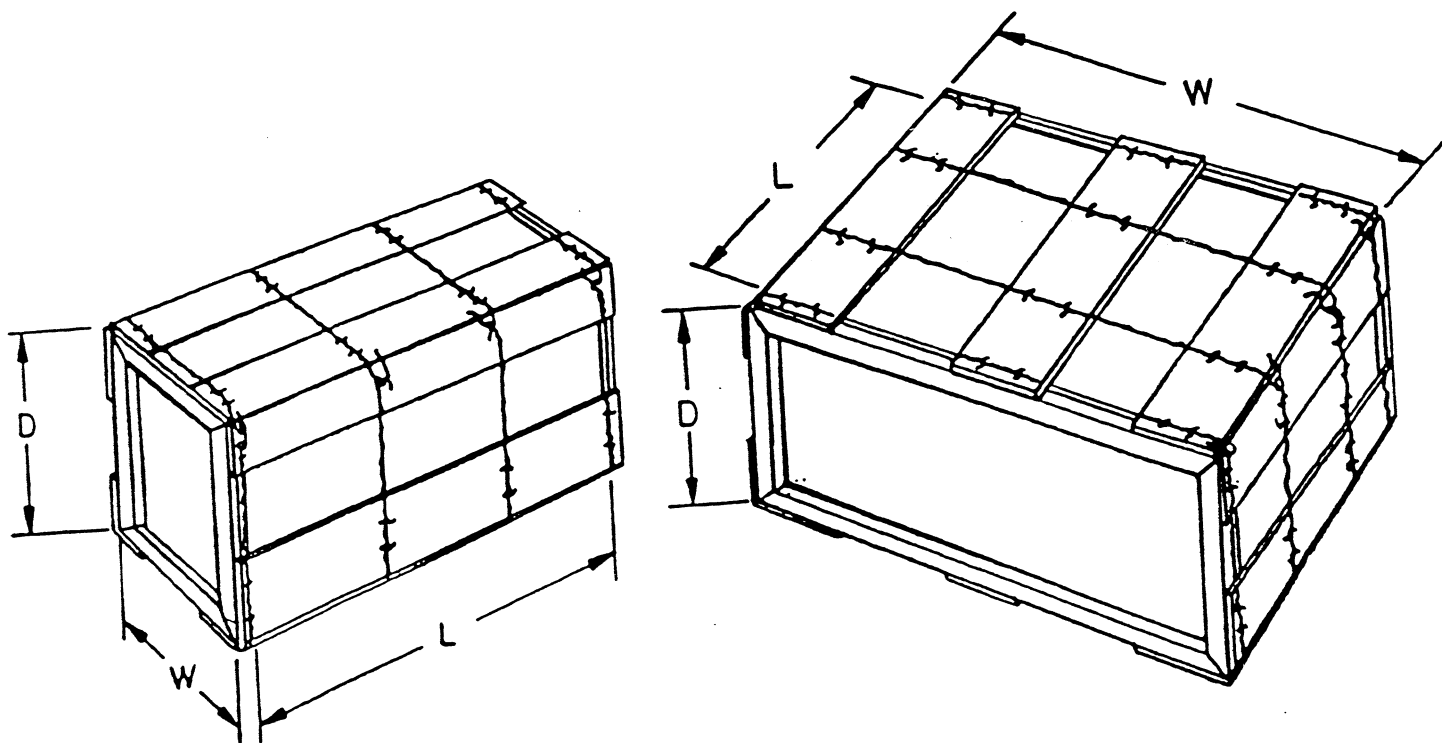
Examine	Defect	Category	
		Major	Minor
Assembly type II, class 2	End boards not fastened to inside of side cleats with nails or staples	101	
	Nails or staples for fastening end boards to side cleats less than diameter or gage specified	102	
	Length of fasteners less than thickness of end boards plus 3/4 thickness of the cleats	103	
	Point of fasteners protrudes from cleat.	104	
	Average spacing of fasteners more than 2-1/2 inch		201
Type III, styles 1, 2, and 3	Bottom cleat of front and back sections not fastened to skid of base as specified	105	

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TABLE XIV. Assembly and closure defects (cont'd)

Examine	Defect	Category	
		Major	Minor
Type III, styles 1, 2, and 3 (cont'd)	Faceboard and cleat at center of each side section, not fastened to adjacent cleat or center skid as specified	106	
	Top not fastened as specified	107	
	Size and type of nail not as specified	108	
Closure types 1, 2, and 3, all styles	Not closed	109	
	Not closed as specified		202
	Insecure closure	110	
Condition of crates	Broken or fractured wooden component	111	
	Broken wire	112	

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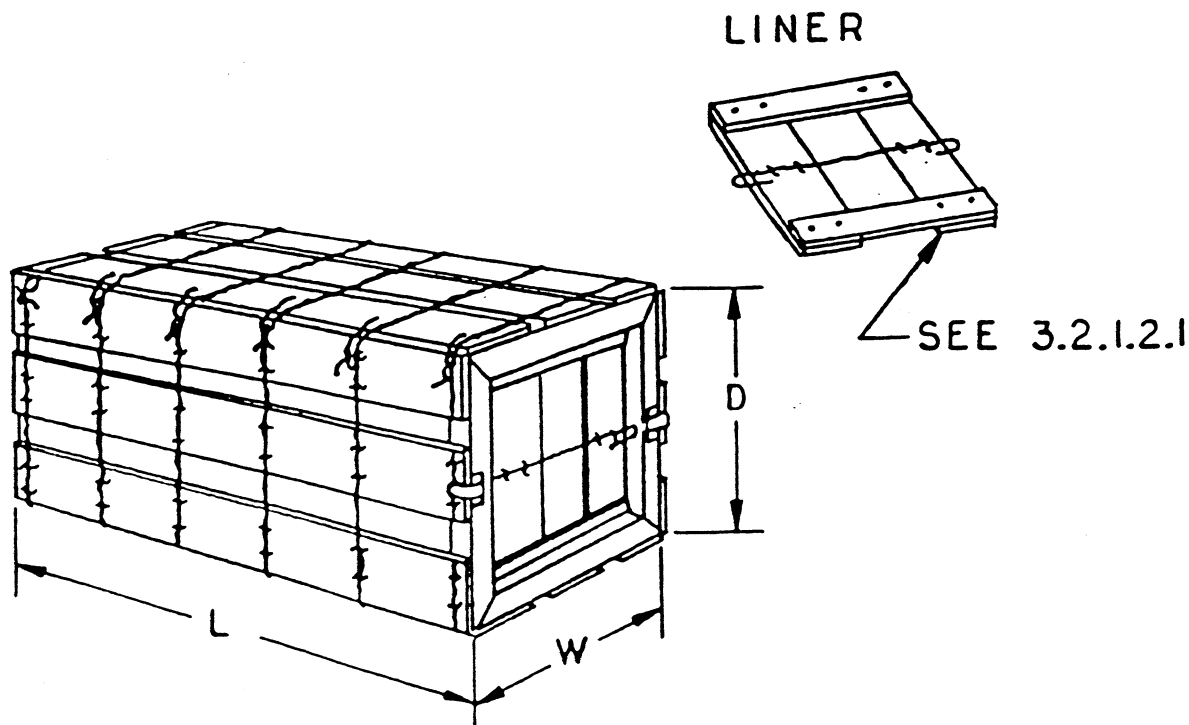
Overwrap - no ends - see 6.1.2
Maximum weight of contents 200* pounds for type I load only.

Notes:

1. Add 1/4 inch to dimensions required to clear intended load. Inside length of overpack is distance between cleats.
2. Cleats shall be 13/16 wide by 3/4 inch thick for length of cleat not exceeding 30 inches, and contents not exceeding 125 pounds.
*When cleat required is over 30 inches long or weight of contents exceeds 125 pounds, cleats shall be 1-1/8 x 1-1/8 inch. No cleat shall exceed 60 inches long. No intermediate cleats are required.
3. Faceboard thickness shall be as specified in table IV.
4. Minimum faceboard width shall be 3-3/8 inch. Maximum space between faceboards shall be 12 inches, but in no case shall the total faceboard coverage be less than 50 per cent on each face.
5. Binding wires - for requirements see tables V and VI.
6. Staples - for requirements see table VII.
7. No ends are required.

FIGURE 1. TYPE I; OVERWRAP, NO ENDS

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Conventional crate - with wired ends.

Maximum weight of contents 200 pounds. For type I or type II loads only, maximum width or depth shall not exceed 30 inches.

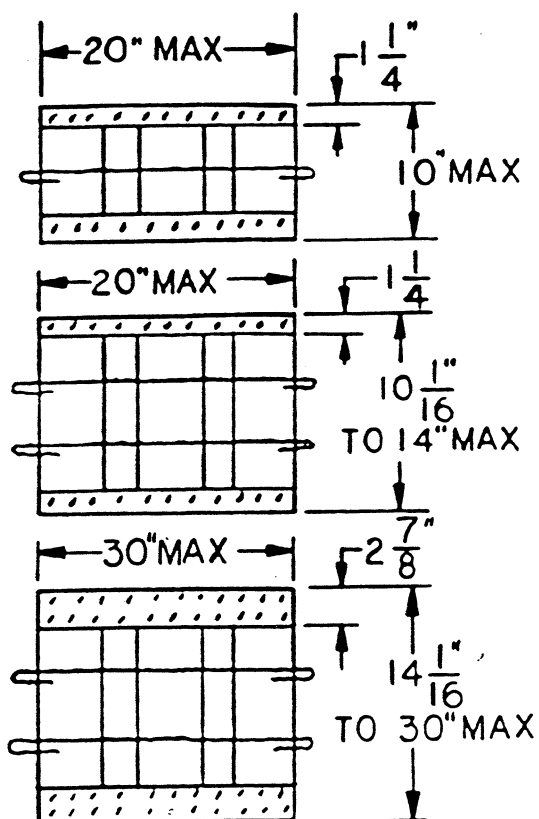
Notes:

1. For inside dimensions add $1/4$ inch to dimensions required to clear intended load. Inside length shall be the clear distance between the ends when in the assembled position.
2. Edge cleats shall be $13/16$ wide by $3/4$ inch thick for length of cleat not exceeding 20 inches. When cleat length required is over 20 inches, cleats shall be $1-1/8 \times 1-1/8$ inch. See tables II and III for intermediate cleat requirements.
3. Faceboard thickness shall be as required in table IV.
4. Minimum faceboard width shall be $3-3/8$ inch. Space between faceboards shall not exceed 12 inches, but in no case shall the total faceboard coverage be less than 50 per cent on each face.
5. Binding wires - for requirements see tables V and VI.
6. Staples - for requirements see tables VII.
7. End construction shall conform to figure 2A except that when specified liners and wires may be on the inside of the crate.

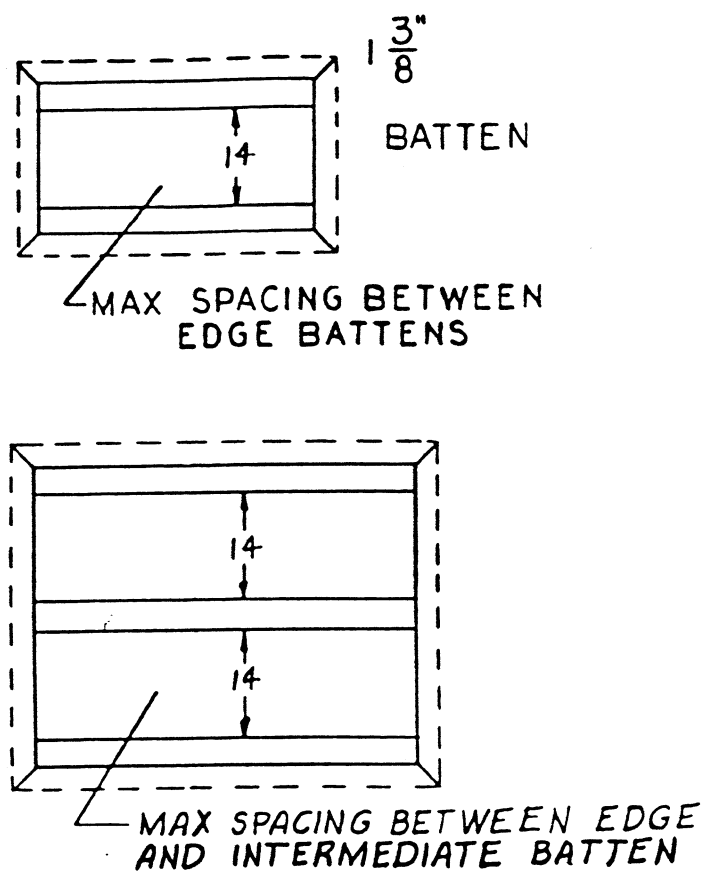
FIGURE 2. TYPE II, CLASS 1; CONVENTIONAL CRATE, WIRED ENDS

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TYPE II, CLASS 1

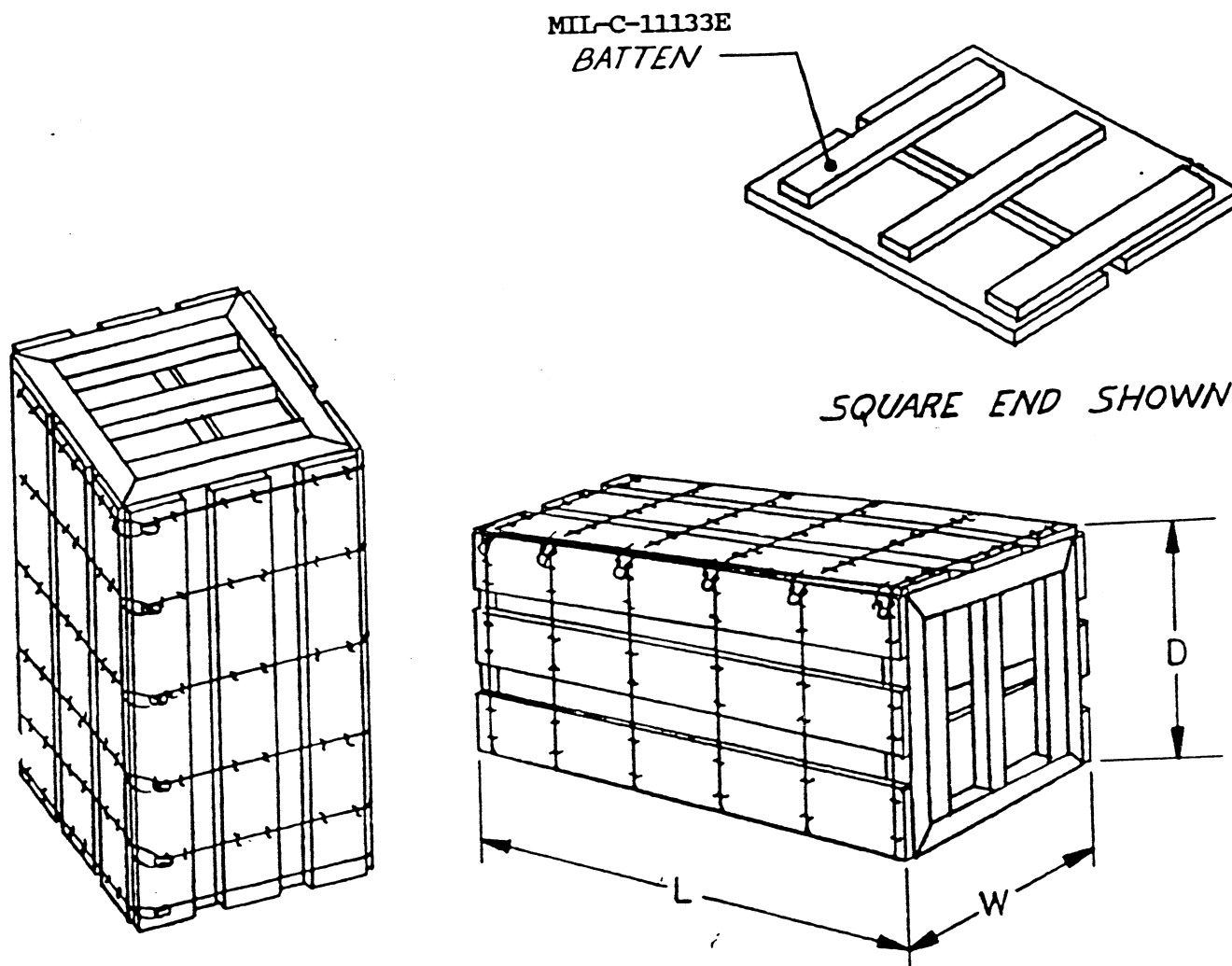


TYPE II, CLASS 2



1. Ends - Type II, class 1 - width of liners, number of rows of staples and number of wires shall be as shown. Gage of wire shall be the same as required for the wirebound blank. See table VII for staple requirements.
2. Ends - Type II, class 2 - the minimum size of battens shall be 1-3/8 inches by 3/4 inch.

FIGURE 2A. TYPE II CRATES; END CONSTRUCTION REQUIREMENT



Conventional crate - with batten ends

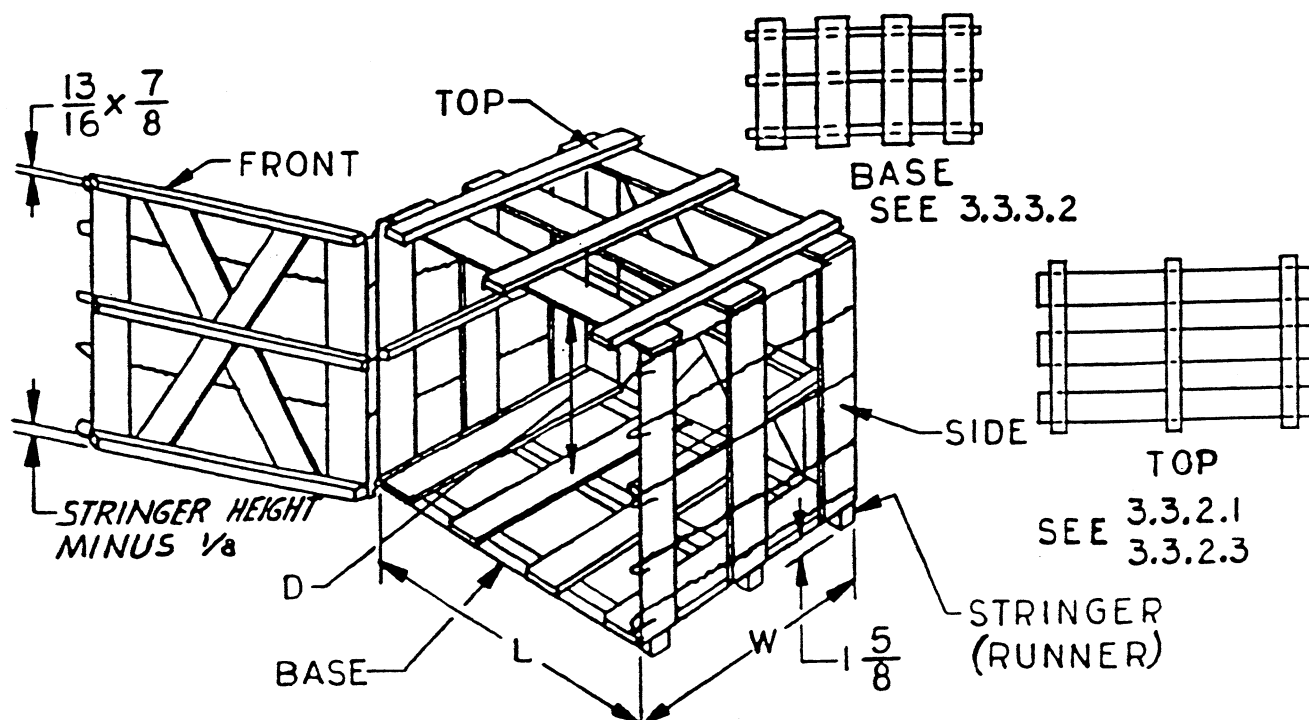
Maximum weight of contents 200 pounds for type I or II loads only.

Notes:

1. For inside dimensions add 1/4 inch to dimensions required to clear intended load. Inside length shall be the clear distance between ends when ends are in assembled position.
2. Cleats shall be 13/16 wide by 3/4 inch thick. See tables II and III for intermediate cleat requirements.
3. Faceboard thickness shall be as specified in table IV.
4. Minimum faceboard width shall be 3-3/8 inch. Space between faceboard shall not exceed 12 inches, but in no case shall the total faceboard coverage be less than 50 per cent on each face.
5. Binding wires - for requirements see tables V and VI.
6. Staples - for requirements see table VII.
7. End construction shall conform to figure 2A.

FIGURE 3. TYPE II, CLASS 2; CONVENTIONAL CRATE, BATTEN ENDS

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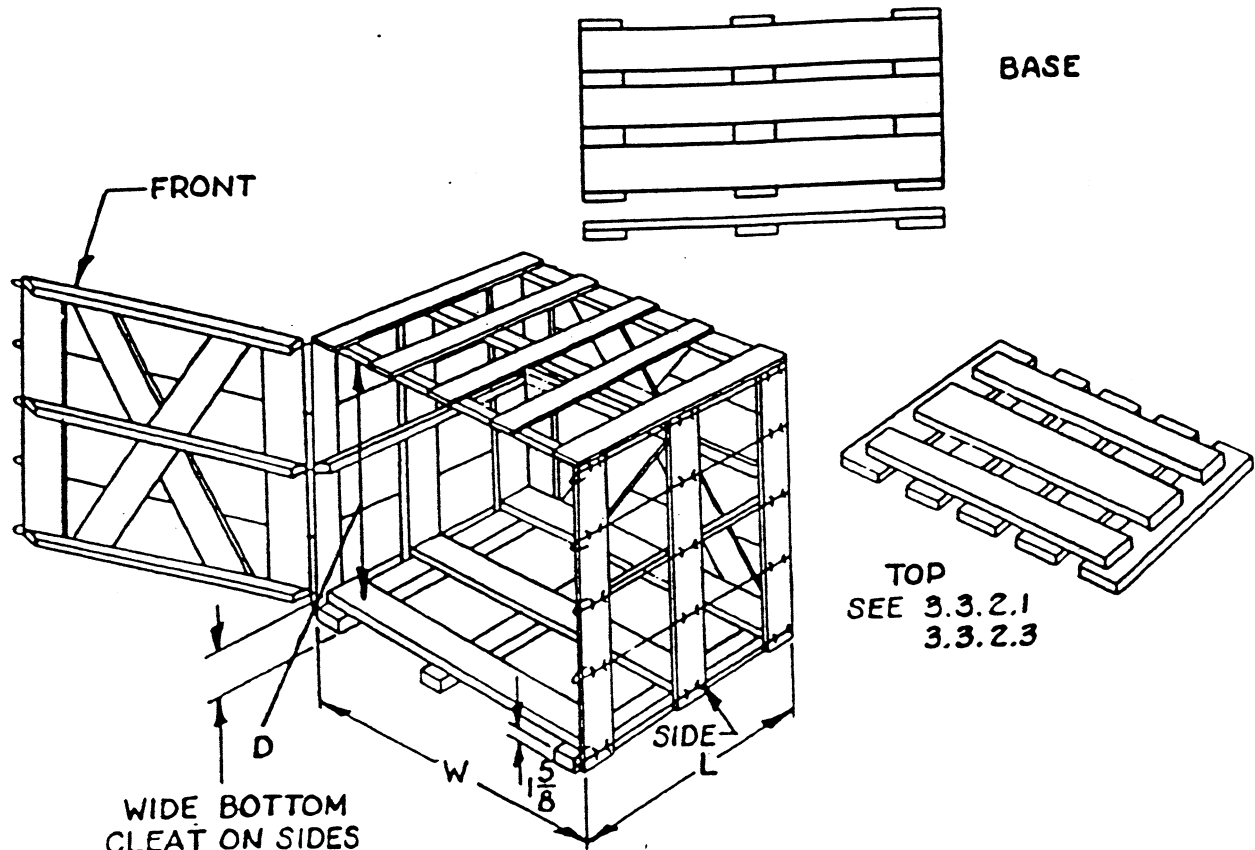


Notes:

1. For inside dimensions add adequate clearance, as determined by the user, to dimensions required to clear the intended loads. Inside length is the clear inside dimension parallel to the stringers (runners) of the base measured between intermediate cleats if any. Width is the clear inside dimension at 90 degrees to the stringers measured between intermediate cleats, if any. Depth (height) is the vertical dimension required from the top of the base deckboard to the under side of the top. Where no intermediate cleats are required, inside dimensions are the distances between faceboards when crate is in assembled position.
2. Edge cleats shall be $13/16$ wide by $3/4$ inch thick, except the front and back bottom cleat, which shall be $1/8$ inch less than the stringer thickness by $3/4$ inch.
See tables II and III for intermediate cleat requirements.
3. Faceboard thickness shall be as specified in table IV.
4. Minimum faceboard width shall be $3-3/8$ inch. When diagonals cannot be used because the minimum angle between faceboard and diagonal is less than 14° , space between faceboards shall not exceed 12 inches, but in no case shall the total faceboard coverage be less than 5° per cent of each face.
5. Binding wires - for requirements see tables V and VI.
6. Staples - for requirements see table VII.
7. Base construction - see tables VIII and IX for requirements.

FIGURE 4. TYPE III, CLASS 1; UPRIGHT CRATE, INTERLOCKING, BASE

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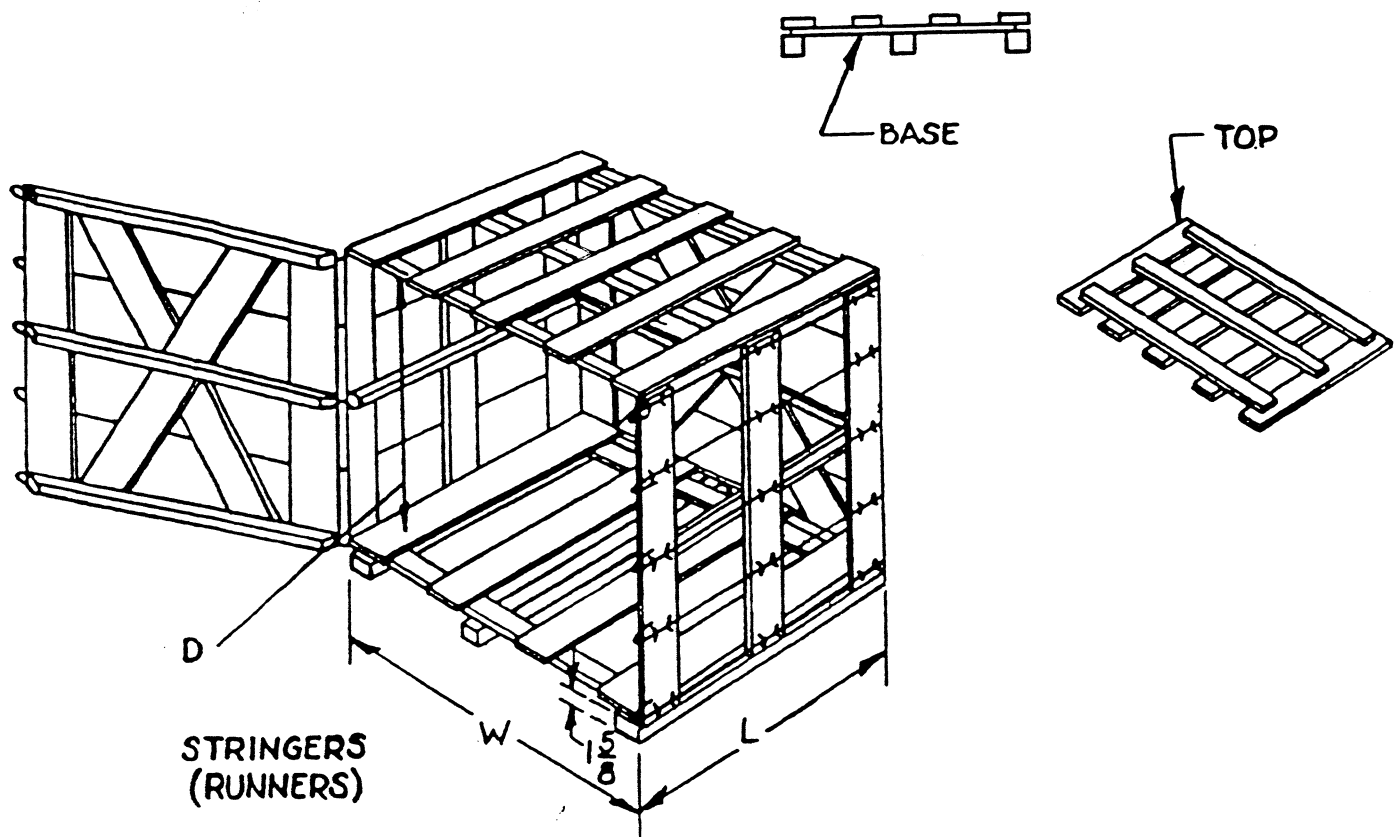


Notes:

1. For inside dimensions add adequate clearance, as determined by the user, to dimensions required to clear intended load. Inside length is the clear inside dimensions parallel to the stringers (runners) of the base measured between intermediate cleats if any. Width is the clear dimension at 90 degrees to the stringers measured between intermediate cleats if any. Depth (height) is the vertical dimension measured from the top of the base deckboard to the under side of the top. When no intermediate cleats are required, inside length and width are the inside distances between faceboards. Depth is the same as above.
2. Edge cleats shall be $13/16$ wide by $3/4$ inch thick, except the wide bottom side cleats as shown above. The width of the bottom side cleats shall be equal to the combined thickness of the stringers (runners) and base deckboards required minus $1/8$ inch. See tables II and III for intermediate cleat requirements.
3. Faceboard thickness shall be as specified in table IV.
4. Minimum faceboard width shall be $3-3/8$ inch. When diagonals cannot be used because the minimum angle between faceboard and diagonal is less than 14° , space between faceboards shall not exceed 12 inches, but in no case shall the total faceboard coverage be less than 50 per cent of each face.
5. Binding wires - for requirements see tables V and VI.
6. Staples - for requirements see table VII.
7. Base construction - see tables VIII and IX.

FIGURE 5. TYPE III, CLASS 2; UPRIGHT CRATE, FLUSH BASE

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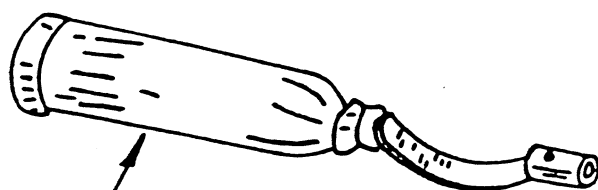
Notes:

1. For inside dimensions add adequate clearance, as determined by the user, to dimensions required to clear intended load. Inside length is the clear inside dimension parallel to the stringers (runners) of the base measured between intermediate cleats if any. Width is the clear inside dimension at 90 degrees to the stringer measured between intermediate cleats if any. Depth (height) is the vertical dimension measured from the top of the base deckboard to the under side of the top. When no intermediate cleats are required, inside length and width are the distance between faceboards. Depth is the same as above.
2. Edge cleats shall be $13/16$ wide by $3/4$ inch thick.
3. Minimum faceboard width shall be $3-3/8$ inch. When diagonals cannot be used because the minimum angle between faceboard and diagonal is less than 14° , space between faceboards shall not exceed 12 inches, but in no case shall the total faceboard coverage be less than 5° per cent of each face.
4. Binding wires - for requirements see tables V and VI.
5. Staples - for requirements see table VII.
6. Base Construction - see tables VIII and IX.

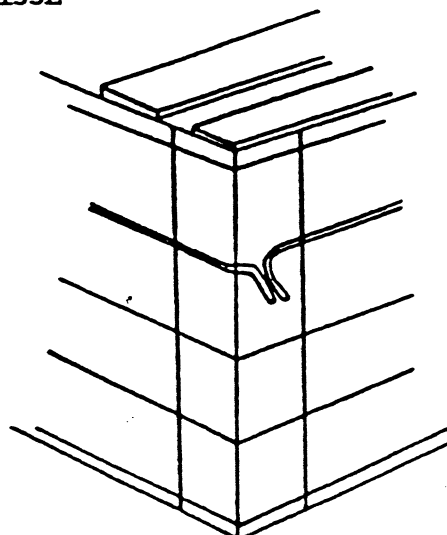
FIGURE 6. TYPE III, CLASS 3; UPRIGHT CRATE, CHANNEL BASE

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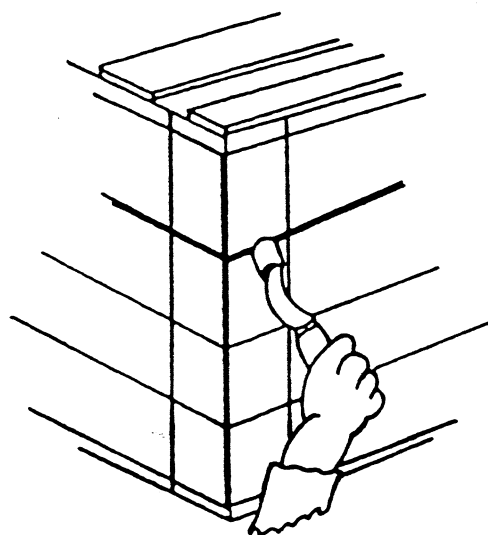

STYLE 1 TWISTED WIRE CLOSURE



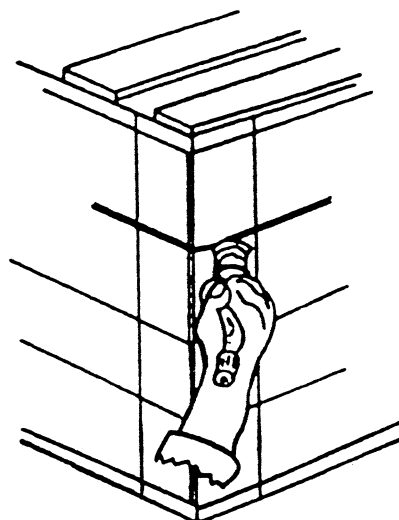
HAND TWISTER
SEE 40.1



1. AFTER THE CRATE IS PREPARED FOR CLOSING, THE WIRES ARE BENT AT RIGHT ANGLES TO THE BOX APPROXIMATELY $5/8$ " FROM THE CLOSING EDGE.



2. THE END OF THE BIT IS PUSHED OVER THE WIRES AGAINST THE CRATE THEN THE HAND TWISTER IS ROTATED UNTIL THE WIRES ARE CUT OFF.

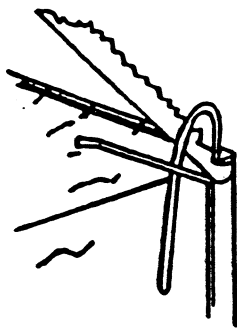


3. AFTER ALL OF THE TWISTS ARE COMPLETED THEY ARE KNOCKED AGAINST THE CRATE PARALLEL TO THE BINDING WIRE - WITH THE BUTT END OF THE TOOL.

CRANK TWISTER AND POWER TWISTER (ELECTRIC OR PNEUMATIC) ARE ALSO AVAILABLE FROM ANY WIREBOUND CRATE SUPPLIER.

FIGURE 7. CLOSING STYLE 1 CRATE; TWISTED WIRE CLOSURE

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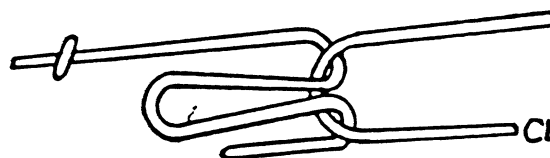
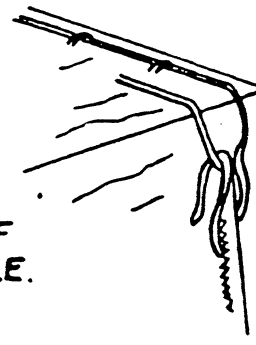
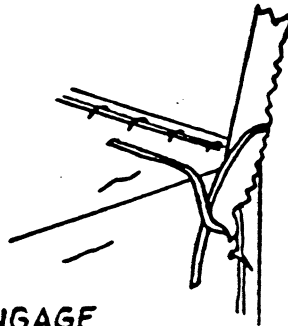


SALLEE CLOSER
SEE 40.2

1. INSERT SALLEE CLOSER THROUGH NARROW LOOP AND CATCH WIDE LOOP IN NOTCH ON END OF TOOL.

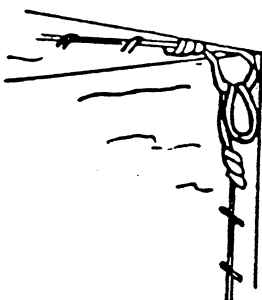
2. PUSH WIDE LOOP AGAINST SURFACE OF CRATE FACE, ENGAGE NARROW LOOP IN TEETH OF TOOL AND START SWING.

3. COMPLETE CLOSING BY SWINGING HANDLE OF SALLEE CLOSER AROUND AS FAR AS POSSIBLE.

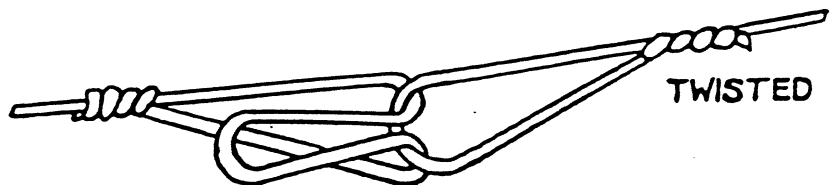


CLINCHED IN WOOD

STYLE 2 LOOPED WIRE CLOSURE



TWISTED LOOP CLOSURE.
CLOSED SAME AS ABOVE.



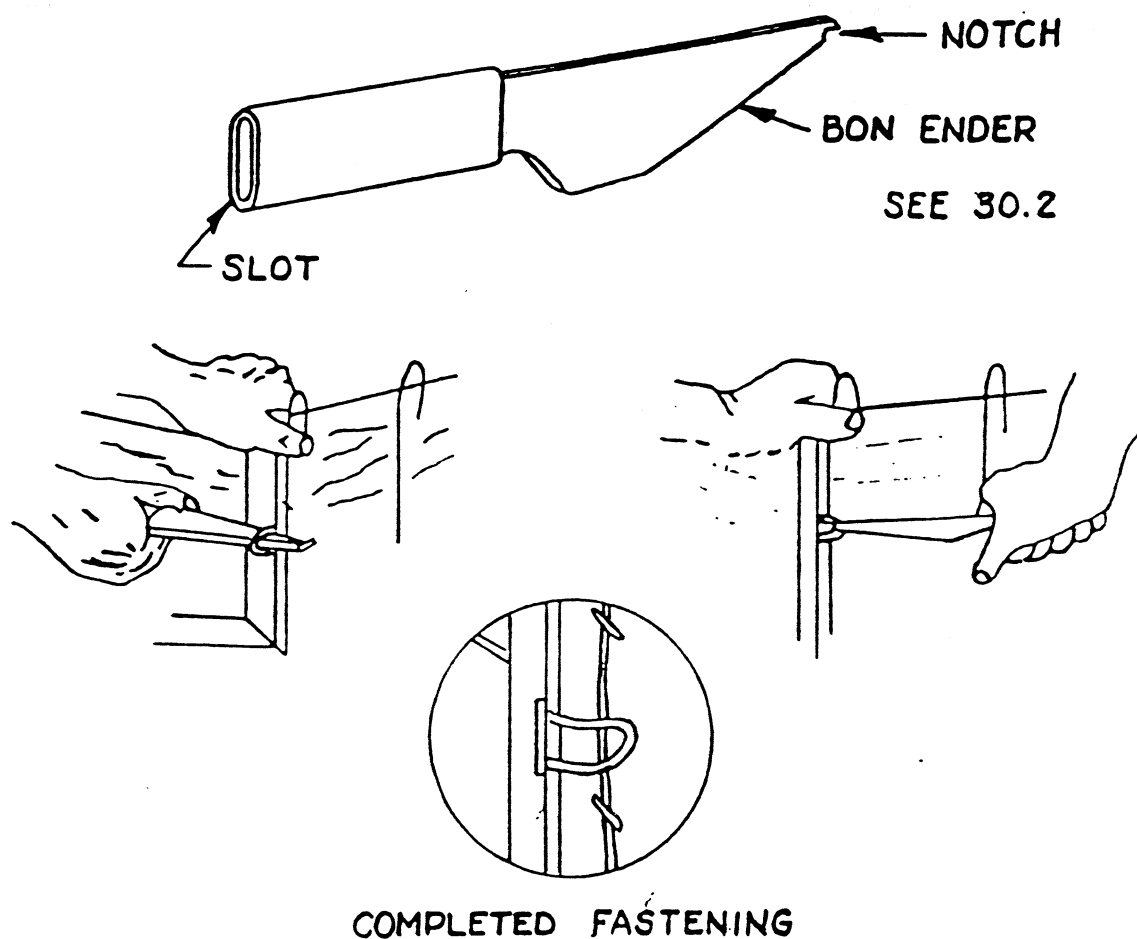
TWISTED

STYLE 2A TWISTED WIRE LOOP CLOSURE

STYLE 2 OR STYLE 2A LOOPS SHALL BE AT MANUFACTURER'S OPTION

FIGURE 8. CLOSING STYLE 2 CRATE; LOOPED WIRE CLOSURE

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1. Slide handle of Bon Ender over loop of end and bend loops at right angle to end boards.
2. Push loops of end through notches in side cleats of blank.
3. To fasten ends, insert nose of Bon Ender in loop of end, pulling tightly against cleat by pressing on handle. Holding tension, swing Bon Ender around edge of crate until it touches binding wire. Then slide Bon Ender back through loop until notch in end of tool engages binding wire. Complete motion until end of loop touches side of crate.

Bon Enders are available from crate supplier.

FIGURE 9. SETTING UP TYPE II, CLASS 1 CRATES

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I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER

MIL-C-11133E

2. DOCUMENT DATE (YYMMDD)

1992 December 31

3. DOCUMENT TITLE

CRATES, SHIPPING, WOOD, OPEN, WIREBOUND

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

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7. DATE SUBMITTED (YYMMDD)

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(2) AUTOVON
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