List of Publications on
BOX AND CRATE CONSTRUCTION
AND PACKAGING DATA

August 1960

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FOREST PRODUCTS LABORATORY
MADISON, WISCONSIN

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

In Cooperation with the University of Wisconsin
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INSTRUCTIONS FOR OBTAINING PUBLICATIONS

Publications available for distribution at this Laboratory are marked with an asterisk (*).

Single technical notes, reprints, and processed reports may be obtained free upon request from the Director, Forest Products Laboratory, Madison 5, Wis.

Federal government bulletins, circulars, leaflets, and specifications, if not available for free distribution at this Laboratory, may be purchased at the price indicated from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Requests for copies of these publications should stipulate both the title and identifying number. Send money order, draft, or cash; stamps or personal checks are not accepted.

Copies of military specifications required by the activities of the Departments of the Army, the Navy, and the Air Force may be requested by government personnel through established departmental channels. Requests for specifications from other non-military sources should be directed to one of the following custodians:

Chief of Engineers
Department of the Army
Attn: ENGHP
Washington 25, D. C.

Commanding General
Philadelphia Quartermaster Depot
2800 South 20th Street
Philadelphia 45, Pa.

Commander
Wright Air Development Center
Attn: WCXP
Wright-Patterson Air Force Base, Ohio

Chief, Bureau of Naval Weapons
Technical Data Division
Department of the Navy
Washington 25, D. C.

Chief of Ordnance
Department of the Army
Washington 25, D. C.

Chief, Bureau of Supplies & Accounts
Attn: Code S-33
Department of the Navy
Washington 25, D. C.

Trade journals containing articles herein listed may often be purchased from the publishers or may be consulted in various libraries.

TAPPI standards may be obtained from the Technical Association of the Pulp and Paper Industry, 155 E. 44th St., New York 17, N. Y. Price: 1-2 pp. $.25; over 3 pp. $.50.

The Forest Products Laboratory reserves the right to furnish only those publications which in its judgment will give the information requested. Blanket requests or requests for a large number of copies of any individual article will not be filled except in unusual cases.
NAILED-WOOD BOXES

Technical Notes

*B-10  The nailing of wood boxes.
*128  Moisture content and storage affect strength of nailed wood boxes.
*164  Common styles of nailed-wood boxes.
*182  Details of nailing for common styles of nailed wood boxes.

Government Publications


Federal Specification

PPP-B-621  Boxes; wood, nailed, and lock-corner. $.20.

Processed Reports


Articles in Trade and Technical Press


NAILED-WOOD BOXES (Continued)

Articles in Trade and Technical Press (Continued)


Western woods as box material, by J. R. Watkins, Barrel & Box, Nov. 1921.

NAILED-WOOD CRATES

Technical Notes

*134 The crate corner.
*172 How to obtain rigidity in crate construction.

Government Publications


Federal Specification

PPP-C-580 Crates, wood, for household goods. $.20.

Military Specifications

MIL-C-104A Crates, wood; lumber and plywood sheathed, nailed and bolted (Corps of Engineers).

MIL-C-132B Crates, wood, open; maximum capacity 2,500 pounds (Corps of Engineers).

MIL-C-3774 Crates; open, wood (2,500 to 10,000 pounds). (Overseas). (Corps of Engineers).

MIL-C-4349 Crates; wood, 1,000 pound maximum load, open domestic. (Air Force).
NAILED-WOOD CRATES (Continued)

Government Publications (Continued)

Military Specifications (Continued)

MIL-C-5406  Crates; wood, open, demountable, 10,000 pound maximum load. (Domestic or overseas). (Air Force).

MIL-C-6057  Crates and boxes; aircraft and airframe component parts (general specification for). (Domestic or overseas). (Air Force).

MIL-C-9437B  Crate, wood, open, fuel tank, external assembled. (Domestic or overseas). (Air Force).

MIL-C-11456A  Crates, wood, nailed, unsheathed; domestic shipment, 1,500 pounds maximum load. (Quartermaster Corps).

MIL-C-25010  Containers: Air and surface shipment of aircraft components (2,000-pound maximum load). (Air Force).

MIL-C-25139  Crates, wood, open, domestic (for lightweight bulky airframe items). (Air Force).

MIL-C-25731  Crates, wood, for lightweight bulky aircraft items. (USAF)

Processed Reports


Articles in Trade and Technical Press


Cause of twisting in crates demonstrated, by G. E. Heck. Barrel & Box & Packages, June 1930.

... Same. Packing & Shipping, Nov. 1931.


WIREBOUND CONTAINERS

Government Publications

Federal Specification

PPP-B-585 Boxes; wood, wirebound. (Domestic or overseas). $.35.

Military Specifications

MIL-C-11133A Crates; wood, slatted style, wirebound, domestic. (Quartermaster Corps).

WOOD-CLEATED BOXES

Technical Notes

*131 Properties of ordinary wood compared with plywood.

Government Publications

Federal Specifications

PPP-B-591 Boxes; fiberboard, wood-cleated. (Domestic or overseas). $.15.

PPP-B-601A Boxes; wood-cleated-plywood. (Domestic or overseas). $.10.

Military Specifications

MIL-B-10377A Box, wood, cleated, veneer, paper, overlaid. (Domestic or overseas). (Quartermaster Corps).

CORRUGATED AND SOLID FIBERBOARD BOXES

Technical Notes

*150 Direction of fibers affect strength of fiber boxes.
Government Publications


Federal Specifications

PPP-C-570 Containers, folding, fiberboard, corrugated (for household goods). $.05.

PPP-B-575 Box, paper-overlaid veneer (straparound type). (Domestic or overseas). $.10.

PPP-B-636b Boxes; fiberboard (Domestic or overseas). $.25.

PPP-B-640b Boxes, corrugated, triple wall, 350-pound maximum weight.

PPP-B-645 Boxes, folding, fiberboard, heavy duty. (Domestic or overseas). $.10.

PPP-B-655 Boxes, fiberboard, six or eight sides. (Domestic). $.15.

Processed Reports


*2110 Evaluation of nine styles of fiberboard boxes with more than four sides, by T. B. Heebink. Aug. 1957.


Articles in Trade and Technical Press

Structural design notes for corrugated containers, by K. Q. Kellicutt.


Articles in Trade and Technical Press (Continued)

Structural design notes for corrugated containers, by K. Q. Kellicutt.


CORRUGATED AND SOLID FIBERBOARD BOXES (Continued)

Articles in Trade and Technical Press (Continued)


CORRUGATED AND SOLID FIBERBOARD BOXES (Continued)

Articles in Trade and Technical Press (continued)


....Same. Package Advertiser, Dec. 1928.


TESTING OF CONTAINERS AND PACKAGING MATERIALS

Articles in Trade and Technical Press


Processed Reports


Standards

Compression test for shipping containers. ASTM D 642-47; TAPPI T804 m-45.

Drop test for cylindrical shipping containers. ASTM D 997-50.

Drop test for bags. ASTM D 959-50.

Drop test for shipping containers. ASTM D 775-47; TAPPI T802 m-44.

Revolving hexagonal drum test for shipping containers. ASTM D 782-47; TAPPI T800 m-50.
Standards (Continued)

Incline-impact test for shipping containers. ASTM D 880-50; TAPPI T801 sm-44.

Penetration test of liquids into submerged containers. ASTM D 998-51.

Test for large shipping cases and crates. ASTM D 1083-53.

Test for pallets. ASTM D 1185-51T.

Vibration test for shipping containers. ASTM D 999-48T.

Test for water resistance of containers by spray method. ASTM D 951-51; TAPPI T805 m-50.

Test for water vapor permeability of packages. ASTM D 895-51.

Test for water vapor permeability of shipping containers. ASTM D 1008-51.

Test for water vapor permeability of packages by cycle method. ASTM D 1251-53T.

Test for water vapor permeability of shipping containers by cycle method. ASTM D 1276-53 T.

Test for adhesiveness of gummed tape. ASTM D 773-47; TAPPI T463 m-52.

Test for basis weight of paper and paper products. ASTM D 646-50; TAPPI T410 m-45.

Bending quality of paperboard. TAPPI T474 m-47.

Test for bleeding resistance of asphalted papers at elevated temperatures. ASTM D 917-49; TAPPI T475 m-50.

Test for blocking resistance of paper and paperboard. ASTM D 918-49; TAPPI T477 m-47.

Test for bursting strength of paper. ASTM D 774-46; TAPPI T 403 m-53.

Test for ring crush of paperboard. ASTM D 1164-53; TAPPI T472 m-51.

Flexural resistance and deflection of fiberboard. TAPPI T469 sm-45.
Standards (Continued)

Test for internal tearing resistance of paper. ASTM D 689-44; TAPPI T414 m-49.

Test for machine direction of paper. ASTM D 528-41; TAPPI T409 m-35.

Test for moisture in paper, paperboard, and paperboard and fiberboard containers. ASTM D 644-55; TAPPI T412 m-53.

Test for puncture and stiffness of paperboard, corrugated and solid fiberboard: ASTM D 781-44T; TAPPI T803 m-50.

Rigidity, stiffness, and softness of paper and paperboard. TAPPI T451 m-45.

Static bending test for corrugated paperboard. ASTM D 1098-52.

Test for stretch of paper and paper products under tension. ASTM D 987-48T; TAPPI T457 m-46.


Test for wet tensile breaking strength of paper and paper products. ASTM D 829-48; T456 m-49.

Test for tensile properties of thin plastic sheets and films. ASTM D 882-49T.

Test for thickness of paper and paper products. ASTM D 645-43; TAPPI T411 m-44.

Water absorptiveness of nonbibulous paper and paperboard. TAPPI T441 m-45.

Test for water resistance of paper, paperboard, and other sheet materials by the dry indicator method. ASTM D779-55T; TAPPI T433 m-44.

Test for water vapor permeability of paper and paperboard. ASTM D 988-51T; TAPPI T448 m-49.

Water vapor permeability of paper and other sheet materials at elevated temperature and humidity. TAPPI T464 m-45.

Test for water vapor permeability of plastic sheets. ASTM D 697-42T.
Testing of Containers and Packaging Materials (Continued)

Standards (Continued)

Adhesiveness of seals and closures for packages. TAPPI T806 sm-46.

Conditioning paper and paper products for testing. ASTM D 685-44; TAPPI T402 m-49.

Conditioning paperboard, fiberboard, and paperboard containers for testing. ASTM D 641-49; TAPPI T402 m-49.

Creasing paper for permeability tests. ASTM D 1027-51; TAPPI T465 sm-52.

Definition of terms relating to shipping containers. ASTM D 996-50.

Sampling paper and paper products. ASTM D 585-42; TAPPI T400 m-49.

Testing package cushioning materials. ASTM D 1372-55T.

Flat crush of corrugated paperboard. ASTM D 1225-52T.

Pallets

Government Publications

Federal Specification

NN-P-71 Pallets; materials-handling, wood (general construction requirements). $.05.

NN-P-0074 Pallets: Wood, stringer design, maximum capacity 2,500 pounds.

Military Specifications

MIL-P-15011D Pallets, material handling, hardwood, post construction, 4-way. (Navy S&A).

MIL-P-4894 Pallet materials handling, box type, wood (light duty).

MIL-P-15943A Pallet, material handling, wood, ship cargo (stevedoring), 2-way entry. (Navy S&A).
Government Publications (Continued)

Military Specifications (Continued)

MIL-P-16496 Pallet, softwood (hardwood posts), 40" x 48", 4-way nailed construction, general purpose. (Navy S&A).

MIL-P-26342 Pallet box, fiberboard expendable, for air shipment.

MIL-P-26966A Pallet, uses handling, lightweight, air cargo.

American Standard


Processed Reports


*1957 The wood pallet industry--its development and progress toward standardization. Sept. 1953.

Articles in Trade and Technical Press


Minimum standard specifications for warehouse, permanent or returnable wooden pallets of West Coast woods. Species--Douglas-fir, hemlock, larch (Tamarack). NWPMA, Barr Bldg. Washington 6, D. C.


BARRELS

Government Publications

BARRELS (Continued)

Federal Specifications

PPP-B-41 Barrels; wood, slack. (Domestic or overseas). $.10.

PPP-B-112a Barrels; wood, tight (for liquids). (Domestic or overseas). $.10.

Articles in Trade and Technical Press


GENERAL PACKAGING DATA

Government Publications

Federal Specifications

PPP-B-566 Boxes, folding, paperboard. (Domestic). $.20.

PPP-B-665 Boxes, paperboard, metal stayed (including stay material). $.05.

PPP-B-676 Boxes, set-up, paperboard. (Domestic). $.15.

Military Specifications

MIL-P-3448 Packaging of board, fiberboard, and wallboard including corrugated, overseas shipment. (Corps of Engineers.)

MIL-P-7936A Parts and equipment, aeronautical, preparation for delivery.

Military Standard

MIL-STD-731 Quality of wood members for containers and pallets.

Processed Reports

*2064 Packaging research at the U.S. Forest Products Laboratory, by F. J. Champion. Sept. 1956.
Articles in Trade and Technical Press


Uniform Freight Classification No. 2, "Rules 40 and 41." Geo. H. Dumas, agent, 202 Union Station, Chicago 6, Ill. $3.75.


Articles in Trade and Technical Press


Export Shipping Data


...... Same. Packing & Shipping, June, July, Aug. 1932.

STRAPPING AND METAL REINFORCING

Government Publications

Federal Specifications

QQ-S-781b Strapping; flat, steel. $.10.

QQ-S-790a Strapping; round, steel, bare and zinc coated. $.10.
STRAPPING AND METAL REINFORCING (Continued)

Articles in Trade and Technical Press

Recommended sizes of flat straps and wires for packing boxes, by C. A. Plaskett. Packing & Shipping, April 1931.

Same. Selecting the proper size of box strapping. Barrel & Box, May 1931; Purchasing Agent, Apr. 1931.

METAL FASTENERS

Technical Notes

*182 Details of nailing for common styles of nailed wood boxes.
*236 Nail-holding power of American woods.
*243 General observations on the nailing of wood.
*247 Nailing dense hardwoods.

Government Publications


Federal Specifications

FF-N-101 Nails; spikes, staples, and tacks. $.10.
FF-N-103a Nails (small) and tacks; cut. $.10.
FF-N-105 Nails, wire; and staples. $.15.
FF-S-111a Screws; wood. $.10.
FF-F-133 Fasteners, wood joint, corrugated (saw edge). $.05.
FF-B-561a Bolts; lag, steel (lag screws). $.05.
FF-B-571a Bolts; nuts, studs, and tap rivets (and material for same). $.05.
FF-N-836 Nuts, hexagon and square. $.25.

Military Specification

MIL-F-4209A Fastener assembly, (metal) nut sleeve. (Air Force).
METAL FASTENERS (Continued)

Processed Reports

*1226 Effect of nail points on the withdrawal resistance of plain nails, by J. A. Scholten. 1959.

Articles in Trade and Technical Press


Treated nail has high holding power. Iron Age, Oct. 6, 1932.
Forest Products Laboratory develops a better nail. Packing & Shipping, July 1932.
Increases holding power of nails by new chemical etching process. Steel, Aug. 22, 1932.
Laboratory announces improved nail. Timberman, July 1932.

......Same. Barrel & Box, July 1929.
Southern Lbrman., July 15, 1929.
Nail-holding tests made, Timberman, Aug. 1929.

WOOD -- ITS PROPERTIES, etc.

Technical Notes

*B-14 Methods of determining the specific gravity of wood.
*131 Properties of ordinary wood compared with plywood.
*218 Weights of various woods grown in the United States.
*236 Nail-withdrawal resistance of American woods.
*240 A hundred definitions pertaining to wood and other forest products.
WOOD -- ITS PROPERTIES, etc. (Continued)

Processed Reports

*MC-152  Grouping of woods according to nail-holding qualities and other properties of importance in container construction. 1954.

*258  Key for identification of woods used for box and crate construction, by Eloise Gerry. 1956.

*399  Some books about wood (a list). 1955.

Articles in Trade and Technical Press


Government Publications


Aspen for containers, by Waldo Sands. Lake States Aspen Rept. No. 10. 1947. Available from Lake States Forest Experiment Station, University Farm, St. Paul 8, Minn.
WOOD -- ITS PROPERTIES, etc. (Continued)

Government Publications (Continued)

Federal Specifications

PPP-V-205  Veneer, paper-overlaid, container-grade. (For use in domestic or overseas containers.) $0.10.

NN-P-515a  Plywood, container grade. (For use in domestic or overseas containers.) $0.10.

MISCELLANEOUS CONTAINER DATA

Government Publications


Preservation, packaging, and packing of military supplies and equipment. (AFM 71-1, TM 38-230, NAVEXOS P-938). $1.75.


Federal Specifications

PPP-P-291a  Paperboard, wrapping, cushioning. $0.05.

PPP-D-723c  Drums, fiber. (Domestic or overseas). $0.25.

PPP-C-843  Cushioning material, cellulosic. $0.10.

PPP-E-911a  Excelsior, wood, fabricated pads and bulk form. $0.05.

Military Specifications

MIL-P-116C  Preservation, methods of. (Ordnance Corps).
Government Publications (Continued)

Military Specifications (Continued)

MIL-B-138A Boxes, wood, fiberboard lined for overseas shipment (for weight of contents not exceeding 500 pounds). (Quartermaster Corps).

MIL-P-3420 Packaging materials, volatile corrosion inhibitor treated. (Bureau of Aeronautics).

MIL-C-4631 Cushioning material, special purpose. (Air Force).

MIL-C-4694 Cushioning material, fibrous glass. (Air Force).

MIL-C-7769 Cushioning material, bound fiber. (Air Force).

MIL-C-26861 Cushioning material: General.

MIL-F-26862 Fiberboard, solid, dunnage multipurpose cushioning and blocking applications.

Processed Reports


*R1462 Test for shipping containers in revolving hexagonal drum box-testing machines. Rev. 1956.


*R1498 Influence of temperature on relative humidity within confined spaces with and without a desiccant, by Leon Lassen. 1959.


*2120 The FPL dynamic compression testing equipment for testing package cushioning materials, by R. K. Stern. 1958.
MISCELLANEOUS CONTAINER DATA (Continued)

Articles in Trade and Technical Press


Speeded up kiln drying schedules for aspen boxing and crating lumber, by H. H. Smith. Wood Products 49(3): 46, 48, 50, 52-54, Mar. 1944;
...... Same. Kiln drying schedule for aspen boxing and crating lumber, Barrel & Box & Packaging 49(1): 8-10, Jan. 1944.


CARLOADING AND BRACING

Articles in Trade and Technical Press


Good car braces from knotty lumber, by J. A. Newlin. 1934. (Distributed by Freight Claim Div., Assn. of Amer. Railroads, 59 E. Van Buren St., Chicago, Ill.)

Species of timber for car bracing, by J. A. Newlin. 1934. (Distributed by Freight Claim Div., Assn. of Amer. Railroads, 59 E. Van Buren St., Chicago, Ill.)


...... Same. Railway Age, May 8, 1926.
Dodge Idea, June 1926.
Mfg. Industries, June 1926.

DATA ON SPECIFIC COMMODITY CONTAINERS

Processed Reports


Miscel. A treatment for red oak beer barrels. 1934.
Government Publications


Better shipping crates for livestock. Extension Service, College of Ag., Univ. of Wis., in cooperation with the FPL. Univ. Circ. 153, 1926.


Articles in Trade and Technical Press


Uniform Freight Classification No. 2, "Authorized Packages or Shipping Containers," Geo. H. Dumas, agent, 202 Union Station, Chicago 6, Ill. $3.75.
Processed Reports


*2054 Condition of preservative treated field boxes after 5 years of outdoor exposure, by R. S. Kurtenacker, T. G. Scheffer, and J. O. Blew. Apr. 1956.
OTHER PUBLICATION LISTS ISSUED BY THE
FOREST PRODUCTS LABORATORY

The following lists of publications which deal with the other investigative
projects of the Forest Products Laboratory are obtainable upon request:

Building Construction Subjects--Partial list of Government publications of
interest to architects, builders, engineers, and retail lumbermen.

Chemistry of Wood and Derived Products--Chemical properties and uses of
wood and chemical wood products, such as turpentine, alcohol, and
acetic acid.

Fire Protection--Fire test methods, fire retarding chemicals and treat-
ments and fire behavior of treated and untreated wood, wood products,
and wood structures.

Fungus Defects in Forest Products--Decay, stains, and molds in timber,
buildings, and various wood products; antiseptic properties of protec-
tive materials.

Furniture Manufacturers, Woodworkers and Teachers of Wood Shop Prac-
tice--Partial list of Government publications on growth, structure, and
identification of wood; moisture content, physical properties, air season-
ing, and kiln drying; grading, manufacturing, and waste utilization;
strength and related properties and joints and fastenings; glues and gluing,
veneer and plywood fabrication; box and crate construction.

Glue and Plywood--Development of waterproof glues, preparation and appli-
cation of various glues, plywood manufacturing problems.

Growth, Structure, and Identification of Wood--Structure and identification
of wood; the effect of cellular structure of wood on its strength, shrink-
age, permeability, and other properties; the influence of environmental
factors, such as light, soil, moisture, and fire, on the quality of wood
produced; and secretions of economic value produced by trees and their
exploitation.

Logging, Milling, and Utilization of Timber Products--Methods and practices
in the lumber-producing and wood-consuming industries; standard lumber
grades, sizes, and nomenclature; production and use of small dimension
stock; specifications for small wooden products; uses for little-used
species and commercial woods; and low-grade and wood waste surveys.
Mechanical Properties of Timber—Strength of timber and factors affecting strength; design of wooden articles or parts where strength of resistance to external forces is of importance.

Pulp and Paper—Suitability of various woods for pulp and paper; fundamental principles underlying the pulping and bleaching processes; methods of technical control of these processes; relation of the chemical and physical properties of pulps and the relation of these properties to the paper making qualities of the pulps; waste in the industry, for example, decay in wood and pulp, utilization of bark, white water losses, etc.

Seasoning of Wood—Experimental and applied kiln drying, physical properties, air drying, steam bending.

Structural Sandwich, Plastic Laminates, and Wood-Base Aircraft Components—Strength, selection, and character of aircraft wood, plywood, and wood and composite laminated and sandwich materials; fabrication and assembly problems; methods of calculating the strength.

Wood Finishing Subjects—Effect of coatings in preventing moisture absorption; painting characteristics of different woods and weathering of wood.

Wood Preservation—Preservative materials and methods of application; durability and service records of treated and untreated wood in various forms.

NOTE: Since Forest Products Laboratory publications are so varied in subject matter, no single big list is issued. Instead a list is made up for each Laboratory division. Twice a year, December 31 and June 30, a list is made up showing new reports for the previous 6 months. This is the only item sent regularly to the Laboratory's mailing list. Anyone who has asked for and received the proper subject lists and who has had his name placed on the mailing list can keep up to date on Forest Products Laboratory publications. Each subject list carries descriptions of all other subject lists.