CS45-45
Plywood; Douglas Fir

U. S. DEPARTMENT OF COMMERCE
HENRY A. WALLACE, Secretary
NATIONAL BUREAU OF STANDARDS
LYMAN J. BRIGGS, Director

DOUGLAS FIR PLYWOOD

(SIXTH EDITION)

COMMERCIAL STANDARD CS45-45

[Supersedes CS45-42]

Effective Date for New Production From January 27, 1945

A RECORDED VOLUNTARY STANDARD
OF THE TRADE

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PROMULGATION

of

COMMERCIAL STANDARD CS45–45

for

DOUGLAS FIR PLYWOOD

(Sixth Edition)

On August 17, 1932, manufacturers, distributors, and users of Douglas fir plywood approved the adoption of standard grading rules for the guidance of the Douglas fir plywood industry. These grading rules were accepted by the trade and promulgated as Douglas Fir Plywood, Commercial Standard CS45–33. The standard was revised in 1936, 1938, 1940, and 1942.

A recommended revision submitted by the Douglas Fir Plywood Association and endorsed by the standing committee, was circulated on July 31, 1944, to the trade for written acceptance. Those concerned have since accepted and approved the revised standard as shown herein for promulgation by the United States Department of Commerce, through the National Bureau of Standards.

The standard is effective for new production from January 27, 1945.

Promulgation recommended.

I. J. Fairchild,
Chief, Division of Trade Standards.

Promulgated.

Lyman J. Briggs,
Director, National Bureau of Standards.

Promulgation approved.

Henry A. Wallace,
Secretary of Commerce.

DOUGLAS FIR PLYWOOD

(SIXTH EDITION)

COMMERCIAL STANDARD CS45-45

PURPOSE

1. Because of the extended application of Douglas fir plywood to a large number of new uses, the following standard grading rules are offered as a universal basis of understanding in the industry. General adoption and use of this standard will facilitate procurement of the proper grade of material and the proper type as to moisture resistance for its varied uses and provide a better understanding between buyer and seller. Architects, engineers, contractors, industrial users, and home owners will thus be able to specify their needs from nationally accepted grading standards.

SCOPE

2. These rules cover six grades of moisture-resistant type and eight grades of exterior type Douglas fir plywood; a laminated board for paneling, sheathing, concrete forms, marine work, cabinet work, and many other structural and industrial uses. In addition, there are included grade specifications for door panels, tests, standard sizes, size tolerances, reinspection rules, and nomenclature and definitions.

DEFINITION

3. Douglas fir plywood is a built-up board of laminated veneers in which the grain of each piece is at right angles to the one adjacent to it. The kiln-dried veneer is united under high pressure with a bonding agent, making the joints as strong as or stronger than the wood itself. The alternating direction of the grain with each contiguous layer of wood equalizes the strains and in this way minimizes shrinkage and warping of the product and prevents splitting.

GENERAL REQUIREMENTS

4. All Douglas fir plywood sold as of commercial standard quality shall meet the following general requirements.

5. *Workmanship.*—Unless otherwise specified, plywood shall be smoothly sanded on two sides. When specified rough or unsanded, plywood may have paper tape on either face or back, or both, except for the exterior type of industrial grade. It shall be well manufactured and free from blisters, laps, and defects, except as permitted in the specific rules for the various grades.

6. *Bonding.*—The entire area of each contacting surface of the plywood shall be bonded in an approved manner with material best adapted to each use classification.

7. *Loading or packing.*—It shall be securely loaded or packed to insure delivery in a clean and serviceable condition.

DETAIL REQUIREMENTS

8. Douglas fir plywood is made in two types, moisture-resistant (M. Res.) and exterior (Ext.). It shall be graded according to both sides of the piece into the various grades as hereinafter defined. The grade descriptions set forth the minimum requirements, and therefore the majority of panels in any shipment will exceed the specification given.

MOISTURE-RESISTANT TYPE

9. This type represents the majority of production and consists of plywood with a high degree of moisture resistance where its application requires that it shall retain its original form and practically all its strength when occasionally subjected to a thorough wetting and subsequent normal drying, a plywood suitable for construction where subjected to occasional deposits of moisture by condensation through walls or leakage or from other sources. Veneers 1/12 inch or more shall be used in the construction of moisture-resistant type panels 1/4 inch and upward in thickness. The veneer thickness shall be measured before the panel is sanded. This type shall meet the test requirements set forth in paragraphs 26 and 27. This type is available in the following grades:

10. *Sound 2 Sides* (*SO2S*).—Each face shall be of one or more pieces of firm, smoothly cut veneer. When of more than one piece, it shall be well joined and reasonably matched for grain and color at the joints. It shall be free from knots, splits, pitch pockets, and other open defects. Streaks, discolorations, sapwood, shims, and neatly made patches shall be admitted. This grade shall present a smooth surface suitable for painting.

11. *Sound 1 Side* (*SO1S*).—The face shall be of one or more pieces of firm smoothly cut veneer. When of more than one piece, it shall be well joined and reasonably matched for grain and color at the joints. It shall be free from knots, splits, pitch pockets, and other open defects. Streaks, discolorations, sapwood, shims, and neatly made patches shall be admitted. The face shall present a smooth surface suitable for painting. The back shall present a solid surface with all knots in excess of 1 inch patched and with the following permitted: Not more than six knotholes or borer holes 5/8 of an inch or less in greater dimension, splits 1/8 of an inch or less in width and pitch pockets not in excess of 1 inch wide or 3 inches long or that do not penetrate through veneer to glue line. There may be any number of patches and plugs in the back.

12. *Wallboard* (*WB*).—This is a 3-ply board of 1/4-inch or 3/8-inch sanded, or 5-ply 1/2-inch sanded thickness, made only in standard wallboard sizes, the face of which shall be of one or more pieces of firm, smoothly cut veneer. When of more than one piece it shall be well joined and reasonably matched for grain and color at the joints. It shall be free from knots, splits, pitch pockets, and other open defects. Streaks, discolorations, sapwood, shims, and neatly made patches shall be admitted. The face on this grade shall present a smooth surface suitable for painting. The back shall contain knotholes or pitch pockets, splits, and other defects in number and size that will not seriously affect the strength or serviceability of the panel and

which cannot reasonably and economically be repaired to make a sound face. All wallboard panels shall be so designated by grade marking each panel.

13. *Sheathing* (*SH*) (*Unsanded*).—An unsanded plywood made only in the following sizes: Thicknesses 5/16 inch and 3/8 inch 3-ply; 1/2 inch and 5/8 inch 3- or 5-ply; widths 36 and 48 inches; length 96 inches. The face shall present a solid surface except that the following will be permitted: (a) Not more than ten knotholes none of which shall exceed 1½ inches with not more than five exceeding ¾ inch in greatest dimension; (b) No group of knotholes within any 12-inch diameter circle shall have an aggregate greatest dimension of more than 3 inches; (c) No splits wider than 1/8 inch; nor any type of borer holes longer than 1 inch; nor open pitch pockets more than 1 inch wide. There may be any number of patches and plugs in the face, but the face may not be of such quality that, if sanded, it will pass for a Wallboard face. No belt sanding is permissible. The back shall be at least equal in quality to a Wallboard grade back. No tape shall be permitted in the glue line. All sheathing panels shall be scored or marked for nailing to conform to standard spacing of lumber studding.

14. *Industrial* (*Unsanded*).—Faces of panels shall be free from knotholes. Faces shall also be free from any type of borer holes more than 5/8 of an inch in greatest dimension and open pitch pockets more than 1 inch wide. Tight knots, checks, plugs, patches and shims shall be admitted in either face. Core and crossbands shall be of firm stock but shall contain no knotholes greater than 1¼ inches in any dimension.

15. *Concrete-form plywood.*—Concrete-form plywood shall be built up of three or five thicknesses of veneer, of which the two outside plies are at least 1/8-inch thick before sanding, except for plywood ¼ inch in thickness. An occasional knothole is permissible in the center or core of 5-ply panels only, but no knotholes are permitted in cross banding. Appearance of faces shall be similar to that of "Sound 2 Sides" grade (par. 10). The bonding agent used shall be especially prepared for this purpose and be very highly water-resistant. All concrete-form plywood shall be so designated by grade marking each panel on the face. Concrete-form plywood shall be edge-sealed, and have the faces mill-oiled unless the order specifically states not to oil.

DOOR PANELS

(Moisture-Resistant Type)

16. *Door Panel.*—The standard thickness of 3-ply flat veneered panels shall be ¼ inch after sanding. Each face shall be of one or more pieces of firm, smoothly cut veneer. When of more than one piece, it shall be well joined and reasonably matched for grain and color at the joints. It shall be free from knots, splits, pitch pockets, and other open defects. Streaks, discolorations, sapwood, shims, and neatly made patches shall be admitted.

EXTERIOR TYPE

17. This type represents the ultimate in moisture resistance, a plywood that will retain its original form and strength when repeatedly wet and dried and otherwise subjected to the elements, and suitable for permanent exterior use. It shall be free from both core gaps and core voids that impair the strength or serviceability of the panel.

Only a resin-impregnated tape shall be permitted in the glue line. No veneer thicker than 5/16 inch shall be used. All exterior panels shall be so designated by a distinctive symbol "Ext." branded or stamped on edge of each panel. Plywood of this type shall meet the test requirements set forth in paragraphs 26, 28a, and 28b. This type is available in the following grades:

18. *Marine Exterior.*—This is a special quality of exterior type, intended for marine use. Each face shall consist of firm, smoothly cut veneer. When of more than one piece, the face veneer shall be machine-jointed and made tight for full length of joint either by taping or edge-gluing. No face ply shall exceed 1/8 inch in thickness after sanding. No interior ply shall exceed 5/16 inch in thickness. Total thickness of parallel plies shall constitute at least 1/3 of panel thickness. Faces shall be free from knots, splits, pitch pockets, and other open defects. No sapwood shall be included in the faces. Streaks and discolorations shall be admitted. Diagonal grain shall be limited to a slope of 1 in 8. Neatly made, tight-fitting patches, not exceeding 13/16 inch in width and 5¼ inches in length, and shims not more than 12 inches long, shall be admitted, but both shall be inserted and glued on all edges and bottom, with suitable press and adhesive so that shear samples cut through the patch will meet tests prescribed for exterior type in paragraphs 28a and 28b. All interior plies shall be machine-jointed and laid up tightly with core gaps limited to 1/16 inch. In panels with 5 or more plies, gaps shall be staggered. All interior plies shall be free from both knots and knotholes larger than ½ inch in least dimension, diagonal grain more than 1 in 8, pitch pockets wider than ½ inch, and splits or core gaps wider than 1/16 inch. Any number of neatly made patches or plugs may be used in interior plies. All adhesives used must be capable of withstanding tests in both fresh and salt (sea) water.

19. *Good 2 Sides Exterior* (*G2S-Ext.*).—Each face shall be of a single piece of smoothly cut veneer of 100-percent heartwood, free from knots, splits, pitch pockets, and other open defects. The face shall be a yellow or pinkish color without stain. Shims that occur only at the ends of panels and inconspicuous well matched small patches not to exceed 3/8 inch wide by 2½ inches long shall be admitted. This grade is recommended for uses where a light stain or natural finish is desired.

20. *Good 1 Side Exterior* (*G1S-Ext.*).—The face shall be equal to that described under "Good 2 Sides Exterior" grade (paragraph 19), while the back shall be equal to the "Sound 2 Sides Exterior" grade (paragraph 21).

21. *Sound 2 Sides Exterior* (*SO2S-Ext.*).—Each face shall be of one or more pieces of firm, smoothly cut veneer. When of more than one piece, it shall be well joined and reasonably matched for grain and color at the joints. It shall be free from knots, splits, pitch pockets, and other open defects. Streaks, discolorations, sapwood, shims and neatly made patches shall be admitted. This grade shall present a smooth surface suitable for painting.

22. *Sound 1 Side Exterior* (*SO1S–Ext.*).—The face shall be of one or more pieces of firm, smoothly cut veneer. When of more than one piece, it shall be well joined and reasonably matched for grain and color at the joints. It shall be free from knots, splits, pitch pockets, and other open defects. Streaks, discolorations, sapwood, shims, and neatly made patches shall be admitted. The face on this grade shall

present a smooth surface suitable for painting. The back shall contain knotholes not larger than 1 inch or pitch pockets, splits not wider than 3/16 inch, and other defects in number and size that will not impair the serviceability of the panel and that cannot be reasonably and economically repaired to make a sound face.

23. *Sheathing Exterior* (*SH.-Ext.*) (*Unsanded*).—An unsanded panel, the face of which shall present a solid surface except that the following will be permitted: (a) Not more than six knotholes 3/8 inch or less in greatest dimension, (b) splits 1/16 inch or less in width, (c) one or two strips of paper tape. There may be any number of patches and plugs in the face but the face may not be of such quality that, if sanded, it will pass for "Sound 1 Side Exterior" grade. No belt sanding is permissible. The back shall be the same as the back described under "Sound 1 Side Exterior" grade (paragraph 22). Exterior type sheathing is made in 5/16 inch, 3/8 inch, 1/2 inch, and 5/8 inch thicknesses and in one standard panel size 48 inches by 96 inches.

24. *Industrial Exterior.*—Industrial Exterior plywood shall have two solid faces made of one or more pieces. All open defects shall be repaired, except small pitch pockets, and tight splits which are 1/16 inch or under in width. All knotholes in the face veneer shall be patched. Panels in this grade shall be lightly "touch" sanded on both sides to remove dry tape, surplus glue, etc., but the tolerance of 1/32 inch, as allowed for unsanded panels, shall apply.

25. *Concrete-form Exterior.*—Concrete-form Exterior plywood shall be the same as "Sound 2 Sides Exterior" (paragraph 21), except that faces shall be 1/8 inch thick before sanding. It is made only in 5/8 inch and 3/4 inch thicknesses. All concrete-form plywood shall be so designated by grade marking each panel on the face. Concrete-form plywood shall be edge-sealed, and have the faces mill-oiled unless the order specifically states not to oil.

TESTS

26. *Sampling.*—Samples for testing shall be taken from one percent of the panels in any shipment, but not less than 5 and not more than 10 panels shall be selected. From each panel selected a test piece shall be cut from each end, approximately at midwidth of the panel, and from each edge approximately at midlength of the panel, while a fifth piece shall be cut from somewhere near the middle or center of the panel.

27. *Tests for Moisture-Resistant Type.*—One test sample 6 by 6 inches shall be taken from each test piece. They shall be submerged in water at room temperature for a period of 4 hours, followed by drying at a temperature not to exceed 100° F for a period of 20 hours. For all grades except the concrete-form grade, this cycle shall be repeated a second time; for the concrete-form grade, this cycle shall be repeated nine additional times. After this test, the test samples of all grades must not show more than 2 inches of delamination along the edge.

28. *Test for Exterior Type.*

28a. *Cold Soaking Test.*—Five shear specimens shall be cut as shown in figure 1 from each test piece, except for marine grade when ten shear specimens shall be cut, five for submersion in fresh tap water and five in salt (sea) water. They shall be submerged in water at room temperature for a period of 48 hours and dried for 8 hours at a

temperature of 145° F (± 5° F) and then followed by two cycles of soaking for 16 hours and drying for 8 hours under the conditions described above. The shear specimens shall again be soaked for a period of 16 hours and tested while wet in a shear-testing device as illustrated in figure 2, by placing them in the jaws of the device to which a load shall be applied at the rate of 600 to 1,000 lb per minute

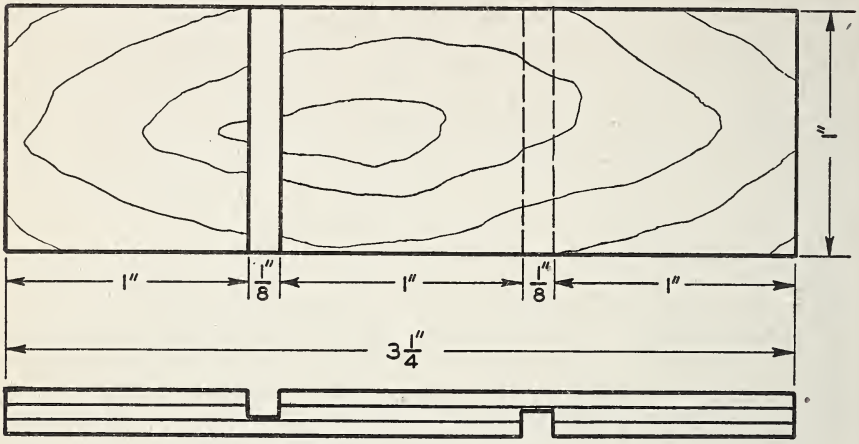

FIGURE 1.—*Shear specimen.*

until failure. The shear specimens must show no less than 30 percent minimum and 60 percent average wood failure and no delamination. If the number of plies exceeds 3, the cuts shall be made so as to test any two of the joints, but the additional plies need not be stripped except as demanded by the limitations of the width of the retaining jaws on the testing device. When desired, special jaws may be constructed to accommodate the thicker plywood. If the number of plies exceeds 3, the choice of joints to be tested shall be left to the

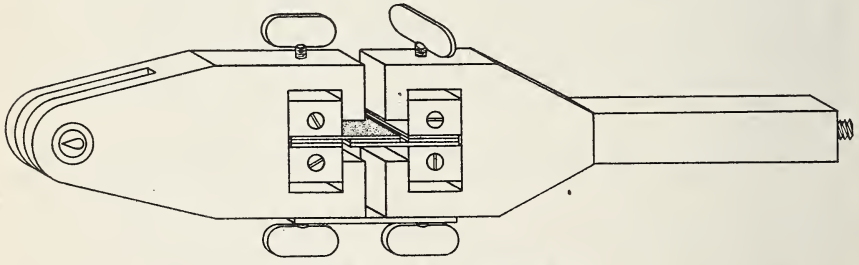

FIGURE 2.—*Jaws for shear test.*

discretion of the inspector, but at least one-half the tests shall include the innermost joints.

28b. *Boiling Test.*—Take shear specimens as described in paragraph 28a, boiling them in water for 4 hours, followed by a drying of 20 hours at a temperature of 145° F (±5° F). They shall be boiled again for a period of 4 hours and the shear specimens tested while wet, as described in paragraph 28a. The shear specimens must show no less than 30 percent minimum and 60 percent average wood failure, and no delamination.

TABLE 1.—*Standard Douglas fir plywood sizes*

Item	Width	Length	Thickness
MOISTURE-RESISTANT TYPE			
Standard panels (S02S) (S01S).	*Inches* 24 30 36 48	*Inches* 60 72 84 96	*Inches* 1/8 (3 ply, sanded 2 sides). 3/16 (3 ply, sanded 2 sides). 1/4 (3 ply, sanded 2 sides). 3/8 (3 ply, sanded 2 sides). 1/2 (5 ply, sanded 2 sides). 5/8 (5 ply, sanded 2 sides). 3/4 (5 ply, sanded 2 sides).
Wallboard.	48	60 72 84 96	1/4 (3 ply, sanded 2 sides). 3/8 (3 ply, sanded 2 sides). 1/2 (5 ply, sanded 2 sides).
Sheathing.	36 48	96	5/16 (3 ply, unsanded). 3/8 (3 ply, unsanded). 1/2 (3 or 5 ply, unsanded). 5/8 (3 or 5 ply, unsanded).
Industrial.	As ordered up to 48.	As ordered up to 96.	1/4 (3 ply, unsanded). 5/16 (3 ply, unsanded). 3/8 (3 ply, unsanded). 1/2 (5 ply, unsanded) 9/16 (5 ply, unsanded). 5/8 (5 ply, unsanded). 11/16 (5 ply, unsanded). 3/4 (5 ply, unsanded) 7/8 (5 ply, unsanded). 7/8 (7 ply, unsanded).
Concrete-form panels.	36 48	60 72 84 96	1/4 (3 ply, sanded 2 sides). 1/2 (5 ply, sanded 2 sides). 9/16 (5 ply, sanded 2 sides). 5/8 (5 ply, sanded 2 sides). 3/4 (5 ply, sanded 2 sides).
EXTERIOR TYPE [1]			
Standard panels (Marine) (G2S-Ext.) (G1S-Ext.) (S02S-Ext.) (S01S-Ext.).	12 14 16 18 20 22 24 26 28 30 36 42 48	48 60 72 84 96	3/16 (3 ply, sanded 2 sides). 1/4 (3 ply, sanded 2 sides). 5/16 (3 ply, sanded 2 sides). 3/8 (3 ply, sanded 2 sides). 7/16 (5 ply, sanded 2 sides). 1/2 (5 ply, sanded 2 sides). 9/16 (5 ply, sanded 2 sides). 5/8 (5 ply, sanded 2 sides). 11/16 (5 ply, sanded 2 sides). 3/4 (5 ply, sanded 2 sides). 13/16 (5 ply, sanded 2 sides). 7/8 (7 ply, sanded 2 sides). 15/16 (7 ply, sanded 2 sides). 1 (7 ply, sanded 2 sides). 1 1/16 (7 ply, sanded 2 sides). 1 1/8 (7 ply, sanded 2 sides). 1 3/16 (7 ply, sanded 2 sides).
Sheathing, exterior.	48	96	5/16 (3 ply, unsanded). 3/8 (3 ply, unsanded). 1/2 (3 ply, unsanded). 5/8 (3 ply, unsanded).
Industrial, exterior.	As ordered.	As ordered.	1/4 (3 ply, unsanded). 5/16 (3 ply, unsanded). 3/8 (3 ply, unsanded). 7/16 (3 ply, unsanded). 1/2 (5 ply, unsanded). 9/16 (5 ply, unsanded). 5/8 (5 ply, unsanded). 11/16 (5 ply, unsanded). 3/4 (5 ply, unsanded). 7/8 (5 ply, unsanded).
Concrete-form panels, exterior.	Same as standard panels.	Same as standard panels.	5/8 (3 ply, sanded 2 sides). 3/4 (5 ply, sanded 2 sides).

[1] Number of plies listed under thickness is minimum.

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29. *Interpretation of Tests.*—If there is failure of more than one test piece from any panel, that specific panel shall be rejected. If there is a failure in any of the panels tested, 5 additional panels shall be selected and tested under the conditions described, and all of these 5 panels must pass the required test. If the panels do not pass such test, a reinspection may be demanded by either buyer or seller as provided for in paragraphs 33 to 35.

STANDARD SIZES

30. Douglas fir plywood is made in the standard sizes shown in table 1.

SIZE TOLERANCES

31. A tolerance of $\frac{1}{64}$ (0.0156) inch over or under the specified thickness shall be allowed on sanded panels and a tolerance of $\frac{1}{32}$ (0.0312) inch on unsanded panels.

32. A tolerance of $\frac{1}{32}$ (0.0312) inch over or under the specified length and/or width shall be allowed but all panels shall be square within $\frac{1}{8}$ (0.1250) inch.

INSPECTION

33. All plywood guaranteed to conform to the commercial standard grading rules is sold subject to inspection in the white only, except concrete-form material which may have a priming of oil or other preparation before shipment. All complaints regarding the quality of any shipment must be made within 15 days from receipt thereof.

34. If the grade of any plywood shipment is in dispute and a reinspection is demanded, the cost of such reinspection shall be borne by the seller and the shipment settled for on the basis of the reinspection report if the shipment is more than 5 percent below grade, or if it contains more than 1 percent of mismanufactured panels containing defects such as short core, lapped core, blisters, delamination, etc., which render the panel unfit for normal use. The buyer need accept no such defective panels shipped as any standard grade listed in this commercial standard.

35. If reinspection establishes the shipment to be 5 percent or less below grade, and to contain 1 percent or less of mismanufactured panels, the buyer pays the cost of reinspection and pays for the shipment as invoiced.

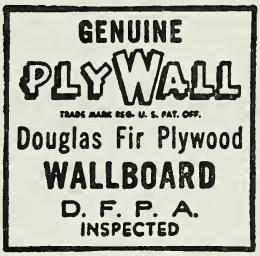
GRADE MARKING AND CERTIFICATION

36. In order to assure the purchaser that he is getting Douglas fir plywood of the grade specified, producers may individually or in concert with their trade association or inspection bureau, issue certificates with each shipment; or grade mark each panel as conforming to the standard.

37. The following sets forth the grade marking and certification rules adopted by the Douglas Fir Plywood Association to preserve the high standards of quality herein recorded and to insure distributors and ultimate consumers receiving the proper kind of plywood for their specific needs. All standard-size panels are stamped or branded with the following symbols:

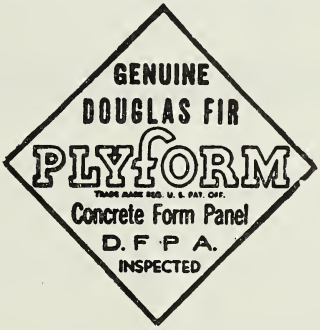
(a) *Standard Panels* of Sound 2 Sides and Sound 1 Side grades are stamped or branded on one edge.

(b) *Wallboard* is stamped on the back.



(c) *Sheathing* is scored in parallel lines at 16-inch intervals across the face, with the name "PLYSCORD", repeated at frequent intervals, and also stamped in the corner of the panel.

(d) *Concrete-form panels* are stamped on the face.

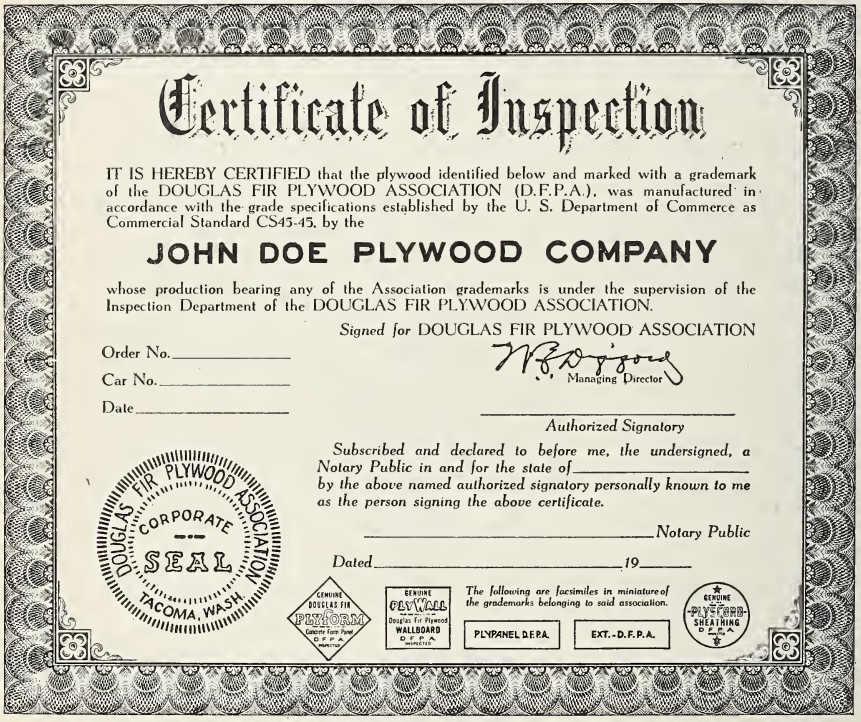


(e) *All Exterior-type plywood* is stamped or branded on the edge.

(f) *Marine Exterior plywood* is stamped or branded.

⚓ MARINE EXT. D.F.P.A. ⚓ 00

38. The Douglas Fir Plywood Association maintains an Inspection Bureau for the careful grading of its members' products. By the use of certificates on carload lots, the first unloading buyer of a carload is assured of receiving plywood of the grade specified. This is of special value to buyers of industrial grade plywood which, because of frequent odd sizes, cannot be grade marked separately.



Certificate of Inspection

IT IS HEREBY CERTIFIED that the plywood identified below and marked with a grademark of the DOUGLAS FIR PLYWOOD ASSOCIATION (D.F.P.A.), was manufactured in accordance with the grade specifications established by the U. S. Department of Commerce as Commercial Standard CS45-45, by the

JOHN DOE PLYWOOD COMPANY

whose production bearing any of the Association grademarks is under the supervision of the Inspection Department of the DOUGLAS FIR PLYWOOD ASSOCIATION.

Signed for DOUGLAS FIR PLYWOOD ASSOCIATION

Order No._____

Car No._____

Date_____

Managing Director

Authorized Signatory

Subscribed and declared to before me, the undersigned, a Notary Public in and for the state of_____ by the above named authorized signatory personally known to me as the person signing the above certificate.

Notary Public

*Dated*_____ *19*____

DOUGLAS FIR PLYWOOD ASSOCIATION CORPORATE SEAL TACOMA, WASH.

The following are facsimiles in miniature of the grademarks belonging to said association.

PLYPANEL D.F.P.A.

EXT.-D.F.P.A.

FIGURE 3.—*Inspection certificate of the Douglas Fir Plywood Association.*

NOMENCLATURE AND DEFINITIONS

Back.—The side reverse to the face of the panel.

Borer holes.—Voids made by wood-boring insects or worms.

Centers—See *cores.*

Checks.—Small splits running parallel to the grain of the wood caused chiefly by strains produced in seasoning.

Cores.—Cores or centers are the innermost layer in plywood construction.

Crossbanding.—Veneer used in the construction of plywood with five or more plies. In 5-ply construction it is placed at right angles between the core and faces.

Defects, open.—Checks, splits, open joints, cracks, loose knots, and other defects interrupting the smooth continuity of the panel surface.

Face.—The better side of a panel in any grade calling for a face and a back; also, either side of a panel where the grading rules draw no distinction between faces.

Heartwood.—The darker-colored wood occurring in the inner portion of the tree, sometimes referred to as "heart."

Knots.—Cross section of a branch or limb whose grain usually runs at right angles to that of the piece in which it is found.

Knotholes.—Voids produced by the dropping of knots from the wood in which they were originally embedded.

Lap.—A condition where the veneers used are so misplaced that one piece overlaps the other rather than making a smooth butt joint.

Patches.—Insertions of sound wood glued and placed into panels from which defective portions have been removed.

Pitch pockets.—A pitch pocket is a well-defined opening between rings of annual growth, usually containing, or which has contained, more or less pitch, either solid or liquid.

Pitch streaks.—A pitch streak is a well-defined accumulation of pitch in a more or less regular streak.

Sapwood.—The lighter-colored wood occurring in the outer portion of the tree, sometimes referred to as "sap."

Shim.—A long, narrow patch not more than $\frac{3}{16}$ inch wide.

Streaks.—See *pitch streaks*.

METHOD OF ORDERING

39. The established procedure in specifying size and grade of plywood is to name the number of plies, width, length, grade, moisture resistance, finished thickness, and whether sanded or unsanded.

40. Width always refers to distance across the grain of the face plies; length refers to the distance along the grain. Width should always be specified first.

41. If, for example, you require 100 pieces of plywood ¼ inch thick, 48 inches wide, and 96 inches long, for interior or semiexposed conditions, one side of which is to be nailed against a wall where it will not show, but the other side is to be exposed to view and painted, this material should be ordered as follows:

> Douglas Fir Plywood: 100 pcs., 3-ply 48″×96″, Wallboard Grade, Moisture-resistant, Sanded 2 Sides to ¼″ thickness.

42. For most uses, sanded panels are desirable, but there are occasional uses where unsanded panels, of a "Sound" or other grade, are satisfactory. Such panels should be specified, unsanded.

43. For special types of service, special features may be desirable in plywood panels, such as omission of oiling for concrete-form panels, extra-thick faces for certain architectural treatments, etc. In such cases, the special treatment or feature should be stated after the standard specification. For example, a "Standard Sound 2 Sides" panel of ⅜-inch thickness is desired for permanent exterior use. The order should read:

> Douglas Fir Plywood: 100 pcs., 3-ply 48″×96″, Sound 2 Sides, Exterior, Sanded 2 Sides to ⅜″ thickness. (Add further special requirements.)

GRADE USE CLASSIFICATION FOR DOUGLAS FIR PLYWOOD

44. The following chart is offered by the Douglas Fir Plywood Association, as a rough guide to the grades generally suitable to the various uses listed. Where the material is to be exposed to the weather, plywood of "Exterior" type should be specified.

Use	Types		Grades								
	Moisture resistant	Exterior for permanent exposure to weather	Marine (exterior only)	Good 2 sides (exterior only)	Good 1 side (exterior only)	Sound 2 sides	Sound 1 side	Wallboard (moisture resistant only)	Concrete-form panels	Sheathing	Industrial
Amusement-park devices	X	X				X	X	X			
Archways	X							X			
Auto-body parts	X	X				X					X
Auto trailers	X	X		X		X	X				X
Base molding	X							X			
Benches		X				X					
Billboards		X				X	X				
Bins	X	X				X	X	X			
Birdhouses		X					X				
Boats		X	X								
Bookcases	X					X					
Boxes, trays, etc	X					X					
Breakfast nooks	X					X		X			
Bulletin boards	X							X			
Cabinets:											
General	X					X					
Ice cream	X					X					
Kitchen	X					X					
Medicine	X					X					
Ceilings	X							X			
Chests	X					X					
Church pews	X					X					
Closets	X							X			
Clothes chutes	X							X			
Concrete forms	X	X							X		
Counter fronts	X					X	X				
Desks	X					X	X				
Display racks	X					X					
Drawers and bottoms	X					X					
Farm buildings	X	X				X	X	X		X	
Fixtures, store	X					X					
Flooring	X							X			
Flower boxes		X				X					
Furniture	X	X		X	X	X					
Garages	X	X				X	X	X	X	X	
Houses, play	X	X					X		X		
Ironing boards	X					X					
Lockers	X					X					
Manual training uses	X	X		X	X	X		X	X		
Marine applications		X	X								
Mirror backs	X							X			
Paneling	X	X			X		X	X			
Partitions	X					X					
Picnic tables		X				X		X			
Radio cabinets	X										X
Refrigerators		X				X	X				X
Screens (folding)	X					X					
Sheathing	X							X		X	
Shelving	X							X			
Siding		X				X	X				
Signs	X	X			X	X					
Subflooring	X									X	
Sun room porch	X							X			
Table tops	X	X			X		X	X			
Toys	X	X			X	X					
Trailers	X	X				X	X	X			
Trench sheeting	X	X							X		
Trunks	X					X					
Wardrobes	X					X					
Walls	X							X			
Window displays	X					X	X				
Window seats	X					X	X				
Window valances	X					X	X				
Work benches	X	X				X	X	X			

EFFECTIVE DATE

45. The standard is effective for new production from January 27, 1945.

STANDING COMMITTEE

46. The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Each organization nominated its own representative. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Division of Trade Standards, National Bureau of Standards, which acts as secretary for the committee.

Craig Spencer (chairman), Elliott Bay Mill Co., 600 W. Spokane St., Seattle, Wash.
Nelson S. Perkins, Douglas Fir Plywood Association, Tacoma Bldg., Tacoma 2, Wash.
Norman O. Cruver, The Wheeler, Osgood Co., 1216 St. Paul Ave., Tacoma 1, Wash.
Arnold Koutonen, Associated Plywood Mills, Foot of Jefferson St., Olympia, Wash.
Charles W. Jacob, John Bader Lumber Co., 2020 Clybourne Ave., Chicago, Ill.
Walter Junge, Technical Division, Federal Housing Administration, Washington 25, D. C.

HISTORY OF PROJECT

47. Pursuant to a request from the manufacturers of Douglas fir plywood, a general conference of manufacturers, distributors, and users of the product was held at the Winthrop Hotel, Tacoma, Wash., on August 17, 1932, to consider the adoption of standard grading rules for the guidance of the industry. Manufacturers representing approximately 80 percent of the production of Douglas fir plywood were in attendance, as well as others interested in the distribution and use of the product. The proposed standard tentatively drafted by a committee of manufacturers was thoroughly discussed and several constructive changes were made. Following written acceptance by a satisfactory majority, the standard was promulgated as CS45–33, effective February 15, 1933.

FIRST REVISION

48. The standing committee as a result of an industry conference held in Tacoma, Wash., on August 3, 1936, recommended some modifications. The recommended revision was circulated on September 11, 1936, for written acceptance with the result that the revised standard was accepted and authorized by the industry for publication as Douglas Fir Plywood (Domestic Grades) (Second Edition), Commercial Standard CS45–36, effective November 1, 1936.

SECOND REVISION

49. Agreeable to a suggestion from the Federal Housing Administration, and following several conferences between representatives of the Forest Products Laboratory, the FHA and the plywood manufacturers, a second revision, so as to provide for two classes of moisture

resistance and changes in the sheathing grade, was proposed. On approval by the standing committee, this revision was circulated September 16, 1938, for acceptance. Following acceptance by a satisfactory majority, the success of the revision was announced on October 25, 1938, and the standard became effective for new production on November 10, 1938, as CS45–38.

THIRD REVISION

50. A general demand for the various grades of Douglas fir plywood as manufactured for permanent exterior use, led to the submission of a proposed revision by the Douglas Fir Plywood Association, to include detail requirements in the standard for seven distinct grades of the exterior type. Upon approval by the standing committee, the recommended revision was submitted on May 7, 1940, to the trade for written acceptance, and the establishment of the revision was announced on July 20, 1940. The revised standard became effective for new production on August 20, 1940, as CS45–40.

FOURTH REVISION

51. Pursuant to a request from the Douglas Fir Plywood Association, dated May 27, 1942, and following approval by the Standing Committee, the fourth revision was circulated on July 2, 1942, to the trade for written acceptance. The purpose of this revision was to make adjustments in the moisture-resistant type, so as to speed up the production of those grades and sizes essential for defense construction needs. The major changes were the elimination of the grades "Good 2 Sides" and "Good 1 Side," the addition of a new grade "Sound 1 Side" and a considerable reduction in the number of standard panel sizes. This revision supersedes both CS45–40 (Domestic Grades) and CS45E–36 (Export Grades), since Douglas fir plywood is now graded on the same basis whether for domestic or export purposes. Following acceptance by a preponderant majority, the establishment of the revision was announced on October 30, 1942, as Commercial Standard CS45–42, effective for new production from November 16, 1942.

FIFTH REVISION

52. The result of experience gained by our armed forces in the use of plywood for various marine applications led to the development of an improved grade for such use. On June 22, 1944, the Douglas Fir Plywood Association submitted a proposed revision which was unanimously approved by the standing committee. On July 31, 1944, the recommended revision was circulated to the trade for written acceptance. Following acceptance by a satisfactory majority, the success of the revision was announced on December 27, 1944, as Commercial Standard CS45–45.

ACCEPTANCE OF COMMERCIAL STANDARD

If acceptance has not previously been filed, this sheet properly filled in, signed and returned will provide for the recording of your organization as an acceptor of this commercial standard.

Date _____

Division of Trade Standards,
National Bureau of Standards,
Washington 25, D. C.

Gentlemen:

Having considered the statements on the reverse side of this sheet, we accept the Commercial Standard CS45–45 as our standard of practice in the

Production [1] Distribution [1] Use [1] Testing [1]

of Douglas fir plywood.

We will assist in securing its general recognition and use, and will cooperate with the standing committee to effect revisions of the standard when necessary.

(Cut on this line)

Signature of individual officer _____
(in ink)

(Kindly typewrite or print the following lines)

Name and title of above officer _____

Organization _____
(Fill in exactly as it should be listed)

Street address _____

City, Zone, and State _____

[1] Please designate which group you represent by drawing lines through the other three. Please file separate acceptances for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade papers, colleges, etc., desiring to record their general approval, the words "in principle" should be added after the signature.

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices and the like.

2. *The acceptor's responsibility.*—The purpose of commercial standards is to establish for specific commodities nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard, and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of commercial standards on a Nation-wide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fouth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

53. The organizations and individuals listed below have accepted these grading rules as their standard of practice in the production, distribution, and use of Douglas fir plywood. Such endorsement does not signify that they may not find it necessary to deviate from the standard nor that producers so listed guarantee all of their products in this field to conform with the requirements of this standard. Therefore, specific evidence of quality certification should be obtained where required.

ASSOCIATIONS

American Association of Engineers, Chicago, Ill.
American Association of State Highway Officials, Washington, D. C.
American Institute of Architects, Cincinnati Chapter, Cincinnati, Ohio.
American Specification Institute, Chicago, Ill.
Arizona Retail Lumber & Builders Supply Association, Inc., Phoenix, Ariz.
Associated General Contractors of America, Inc., The, Washington, D. C.
Associated General Contractors of America, Inc., The, Lake Charles Chapter, Lake Charles, La.
Associated General Contractors of America, Inc., The, San Diego Chapter, San Diego, Calif. (In principle.)
Builders Association of Chicago, Inc., Chicago, Ill.
Building Officials' Conference of America, Inc., Washington, D. C.
Carolina Lumber & Building Supply Association, Charlotte, N. C. (In principle.)
Douglas Fir Plywood Association, Tacoma, Wash. (In principle.)
Hardwood Plywood Institute, Chicago, Ill. (In principle.)
Lumbermen's Association of Texas, Houston, Tex.
Michigan Retail Lumber Dealers Association, Lansing, Mich.
National Door Manufacturers Association, Inc., Chicago, Ill.
National Hardwood Lumber Association, Chicago, Ill. (In principle.)
New York Lumber Trade Association, Inc., New York, N. Y.
Prefabricated Home Manufacturers' Institute, Washington, D. C. (In principle.)
Producers' Council, Inc., The, Washington, D. C. (In principle.)
Retail Merchants Association of Sacramento, Sacramento, Calif.
Southern California Retail Lumber Association, Los Angeles, Calif.
West Coast Lumbermens Association, Seattle, Wash.
Veneer Association, The, Chicago, Ill. (In principle.)
Wisconsin Retail Lumbermens Association, Milwaukee, Wis.
Young Service Bureau, J. F., Silver Spring, Md.

FIRMS

Abel, Inc., Seattle, Wash.
Aberdeen Plywood Corporation, Aberdeen, Wash.
Acme Door Co., Hoquiam, Wash.
Acme Scale & Fixture Co., Los Angeles, Calif.
Adams, Franklin O., Tampa, Fla.
Adams & Kelly Co., Omaha, Nebr.
Addison-Rudesal Co., Atlanta, Ga.
Aetna Plywood & Veneer, Chicago, Ill.
Aladdin Co., The, Bay City, Mich.
Albany-Plylock Division, The (M. & M. Wood Working Co.), Albany, Oreg.
Allan Lumber Co., Inc., Greencastle, Ind.
Allison & Rible, Los Angeles, Calif.
Altfillisch, Charles, Decorah, Iowa.
American Car & Foundry Co., St. Louis, Mo.
American Houses, Inc., New York, N. Y.
American Plywood Corporation, New London ,Wis.
American Sash & Door Co., Kansas City, Mo.
Am-Mex Sales Co., Inc., Buffalo, N. Y.
Anacortes Veneer, Inc., Anacortes, Wash.
Andrews, Jones, Biscoe & Whitmore, Boston, Mass.
Andrews Lumber Co., C. E., New Bethlehem, Pa.
Angelina County Lumber Co., Keltys, Tex.
Anson & Gilkey Co., Merrill, Wis.
Arizona Sash, Door & Glass Co., Phoenix, Ariz., and Tucson, Ariz.
Arkmo Lumber Co., The, Little Rock, Ark.
Armstrong-Walker Lumber Co., Terre Haute, Ind.
Arrington & Co., Inc., W. C., Norfolk, Va.
Asheim, Leonard, Bridgeport, Conn. (In principle.)
Ashton Co., C. J., Detroit, Mich.
Associated Plywood Mills, Olympia, Wash.
Atlanta Oak Flooring Co., Atlanta, Ga.
Atlantic Plywood Co., Inc., New York, N. Y.
Atlas Powder Co., Zapon Division, Stamford, Conn.
Auburn Lumber Co., Auburn, Calif.
Augusta Lumber Co., Augusta, Ga.
Auler, Jensen & Brown, Oshkosh, Wis.
Austin, Ennis R., South Bend, Ind.
Bach Millwork Co., E. E., Minneapolis, Minn.
Bader Lumber Co., John, Chicago, Ill.
Bakelite Corporation, Bloomfield, N. J.
Balch & Lippert, Madison, Wis.
Baldridge Lumber Co., J. C., Albuquerque, N. Mex.
Balfour, Guthrie & Co., Ltd., Plywood Adhesives Division, Tacoma, Wash.
Baltimore, City of, Bureau of Plans & Surveys, Baltimore, Md.
Bank Building & Equipment Corporation of America, St. Louis, Mo.
Barger Millwork Co., Statesville, N. C.
Barnes Lumber Co., W. F. & J. F., Wholesale Department, Waco, Tex.
Barthmaier, Eugene V., Philadelphia, Pa.
Bartlett & Co., Inc., Binghamton, N. Y.
Baton Rouge Sash & Door Works, Inc., Baton Rouge, La.
Baxter & Co., C. B., Kansas City, Mo.
Bay City Cabinet Co., Oakland, Calif.
Beach Mill & Supply Co., Miami Beach, Fla.
Beasley & Sons Co., Nashville, Tenn.
Beaver Falls Planing Mill Co., Beaver Falls, Pa.
Becker Builders Supply Co., Wilmington, N. C.
Belber Trunk & Bag Co., Woodbury, N. J.
Bellingham Plywood Corporation, S. Bellingham, Wash.
Bellman, Gillett & Richards, Toledo, Ohio.
Bennett-Bailey Lumber Co., Minneapolis, Minn.
Bennett Lumber Corporation, N. Tonawanda, N. Y.
Berger, F. E., & R. L. Kelley, Champaign, Ill.
Besch Co., The Carl, New York, N. Y.
Beuttler, William, Sioux City, Iowa.
Billings Sash & Door Co., Billings, Mont.
Binswanger & Co., Inc., Columbia, S. C., and Richmond, Va.
Birmingham Sash & Door Co., Birmingham, Ala.
Bishop, Horatio W., La Mesa, Calif.
Blackburn, Inc., Robert, W. Allis, Wis.
Blair Veneer Co., N. Troy, Vt.
Blanchard Lumber Co., New York, N. Y.
Blithe, Wesley Lesher, Philadelphia, Pa.
Boehm, Goerge A., New York, N. Y.
Bogert, Cornelius V. R., Hackensack, N. J.
Bogner, Harry, Milwaukee, Wis.
Borcherding Co., W. C., Indianapolis, Ind.
Bosman & Casson, Inc., Harrison, N. J.
Botsford Lumber Co., Winona, Minn.

Bovard, William R., Kansas City, Mo. (In principle.)
Brainerd, Harry B., New York, N. Y. (In principle.)
Brazer, Clarence W., New York, N. Y.
Bridge Tables & Novelties, Inc., Lowell, Mass.
Brill Co., The J. G., Philadelphia, Pa.
Bristol Door & Lumber Co., Bristol, Va.
Brockway-Smith-Haigh-Lovell Co., Charlestown, Mass.
Brown, W. J., Cedar Rapids, Iowa.
Brown Graves Co., Akron, Ohio.
Bruett Lumber, Inc., T. A., Milwaukee, Wis.
Brust & Brust, Milwaukee, Wis.
Buck, Inc., Daniel, Philadelphia, Pa.
Buckeye Mill & Lumber Co., Jackson, Ohio.
Buckley Door Co., F. S., San Francisco, Calif.
Budde & Weis Manufacturing Co., Jackson, Tenn.
Buechner & Orth, St. Paul, Minn. (In principle.)
Buell Lumber & Manufacturing Co., Dallas, Tex.
Buffalo, City of, Department of Public Works, Architectural Service, Buffalo, N. Y.
Buffalo Plywood Corporation, Buffalo, N. Y.
Buffelen Lumber & Manufacturing Co., Detroit, Mich., and Tacoma, Wash.
Burhman-Pharr Hardware Co., Texarkana, Ark.
Builders Supply Co., Bismarck, N. Dak.
Building Industry Center, San Francisco, Calif. (In principle.)
Building Service, Inc., Great Falls, Mont.
Burger Boat Co., Manitowoc, Wis.
Burkhardt, E. W., Auburn, Ala.
Burnet-Binford Lumber Co., Inc., Indianapolis, Ind.
Burnside Veneer Co., Burnside, Ky.
Burton Lumber & Hardware Co., Salt Lake City, Utah.
Byron Sash & Door Co., Inc., Louisville, Ky.
C–W Plywood Co., Chicago, Ill.
California Builders Supply Co., Oakland, Calif.
California Door Co., The, Los Angeles, Calif.
California Panel & Veneer Co., Los Angeles, Calif.
Cameron & Co., Inc., Wm., Waco, Tex.
Cameron Lumber Co., Inc., Newburgh, N. Y.
Camfield Manufacturing Co., Grand Haven, Mich.
Camp Plywood Co., Inc., E. W., Hoquiam, Wash., and Indianapolis, Ind.
Candela, Rosario, New York, N. Y.
Cannon & Mullen, Salt Lake City, Utah.
Carder, Macon O., Amarillo, Tex.
Carey, Lombard, Young & Co., Oklahoma City, Okla.
Carhart Lumber Co., Wayne, Nebr.
Carmean Lumber Co., Chadron, Nebr.
Carolina Builders Corporation, Raleigh, N. C.
Carr, Adams & Collier Co., Dubuque, Iowa.
Carr-Cullen Co., Minneapolis, Minn. (In principle.)
Carroll, John, Ocean Grove, N. J.
Carstens Brothers, Ackley, Iowa.
Cascades Plywood Corporation, Portland, Oreg.
Casein Co. of America, Seattle, Wash.
Cavalier Corporation, Chattanooga, Tenn.
Cederquist Show Case & Cabinet Co., Los Angeles, Calif.
Central Building Supply, Inc., Baltimore, Md.
Central City Lumber & Manufacturing Co., Inc., Central City, Ky.
Central Glazing Co., Fort Worth, Tex.
Central Jersey Wholesale Supply Co., Trenton, N. J.
Central Laboratories, Inc., Memphis, Tenn.
Central Wholesale Co., Inc., Shreveport, La.
Chapin, Rollin C., Minneapolis, Minn.
Chapin Lumber Co., The, Aurora, Colo.
Chapman Lumber Co., C. W., Waterloo, Iowa.
Charlottesville Lumber Co., Inc., Charlottesville, Va.
Chase Lumber Co., Payson, Utah.
Chemical Corporation of America, Los Angeles, Calif.
Chicago & Riverdale Lumber Co., Chicago, Ill.
Chicago, Rock Island & Pacific Railway Co., Chicago, Ill.
Chicago Trim & Plywood Co., Chicago, Ill.
Christmann Veneer & Lumber Co., St. Louis, Mo.
Chrysler Corporation, Detroit, Mich.
Churchill Cabinet Co., Chicago, Ill.
Cincinnati Sash & Door Co., The, Cincinnati, Ohio.
Clark, Carl W., Cortland, N. Y.
Clark Veneer Co., Walter, Grand Rapids, Mich.
Cleary Millwork Co., Inc., Ansonia, Conn.
Cleveland Transit System, Cleveland, Ohio.
Cleverdon, Varney & Pike, Boston, Mass.
Coast Sash & Door Co., Tacoma, Wash.
Cogswell Construction Co., The, Baltimore, Md.
Combs Lumber Co., Inc., Lexington, Ky.
Concrete Grid Forms, Berkeley, Calif.
Conrad & Cummings, Binghamton, N. Y.
Coolbaugh & Son Co., C. C., Gloucester City, N. J.
Coolerator Co., The, Duluth, Minn.
Coolidge, Shepley, Bulfinch & Abbott, Boston, Mass.
Co-operative Community Builders, Wauwatosa, Wis.
Corddry Co., The, Snow Hill, Md.
Corduan Manufacturing Co., Inc., Chicago, Ill.
Corunna Manufacturing Co., Inc., Corunna, Mich.
Cottonwood Lumber Co., Cottonwood, Ariz.
Courville Lumber Co., Deo, Frankfort, Mich.
Cram & Ferguson, Boston, Mass.
Crane Co., The Arthur D., Sparta, N. J.
Cresmer Manufacturing Co., Riverside, Calif.
Crompton & Knowles Loom Works, Worcester, Mass.
Cross, Austin & Ireland Lumber Co., Brooklyn, N. Y.
Crowell & Lancaster, Bangor, Maine.
Crump-Colton Co., Rockford, Ill.
Curran Bros., Pomona, Calif.
Curtis Co's., Inc., Clinton, Iowa., Wausau, Wis., and Lincoln, Nebr.
Curtis Co., Ros, Detroit, Mich.
Curtiss-Wright Corporation, Airplane Division, Louisville Plant, Louisville, Ky.
Cuyahoga Lumber Co., The, Cleveland, Ohio.
Dakota Sash & Door Co., Aberdeen, S. Dak.
D'Arcy Co., Dover, N. H.
Darlington Veneer Co., Inc., Darlington, S. C.
Davidson Sash & Door Co., Inc., Lake Charles, La.
Davis Hardwood Co., San Francisco, Calif.
Davis Plywood Corporation, The, Cleveland, Ohio, Columbus, Ohio, and Toledo, Ohio.
Dayton Sash & Door Co., The, Dayton, Ohio.
De Jarnette, Charles Wagner, Des Moines, Iowa.
De Luxe Metal Furniture Co., Warren, Pa.
Deacon Co., J. C., Chicago, Ill.
Dealers Wholesale Supply, Inc., Detroit, Mich.
Deats Sash & Door Co., Los Angeles, Calif.
Denny Roll & Panel Co., High Point, N. C.
Denver Reserve Supply Co., Denver, Colo.
Detroit Show Case Co., Detroit, Mich.
Dibble Lumber Co., The S. B., N. Adams, Mass.
Dickerson Lumber Co., Huntington, W. Va.
Dix Lumber Co., N. Cambridge, Mass.
Dixie Millwork Co., Inc., Hagerstown, Md.
Doak Lumber Co., Inc., Greeneville, Tenn.
Doddington Corporation, The, Columbus, Ohio.
Doerr, J. G., Boise, Idaho.
Donlin-Johnson Co., St. Cloud, Minn.
Donova, John J., Berkeley, Calif.
Dougher, Rich & Woodburn, Des Moines, Iowa.
Dougherty Lumber Co., Cleveland, Ohio.
Dover Lumber Co., Dover, N. J.
Dower Lumber Co., John, Tacoma, Wash.
Downes Lumber Co., Boston, Mass.
Duncan Laboratories, Portland, Oreg.
Durez Plastics & Chemicals, Inc., N. Tonawanda, N. Y.
Dyke Bros., N. Little Rock, Ark.
Dykes Lumber Co., New York, N. Y.
East Bay Refrigerator & Fixture Co., Oakland, Calif.
East Coast Lumber & Supply Co., Millwork Division, Fort Pierce, Fla.
Eastern Aircraft, Trenton Division, Trenton, N. J.
Economy Lumber Co., Inc., Christiansburg, Va.
Edison Wood Products, Inc., New London, Wis.
Edmonton Paint & Glass Co., Ltd., The, Edmonton, Alberta, Canada.
Ehrlich & Sons Manufacturing Co., H., St. Joseph, Mo.
Eiler Lumber Co., Edward, Pittsburgh, Pa.
Elliott Bay Lumber Co., Seattle, Wash.
Elliott Bay Mill Co., Seattle, Wash.
Elmer Co., J. O., San Francisco, Calif.
Elmer & Moody Co., Seattle, Wash.
Emery, Henry C., Nyack, N. Y.
Emery Industries, Inc., Cincinnati, Ohio.
Empire Millwork Co., Corona, N. Y.
Empire Sash & Door Co., Ltd., The, Winnipeg, Manitoba, Canada.
Engineering & Research Corporation, Riverdale, Md.

Engineering Systems, Inc., Chicago, Ill.
Engler Millwork Corporation, Jersey City, N. J.
English, Harold T., Hutchinson, Kans.
Epstein Co., N. B., Scranton, Pa.
Eugene Plywood Co., Eugene, Oreg.
Evans & Callaway, Fowler, Ind.
Evans & Co., H. C., Chicago, Ill.
Evans-MacArthur Co., New York, N. Y.
Evans Products Co., Lafayette, Ind.
Evans Products Co., Western Division, Marshfield, Oreg.
Evansville Sash & Door Co., Inc., Evansville, Ind.
Everett & Associates, H. F., Allentown, Pa.
Exchange Lumber Co., Inc., Rochester, N. Y.
Exchange Lumber & Manufacturing Co., Spokane, Wash.
Farley & Loetscher Manufacturing Co., Dubuque, Iowa.
Fayfield, Robert C., Buffalo, N. Y.
Ferguson Bros. Manufacturing Co., Hoboken, N. J.
Fessenden Hall, Philadelphia, Pa.
Fetzer & Fetzer, Salt Lake City, Utah.
Fidelity Storage & Transfer Co., St. Paul, Minn.
Fink & Schindler Co., The, San Francisco, Calif.
Fischer Lime & Cement Co., Memphis, Tenn.
Fish & Hunter Co., The, Rapid City, S. Dak., and Deadwood, S. Dak.
Flannagan, Eric G., Henderson, N. C.
Flint Sash & Door Co., Inc., Flint, Mich.
Florida, University of, School of Forestry, Gainesville, Fla.
Foltz & Son, Herbert, Winter Haven, Fla.
Ford Motor Co., Dearborn, Mich.
Foreman-Derrickson Veneer Co., Elizabeth City, N. C. (In principle.)
Forsyth Hardwood Co., San Francisco, Calif.
Fort Wayne Builders Supply Co., Fort Wayne, Ind.
Foster Lumber Co., R. S., Indianapolis, Ind.
Free Sewing Machine Co., Rockford Cabinet Division, Rockford, Ill.
French Co., E. L., Detroit, Mich.
Frost Hardwood Lumber Co., San Diego, Calif.
Fry-Fulton Lumber Co., St. Louis, Mo.
Fuller & Co., W. P., Boise, Idaho, Portland, Oreg., Seattle, Wash., and other cities.
Fuller Goodman Co., Oshkosh, Wis.
Furer, Wm. C., Honolulu, Hawaii.
Gaines Hardwood Lumber Co., St. Louis, Mo.
Gair Co., Inc., Robert, Haverhill Boxboards Division, Haverhill, Mass.
Gale Manufacturing Co., Albion, Mich.
Garber, Frederick W., Cincinnati, Ohio.
Garratt & Co., Wayne, Pa.
General Box Co., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
General Millwork Corporation, Utica, N. Y.
General Radio Co., Cambridge, Mass.
Georgeson, F. T., Eureka, Calif.
Georgia Hardwood Lumber Co., Augusta, Ga.
Georgia Show Case Co., Montgomery, Ala.
Gibb, Arthur N., Ithaca, N. Y.
Gibbs Lumber Co., Anaheim, Calif.
Gibson Door Co., The, Utica, N. Y.
Ginsberg & Sons, Inc., D., Corona, N. Y.
Girdler Corporation, The, Louisville, Ky. (In principle.)
Globe Wernicke Co., The, Norwood, Ohio.
Godfrey Lumber Co., Boston, Mass.
Goshen Sash & Door Co., Goshen, Ind.
Grand Rapids Sash & Door Co., Grand Rapids, Mich.
Grand Rapids Store Equipment Co., Grand Rapids, Mich.
Great Lakes Sash & Door Co., The, Cleveland, Ohio.
Greater New York Lumber Industries, Inc., New York, N. Y.
Groffmann, L. C., St. Louis, Mo. (In principle.)
Grogan-Robinson Lumber Co., Great Falls, Mont.
Gulf States Plywood Co., New Orleans, La.
Haley Bros., Santa Monica, Calif.
Hall-Gregg, Inc., Somerville, Mass.
Hallack & Howard Lumber Co., The, Denver, Colo.
Hammond Lumber Co., Los Angeles, Calif.
Handling Equipment Co., St. Paul, Minn.
Hanna, John G., Dunedin, Fla.
Hannaford & Sons, Samuel, Cincinnati, Ohio.
Hansen Lumber Co., Ltd., The, Quebec, Canada.
Haralson & Mott, Fort Smith, Ark.
Harbor Plywood Corporation of California, San Francisco, Calif.
Harbor Plywood Corporation, Hoquiam, Wash., Chicago, Ill., and Jacksonville, Fla.
Harbor Sales Co., Inc., The, Baltimore, Md.
Harmony Co., The, Chicago, Ill.
Harris Brothers Co., Chicago, Ill.
Harrison-Martin Lumber Co., Grand Island, Nebr.
Hartung Co., F. L., Seattle, Wash.
Hasness, Carlisle D., Harrisburg, Pa.
Hass Millwork & Building Materials, Inc., South Bend, Ind.
Hastings & Co., Inc., A. W., Somerville, Mass.
Hawkins Lumber & Warehouse Co., Boston, Mass.
Haxby & Bissell, Minneapolis, Minn.
Heidritter Lumber Corporation, Elizabeth, N. J.
Helfensteller, Hirsch & Watson, St. Louis, Mo.
Henrich Panel Co., Inc., Buffalo, N. Y.
Henshaw & Ellwanger, Inc., Denver, Colo.
Henshaw Refrigeration & Fixture Co., San Francisco, Calif.
Hermsdorf Fixture Manufacturing Co., Manchester, N. H.
Heynen Lumber Co., Columbus, Nebr.
Higgins, Charles H., New York, N. Y.
Higgins Lumber Co., J. E., San Francisco, Calif.
Hill Aircraft Plywoods, Lyman, Hollywood, Calif.
Hill-Top Lumber Co., Pittsburgh, Pa.
Hinckley Lumber Corporation, The Dwight, Cleveland, Ohio.
Hinckley & Son Co., John, Hyannis, Mass.
Hodgdon & Son, Charles, Chicago, Ill.
Hodgson Co., E. F., Dover, Mass.
Hoffman Co., Earl, Los Angeles, Calif.
Hoffmann Lumber Co., Pittsburgh, Pa.
Hogan Lumber Co., Oakland, Calif.
Holmboe, E. C., Clarksburg, W. Va.
Holsman & Holsman & Klekamp, Chicago, Ill.
Honerkamp Co., F. W., New York, N. Y.
Hope, Frank L., Jr., San Diego, Calif.
Hopkins, A. H., Buffalo, N. Y.
Horley, Edward F., Ingram, Pittsburgh, Pa.
Horsley Co., Inc., The, New York, N. Y.
Houkom, S. M., Fargo, N. Dak.
Houston, Better Business Bureau of, Houston, Tex. (In principle.)
Houston Sash & Door Co., Houston, Tex.
Howell, Leslie D., Portland, Oreg.
Hubbard, John C., Weimar, Tex.
Huber-Lanctot Housewrecking Corporation, Buffalo, N. Y.
Huck Manufacturing Co., Quincy, Ill.
Hussey-Williams Co., Inc., Ozone Park, L. I., N. Y.
Hutchings, E. T., Louisville, Ky.
Huttig Sash & Door Co., Columbus, Ohio., Jacksonville, Fla., Roanoke, Va., and St. Louis, Mo.
Huttig Sash & Door Co., Hughes Division, Louisville, Ky.
Huttig Sash & Door Co. of Texas, Dallas, Tex.
Illinois, University of, Urbana, Ill.
Industrial Plastics Corporation, Milwaukee, Wis.
Industrial Wholesale Lumber Co., Cleveland, Ohio.
Interior Woodwork Co., Milwaukee, Wis.
Intermountain Consumers' Service, Inc., Denver, Colo.
Interstate Lumber Co., Missoula, Mont.
Interstate Sash & Door Co., The, Canton, Ohio
Iowa Builders Supply Co., Cedar Rapids, Iowa.
Iron City Sash & Door Co., Pittsburgh, Pa.
Ivey, Inc., Edwin J., Seattle. Wash.
Jacksonville Sash & Door Co., Inc., Jacksonville, Fla.
Jaeger Manufacturing Co., Inc., The, Des Moines. Iowa.
Jefferson Wood Products Co., Jefferson, Wis.
Jersey Millwork Corporation, Jersey City, N. J.
Johnson, Wallwork & Dukehart, Portland Oreg.
Johnson & Wimsatt, Inc., Washington, D. C.
Jones Hardwood Co., San Francisco, Calif.
Jordan Millwork Co., Sioux Falls, S. Dak.
Kaelber & Waasdorps, Rochester, N. Y.
Kahn, Ely Jacques—Robert Allan Jacobs, New York, N. Y.
Kahn Associated Architects & Engineers, Inc., Albert, Detroit, Mich.
Kansas State College, Engineering Extension Department, Manhattan, Kans. (In principle.)
Karcher, Walter T., & Livingston Smith, Philadelphia, Pa.
Karno-Smith Co., Trenton, N. J.
Karpen & Bros., S., Huntington Park, Calif.
Keely Plywood Co., Hal, Pittsburgh, Pa.
Keen Coal & Supply Co., Batavia, Ohio.

Keich & O'Brien, Warren, Ohio.
Kelley, Frederic P., New York, N. Y.
Kellogg & Sons Co., Charles C., Utica, N. Y.
Kennedy Lumber & Coal Co., Trenton, N. J.
Kilham, Hopkins & Greeley, Boston, Mass.
Killefer Manufacturing Corporation, Los Angeles, Calif.
Kilpatrick Brothers, Inc., Oklahoma City, Okla.
Kimball Lumber Co., Watertown, Mass.
Kimball & Wilson, Inc., Detroit, Mich.
Kime Lumber Co., O. F., Bucyrus, Ohio.
Kittinger Co., Inc., Buffalo, N. Y.
Knox & Toombs, Hoquiam, Wash.
Koch Butchers' Supply Co., N. Kansas City, Mo.
Kochton Plywood & Veneer, Chicago, Ill.
Koehl & Son, Inc., John W., Los Angeles, Calif.
Kohn, Robert D., & Chas. Butler, New York, N. Y.
Krauss Bros. Lumber Co. of Florida, Tampa, Fla.
Kruckemeyer & Strong, Cincinnati, Ohio.
Kulchar & Co., S., Oakland, Calif.
Kullberg Manufacturing Co., Minneapolis, Minn.
Kyle, Herbert S., Charleston, W. Va. (In principle.)
Lacy Manufacturing Co., Fayetteville, N. C. (In principle.)
Lambert Lumber Co., Leavenworth, Kans.
Lander Lumber Co., El Paso, Tex.
Lane Mill Service, Arthur E., New York, N. Y.
Larrick, Thomas, Columbus, Ohio.
Latenser & Sons, John, Omaha, Nebr.
Laucks, Inc., I. F., Seattle, Wash.
Law, Law, Potter & Nystrom, Madison, Wis.
Leake & Goodlett, Inc., Tupelo, Miss.
Lee, Wm. H., Philadelphia, Pa.
Levine, Ernest, Highland Park, N. J.
Levy, Will, St. Louis, Mo.
Lewis Lumber Co., Spring Lake, N. J.
Liggett Drug Co., Inc., Boston, Mass.
Lingo Lumber Co., Dallas, Tex.
Litle, W. A., Washington, Pa.
Lloyd & Son, Ltd., C., Wingham, Ontario, Canada.
Loeb, Laurence M., Elmsford, N. Y.
Loetscher & Burch Manufacturing Co., Des Moines, Iowa.
Loizeaux Lumber Co., J. D., Plainfield, N. J.
Lomasney & Co., J. F., Los Angeles, Calif.
Lookout Lumber Co., Chattanooga, Tenn.
Lord & Bushnell Co., The, Chicago, Ill.
Los Angeles, City of, Los Angeles, Calif.
Lovatt, George I., Philadelphia, Pa.
Lovell-Denniston Lumber Co., Eldora, Iowa.
Lumber & Millwork Co. of Philadelphia, The, Philadelphia, Pa.
Lumber Products, Inc., Portland, Oreg.
Lumber Supply & Warehouse Co., Inc., Seattle, Wash.
Lumberman's Supply, Inc., Sacramento, Calif.
Lumbermens Associated Buyers Co. (Iowa Corporation), Des Moines, Iowa.
Lumbermen's Credit & Warehouse Co., Kalamazoo, Mich.
Lumbermen's Door & Trim Co., The, E. Cleveland, Ohio.
Lyman-Hawkins Lumber Co., The, Akron, Ohio.
Lyon-Gray Lumber Co., Dallas, Tex.
Lyon Metal Products, Inc., Aurora, Ill.
M & M Wood Working Co., Portland, Oreg.
Mahoney Sash & Door Co., The, Canton, Ohio.
Mahood, Alex B., Bluefield, W. Va.
Mann & Co., Hutchinson, Kans.
Markland Contracting Co., M. B., Atlantic City, N. J.
Marquart Millwork Co., Oshkosh, Wis.
Marsh & Truman Lumber Co., Chicago, Ill.
Marshall-Wright Lumber Co., Ionia, Mich.
Martell Co., F. H., Washington, D. C.
Martin, Edgar, Chicago, Ill.
Martin Lumber Co., Springfield, Mass.
Mason City Millwork Co., Mason City, Iowa.
Mason & Co., George D., Detroit, Mich.
Mason Lumber Co., Jacksonville, Fla.
Massey Concrete Products Co., Chicago, Ill.
Matheny Sash & Door Co., Oakland, Calif.
Matot, Inc., D. A., Chicago, Ill.
Mauk Seattle Lumber Co., Seattle, Wash.
Mauran, Russell, Crowell & Mulligardt, St. Louis, Mo.
Maxson & Starin, Cortland, N. Y.
McClelland Co., The, Davenport, Iowa.
McCoy & Co., Inc., Lawrence R., Worcester, Mass.
McCray Refrigerator Co., Kendallville, Ind.
McCulloch, E. Russell, Atlanta, Ga.
McEwen Lumber Co., High Point, N. C.
McGrath, R. A., Detroit, Mich.
McPhillips Manufacturing Co., Mobile, Ala.
Melville Lumber Co., J. H., Broken Bow, Nebr.
Memphis Sash & Door Co., Memphis, Tenn.
Mengel Co., The, Louisville, Ky.
Merrill-Schaaf Lumber Co., Pierre, S. Dak.
Merritt Lumber Yards, Inc., Reading, Pa.
Michigan State College, East Lansing, Mich. (In principle.)
Michigan Wholesales, Inc., Ft. Wayne, Ind.
Midland Planing Mills, Ltd., Midland, Ontario, Canada.
Mid-West Lumber Co., The, Mankato, Kans.
Midwest Lumber Co., Dubuque, Iowa.
Miles Lumber & Coal Co., A. W., Livingston, Mont.
Miller Brothers, Inc., Lebanon, Pa.
Miller & Yeager, Terre Haute, Ind.
Modern Refrigerator Works, Glendale, Calif.
Moline Furniture Works, Moline, Ill.
Molther, F. R., Ancon, Canal Zone.
Montague Co., The, San Francisco, Calif.
Moore & Co., Dallas, Tex.
Moore & Co., Le Mars, Iowa.
Moore Dry Dock Co., Oakland, Calif.
Moore-Handley Hardware Co., Birmingham, Ala.
Moore Lumber Co., L. A., Mason City, Iowa.
Moore-Whittington Lumber Co., Ltd., The, Victoria, B. C., Canada.
Mooser, William, San Francisco, Calif.
Morgan Millwork Co., Baltimore, Md.
Morgan Sash & Door Co., Chicago, Ill.
Morgan Sash & Door Co., Oklahoma City, Okla.
Morrill & Sturgeon Lumber Co., Portland, Oreg.
Morrison-Merrill & Co., Salt Lake City, Utah.
Mowry & Co., Inc., Geo., Derry, Pa.
Mueller, Hair & Hetterich, Hamilton, Ohio.
Muhlenberg Bros., Reading, Pa.
Mullen Manufacturing Co., San Francisco, Calif.
Nachtegall Manufacturing Co., Grand Rapids, Mich.
Nash, Robinson & Co., Waco, Tex.
Nassau Suffolk Lumber & Supply Corporation, Amityville, N. Y.
National Plywood Co., Inc., New York, N. Y.
National Plywoods, Inc., Chicago, Ill.
Neal-Blun Co., Savannah, Ga.
Neumann & Sons, William, Jersey City, N. J.
New Castle Products, New Castle, Ind.
New England Box Co., The, Greenfield, Mass.
New England Panel Co., Everett, Mass.
New Orleans, Inc., Better Business Bureau of, New Orleans, La. (In principle.)
New Rochelle Coal & Lumber Co., New Rochelle, N. Y.
New York Wood Working Corporation, New York, N. Y.
Newton Co., F. H., Somerville, Mass.
Newton Lumber Co., The, Pueblo, Colo.
Newton Lumber & Manufacturing Co., The, Colorado Springs, Colo.
Nichols & Cox Lumber Co., Grand Rapids, Mich.
Nicolai Door Sales Co., San Francisco, Calif.
Northern Lumber Co., Billings, Mont.
Northern Sash & Door Co., Hawkins, Wis.
Northwest Door Co., Tacoma, Wash.
Northwestern Furniture Co., Milwaukee, Wis.
Northwestern Sash & Door Co., Fergus Falls, Minn.
Norton, Paul W., Boston, Mass. (In principle.)
Nurenburg, W. S., Ft. Worth, Tex.
O & N Lumber Co., Menomonie, Wis.
Oakland, Public Schools, Oakland, Calif.
O'Connor, R. B. & W. H. Kilham, Jr., New York N. Y.
Ohio City Sash & Door Co., Dayton, Ohio.
Ohio State University, The, Columbus, Ohio.
Olympia Veneer Co., Olympia, Wash.
Olympic Plywood Co., Shelton, Wash.
Omaha Hardwood Lumber Co., Omaha, Nebr., and Sioux City, Iowa.
Oregon Plywood Corporation, Buffalo, N. Y.
Oregon-Washington Plywood Co., Tacoma, Wash.
Ostlund & Johnson, San Francisco, Calif.
Overstreet, N. W., Jackson, Miss.
Owens-Parks Lumber Co., Los Angeles, Calif.
Pacific Lumber Agency, Sumner, Wash.
Pacific Manufacturing Co., Santa Clara, Calif.
Pacific Mutual Door Co., Kansas City, Kans.
Pacific Mutual Door Co., Chicago Branch, Chicago, Ill.
Pacific Plywood Corporation, Willamina, Oreg.
Pacific States Box & Basket Co., Weston Basket & Barrell Plant, San Francisco, Calif.

Parmentier Plywood Service, Inc., Philadelphia, Pa.
Parshelsky Bros., Inc., Brooklyn, N. Y.
Patten-Blinn Lumber Co., Los Angeles, Calif.
Paxton Lumber Co., Frank, Denver, Colo., Kansas City, Kans., and Ft. Worth, Tex.
Pearl City Plywood Co., Inc., Jamestown, N. Y.
Pease Woodwork Co., Inc., Cincinnati, Ohio.
Peerless Built-In Fixture Co., Berkeley, Calif.
Pehrson, G. A. Spokane, Wash.
Peninsula Plywood Corporation, Port Angeles, Wash.
Pennsylvania, Commonwealth of, Bureau of Standards, Harrisburg, Pa.
Pennsylvania State College, The, Department of Forestry, State College, Pa. (In principle.)
Pepper, George W., Jr., Philadelphia, Pa.
Perlin Lumber Co., Brooklyn, N. Y.
Perry Lumber Co., J. B., New York, N. Y.
Pflueger, Timothy L., San Francisco, Calif.
Phelps & Dewees & Simmons, San Antonio, Tex.
Philco Corporation, Philadelphia, Pa.
Pittsburgh & Shawmut Railroad, Kittanning, Pa.
Platt & Bro., F. P., New York, N. Y.
Plylock Corporation, The (Division of the M & M Wood Working Co.), Portland ,Oreg.
Plywood Detroit Co., Detroit, Mich.
Plywood Distributing Co., Chicago, Ill.
Plywood & Lumber Service, Baltimore, Md.
Plywood Products Corporation, New York, N. Y.
Plywoods-Plastics Corporation, Hampton, S. C.
Porete Manufacturing Co., N. Arlington, N. J.
Portsmouth Lumber Corporation, Portsmouth, Va.
Prescott Lumber Co., Prescott, Ariz.
Proudfoot Rawson—Brooks & Borg, Des Moines, Iowa. (In principle.)
Puget Sound Plywood, Inc., Kansas City, Mo., and Tacoma, Wash.
Queen City Sash & Door Co., The, Cincinnati, Ohio.
Queensborough Lumber Co., Inc., Bayside, N. Y.
Quigley Co., J. R., Gloucester, N. J.
Radford Co., The, Duluth, Minn.
Radford & Sanders, Inc., Baltimore, Md.
Ramsey & Sons, Inc., A. H., Miami, Fla.
Rather, J. T., Jr., Houston, Tex.
Raytheon Manufacturing Co., Equipment Division, Waltham, Mass.
Ream Co., George E., Los Angeles, Calif.
Reeb Millwork Corporation, Roselle, N. J.
Reichhold Chemicals, Inc., Detroit, Mich. (In principle.)
Reid, Wm. H., Jr., Billings, Mont.
Reinholdt & Lewis, Salem, Oreg.
Rensselaer Polytechnic Institute, Troy, N. Y.
Renuart Lumber Yards, Inc., Coral Gables, Fla.
Reo Motors, Inc., Lansing, Mich.
Requarth Co., The F. A., Dayton, Ohio.
Rhodes, Harry A., Rensselaer, N. Y.
Richards & Davis Co., Fall River, Mass.
Richardson-Phelps Lumber Co., Grinnell, Iowa.
Richmond Lumber Co., Richmond, Ind.
Ripley & Sons, David—W. Frank Hopping, Newark, N. J. (In principle.)
Risser Lumber & Manufacturing Co., Art, Paris, Ill.
Robbins Door & Sash Co., Inc., Ithaca, N. Y.
Robert & Co., Inc., Atlanta, Ga.
Roberts Corporation, U. N., Davenport, Iowa
Robinson Lumber & Coal Co., Robinson, Ill.
Robinson Manufacturing Co., Everett, Wash.
Rock Hill Lumber Co., Rock Hill, S. C.
Rock Island Lumber Co., Cleveland, Ohio.
Rockwell Bros. & Co., Houston, Tex.
Rockwell Lumber Co., Houston, Tex.
Roddis Co., Chicago, Ill.
Roddis Lumber & Veneer Co., Kansas City, Mo., Dallas, Tex., and Milwaukee, Wis.
Roddis Lumber & Veneer Co. of Missouri, San Antonio, Tex.
Roddis Panel & Door Co., Louisville, Ky., and Cincinnati, Ohio.
Roddis Plywood & Door Co., Inc., Cambridge, Mass., and New York, N. Y.
Roemer Bros., Bowling Green, Ky.
Rogers Lumber Co., The T. H., Oklahoma City, Okla.
Rohrer Lumber Co., D. J., Clintonville, Wis.
Root Lumber Co., Piqua, Ohio.
Rosser Lumber Co., The W. F., Arcanum, Ohio.
Rounds & Porter Co., Wichita, Kans.
Rowley Associates, Inc., Chas. Bacon, Cleveland, Ohio.
Royal Oak Wholesale Co., Royal Oak, Mich.
Rudinger, Inc., C. R., South Kearny, N. J.
Ruggles Lumber Co., Carlos, Springfield, Mass.
Ruse & Co., Baltimore, Md.
Rust Sash & Door Co., Kansas City, Mo.
Rutherford Co., Ltd., Montreal, Quebec, Canada.
Safeway Stores, Inc., Construction Design Co. Division, Oakland, Calif.
St. Louis, City of, Board of Education, St. Louis, Mo.
St. Louis Plywood Manufacturers, Inc., St. Louis, Mo.
St. Paul & Tacoma Lumber Co., Tacoma, Wash.
Santa Fe Builders Supply Co., Santa Fe, N. Mex.
Sash, Door & Glass Corporation, Richmond, Va.
Schiefer & Sons, San Diego, Calif.
Schmidt, Garden & Erikson, Chicago, Ill.
Schroeder Lumber & Supply Co., John, Milwaukee, Wis.
Schroeder Sales Co., Houston, Tex.
Schuette Co., William, Pittsburgh, Pa.
Schulzke, William H., Moline, Ill.
Schwarz Bros. Co., The, Bridgeport, Conn.
Schweiger Contracting Co., T. G., Kansas City, Mo.
Scott Graff Co., Duluth, Minn.
Scranton Better Business Bureau, Scranton, Pa. (In principle.)
Sears, Roebuck & Co., Chicago, Ill.
Segelke & Kohlhaus Co., La Crosse, Wis.
Seville Lumber & Supply Co., Seville, Ohio.
Seymour Commercial Co., The, Seymour, Conn.
Shanley, Geo. H., Great Falls, Mont.
Shaver, Chas. W., Salina, Kans.
Sheboygan Fruit Box Co., Sheboygan, Wis.
Shenk Co., Henry, Erie, Pa.
Shepard & Morse Lumber Co., New York, N. Y.
Simons, Inc., Minneapolis, Minn.
Simons Lumber Co., Henry, Minneapolis, Minn.
Simpson Logging Co., Plywood & Door Division, McCleary, Wash.
Sjostrom Co., John E., Philadelphia, Pa.
Skaneateles Boats, Inc., Skaneateles, N. Y.
Sloan Lumber Co., Ft. Worth, Tex.
Smith Co., Allen A., Toledo, Ohio.
Smith Co., E. E., Providence, R. I.
Smith, Hinchman & Grylls, Detroit, Mich.
Smith Wood-Products, Inc., Portland, Oreg.
Snedaker & Co., Inc., Frank C., Philadelphia, Pa.
Snell Sash & Door Co., St. Paul, Minn.
Snook-Veith Lumber Co., The, Cincinnati, Ohio.
Solie Lumber Co., Janesville, Wis.
Sothman Co., The, Grand Island, Nebr.
South Park Lumber Co., St. Joseph, Mo.
South Side Lumber & Supply Co., The, Toledo Ohio.
Southern Sash & Door Co., Greenville, S. C.
Southwestern Sash & Door Co., Albuquerque, N. Mex., Joplin, Mo., and El Paso, Tex.
Spahn & Rose Lumber Co., Dubuque, Iowa.
Spaulding Logging Co., Chas. K., McMinnville, Oreg.
Spokane Sash & Door Co., Spokane, Wash.
Spokane Woodworking Co., Spokane, Wash.
Standard Cabinet Works, Inc., Los Angeles, Calif.
Standard Lumber Co., Pine Bluff, Ark.
Standard Lumber Co., Spokane, Wash.
Standard Lumber & Supply Co., Fort Wayne, Ind.
Stanton & Son, Inc., E. J., Los Angeles, Calif.
Stark & Co., Kansas City, Mo.
Steele & Hibbard Lumber Co., St. Louis, Mo.
Steinmann, Robert, Cincinnati, Ohio.
Stepnoski & Son, Frank J., Fond du Lac, Wis. (In principle.)
Stern, George J., Roscoe, Los Angeles, Calif.
Steves Sash & Door Co., Houston, Tex.
Stewart Lumber Co., A. P., Thermopolis, Wyo.
Stewart-Warner Corporation, Chicago, Ill.
Stiles Lumber & Veneer Co., Grand Rapids, Mich.
Stillwater Manufacturing Co., The, Stillwater, Minn.
Stoetzel, Ralph E., Chicago, Ill.
Stokes & Allyn, Portland, Oreg.
Store Kraft Manufacturing Co., The, Beatrice, Nebr.
Stouck-Reaser Co., Inc., Gettysburg, Pa.
Strable Hardwood Co., Oakland, Calif.
Streator Manufacturing Co., Streator, Ill.
Strong & Hale Lumber Co., The, Portland, Conn.

Sunshine Lumber & Supply Co., St. Petersburg, Fla.
Sutliff Co., Milan R., Oshkosh, Wis.
Swan Lake Moulding Co., Klamath Falls, Oreg.
Sweet's Catalog Service, New York, N. Y.
Sweetwater Sash & Door Co., Sweetwater, Tex.
Syracuse University, Syracuse, N. Y.
Taylor, Ellery K., Haddonfield, N. J.
Taylor Sash & Door Co., Pensacola, Fla.
Taylor, Edward Cray & Ellis Wing, Los Angeles, Calif.
Teachout Sash, Door & Glass Co., Detroit, Mich.
Temple Lumber Co., Fabricating Division, Pineland, Tex.
Temple, Seth J.—Arthur Temple, Davenport, Iowa.
Texas Technological College, Department of Architecture & Allied Arts, Lubbock, Tex. (In principle.)
Textor Lumber Co., Wilkinsburg, Pa.
Theiling-Lothman Manufacturing Co., St. Louis, Mo.
Thomas, Arthur E., Dallas, Tex.
Thompson Bros. Boat Manufacturing Co., Peshtigo, Wis.
Thompson & Lichtner Co., The, Inc., Boston, Mass.
Thorne, Henry Calder, Ithaca, N. Y.
Throop-Martin Co., The, Columbus, Ohio.
Tolles-Bickford Lumber Co., Inc., Nashua, N. H.
Toombs & Co., Springfield, Mo.
Travis-Applegate Co., Grand Rapids, Mich.
Trexler Lumber Co. (Division of Estate of Harry C. Trexler, deceased), Allentown, Pa.
Trojan Cupboard Co., Burbank, Calif.
Tulane Hardwood Lumber Co., Inc., New Orleans, La.
Turner Lumber Co., Houston, Tex.
Twin City Hardwood Lumber Co., St. Paul, Minn.
Twin Oaks Builders Supply Co., Eugene, Oreg.
Underwood Coal & Supply Co., Mobile, Ala.
Underwood Veneer Co., Wausau, Wis.
United Sash & Door Co., Wichita, Kans., and Amarillo, Tex.
United States Plywood Corporation, Cincinnati, Ohio, and New York, N. Y.
Unity Lumber Co., Inc., Brooklyn, N. Y.
Valverde Co., Scranton, Pa.
Van Arsdale-Harris Lumber Co., Inc., San Francisco, Calif.
Van Bergen, John S., Highland Park, Ill.
Van Petten Lumber Co., Ontario, Oreg.
Vancouver Plywood & Veneer Co., Vancouver, Wash.
Vaughan & Sons, Geo. C., Houston, Tex., and San Antonio, Tex.
Vickere Lumber Co., T. W., Sheridan, Wyo.
Virginia Polytechnic Institute, Blacksburg, Va.
Virginia, University of, Charlottesville, Va.
Von Tobel Lumber Co., Ed, Las Vegas, Nev.
Waddell Co., Inc., The, Greenfield, Ohio.
Walker Lumber Co., Hubert M., Mount Vernon, Ohio.
Walsh, Louis A., Waterbury, Conn.
Walton Plywood Co., Everett, Wash.
Wanke Panel Co., Portland, Oreg.
Ward, J. Francis, San Francisco, Calif.
Ware & McClenahan, Salt Lake City, Utah.
Warren Brothers Co., Nashville, Tenn.
Washburn, Williams Lumber Co., Scranton, Pa.
Washington Door Co., Tacoma, Wash.
Washington Veneer Co., Fort Worth, Tex.
Washington Woodworking Co., Inc., Washington, D. C.
Watertown Sash & Door Co., Watertown, S. Dak.
Wearn Lumber Co., The, Charlotte, N. C.
Weber Showcase & Fixture Co., Inc., Los Angeles, Calif.
Weber Veneer & Plywood Co., Shawano, Wis.
Weimer & Sons, George, St. Albans, W. Va.
Weinel Lumber Co., A. F., Columbia, Ill.
Welch, Carroll E., Huntington, N. Y.
Welch Sash & Door Co., Port Huron, Mich.
Wenner & Fink, Philadelphia, Pa.
West, Albert E., Boston, Mass.
West Coast Plywood Co., Aberdeen, Wash.
West Frankfort Lumber Co., West Frankfort, Ill.
West Woodworking Co., Chicago, Ill.
Westerman Lumber Co., H. F., Montgomery, Minn.
Western Door & Sash Co., Oakland, Calif.
Western Electric Co., Inc., New York, N. Y.
Western Hardwood Lumber Co., Los Angeles, Calif.
Western Reserve Lumber Co., The, Warren, Ohio.
Western Union Telegraph Co., The, New York, N. Y.
Weyerhaeuser Sales Co., Tacoma, Wash.
Weyerhaeuser Timber Co.—Tacoma Building Operations, Tacoma, Wash.
Wheeler, Osgood Co., The, Tacoma, Wash.
Wheelock, Inc., E. U., Los Angeles, Calif.
Whissel Lumber Co., Inc., L. N., Buffalo, N. Y.
White Brothers, San Francisco, Calif.
Whitmer-Jackson Co., Inc., The, Buffalo, N. Y., and Cleveland, Ohio.
Whitmer Mills, Albuquerque, N. Mex.
Whittier Lumber & Millwork Co., Newark, N. J.
Wholesale Building Supply, Inc., Oakland, Calif.
Wholesale Distributing Co., Pittsburgh, Pa.
Wickes Engineering & Construction Co., Camden, N. J.
Wight & Wight, Kansas City, Mo.
Wilbur Lumber Co., West Allis, Wis.
Wiles-Chipman Lumber Co., St. Louis, Mo.
Willatsen, Andrew, Seattle, Wash.
Williams & Hunting Co., Cedar Rapids, Iowa.
Williams Veneer Co., Inc., O. L., Sumter, S. C. (In principle.)
Willingham-Tift Lumber Co., Atlanta, Ga.
Willson, Fred F., Bozeman, Mont.
Wilson & Co., Inc., United Chemical & Organic Products Division, Chicago, Ill. (In principle.)
Wilson & Greene Lumber Co., Inc., Syracuse, N. Y.
Wilson & Sons, Inc., W. A., Wheeling, W. Va.
Winde, McCormick & Chapin, Inc., Charlestown, Mass.
Winner Manufacturing Co., Inc., Trenton, N. J.
Wisconsin's Transfer Yard, Oshkosh, Wis.
Woltersdorf, Arthur, Chicago, Ill.
Wolverine Shingle & Lumber Co., Detroit, Mich.
Wood Lumber Co., Birmingham, Ala.
Wood Lumber Co., E. K., Los Angeles, Calif., and Oakland, Calif.
Wood & Son, Edward J., Clarksburg, W. Va.
Woodcraft Corporation, The, Bay City, Mich.
Woods, Everett D., & Robert Brown, Associate, Memphis, Tenn.
Wright, George Caleb, Indianapolis, Ind.
Wright & Wright, Detroit, Mich. (In principle.)
Young & Richardson, Seattle, Wash.
Zenith Radio Corporation, Chicago, Ill.
Zimmerman, A. C., Pasadena, Calif.
Zoller & Muller, New York, N. Y.

U. S. GOVERNMENT

Agriculture, U. S. Department of, Division of Purchase, Sales & Traffic, Washington, D. C.
Agriculture, U. S. Department of, Forest Service, Missoula, Mont.
Agriculture, U. S. Department of, Farm Security Administration, Washington, D. C., and Portland, Oreg.
Federal Works Agency, Public Buildings AdministrationWashington, D. C. (In principle.)
Interior, Department of the, Bureau of Reclamation, Denver, Colo.
Interior, Department of the, Office of Indian Affairs, Chicago, Ill.
Justice, Department of, Construction Division, Bureau of Prisons, Washington, D. C.
National Housing Agency, Federal Housing Administration, Washington, D. C.
National Housing Agency, Federal Public Housing Authority, Technical Division, Washington, D.C.
Naval Air Station, Public Works Department, Lakehurst, N. J.
Naval Air Training Bases, Pensacola, Fla.
Naval District, 15th—Public Works Department, New York, N. Y.
Navy Department, U. S. Coast Guard, Civil Engineering Division, Washington, D. C.
Navy Yard, Public Works Department, Portsmouth, N. H.
Veterans Administration, Washington, D. C.
War Department, Aircraft Radio Laboratory, Wright Field, Dayton, Ohio.
War Department, Post Engineer, Camp John T. Knight, Oakland, Calif.
War Production Board, Office of Civilian Requirements, Washington, D. C. (In principle.)