

PPP-B-1161B

February 27, 1970

SUPERSEDED

Int. Fed. Spec. PPP-B-001161A (OSM-PSS)

August 1, 1967

FEDERAL SPECIFICATION

BOX, CORRUGATED FIBERBOARD, HIGH COMPRESSION STRENGTH,
WEATHER-RESISTANT, WAX-RESIN IMPREGNATED

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

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the material and manufacturing requirements for boxes and sheets made of single and double-wall corrugated fiberboard which are impregnated with a wax-resin composition to increase their wet strength.

1.2 Classification.

1.2.1 Styles. Boxes shall be furnished in the following styles, as specified (see 6.2):

- RSC - Regular slotted box (see figure 1).
- OSC - Overlap slotted box (see figure 2).
- TC - Telescope box, full or partial (see figure 3).
- HSC - Half-slotted box with cover (see figure 4).
- HSCS - Half-slotted box with flanged tube and cover (see figure 5).
- DCC - Double cover box (see figure 6).

1.2.2 Classes, types, and grades of fiberboard. The impregnated corrugated fiberboard shall be of the following classes, types, and grades, as specified (see 6.2):

Class I - High compression strength (primarily intended for shipping containers).

Type SCFI - Single wall corrugated fiberboard, impregnated.

Grade 125
Grade 175
Grade 200
Grade 250
Grade 275
Grade 300
Grade 350

Type DCFI - Double-wall corrugated fiberboard, impregnated.

Grade 275
Grade 350
Grade 450
Grade 600

Class II - Low water absorbing (primarily intended for pallet shrouds and sheathing).

Type SCFI

Grade 250
Grade 275
Grade 300
Grade 350

Type DCFI

Grade 350
Grade 450
Grade 600

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2. APPLICABLE DOCUMENTS

2.1 Specifications and standards. The following specifications and standards, of the issues in effect on date of invitation for bids, form a part of this specification to the extent specified herein:

Federal Specifications:

PPP-B-636 - Box, Fiberboard.

PPP-B 638 - Boxes, Liners and Sleeves, Fiberboard, Knocked-Down, Flat; Packing Of.

Federal Standards:

Fed. Test Method Std. No. 101 - Preservation, Packaging, and Packing Materials: Test Procedures.

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

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

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

Military Standard:

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

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

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issues in effect on date of invitation for bids or request for proposal shall apply.

Uniform Classification Committee:

Uniform Freight Classification

(Application for copies shall be addressed to the Uniform Classification Committee, 202 Union Station, Chicago, Illinois 60606.)

National Classification Board:

National Motor Freight Classification

(Application for copies shall be addressed to the American Trucking Associations, Inc., Attention: Tariff Order Section, 1616 P Street N. W., Washington, D. C. 20036.)

American Society for Testing and Materials (ASTM) Standards:

ASTM E4 - Tentative Methods of Verification of Testing Machines.

ASTM D936 - Congealing Point of Petroleum Wax, Including Petroleum.

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

3. REQUIREMENTS

3.1 Materials.

3.1.1 Facings. Facings shall be kraft only and when tested in accordance with paragraph 4.5.2.5, shall have the basis weight specified in 3.2.1 and 3.2.2 for the applicable grade of fiberboard.

3.1.2 Corrugated member. Unless otherwise specified (see 6.2), the corrugated members of type SM and DW fiberboard shall be either kraft or semi-chemical medium and when tested in accordance with paragraph 4.5.2.5 shall have the basis weight specified in 3.2.1 and 3.2.2 for the applicable grade of fiberboard.

3.2 Fiberboard construction.

3.2.1 Type SM (SMCFI).

3.2.1.1 Grade 125. Grade 125 shall consist of a 26-pound corrugated member bonded between two 26-pound facings.

3.2.1.2 Grade 175. Grade 175 shall consist of a 26-pound corrugated member bonded between an outer 42-pound facing and an inner 33-pound facing.

3.2.1.3 Grade 200. Grade 200 shall consist of a 33-pound corrugated member bonded between two 42-pound facings.

3.2.1.4 Grade 250. Grade 250 shall consist of a 33-pound corrugated member bonded between a 69 and a 42-pound facing.

3.2.1.5 Grade 275. Grade 275 shall consist of a 33-pound corrugated member bonded between two 69-pound facings.

3.2.1.6 Grade 300. Grade 300 shall consist of a 33-pound corrugated member bonded between 69- and 90-pound facings.

3.2.1.7 Grade 350. Grade 350 shall consist of a 33-pound corrugated member bonded between two 90-pound facings.

3.2.2 Type DW (DMCFI).

3.2.2.1 Grade 275. Grade 275 shall consist of two 26-pound corrugated members, two outside facings of 42-pound weight and a center facing of 26-pound weight.

3.2.2.2 Grade 350. Grade 350 shall consist of two 33-pound corrugated members, two outside and a center facing of 42-pound weight.

3.2.2.3 Grade 450. Grade 450 shall consist of two 33-pound corrugated members, two outside facings of 69-pound material and a center facing of 42-pound weight.

3.2.2.4 Grade 600. Grade 600 shall consist of two 33-pound corrugated members, two outside and a center facing of 90-pound weight.

3.2.3 Adhesive. Adhesive used in the fabrication of the fiberboard shall be water-resistant. The degree of ply separation on the unaxed board shall not exceed the requirements specified in paragraph 4.5.2.3.

3.2.4 Flutes. Flutes for type SM, single-wall, shall be A or C flute. Flutes for DW, double-wall, shall be C and B or A and B. The number of flutes per linear foot of corrugated fiberboard and their approximate height shall be as follows:

- A Flute, 33-39, 1/16-inch.
- B Flute, 47-53, 1/8-inch.
- C Flute, 39-45, 5/32-inch.

3.3 Box construction.

3.3.1 General. Boxes shall be constructed of fiberboard conforming to paragraph 3.2 and shall meet the tests specified in paragraph 4.5.2.

3.3.2 Direction of flutes. Unless otherwise specified (see 6.2), flutes shall run perpendicular to the score line of the box opening.

3.3.3 Dimensions. Boxes shall be furnished in the sizes specified (see 6.2). Dimensions shall be given in the sequence of length, width, and depth. Unless otherwise specified, dimensions shall be the inside dimensions. A tolerance of plus or minus 1/8-inch shall be permitted.

3.3.4 Body (manufacture's) joint.

3.3.4.1 General. The body joint is that seam of the box where the box blank is joined. The body joint

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shall be lapped on the outside face of a side or end panel. At the option of the supplier, boxes with a perimeter exceeding 90 inches may be fabricated with the two body joints positioned at diagonally opposite corners of the box. Alternatively, the body joints may be in the center of each end of the box.

3.3.4.2 Staples (body joints). The staples used in fabricating boxes shall be flat wire conforming to either 3.3.4.2.1 or 3.3.4.2.2 at the option of the boxmaker. Each staple shall have a commercially applied coating or plating such as a zinc coat (galvanized) or copper wash.

3.3.4.2.1 Staples shall have a thickness of 0.037 inches with a tolerance of plus unlimited minus 0.001-inch. The width shall be 0.068 inches with a tolerance of plus 0.001 minus 0.008-inches. The crown length shall be 1/8 inches plus or minus 1/16 inches. The leg length of the staple (perpendicular measurement from the bottom of the crown to the tip of the staple leg before the staple is inserted into the box) shall meet the requirements of table I.

TABLE I. Staple leg length requirements

Board type	Staple leg length, INCHES	
	Average	Tolerance
Type BSCV	0.375 (1/8)	+ 0.031 (1/32)
Type BSCV	0.500 (1/2)	± 0.031 (1/32)

3.3.4.2.2 Staples shall have a thickness of 0.080 inches with a tolerance of plus unlimited minus 0.001. The width shall be 0.103 inches with a tolerance of plus 0.001 minus 0.008 inches. The crown length shall be 7/16-inches plus or minus 1/16-inches. The leg length of the staple shall meet the requirements of table I.

3.3.4.3 Styles BSC, OSC, ESC, (body only), ESCS (body and flanged tabs), and DEC (body only). The body joint shall be a minimum of 1-1/2 inches wide. Prior to stapling, the corrugations in the 1-1/2-inch wide strip may be completely crushed on both the body and strip. The metal staples shall be placed horizontally or on a slant across the strip and shall be placed not more than 1-1/8-inches apart when staples described in 3.3.4.2.1 are used or more than 1-inch apart when the staples described in 3.3.4.2.2 are used. The 1-1/2- or 1-inch measurement shall be from the lower tip of one staple to the top tip of the staple directly below.

3.3.4.4 Styles TC, ESC, (cover only), ESCS (cover only), and DEC (cover only). When set up, the flaps shall overlap, but shall be of sufficient length to allow them to be securely fastened to the adjoining walls with not less than five staples. Fastening along the free edges shall be not more than 4-inches apart.

3.3.4.4.1 Unless otherwise specified, the flaps on the body of style TC boxes shall be positioned in either of the following combinations at the option of the contractor:

- (a) Flaps outside the side panels of the body and inside the end panels of the cover.
- (b) Flaps outside the end panels of the body and inside the side panels of the cover.

Unless otherwise specified, covers or caps for styles ESC, ESCS, and DEC shall have the flaps on the outside of the end panels.

3.4 Styles.

3.4.1 Regular slotted (RSC). This box shall be in accordance with figure 1. The box shall be constructed of fiberboard (see 3.2) scored and slotted to form a body piece having four flaps for closing each of two opposite faces. The flaps along the longer edge of the box opening are the outer flaps and those along the shorter edge are the inner flaps. Flaps shall not project beyond the edge of the box. All flaps shall be of equal length. The outer flaps shall not overlap, nor shall they gap more than 1/32 inch.

3.4.2 Overlap slotted container (OSC). This box shall be in accordance with figure 2. The box shall be constructed of fiberboard (see 3.2) scored and slotted to form a body piece having four flaps for closing each of two opposite faces. When closed, the inner flaps shall not overlap and the outer flaps shall overlap the distance specified in the invitation for bids (see 6.2). Inner flaps shall be the same length as the outer flaps, except where the relation of width to length would cause the inner flaps to overlap, in which case the inner flaps shall be cut so that when in a closed position they will meet.

3.4.3 Full or partial telescope box (TC). This box shall be in accordance with figure 3. The box shall consist of a body and a cover each constructed of one piece of slotted and scored fiberboard (see 3.2). The inside depth of the cover shall be either the overall depth of the body or the depth specified in the invitation for bids (see 6.2). Setup of the boxes shall be in accordance with 3.3.4.4 and 3.3.4.4.1.

3.4.4 Half-slotted box with cover (HSC). This box shall be constructed of fiberboard (see 3.2) in

in accordance with figure 4. The body of the box shall be scored and slotted to form a body piece having four flaps for closing one face. The opposite face is open the full length and width of the box. The flaps on the one face shall be as specified in 3.4.1. The cover shall be not less than 4-inches in depth and shall be assembled in accordance with 3.4.4 and 3.4.4.1.

3.4.4.1 Half-slotted box with flanged tube and cover (HSCS). This box shall be constructed of fiberboard (see 3.2) in accordance with figure 5. The bottom plate shall be scored and slotted to form a body piece having four flaps for closing one face. The opposite face is open the full length and width of the box. The flaps on the bottom face shall be as specified in 3.4.1. The flanged tube shall be of a size which will fit snugly over the body with the ends butting. Flaps on the top of the flanged tube shall be not less than 3-inches long. The end flaps shall fold inside of the lengthwise flaps. The cover shall fit snugly over the sleeve. It shall be a scored and slotted sheet or scored and corner-cut sheet.

3.4.5 Double cover box (DOC). This box shall be in accordance with figure 6. The box shall be constructed of three pieces (see 3.4.1 for exception) of fiberboard (see 3.2). The body (sleeve) shall be a stitched tube without flaps. The top and bottom covers shall be made in accordance with 3.4.4. The covers shall afford a snug fit on the body.

3.5 Certification. Each box shall be plainly printed, stenciled, or stamped with characters not less than 1/16-inch in height with the information shown below:

THIS BOX COMPLIES WITH FEDERAL
SPECIFICATION PTF-2-116B

TYPE	GRADE
• SCS	• 350
• DOC	• 350

DATE MANUFACTURED
(month and year, e.g., 11-67)

Boxmaker's name (not necessary if
name is on adjacent boxmaker's certificate)

• As applicable to box being procured.

This certification shall be placed adjacent
to the boxmaker's certificate.

3.6 Printing. Unless otherwise specified, each box, except style HSCS, shall have the cube of the box to the nearest 0.1 cubic foot, based on the outside dimensions, printed on the box in 1/2-inch bold-faced print. The marking shall be placed in a corner of one side panel so that it will be visible when the box is assembled. When additional marking is required it shall be as specified (see 6.2) in the invitation for bid. The outside dimensions may be determined by measuring a sample set-up box, or by adding the material thickness on each face to the inside dimensions. Telescope style boxes shall be measured with the cover extending over the body as far as it will go. The dimensions used to calculate the cube shall be rounded off to the next highest whole inch when fractions of 1/2 inch or greater are involved, or to the next lowest whole inch when fractions less than 1/2 inch are involved.

3.7 Use. When this specification is referenced as a requirement for the shipping of an item or items in a contract or specification, the requirements of the attached appendix are a mandatory part of this specification.

3.8 Box blank impregnation. The following requirements apply to all class I fiberboard:

3.8.1 Impregnating compound. After the box blank has been cut, scored, folded, body stitched, and printed, it shall be impregnated (not coated only) with a composition of resins and waxes to produce a fiberboard box blank which will meet the applicable requirements of table II and subsequent paragraphs of this description.

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TABLE II. Requirements for impregnated board

Types and Grades	Minimum Wet Edge Crush ^{1/} lbs. per inch	Minimum Average Puncture Resistance ^{2/}		Minimum Average Bursting Strength ¹ lbs per sq. inch	Maximum Water Pickup ^{3/} Percent
		Dry	Wet		
SWCFI 125	7			125	
SWCFI 175	11			175	
SWCFI 200	16			200	
SWCFI 250	20	290	240	250	30
SWCFI 275	26	360	280	275	25
SWCFI 300	29	380	290	300	23
SWCFI 350	34	400	300	350	20
DWCFI 275	26			275	
DWCFI 350	37	480	390	350	30
DWCFI 450	45	575	450	450	25
DWCFI 600	64	700	575	600	20

¹Applies to Class I fiberboard only.²Applies to Class II fiberboard only.³Applies to Class I and II fiberboard.

3.8.1.1 Congealing point. The congealing point of the impregnating compound shall be not lower than 130°F. when tested in accordance with paragraph 4.5.1.1. When storage temperatures exceeding 120°F. are anticipated, an impregnating compound with a minimum congealing point of 151°F. shall be used, and shall be so specified in the contract or order (see 6.2).

3.8.2 Basis weight increase. Basis weight increase due to impregnation shall be not less than 40 percent and shall be determined in accordance with the requirements specified in paragraph 4.5.2.6.

3.8.3 Wet edge crush strength. Column crush strength of specimens of impregnated board shall be determined by conditioning specimens according to paragraph 4.5.2.2 and then testing the specimens according to paragraph 4.5.2.4.

3.8.4 Surface wax. The impregnated fiberboard box shall have a generally uniform dry-waxed surface appearance free from excessive areas of surface wax on the exterior surfaces of the side wall panels or top flaps. The side panel surface shall exhibit satisfactory stencil marking ability when tested as specified in paragraph 4.5.2.7.

3.8.5 Curl. There shall be no wave (reverse curl) in either machine or cross direction. Edge curl shall not exceed 1/8-inch when tested as specified in 4.5.2.8.

3.8.6 Scoring and folding performance. The aggregate length of splits completely through the outer facings of the top flaps of the box shall not exceed 3 inches when tested as specified in paragraph 4.5.3.1.

3.8.7 Bursting strength. The bursting strength of specimens of impregnated board shall be determined by conditioning specimens according to paragraph 4.5.2.1 and then testing the specimens according to paragraph 4.5.2.9.

3.8.8 Water pickup. The water pickup of specimens of impregnated fiberboard shall meet the requirements of table II when conditioned and tested in accordance with 4.5.2.11.

3.9 Workmanship. The boxes shall be free from imperfections which may affect their utility. All dimensions of the boxmaker's blank shall be accurately cut, scored, and plotted so that the assembled box parts fit closely without undue binding. No flap shall project beyond an edge of the box when it is in the assembled and closed position.

3.10 Class II fiberboard impregnation. Class II fiberboard and its impregnating compound shall meet the requirements of paragraphs 3.8.1.1, 3.8.2, 3.8.4, 3.8.5, 3.8.6, the applicable requirements of table II, and subsequent paragraphs.

3.10.1 Puncture resistance. The puncture resistance of specimens of impregnated fiberboard shall be determined by conditioning specimens according to paragraph 4.5.2.1 (dry) or paragraph 4.5.2.2 (wet) and then testing the specimens according to paragraph 4.5.2.10.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any

other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the invitation for bid (see 6.2). The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

h.2 Preproduction sample inspection. Preproduction sample inspection is not applicable under this specification unless otherwise required by the invitation for bid or order.

h.3 Samples and inspection for acceptance. Sampling and inspection shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated hereinafter.

h.3.1 Inspection of components and materials. Quality assurance provisions for components or materials described shall be in accordance with this specification and with subsidiary specifications and drawings referenced herein to the extent applicable except that this specification shall govern in the event of conflict.

h.3.1.1 Sampling for tests to determine compliance. Sample specimens needed to conduct the tests to determine compliance with the requirements of paragraph 3.2, table I or II, shall be randomly selected from the lot of fiberboard necessary to fabricate the quantity of impregnated boxes, or from the lot of impregnated boxes of one size, or from the lot of sheets of one size, which will be presented at one time for acceptance. The number of sample specimens shall be sufficient to perform not less than five each of the tests and determinations specified.

h.4 Acceptance tests. Acceptance tests shall consist of the examination of product specified in h.4.1 and performing tests specified in h.5.2.1 through h.5.2.10, and h.5.3.1 on samples selected in accordance with h.3 and h.4.1.

h.4.1 Sampling for inspection and examination of the end item. Sampling and inspection of the end item for sporadic and overall type defects as applicable as well as for count per bundle and preparation for delivery shall be in accordance with the provisions of MIL-STD-105 and the inspection levels and AQL's provided in FFP-B-636.

h.4.1.1 Lot. For the purpose of sampling and inspection, a lot shall consist of all boxes or sheets of the same style and size presented at one time for acceptance.

h.5 Tests.

h.5.1 Impregnating compound.

h.5.1.1 Congealing point test. The congealing point of the impregnating compound shall be determined in accordance with ASTM-D936.

h.5.2 Fiberboard; all classes, types, and grades.

h.5.2.1 Conditioning of fiberboard for dry tests. For dry tests, the board may be tested in the condition as received. However, if the board fails to meet requirements as set forth in this specification, additional samples may be selected and a retest conducted after proper conditioning of the samples. In the case of dispute the box specimens for final referee tests shall be conditioned in an atmosphere maintained at 50 percent relative humidity (tolerance: plus or minus 2 percent R.H.) and $73^{\circ}\text{F} \pm 3^{\circ}\text{F}$. Initial conditioning time shall be not less than 24 hours. The test shall be conducted in the conditioning atmosphere.

h.5.2.2 Conditioning of fiberboard for wet tests. For all wet tests specimens of fiberboard shall be cut to required dimensions as applicable and then shall be immersed for 24 hours in fresh tap water maintained at a temperature of $73^{\circ}\text{F} \pm 3^{\circ}\text{F}$. All specimens shall be submerged in a vertical position with the flutes running in the vertical direction. The top edge of the specimen shall be 1-inch below the surface of the water and the specimen shall be supported in such a manner that the water has free access to all surfaces and ply separation is not restricted. Specimens taken from the water after the 24 hour period shall have excess surface water removed so that surfaces no longer glisten. Water shall be removed from the flutes by shaking specimens vigorously. The tap water shall have a pH value between 5.5 and 8.0 and shall be drawn fresh for each batch of samples to be tested.

h.5.2.3 Fly separation test. Corrugated fiberboard, after immersion procedure specified in h.5.2.2 shall be tested for proper adhesion of components as follows: If separation occurs spontaneously and freely during soaking, the board fails to meet this requirement. Surface tension of water may cause the wet components of the fiberboard to cling together even though not properly bonded. Using pressure sufficient only to overcome the surface tension of water, brush lightly with the ball of the thumb, across the cut edges of the specimen. Repeat at several points on each of the four edges. Separation of the components shall not extend more than 1/4-inch from the edge of the specimen. In addition, for testing double

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wall corrugated fiberboard, a soaked specimen shall be laid on a table, in atmospheric conditions of $73^{\circ} \pm 5^{\circ}\text{F}$. and 50 percent relative humidity, with air circulating across the top surface of the specimen until the specimen fails or reaches equilibrium (minimum 24 hours). The fiberboard complies with the specification if separation of the components does not extend more than 1/4-inch from the edge of the specimen.

4.5.2.4 Edge crush test. Specimens shall be conditioned and tested according to Method 2033 of Fed. Test Meth. Std. No. 101. Only undamaged and unprinted portions of the boxes selected shall be used. This is also known as a short column test.

4.5.2.5 Basis weight determination. Specimens shall be conditioned and tested according to Method 5022 of Fed. Test Meth. Std. No. 101.

4.5.2.6 Basis weight increase determination. The increase in basis weight of the fiberboard due to the pickup of resin-wax compound in the impregnation operation shall be determined by either of the following procedures, paragraph 4.5.2.6.1, or paragraph 4.5.2.6.2.

4.5.2.6.1 Determination by weight gain. Five representative samples of unimpregnated boxes or sheets of the identified manufacturer's lot shall be taken at the feed end of the impregnating operation, and at the same time and from the same lot five representative specimens of the impregnated box shall be taken from the output end of the impregnating operation. The box samples shall be conditioned according to the procedures described in paragraph 4.5.2.1, and shall be weighed. The increase in basis weight due to impregnation shall be calculated and reported as percent increase based on the original unimpregnated board.

4.5.2.6.2 Determination by extraction. Specimens of impregnated fiberboard shall be cut from undamaged portions of the side walls of the box and the basis weight shall be determined in accordance with paragraph 4.5.2.5. The identical board specimens then shall be used for measurement of the amount of impregnating compound, according to the following procedure: The weighed board specimens shall be reduced in size to a number of smaller pieces of approximately 1x2 inch size. All the cut pieces of the original specimen are then placed in a 200 ml glass beaker to which is added 1500 ml of normal heptane. (CAUTION: Flammable Solvent). The beaker is covered with a watch glass and is placed on a steam bath and heated to boiling for 30 minutes, and the solvent is decanted through a filter screen into a tared beaker. The partially extracted board is retained in the original beaker and a fresh portion of solvent measuring 1500 ml is added to the board, returned to boiling for 30 minutes and the solvent is decanted, filtered, and combined with the first extract. The heptane extracts are evaporated to dryness on the steam bath until no heptane odor remains and finally dried on a hot plate to constant weight. The weight of wax extracted is determined and the basis weight increase due to impregnation based on the weight of the unwaxed fiberboard.

4.5.2.7 Stencil marking ability. Pieces 6x10-inches of the side wall panels of impregnated boxes shall be subjected to stencil marking tests as follows: The exterior surface of panel shall be decorated by stencil lettering using approved stencil inks, covering substantial areas of the panel. The ink is allowed to dry and specimen is subjected to water immersion conditions as described in paragraph 4.5.2.2. After immersion, the stenciled decoration shall be clearly readable, shall show no smudging, and shall resist removal when wiped with a paper towel.

4.5.2.8 Curl test. Condition a 6x10-inch specimen of fiberboard on a flat wire screen for four hours at 70° plus or minus 3.5°F . and 50 plus or minus 2 percent relative humidity. Place the conditioned specimen convex side down on a dry flat surface. Measure the greatest distance any portion of the specimen's bottom side rises above the flat surface. Report results to the nearest 1/8-inch.

4.5.2.9 Bursting strength determination. Specimens shall be conditioned and tested according to Method 2007, procedure B, of Fed. Test Meth. No. 101.

4.5.2.10 Puncture resistance determination. Determinations shall be made on specimens 12x12-inches (or equivalent area) cut from sound, undamaged and unprinted portions of the sheets. Specimens shall be conditioned according to paragraph 4.5.2.1 or 4.5.2.2, as applicable. The equipment used shall conform to Method 2032 of Fed. Test Meth. Std. No. 101. (see 6.4). Four puncture test readings shall be made on each specimen in the following manner: One test shall be made so that the edge of the puncture point, which is in the plane of the puncture arm, is perpendicular to the corrugations of the fiberboard and one test shall be made so that the edge of the puncture point is parallel to the corrugations. Such tests shall be made from both sides of the specimen. Results of the four puncture tests shall be averaged to determine the test values for the specimen. The puncture head must be cleansed of wax with a suitable solvent between punctures or low values will be obtained.

4.5.2.11 Water pickup determination. Specimens from sound, uncoated, and unprinted fiberboard shall be conditioned according to paragraph 4.5.2.1, then weighed to the nearest 0.01 gram. The specimens shall then be immersed in water for one hour under the conditions described in paragraph 4.5.2.2. At the end of that time, each specimen shall be immediately reweighed after excess water has been removed by shaking and blotting. The increase in weight of each specimen shall be reported as a percent weight increase and shall indicate the amount of water absorbed.

b.5.3 Assembled box.

b.5.3.1 Scoring and folding performance. Boxes conditioned in accordance with b.5.2.1 shall be tested as follows: Fold the container's top flaps from the initial vertical position inward through an angle of 90 degrees, then outward through an angle 180 degrees and finally back through an angle of 180 degrees to the closure position. To be considered satisfactory, the outer component facing shall not be split completely through more than a total of three inches.

5. PREPARATION FOR DELIVERY

5.1 Packing of boxes. Packing shall be level A, B, or C, as specified (see 6.2).

5.1.1 Level A. The boxes shall be packed knocked-down in accordance with PPP-B-638 as specified therein for level A.

5.1.2 Level B. The boxes shall be packed knocked-down in accordance with PPP-B-638 as specified therein for level B. When specified, the boxes shall be shipped partly or completely assembled in accordance with the requirements of the contract or order.

5.1.3 Level C. The boxes shall be shipped either knocked-down or partly assembled as specified in the contract or order. Unless otherwise specified, the boxes shall be delivered bundled, boxed, or crated in a manner to insure acceptance and safe delivery called for in the contract or purchase order.

5.2 Packing of sheets. Sheet stock shall be packed according to the requirements of level A, B, or C, as specified in paragraph 6.2, and in section 5 of PPP-F-320. The requirements for packing weather-resistant corrugated fiberboard shall apply.

5.3 Marking. Marking shall be in accordance with PPP-B-638.

6. NOTES

6.1 Intended use. The impregnated fiberboard boxes and sheets covered by this specification are intended primarily for use (a) where high stacking strength is desirable, (b) when the ultimate handling atmosphere is moisture-laden, (c) when products are iced or wet packed and, (d) where uncovered storage conditions may be encountered.

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

- (a) Title, number, and date of this specification.
- (b) Style box required (see 1.2.1).
- (c) Class, type, and grade of fiberboard required (see 1.2.2).
- (d) Size of sheets, if applicable.
- (e) Flute designations required (see 3.2.4).
- (f) Whether direction of flutes to be other than perpendicular to score line of the box opening (see 3.3.2).
- (g) Dimensions of box (see 3.3.3).
- (h) Whether position of flaps for style TC boxes shall be other than specified (see 3.3.4.4).
- (i) Whether position of flaps for covers or caps shall be other than specified (see 3.4.1).
- (j) The distance flaps shall overlap on style OOC boxes (see 3.4.2).
- (k) Depth of cover for style TC box, if other than overall depth of box (see 3.4.3).
- (l) Whether additional printing is required (see 3.6).
- (m) How inspection records are to be maintained (see 4.1).
- (n) Selection of the level of packing required (see 5.1).
- (o) Whether boxes shall be shipped partly or completely assembled (see 5.1.2 and 5.1.3).
- (p) Whether or not a minimum coagulating point of 151°F. is required for the impregnating compound (see 3.8.1.1).

6.3 Size limitations. For commodities covered therein, Rule 41 of the Uniform Freight Classification limits the sum of the inside length, width, and depth dimensions to 180 inches. For commodities not covered by Rule 41, there are no size limitations on the boxes.

6.4 Test methods. Method 2032 of Fed. Test Method Std. No. 101B is the same as ASTM D701-59T and TAPPI T603.

NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, and the fact the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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APPENDIX I

10. SCOPE

10.1 This appendix covers requirements for the closure of boxes fabricated in accordance with the requirements of this specification.

20. APPLICABLE DOCUMENTS

20.1 The following specifications and standards, of the issue in effect on date of invitation for bids, form a part of this appendix to the extent specified herein:

Federal Specifications:

- QQ-S-781 - Steel Strapping, Flat.
- PPP-S-760 - Strapping, Nonmetallic (and Closure Seals).
- PPP-T-60 - Tape, Pressure-Sensitive, Adhesive.

Military Specification:

- MIL-T-43115 (MR) - Tape, Pressure-Sensitive, Adhesive, for Preservation and Sealing.

30. REQUIREMENTS

30.1 Materials.

30.1.1 Steel straps. When used for closure, steel strapping shall conform to QQ-S-781, type I, class A or B.

30.1.2 Nonmetallic strapping. Nonmetallic strapping shall be in accordance with PPP-S-760, type I, grade B, type II and III.

30.2 Closure. The kind of closure used will depend on the style of box.

30.2.1 Styles RSC, OSC, and TC. Closure of these boxes shall be in accordance with the applicable methods of the appendix to PPP-B-636. (see notes 1 and 2).

30.2.2 Style DCC. This box shall be closed in accordance with the applicable methods of the appendix to PPP-B-636.

30.2.3 Style HSC. The flaps of the HSC box shall be closed in accordance with the requirements of the appendix to PPP-B-636 for a style RSC box. The top cover shall be secured in accordance with the applicable methods in the appendix to PPP-B-636.

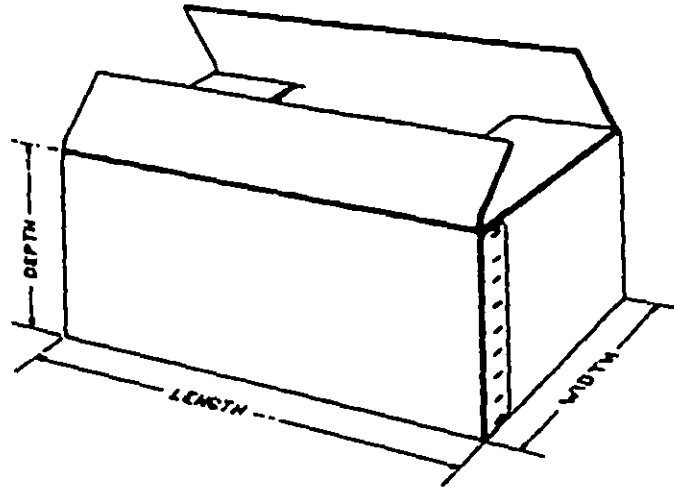
30.2.4 Style ESCS. Unless otherwise specified, prior to loading, this box shall be placed on a pallet or wood skid. The pallet or skid shall be 1-inch longer and 1-inch wider than the box. The box shall be closed and secured by means of strapping (see 30.1). Two straps, positioned approximately 10 inches from the edge of the box, shall be placed lengthwise around the box. These straps shall be placed either on top or underneath the pallet or skid. Straps shall also be placed girthwise around the box; within 6 inches of each end; and one additional strap for every 24 inches of box length. The straps shall be placed under or through the pallet or skid in such a manner as not to be changed during the handling and shipping.

NOTE 1. Where pressure-sensitive tape for sealing is specified in any referenced method, the tape shall be in accordance with MIL-T-43115 or PPP-T-60. Suggested source of tape:

- (a) Minnesota Mining and Manufacturing Company, 2501 Hudson Road, St. Paul, Minnesota.

NOTE 2. Suggested sources of adhesives for sealing flaps are:

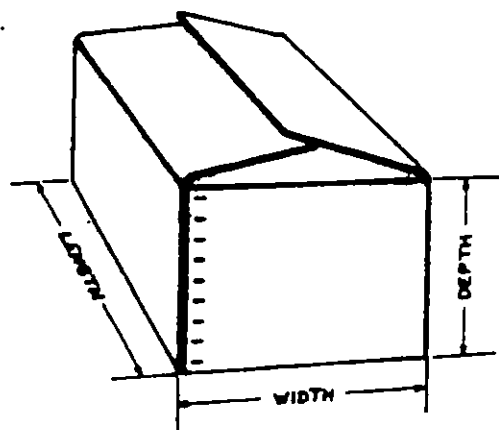
- (a) Defense Supply Agency 3639 - Monumental Adhesive Company, 140 E. Kresson Street, Baltimore, Md.
- (b) 2183 - H. B. Fuller Company, 1144 Eustis Street, St. Paul, Minnesota.
- (c) 1176 - American Adhesive Inc., 30 Waverly Avenue, Brooklyn, New York.
- (d) Wood Lok 40-0212 or Beeryn 32-1199 - National Stock and Chemical Corp., 150 Third Avenue, New York, N. Y.



(Dimension see 3.3.3).

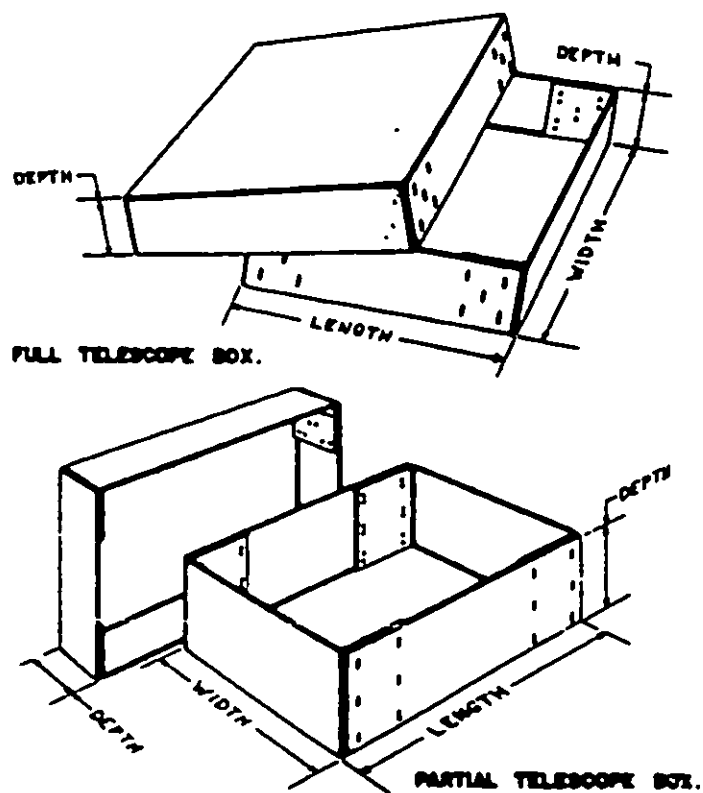
FIGURE 1.- RSC - REGULAR SLOTTED BOX.

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(Reference see 3.2.3).

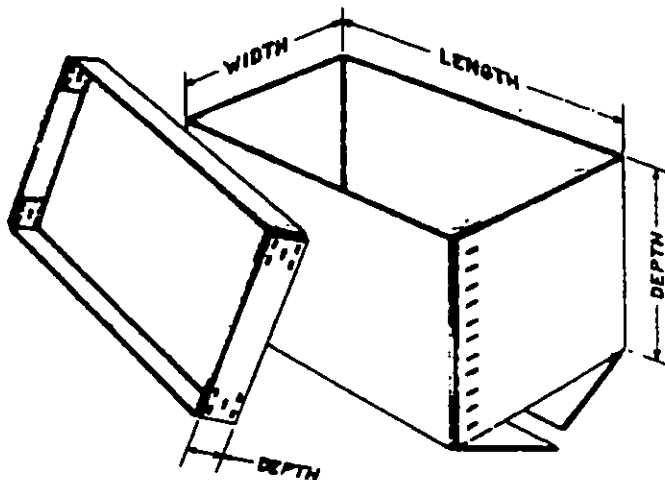
FIGURE 2. - OSC - OVERLAP SLOTTED BOX.



(Reference see 3.3.3)

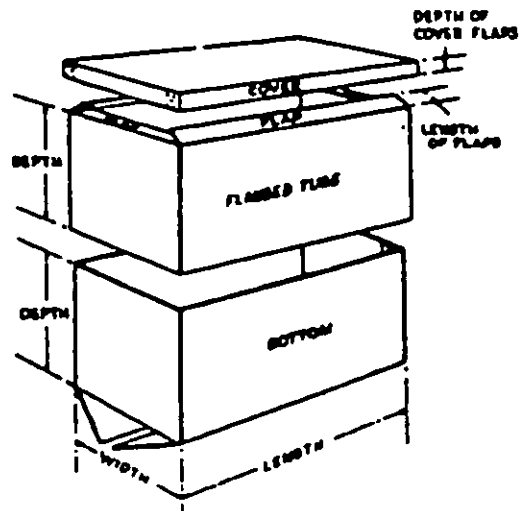
FIGURE 3. - TC - TELESCOPE BOX, FULL OR PARTIAL.

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(Dimensions are 1.1.1).

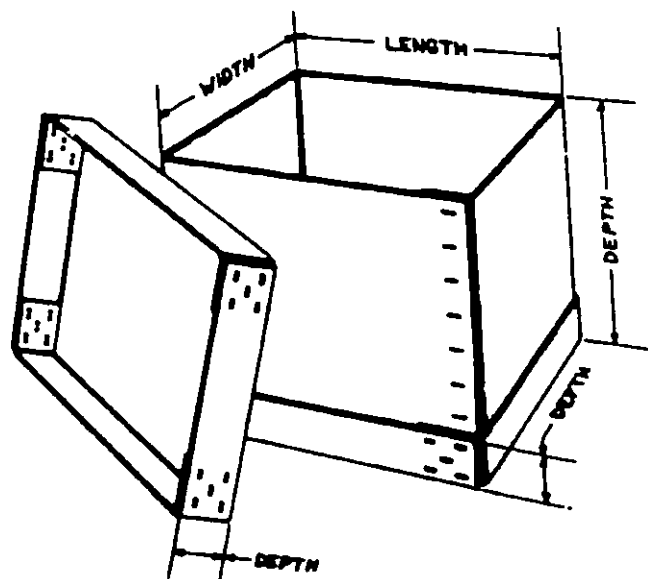
FIGURE 4. - HSC - HALF SLOTTED BOX WITH COVER.



(Dimension lines are 3/4" x 3/4").

FIGURE 5 - 5000 - HALF-HEIGHT TWO DRAWER PLANNED UNIT AND
COVER

PPP-B-1163B



(Illustration not to scale).

FIGURE 8.- DCC - DOUBLE COVER BOX.

PPP-8-1163B

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Air Force - 69

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Navy - AS, XO, MC, EC
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