DOUGLAS FIR PLYWOOD
(Seventh Edition)

COMMERCIAL STANDARD CS45-47
(Supersedes CS45-45)

Effective Date for New Production From September 15, 1947

A RECORDED VOLUNTARY STANDARD
OF THE TRADE

UNITED STATES DEPARTMENT OF COMMERCE

W. AVERELL HARRIMAN, Secretary

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COMMERCIAL STANDARD FOR DOUGLAS FIR PLYWOOD

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, 1942, and 1945.

A recommended revision submitted by the Douglas Fir Plywood Association and endorsed by the standing committee was circulated on June 5, 1947, to the trade for written acceptance. Those concerned have since accepted and approved the revised standard as shown herein.

Project Manager: J. W. Medley, Commodity Standards Division
National Bureau of Standards.

Technical Adviser: V. B. Phelan, Building Technology Division, National Bureau of Standards.

1 Effective July 1, 1947, the Division of Simplified Practice, organized in 1921, and the Division of Trade Standards, organized in 1927, were combined to form the Commodity Standards Division. Since their organization, both of these Divisions have assisted many industries in the development of Simplified Practice Recommendations and Commercial Standards for a wide variety of commodities. A list of previously established Commercial Standards appears herein. A list of effective Simplified Practice Recommendations may be obtained from the Commodity Standards Division, National Bureau of Standards, Washington 25, D. C.
DOUGLAS FIR PLYWOOD  
(SEVENTH EDITION)  
COMMERCIAL STANDARD CS45-47

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 five grades of Interior Type and seven grades of Exterior Type Douglas fir plywood; a laminated board for paneling, sheathing, concrete forms, 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, Interior (Int.) 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.

INTERIOR 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. The following western softwood species may be used for inner plies only, in Interior Type Sound 2 Sides, Sound 1 Side, Industrial, and door panel grades only: Western hemlock, Sitka spruce, noble fir, commercial white fir, Alaskan cedar, western red cedar, California redwood, ponderosa pine, sugar pine, and western larch. Veneers 1/4 in. or more shall be used in the construction of interior type panels 1/4 in. and upward in thickness. The veneer thickness shall be measured before the panel is sanded. Veneer used in crossbands shall contain no knotholes greater than 2 1/2 in. in maximum dimension, and no pitch pocket more than 2-in. wide by 4-in. long or equivalent area if of lesser widths. This type shall meet the test requirements set forth in paragraphs 24 and 25. 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 contain no knotholes greater than 2 1/2 in. in maximum dimension, no pitch pockets more than 2-in. wide by 4-in. long or equivalent area if of lesser width, no splits wider than 1/2 in.; splits 1/8-in. wide at any point may be one-fourth panel length; those not more than 1/4-in. wide at any point may
be half-panel length; and those not more than \( \frac{3}{8} \)-in. wide may be full-panel length. Any number of plugs, patches, shims, worm or borer holes, and other characteristics are permitted in the back provided they do not seriously impair the strength or serviceability of the panel.

12. Sheathing (SH) (Unsanded).—(Scoring for nailing optional). An unsanded plywood made only in the following sizes: Thicknesses \( \frac{3}{8} \)- and \( \frac{3}{4} \)-inch 3-ply; \( \frac{1}{2} \)- and \( \frac{5}{8} \)-inch 5-ply; widths 36 and 48 inches; length 96 inches. The face may contain knotholes not larger than 1 in. in least dimension, pitch pockets not wider than 1 in., splits not wider than \( \frac{3}{8} \) in., and plugs, patches, shims, and other characteristics 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. The back shall be of the same quality as the back for a Sound 1 Side grade, interior type, paragraph 11. No belt sanding is permissible in this grade.

13. Industrial (Unsanded).—The face may contain tight knots, plugs, patches, and shims, worm or borer holes not more than \( \frac{3}{8} \)-in. wide or 1\( \frac{1}{2} \)-in. long, knotholes not more than \( \frac{3}{4} \) in. in least dimension, open pitch pockets not more than \( \frac{3}{4} \)-in. wide or 1\( \frac{1}{2} \)-in. long, and splits not wider than \( \frac{3}{4} \) in. The back may contain knotholes not larger than 1 in. in least dimension, pitch pockets not wider than 1 in., splits not wider than \( \frac{3}{8} \) in., and plugs, patches, shims, and other characteristics 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 back. Cores and crossbands shall be of firm stock but shall contain no knotholes greater than 1 in. in least dimension and no open pitch pockets wider than 1 in.

14. 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 \( \frac{3}{8} \)-in. thick before sanding, except for plywood \( \frac{5}{8} \) in. 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). 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**

(Interior Type)

15. Door panel.—The standard thickness of 3-ply flat veneered panels shall be \( \frac{3}{4} \) in. 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.
16. 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 3/16 in. shall be used. All veneer used in Exterior type panels shall be free from knotholes more than 1 in. in least dimension, open pitch pockets wider than 1 in., worm or borer holes more than 3/8-in. wide or 1 1/2-in. long and all knots unless tight and not more than 1 1/2 in. in least dimension. 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 24, 26a, 26b, and 26c. This type is available in the following grades:

17. 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-in. wide by 2 1/2-in. long shall be admitted. This grade is recommended for uses where a light stain or natural finish is desired.

18. Good 1 Side Exterior (G1S-Ext.).—The face shall be equal to that described under “Good 2 Sides Exterior” grade (par. 17), while the back shall be equal to the “Sound 2 Sides Exterior” grade (par. 19).

19. 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.

20. 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 may contain knotholes not larger than 1 in. in least dimension, pitch pockets not wider than 1 in., splits not wider than 3/16 in., and pluts, patches, shims, and other characteristics 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.
21. Sheathing Exterior (SH-Ext.) (Unsanded).—An unsanded panel made only in \( \frac{3}{8} \) in., \( \frac{1}{2} \) in., \( \frac{3}{4} \) in., and \( \frac{5}{8} \) in. thicknesses and in one standard panel size 48 in. by 96 in. Both face and back of this grade shall be of the same quality as the back of a Sound 1 Side Exterior panel, described in paragraph 20. No belt sanding is permissible.

22. Industrial Exterior.—This grade shall have the same quality of face and back veneer as specified for Industrial (Interior type), as described in paragraph 13. Panels in this grade shall be lightly “touch-sanded” on both sides where necessary to remove tape or surplus glue, but the \( \frac{1}{32} \)-in. tolerance as allowed for unsanded panels shall apply.

23. Concrete-form Exterior.—Concrete-form Exterior plywood shall be the same as “Sound 2 Sides Exterior” (par. 19), except that faces shall be \( \frac{1}{8} \)-in. thick before sanding. It is made only in \( \frac{3}{8} \)-in. and \( \frac{5}{32} \)-in. 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**

24. 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.

25. Test for interior type.—One test sample 6 in. by 6 in. shall be taken from each test piece. They shall be submerged in water at room temperature for a period of 4 hr, followed by drying at a temperature not to exceed 100 deg. F for a period of 20 hr. This cycle shall be repeated until all samples have failed. More than 2 in. of delamination along the edge of a sample shall be considered as failure. The average number of cycles which the five samples from one panel shall withstand is ten, or that specific panel shall be rejected.

26. Test for Exterior Type.

26a. Cold soaking test.—Five shear specimens shall be cut as shown in figure 1 from each test piece. They shall be submerged in water at room temperature for a period of 48 hr and dried for 8 hr at a temperature of 145° F \( \pm 5^\circ F \) and then followed by two cycles of soaking for 16 hr and drying for 8 hr under the conditions described above. The shear specimens shall again be soaked for a period of 16 hr 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 a minute 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 discretion of the inspector, but at least one-half the tests shall include the innermost joints.

26b. **Boiling test.**—Take shear specimens as described in paragraph 26a, boiling them, in water for 4 hr, followed by a drying of 20 hr at a temperature of 145° F (±5° F). They shall be boiled again for a period of 4 hr and the shear specimens tested while wet, as described in paragraph 26a. The shear specimens must show no less than 30 percent minimum and 60 percent average wood failure, and no delamination.
26c. Fire test.—A 5½ in. by 8 in. piece shall be taken from each selected test panel and shall be placed on the stand as illustrated in figure 3 and subjected to a 800° to 900° C flame from a Bunsen-type burner for a period of 10 min. or, in the case of a thin specimen, until a brown char area appears on the back side. The burner shall be equipped with a wing top to envelop the entire width of the specimen in flame. The top of the burner shall be 1 in. from the specimen face and the flame 1½-in. high. The flame shall impinge on the face of the specimen 2 in. from the bottom end. After the test the sample shall be removed from the stand and the glue lines examined for delamination by separating the charred plies with a sharp chisel-like instrument. Any delamination due to combustion shall be considered as failure.

27. Interpretation of tests.—If there is failure of more than one test piece from any Exterior panel, that specific panel shall be rejected. If there is a failure in any of the panels (Exterior or Interior) tested, five additional panels shall be selected and tested under the conditions described. All five panels of this second set must pass the required test.

![Figure 3: Apparatus for fire test.](image-url)
## STANDARD SIZES

28. Douglas fir plywood is made in the following standard sizes.

**Table 1. Standard Douglas fir plywood sizes**

<table>
<thead>
<tr>
<th>Item</th>
<th>Width</th>
<th>Length</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interior Type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard panels (So2S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(So1S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>164</td>
<td>24</td>
<td>60</td>
<td>3/16 (3-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>30</td>
<td>60</td>
<td>72</td>
<td>3/16 (3-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>36</td>
<td>72</td>
<td>84</td>
<td>3/16 (3-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>48</td>
<td>84</td>
<td>96</td>
<td>3/16 (3-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>Sheathing</td>
<td>36</td>
<td>96</td>
<td>5/8 (3-ply; unsanded),</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td></td>
<td>3/8 (3-ply; unsanded),</td>
</tr>
<tr>
<td>Industrial</td>
<td>As ordered up to 48</td>
<td>As ordered up to 96.</td>
<td>1/4 (3-ply; unsanded),</td>
</tr>
<tr>
<td>Concrete-form panels</td>
<td>36</td>
<td>60</td>
<td>3/4 (5-ply; sanded 2 sides),</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>72</td>
<td>5/8 (5-ply; sanded 2 sides),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>84</td>
<td>7/8 (7-ply; sanded 2 sides),</td>
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<tr>
<td></td>
<td></td>
<td>96</td>
<td>15/16 (7-ply; sanded 2 sides),</td>
</tr>
<tr>
<td><strong>Exterior Type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard panels (G2S-Ext.) (G1S-Ext.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(So2S-Ext.) (So1S-Ext.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>164</td>
<td>12</td>
<td>48</td>
<td>3/16 (3-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>14</td>
<td>14</td>
<td>60</td>
<td>3/16 (3-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>72</td>
<td>3/16 (3-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>18</td>
<td>18</td>
<td>84</td>
<td>3/16 (3-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>96</td>
<td>3/16 (3-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>22</td>
<td>22</td>
<td></td>
<td>5/8 (5-ply; sanded 2 sides),</td>
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<tr>
<td>24</td>
<td>24</td>
<td></td>
<td>7/8 (7-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>26</td>
<td>26</td>
<td></td>
<td>15/16 (7-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>28</td>
<td>28</td>
<td></td>
<td>1 (7-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td></td>
<td>11/16 (7-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>36</td>
<td>36</td>
<td></td>
<td>3/4 (5-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>42</td>
<td>42</td>
<td></td>
<td>5/8 (5-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>48</td>
<td>48</td>
<td></td>
<td>3/4 (5-ply; sanded 2 sides),</td>
</tr>
<tr>
<td>Sheathing, exterior</td>
<td>48</td>
<td>96</td>
<td>3/16 (3-ply; unsanded),</td>
</tr>
<tr>
<td>Industrial, exterior</td>
<td>As ordered.</td>
<td>As ordered.</td>
<td>1/4 (3-ply; unsanded),</td>
</tr>
<tr>
<td>Concrete-form panels, exterior</td>
<td>Same as standard panels</td>
<td>Same as standard panels</td>
<td>3/16 (3-ply; sanded 2 sides),</td>
</tr>
</tbody>
</table>

1 Number of plies listed under thickness is minimum.
SIZE TOLERANCES

29. A tolerance of $\frac{3}{4}$ (0.0156) in. over or under the specified thickness shall be allowed on sanded panels and a tolerance of $\frac{1}{8}$ (0.0312) in. on unsanded panels.

30. A tolerance of $\frac{1}{8}$ (0.0312) in. over or under the specified length and/or width shall be allowed but all panels shall be square within $\frac{3}{8}$ (0.1250) in.

INSPECTION

31. 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.

32. 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.

33. 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

34. 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.

35. 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) Sound 2 Sides grade is stamped or branded on one edge.

PLY PANEL D.F.P.A. — So2S
(b) Sound 1 Side grade is stamped on the back.

(c) Sheathing is scored in parallel lines at 16-in. 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.
36. 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.

FIGURE 4.—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.—Inserted 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 \( \frac{3}{6} \text{-in. wide.} \)

Streaks.—See pitch streaks.

METHOD OF ORDERING

37. 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.

38. 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.

39. If, for example, you require 100 pieces of plywood \( \frac{3}{4} \)-in. thick, 48-in. wide, and 96-in. long, for interior or semi-exposed 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 in. by 96 in., Sound 1 Side Grade, Interior Type, Sanded 2 Sides to \( \frac{3}{4} \)-in. thickness.

40. 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.

41. 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 \( \frac{3}{4} \)-in. thickness is desired for permanent exterior use. The order should read:

Douglas Fir Plywood: 100 pcs., 3 ply 48 in. by 96 in., Sound 2 Sides Grade, Exterior, Sanded 2 Sides to \( \frac{3}{4} \)-in. thickness. (Add further special requirements.)
**GRADE USE CLASSIFICATION FOR DOUGLAS FIR PLYWOOD**

42. 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.

<table>
<thead>
<tr>
<th>Use</th>
<th>Types</th>
<th>Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Interior</td>
<td>Exterior</td>
</tr>
<tr>
<td>-</td>
<td></td>
<td>for permanent</td>
</tr>
<tr>
<td>-</td>
<td></td>
<td>exposure to</td>
</tr>
<tr>
<td>-</td>
<td></td>
<td>weather</td>
</tr>
<tr>
<td>Amusement-park devices.</td>
<td>X X</td>
<td>X</td>
</tr>
<tr>
<td>Archways</td>
<td>X X X</td>
<td>X</td>
</tr>
<tr>
<td>Auto body parts.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Auto trailers.</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Base molding.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Benches</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Billboards.</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Bins</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Birdhouses.</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Boats</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Boxes, trays, etc.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Breakfast nooks</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Bulletin boards.</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Cabinets:</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>- General</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>- Ice cream</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>- Kitchen</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>- Medicine</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Ceilings</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Chests</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Church pews</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Closets</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Clothes chutes</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Concrete forms</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Counter fronts</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Decks</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Display racks</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Drawers and bottoms</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Farm buildings</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Fixtures, store</td>
<td>X</td>
<td>X X X</td>
</tr>
<tr>
<td>Flooring</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Flower boxes</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Furniture</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Garages</td>
<td>X X</td>
<td>X</td>
</tr>
<tr>
<td>Houses, play</td>
<td>X X</td>
<td>X</td>
</tr>
<tr>
<td>Ironing boards</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Lockers</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Manual training uses</td>
<td>X X</td>
<td>X X X</td>
</tr>
<tr>
<td>Marine applications</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Mirror backs</td>
<td>X X</td>
<td>X X X</td>
</tr>
<tr>
<td>Paneling</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td>Partitions</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Picnic tables</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Radio cabinets</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Refrigerators</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Screen (folding)</td>
<td>X</td>
<td>X X X</td>
</tr>
<tr>
<td>Sheathing</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Shelving</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Siding</td>
<td>X</td>
<td>X X X</td>
</tr>
<tr>
<td>Signs</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Subflooring</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Sun room porch</td>
<td>X X</td>
<td>X X</td>
</tr>
<tr>
<td>Table tops</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Toys</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Trailers</td>
<td>X X</td>
<td>X X</td>
</tr>
<tr>
<td>Trench sheeting</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Trunks</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Wardrobes</td>
<td>X X</td>
<td>X X X</td>
</tr>
<tr>
<td>Work benches</td>
<td></td>
<td>X X</td>
</tr>
</tbody>
</table>
STANDING COMMITTEE

43. 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 Commodity Standards Division, National Bureau of Standards, which acts as secretary for the committee.

Craig Spencer (chairman), Elliott Bay Mill Co., 600 West Spokane Street, Seattle, Wash.
Charles W. Jacob, John Bader Lumber Co., 2020 Clybourn Avenue, Chicago, Ill.
Arnold Koutonen, Associated Plywood Mills, Foot of Jefferson Street, Olympia, Wash.
Harry H. Steidle, Prefabricated Home Manufacturers’ Institute, 908 Twentieth Street NW., Washington 6, D. C.
Ralph R. Britton, National Housing Agency, Room 3–119, Tempo E Building, Washington 25, D. C.
C. O. Christenson, Property Requirements Section, National Housing Agency, Federal Housing Administration, Washington 25, D. C.

HISTORY OF PROJECT

44. 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

45. The standing committee as a result of an industry conference held in Tacoma, Washington, 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

46. 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 manu-
facturers, 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

47. 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

48. 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

49. 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, effective for new production from January 27, 1945.

SIXTH REVISION

50. On April 14, 1947, the Douglas Fir Plywood Association submitted a proposed revision in which the major changes were a reduction in the number of grades; renaming Moisture-Resistant type to
Interior type; permitting the use of western hemlock, Sitka spruce, noble fir, and other western softwood species in the inner plies of Sound 2 Sides, Sound 1 Side, Industrial, and door panel grades in the Interior type only; increasing the number of cycles of the bondage test for the Interior type from two to an average of ten; and the inclusion of a fire test for Exterior type bondage. These changes were approved by the standing committee and the recommended revision was circulated on June 5, 1947, to those directly concerned for written acceptance. The success of the revision was announced on August 15, 1947, as Commercial Standard CS45–47.

EFFECTIVE DATE

51. Having been passed through the regular procedure of the Commodity Standards Division, and approved by the acceptors herein-after listed, this commercial standard was issued by the Department of Commerce, effective from September 15, 1947.

Edwin W. Ely,
Chief, Commodity Standards Division.

APPENDIX STATEMENT

Commentary on Methods of Sampling and Bondage Test

Although the sampling plan and methods of test set forth in paragraphs 24–27 of the above commercial standard are now in general use throughout the industry, it may be well to note that the whole problem of bondage tests is still under study, and that fully satisfactory criteria remain to be developed.

The determination of percentage of wood failure in particular is subject to rather erratic fluctuations. This seems to be due in part to the fact the specimen is subjected to bending as well as shearing stresses, and it seems reasonable to conclude therefore that the resulting observation may be rather heavily affected by minute variations in the depths of the notches cut in the specimen.

It is believed that the following rough analysis of the lot acceptance sampling plan specified in paragraphs 24 and 27 may prove helpful to users of the plan in evaluating the protection it affords to purchaser and manufacturer. The analysis was prepared by the Statistical Engineering Laboratory of the National Bureau of Standards. It must be viewed as only an approximation; the statistical nature of the tests is such that an exact appraisal of the sampling plan would be too complicated to be given here in detail.

The analysis is based upon interpreting paragraph 27 to mean that 5 retest panels will be selected for each of the originally selected sample panels which is rejected in accordance with the first sentence of paragraph 27. Assume random selection of sample panels from the shipment. Assume further for a moment that the sample panel is evaluated in a completely reproducible manner by the applicable tests. Then the exact operating characteristics of the sampling plan are as outlined in table 2. The table indicates that under the above assumptions (i) a shipment in which less than 3 percent of the panels were rejectable would almost always be accepted; (ii) shipments in
which from 13 percent (in the case of 10 original sample panels) to 20 percent (in the case of 5) of the panels were rejectable would be accepted about half the time; and (iii) 40 percent of the panels in a shipment represented by 5 original sample panels would have to be rejectable to assure the rejection of the entire shipment.

Table 2.—Operating characteristics of the acceptance sampling plan

<table>
<thead>
<tr>
<th>Probability of accepting the shipment without reinspection</th>
<th>True proportion of rejectable panels in the shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Using 5 original sample panels</td>
</tr>
<tr>
<td>0.95</td>
<td>Percent 5</td>
</tr>
<tr>
<td>0.50</td>
<td>20</td>
</tr>
<tr>
<td>0.10</td>
<td>40</td>
</tr>
</tbody>
</table>

* As determined by criterion in par. 27.

Additional complications enter when it is taken into consideration that each sample panel is not evaluated in a completely reproducible manner by the tests and that there is some uncertainty in the classification of the panel as rejectable or not rejectable. In general, the result of this uncertainty will be to decrease the probability of acceptance of a shipment with a low true proportion of rejectable panels (say less than 5 percent) and to increase slightly (or leave unchanged) the probability of acceptance if the true proportion of rejectable panels is high (say about 25 percent).
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.

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

Gentlemen:

We believe that the Commercial Standard CS45-47 constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

production 1  distribution 1  purchase 1  testing 1

of Douglas fir plywood.

We reserve the right to depart from it as we deem advisable.

We understand, of course, that only those articles which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of
Authorized 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 Underline which one. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General support" 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 fourth, 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 of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.
52. The organizations listed below have individually accepted these grading rules for use as far as practicable in the production, distribution, testing, or purchase of Douglas fir plywood. In accepting the standard they reserved the right to depart therefrom as they individually deem advisable. It is expected that articles which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

ASSOCIATIONS (General Support)

American Institute of Architects, Kansas City Chapter, Kansas City, Mo.
American Specification Institute, Chicago, Ill.
Arizona Retail Lumber & Builders Supply Association, Phoenix, Ariz.

Building Officials Conference of America, Inc.,
Washington, D. C.

Carolina Lumber & Building Supply Association, Charlotte, N. C.

Consumers Cooperative Association, Kansas City, Mo.

Douglas's League Co-operative Association, Inc.,
New York, N. Y.

Douglas Fir Plywood Association, Tacoma, Wash.

Hardwood Plywood Institute, Chicago, Ill.

Mississippi Retail Lumber Dealers Association, Inc.,
Jackson, Miss.

National Hardwood Lumber Association, Chicago, Ill.

New Jersey Lumbermen's Association, Newark, N. J.

Prefabricated Home Manufacturers' Institute Washington, D. C.

Southern California Retail Lumber Association, Los Angeles, Calif.

Southern Hardwood Producers, Inc., Memphis, Tenn.

Veneer Association, The, Chicago, Ill.

West Coast Lumbermen's Association, Portland, Ore.

Wisconsin Retail Lumbermen's Association, Milwaukee, Wis.


FIRMS


Acme Door Co., Hoaquim, Wash.

Adams, Franklin C., Tampa, Fla.

Adams Lumber Co., Inc., The George, Inwood, Long Island, N. Y.

Addison-Rudesil, Inc., Atlanta, Ga.

Aeroply-Plywood and Veneer Co., Chicago, Ill.

Albany-Plywood Div. (M & M Wood Working Co.)
Albany, Oreg.

Albany Plywood Co., Albany, N. Y.

Algonquin Lumber Co., Algoma, Wis.

Allen, George W., La Porte, Ind.

Allentown Prefabricators, Allentown, Pa.


Ancortes Veneer, Inc., Ancortes, Wash.

Andrews, Jones, Bicee & Goodell, Boston, Mass.


Anson & Gilkey Co., Merrill, Wis.

Arizona Sash, Door & Glass Co., Phoenix, Ariz., and

Tucson, Ariz.

Armstrong Landon Co., The, Kokomo, Ind.

Arrington Lumber, Norfolk, Va.

Ashley Co., C. J., Detroit, Mich.


Atlantic Plywood Co., Inc., New York, N. Y.

Bailey & Alling Lumber Co., Newark, N. J.

Bakerlith Corp., New York, N. Y.

Bakelite Corp., Bloomfield, N. J. (General sup-
port.)


Baltimore City, of, Bureau of Building Construc-
tion, Baltimore, Md.

Barger Millwork Co., Statesville, N. C.

Baris Lumber Co., J. C., New York, N. Y.


Baumler, Herbert, Columbus, Ohio.

Baxter & Co., C. B., Kansas City, Mo.

Beasley & Sons Co., Nashville, Tenn.

Becker Co., Henry A., West Orange, N. J.

Beeson, Carroll O., Crawfordsville, Ind.

Bell Co., Trenton, N. J.

Bellingham Plywood Corp., South Bellingham, Wash.

Bellman, Gillett & Richards, Toledo, Ohio.

Bennett-Bailey Lumber Co., Minneapolis, Minn.

Berger, F. E., R. L. Kelley and Associates, Champa-
gin, Ill.

Besch Co., The Carl, New York, N. Y.


Bishop, Horatio W., La Mesa, Calif.

Blackburn, Inc., Robert, Robert, Wis.

Blackstock Lumber Co., Seattle, Wash.

Boehm, George A., New York, N. Y.

Boeing Airplane Co., Wichita Division, Wichita, Kans.

Borcharding Co., W. C., Indianapolis, Ind.

Bosman & Casson, Inc., Harrison, N. J.

Botsford Lumber Co., Chicago, Ill.

Brazer, Clarence W., New York, N. Y.


Brooks-Borg, Des Moines, Iowa.


Brueggt Lumber Co., T. A., Milwaukew, Wis.

Brust & Brust, Milwaukew, Wis. (General support.)


Bucky, Fred W., Jr., Jacksonville, Fla.

Buell & Co., Dallas, Tex.

Buffalo Plywood Corp., Buffalo, N. Y.

Buffelin Lumber & Manufacturing Co., Tacoma, Wash.

Builders Supply Co., Bismarck, N. Dak., and

Fargo, N. Dak.

Burket, Harold E., Ventura, Calif.

Burnside Veneer Co., Inc., Burnside, Ky.

Burrin Lumber 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., West, Tex.

Cameron Lumber Co., Inc., Newburgh, N. Y.

Camelt, J. Thomas, Passaic, N. J.

Camp Plywood Co., Inc., E. W., Indianapolis, Ind.

Canada, Forest Products Laboratories of, Ottawa,

Ontario, Canada.

Candeia, Rosario, New York, N. Y.

Cannon & Mullen, Salt Lake City, Utah.

Capitol City Lumber Co., The, Hartford, Conn.

Carr, Adams & Collier Co., Dubuque, Iowa.

Cascades Plywood Corp., Portland, Oreg.

Casey Co., of, Seattle, Wash.

Cedarquist Show Case & Cabinet Co., Los Angeles,

Calif.

Cellarius, Chas. E., Cincinnati, Ohio.

Central Glazing Co., Fort Worth, Tex.

Central Wholesale Co., Inc., Shreveport, La.

Chapin, Rollin C., Minneapolis, Minn. (General sup-
port.)

Chapin Lumber Co., The, Aurora, Colo.

Charlotteville Lumber, Inc., Charlotteville, Va.

Chicago & Oregon Lumber Co., Chicago, Ill.

Chicago Trim & Plywood Co., Chicago, Ill.

Christmann Veneer & Lumber Co., St. Louis, Mo.

21
Fuller & C., W. P., Sacramento, Calif., and Portland, Ore.
Fuller Goodman Co., Oshkosh, Wis.
Furer, Wm. C., Honolulu, T. H.
Gaines Hardwood Lumber Co., St. Louis, Mo.
General Box Co., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
General Millwork Co., Utica, N. Y.
General Motors Corp., Frigidaire Division, Dayton, Ohio.
General Paint Corp., Spokane, Wash.
Georgeon, F. T., Eureka, Calif.
Georgeon & Goodwin Lumber Co., Augusta, Ga.
Giaze & Bro., Winchester, Va.
Globe-Wernicke Co., The, Norwood, Ohio.
Goshen & Door Co., Goshen, Ind.
Great Lakes Sash & Door Co., The, Cleveland, Ohio.
Greater New York Lumber Industries, Inc., New York, N. Y. (General support.)
Greenfield Builders, Cedar Rapids, Iowa.
Gretsch Manufacturing Co., Fred, Brooklyn, N. Y.
Gromoff, L. C., St. Louis, Mo. (General support.)
Hahn, Stanley W., Cleveland, Ohio.
Haley Bros., Santa Monica, Calif.
Hannaford & Sons, Inc., Cincinnati, Ohio.
Hansen Lumber Co., Ltd., The, Quebec City, Canada.
Harrison & Mott, Fort Smith, Ark.
Harbor Plywood Corp. of California, San Francisco, Calif.
Harbor Plywood Corp., Hoquiam, Wash., and Jacksonvile, Fla.
Harbor Plywood Corp., Chicago Division, Chicago, Ill.
Harbor Sales Co., Inc., The, Baltimore, Md., and Washington, D. C.
Hardwood Plywood Distributors, Inc., Baltimore, Md.
Hartung, F. L., Seattle, Wash.
Hassness, C. D., Harrisburg, Pa.
Havens Lumber Supply Co., New York, N. Y.
Hayby, Bissell & Belnir, Minneapolis, Minn.
Heidritter Lumber Corp., Elizabeth, N. J.
Hill Plywoods, Lyman, Hollywood, Calif.
Hodgeon, Charles, San Gabriel, Calif.
Hodgdon Co., E. F., Division of Allied-Hodgdon
Housing Corp., Boston, Mass.
Hoffman Co., Earl, Los Angeles, Calif.
Hoffmann Lumber Co., Pittsburgh, Pa.
Hogue Lumber Co., Oakland, Calif.
Hoke, Karl B., Toledo, Ohio.
Holmsen, Holmsen & Kieckamp, Chicago, Ill.
Hurt, Fred L., Jr., San Diego, Calif.
Houston Sash & Door Co., Houston, Tex.
Howell, Leslie D., Portland, Oreg. (General support.)
Hubel & Landonco Housewrecking Co., Buffalo, N. Y.
Humboldt Plywood Corp., Portland, Ore.
Hunter Lumber Co., Clitheroe, Ill.
Huntington Lumber Co., R. D., Cedar Rapids, Iowa.
Huss Lumber Co., Chicago, Ill.
Huttig Sash & Door Co., Jacksonville, Fla.
Ivye, Inc., Edgewood, Seattle, Wash.
Jacksonville Sash & Door Co., Jacksonville, Fla.
Jamestown Veneer & Plywood Corp., Jamestown, N. Y.
Joseph hardwood Co., San Francisco, Calif.
Karpfen & Bros., S., Chicago, Ill.
Keich & O'Brien, Warren, Ohio.
Kellogg & Sons Co., Chas. C., Utica, N. Y.
Kennedy Lumber Co., Trenton, N. J.
Kimball Lumber Co., Watertown, Mass.
Kimball & Wilson, Inc., Detroit, Mich.
Kochtren Plywood & Veneer Co., Inc., Chicago, Ill.
Kohn, Robert C., & Butler, Architects Associated, New York, N. Y.
Krauss Bros. Lumber Co. of Florida, Tampa, Fla.
Kyle, Herbert S., Charleston, W. Va. (General support)
Lambert Lumber Co., Leavenworth, Kansas.
Law, Law, Potter & Nystrom, Madison, Wis.
Leidighan & Havens Lumber Co., Saline, Kansas.
Levy, Will, St. Louis, Mo.
Lewis Lumber Co., Spring Lake, N. J.
Liberty Lumber & Manufacturing Co., Inc., Erwin, Tenn.
Limback Lumber Co., Cedar Rapids, Iowa.
Linge Lumber Co., Dallas, Tex.
Loeb, Laurence M., White Plains, N. Y.
Lotus Corp., Peter F., Pittsburgh, Pa. (General support)
Logan Lumber Co., Tampa, Fla.
Loizeaux Lumber Co., J. D., Plainfield, N. J.
Lemassay & Co., J. F., Los Angeles, Calif.
Lord & Bushnell Lumber Co., Chicago, Ill.
Los Angeles, City of, Los Angeles, Calif.
Lumbermen's Supply Co., Inc., Sacramento, Calif.
Lundgren Dealers Supply, Inc., Tacoma, Wash.
Lyman-Hawkins Lumber Co., The, Akron, Ohio.
Lyons Metal Products, Inc., Aurora, Ill.
Maecola Lumber Co., The, Baltimore, Md.
Mann & Co., Hutchinson, Kansas.
Markland Contracting Co., M. B., Atlantic City, N. J.
Marsh & Truman Lumber Co., Chicago, Ill.
Martin, Edgar, Chicago, Ill.
Martin Co., The, Glendale, Baltimore, Md.
Mason City Millwork Co., Mason City, Iowa.
Mason & Co., George D., Detroit, Mich.
Mason Lumber Co., Carthage, Texas, Ill.
Massey Concrete Products Co., Chicago, Ill.
Mauran, Russell, Crowell & Mulligardt, St. Louis, Mo.
McCray Refrigerator Co., Kendallville, Ind.
McGowin-Lyons Hardware & Supply Co., Mobile, Ala.
McGuin Lumber Co., Inc., N. J., Charlotte, N. C.
Mears Plywood & Millwork Corp., Baltimore, Md.
Merritt Lumber Yards Inc., Reading, Pa.
Midland Building Industries, Inc., Indianapolis, Ind.
Mid-West Lumber Co., The, Mankato, Kans.
Midwest Lumber Co., Dubuque, Iowa.
Miller & Coal Co., H. W., Livingston, Mont.
Miller & Vrydagh, Terre Haute, Ind.
Milwaukee plywood Co., Milwaukee, Wis.
Minot Builders Supply Co., Minot, N. Dak.
Mordaceraft Co., Inc., The, The, Brooklyn, N. Y., and Minneapolis, Minn.
Modern Woodwork Co., Milwaukee, Wis.
Moore, C. A., Central City, Ky.
Moore & Co., Le Mars, Iowa.
Moore dry Dock Co., Oakland, Calif.
Moore Lumber Co., L. A., California, Iowa.
Moore, William, San Francisco, Calif.
Morrill & Sturgeon Lumber Co., Portland, Ore.
Morrison-Merrill & Co., Salt Lake City, Utah.
Mowry & Co., Detroit, Mich.
Muhlenberg Bros., Reading, Pa.
National Plywood Co., New York, N. Y.
National Plywoods, Inc., Chicago, Ill.
Nelson, Albert L., St. Louis, Mo.
New Orleans, Housing Authority of, New Orleans, La.
New Rochelle Coal & Lumber Co., New Rochelle, N. Y.
New York Wood Working Corp., Flushing, N. Y.
Niagara Plywood Co., Buffalo, N. Y.
Nicolai Plywood Co., Garibaldi, Oreg.
Northwest Door Co., Tacoma, Wash.
Northwest Procurement & Sales, Portland, Ore.
Northwestern Lumber Co., Milwaukee, Wis.
Norwood Sash & Door Manufacturing Co., Norwood, Ohio.
Nuremberg, W. S., Fort Worth, Tex.
O & N Lumber Co., Menomonie, Wis.
Oakland Public Schools, Oakland, Calif.
Officer, Gwynn, Lafayette, Calif.
Ohio City Sash & Door Co., Dayton, Ohio.
Ohio Lumber & Door Co., The, Oklahoma City, Okla.
Ohio Hardwood Lumber Co., Omaha, Neb.
Oregon Plywood Corp., Sweet Home, Oreg.
Oregon, State of, Salem, Oreg.
Ostlund & Johnson, San Francisco, Calif.
Owens-Parks Lumber Co., Los Angeles, Calif.
Pacific Manufacturing Co., Santa Clara, Calif.
Pacific Mutual Door Co., Chicago, Ill.
Patten-Blimn Lumber Co., Los Angeles, Calif.
Patterson-Buck Hardwood Co., Dearborn, Mich.
Pase Woodwork Co., Cincinnati, Ohio.
Peninsula Plywood Corp., Fort Angeles, Wash.
Pepper, George W., Jr., Philadelphia, Pa.
Pettit, Oman, Meinhardt & Cledan, Columbus, Ohio.
Plunkett-Webbster Lumber Co., Inc., Pluster Plywood Division, New York, N. Y.
Plylock Corp., The (Division of M & M Wood Working Co.), Chicago, Ill.
Plywood Distributing Co., Chicago, Ill.
Plywood & Hardwood Lumber Dealers, San Francisco, Calif.
Plywood Products Corp., Hampton, S. C.
Puget Sound Plywood, Inc., Tacoma, Wash.
Queensborough Lumber Co., Inc., Bayside, N. Y.
Radford & Sanders, Inc., Baltimore, Md.
Ramsey & Sons, Inc., A. H., Miami, Fla.
Ream Co., George E., Los Angeles, Calif.
Reel Millwork Corp., Rossell N. J.
Reichhold Chemicals, Inc., Phenolic Plastics Division, Detroit, Mich. (General support)
Reid, William H., Jr., Billings, Mont.
Reliable Boiler & Tank Co., Fort Newark, N. J.
Reo Motors, Inc., Lansing, Mich.
Rhodes, Harry A., Rensselaer, N. Y. (General support)
Richards & Davis Co., Fall River, Mass.
Richardson-Phelps Lumber Co., Grinnell, Iowa.
Risek & Fleece Builders Supplies, Inc., St. Petersburg, Fla.
Ripley-Hopping, Inc. (successors to David Ripley & Sons, WO.) Frankfort, Ind.
Robbins Door & Sash Co., Scranton, Pa., and other cities
Robinson Lumber & Coal Co., Robinson, Ill.
Robinson Manufacturing Co., Everett, Wash.
Rochester, City of, Board of Education, Rochester, N. Y.
Rock Island Millwork Co., Rock Island, Ill.
Rockwell Bros. & Co., Houston, Tex.
Roddis Co., Chicago, Ill.
Roffs Lumber & Veneer Co. of Missouri, Kansas City, Mo., Dallas, Tex., and San Antonio, Texas.
Roddis Panel & Door Co., Louisville, Ky.
Rohrer Lumber Co., D. J., Clintonville, Wis.
Rolfe Building Materials Co., New Brunswick, N. J.
Rudinger, Inc., C. R., South Kenney, N. J.
Russ & Co., Baltimore, Md.
Rust Sash & Door Co., Kansas City, Mo.
St. Paul & Tacoma Lumber Co., Tacoma, Wash.
Stahlton Lumber Co., Plymouth Division, Olympia, Wash.
Schlibe Lumber Co., The, Tamaqua, Pa.
Segelke & Kohlhaas Co., La Crosse, Wis.
Shappert Engineering Co., Belleville, Ill.
Shaver, Charles W. & John A., St. Louis, Mo.
Shutze & Armistead, Atlanta, Ga.
Shymanski Lumber Co., San Leandro, Calif.
Simons, Inc., Minneapolis, Minn.
Simons Lumber Co., Henry, Minneapolis, Minn.
Simon Logging Co., Seattle, Wash.
Sleepy, Harold R., New York, N. Y.
Smith Co., Allen A., Toledo, Ohio.
Smell Sash & Door Co., St. Paul, Minn.
Smith-Valth Lumber Co., The, Cincinnati, Ohio.
Solie Lumber Co., Janesville, Wis.
Soothman Co., The, Grand Island, Nebr.
Southern Counties Gas Co., Los Angeles, Calif.
Southern Sash & Door Co., Albuquerque, N. Mex.
Southwestern Sash & Door Co., Joplin, Mo.
Special Materials Corp., Oakland, Calif.
Specification Record, Chicago, Ill.
Sparke Sash & Door Co., Spokane, Wash.
Springfield Plywood Corp., Springfield, Ore.
Standard Cabinet Works, Inc., Los Angeles, Calif.
Standard Door & Lumber Co., Inc., Fort Worth, Tex.
Stanton & Son, Inc., E. J., Los Angeles, Calif.
Stark & Co., Inc., Kansas City, Mo.
Steele & Hildard Lumber Co., St. Louis, Mo.
Steele & Sandham & Steele, Omaha, Nebr.
Sterling Lumber & Investment Co., The, Denver, Colo.
Stillwater Manufacturing Co., The, Stillwater, Minn.
Stoetzel, Ralph E., Chicago, Ill.
Stokes & Allyn, Portland, Ore.
Struble Hardwood Co., Oakland, Calif.
Strout, Carl B., Minneapolis, Minn.
Streeter, D. D., Brooklyn, N. Y.
Strong & Hale Lumber Co., The, Portland, Conn.
Sutliff Co., Julian H., Oakland, Calif.
Swan Lake Milling Co., Klamath Falls, Ore.
Sweet's Catalog Service, New York, N. Y. (Gen. suppl.)
Sweetwater Sash & Door Co., Sweetwater, Tex.
Synvar Corp., Wilmington, Del.
Syracuse University, Syracuse, N. Y.
Taylor, Ellery KIrke, Haddonfield, N. J.
Taylor & Ells, Kalamazoo, Mich.
Taylor Sash & Door Co., Pensacola, Fla.
Teachout Sash, Door & Glass Co., Detroit, Mich.
Texas Technological College, Department of Architectural Engineering.
Thompson & Lichtner Co., Inc., The, Brookline, Mass.
Throop, Henry Calder, Ithaca, N. Y.
Throop-Martini Co., The, Columbus, Ohio.
Toombs & Co., Springfield, Mo.
Toole & Lumber Co., Wallingford, Pa.
Troy Cupboard Co., Burbank, Calif.
<table>
<thead>
<tr>
<th>CS No.</th>
<th>Item</th>
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<tbody>
<tr>
<td>2-30.</td>
<td>Mopsticks.</td>
</tr>
<tr>
<td>4-29.</td>
<td>Slated and shingled (all-clay) plumbing fixtures.</td>
</tr>
<tr>
<td>5-46.</td>
<td>Pipe nipples; brass, copper, steel, and wrought-iron (second edition).</td>
</tr>
<tr>
<td>7-29.</td>
<td>Standard weight malleable iron or steel screwed unions.</td>
</tr>
<tr>
<td>16-29.</td>
<td>Wall paper.</td>
</tr>
<tr>
<td>17-44.</td>
<td>Diamond core drill fittings (fourth edition).</td>
</tr>
<tr>
<td>18-32.</td>
<td>Forged gear shafts.</td>
</tr>
<tr>
<td>23-30.</td>
<td>Feldspar.</td>
</tr>
<tr>
<td>24-43.</td>
<td>Screw threads and tap-drill sizes.</td>
</tr>
<tr>
<td>26-30.</td>
<td>Aromatic red cedar closet lining.</td>
</tr>
<tr>
<td>32-31.</td>
<td>Cotton cloth for rubber and pyroxylene coating.</td>
</tr>
<tr>
<td>37-31.</td>
<td>Steel bone plates and screws.</td>
</tr>
<tr>
<td>38-32.</td>
<td>Hospital rubber sheeting.</td>
</tr>
<tr>
<td>40-32.</td>
<td>Surgeons' rubber gloves.</td>
</tr>
<tr>
<td>41-32.</td>
<td>Surgeons' latex gloves.</td>
</tr>
<tr>
<td>44-32.</td>
<td>Apple wraps.</td>
</tr>
<tr>
<td>47-34.</td>
<td>Marking of gold-filled and rolled-gold-plate articles other than watchcases.</td>
</tr>
<tr>
<td>49-34.</td>
<td>Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.</td>
</tr>
<tr>
<td>50-34.</td>
<td>Binders board for bookbinding and other purposes.</td>
</tr>
<tr>
<td>51-35.</td>
<td>Marking articles made of silver in combination with gold.</td>
</tr>
<tr>
<td>52-35.</td>
<td>Mohair pile fabrics (100-percent mohair plain velvet, 100-percent mohair plain frieze, and 50-percent mohair plain frieze).</td>
</tr>
<tr>
<td>53-35.</td>
<td>Colors and finishes for cast stone.</td>
</tr>
<tr>
<td>54-35.</td>
<td>Mattresses for hospitals.</td>
</tr>
<tr>
<td>55-35.</td>
<td>Mattresses for institutions.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>CS No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>59-44.</td>
<td>Textiles—testing and reporting (fourth edition).</td>
</tr>
<tr>
<td>61-37.</td>
<td>Wood-slat venetian blinds.</td>
</tr>
<tr>
<td>63-38.</td>
<td>Colors for bathroom accessories.</td>
</tr>
<tr>
<td>64-37.</td>
<td>Water blinds.</td>
</tr>
<tr>
<td>66-38.</td>
<td>Marking of articles made wholly or in part of platinum.</td>
</tr>
<tr>
<td>67-38.</td>
<td>Marking articles made of karat gold.</td>
</tr>
<tr>
<td>68-38.</td>
<td>Liquid hypochlorite disinfectant, deodorant, and germicide.</td>
</tr>
<tr>
<td>72-38.</td>
<td>Household insecticide (liquid spray type).</td>
</tr>
<tr>
<td>75-42.</td>
<td>Automatic mechanical draft oil burners designed for domestic installations (second edition).</td>
</tr>
<tr>
<td>80-41.</td>
<td>Electric direction signal systems other than semaphore type for commercial and other vehicles subject to special motor vehicle laws (after market).</td>
</tr>
<tr>
<td>81-41.</td>
<td>Adverse-weather lamps for vehicles (after market).</td>
</tr>
<tr>
<td>82-41.</td>
<td>Inner-controlled spotlights for vehicles (after market).</td>
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<tr>
<td>83-41.</td>
<td>Clearance, marker, and identification lamps for vehicles (after market).</td>
</tr>
<tr>
<td>84-41.</td>
<td>Electric tail lamps for vehicles (after market).</td>
</tr>
<tr>
<td>85-41.</td>
<td>Electric license-plate lamps for vehicles (after market).</td>
</tr>
<tr>
<td>86-41.</td>
<td>Electric stop lamps for vehicles (after market).</td>
</tr>
<tr>
<td>87-41.</td>
<td>Red electric warning lanterns.</td>
</tr>
<tr>
<td>88-41.</td>
<td>Liquid-burning flares.</td>
</tr>
<tr>
<td>89-40.</td>
<td>Hardwood stair treads and risers.</td>
</tr>
<tr>
<td>90- .</td>
<td>Reserved for power shovels and cranes.</td>
</tr>
<tr>
<td>91-41.</td>
<td>Factory-fitted Douglas fir entrance doors.</td>
</tr>
<tr>
<td>92-41.</td>
<td>Cedar, cypress and redwood tank stock lumber.</td>
</tr>
<tr>
<td>93-41.</td>
<td>Portable electric drills (exclusive of high frequency).</td>
</tr>
<tr>
<td>94-41.</td>
<td>Calking lead.</td>
</tr>
<tr>
<td>95-41.</td>
<td>Lead pipe.</td>
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<tr>
<td>96-41.</td>
<td>Lead traps and bends.</td>
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<tr>
<td>97-42.</td>
<td>Electric supplementary driving and passing lamps for vehicles (after market).</td>
</tr>
<tr>
<td>98-42.</td>
<td>Artists' oil paints.</td>
</tr>
<tr>
<td>99-42.</td>
<td>Gas floor furnaces—gravity circulating type.</td>
</tr>
<tr>
<td>100-44.</td>
<td>Porcelain-enamed steel utensils (second edition).</td>
</tr>
<tr>
<td>101-43.</td>
<td>Flue-connected oil-burning space heaters equipped with vaporizing pot-type burners.</td>
</tr>
<tr>
<td>102- .</td>
<td>Reserved for Diesel and fuel-oil engines.</td>
</tr>
<tr>
<td>103-42.</td>
<td>Cotton and rayon velour (jacquard and plain).</td>
</tr>
<tr>
<td>104-46.</td>
<td>Warm-air furnaces equipped with vaporizing pot-type oil burners (second edition).</td>
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<td>CS No.</td>
<td>Item</td>
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<tr>
<td>105-43</td>
<td>Mineral wool; loose granulated, or felted form, in low-temperature installations.</td>
</tr>
<tr>
<td>106-44</td>
<td>Boys' pajama sizes (woven fabrics) (second edition).</td>
</tr>
<tr>
<td>107-45</td>
<td>Commercial electric-refrigeration condensing units (second edition).</td>
</tr>
<tr>
<td>108-44</td>
<td>Solid-fuel-burning forced-air furnaces.</td>
</tr>
<tr>
<td>109-44</td>
<td>Tire repairs—vulcanized (passenger, truck, and bus tires).</td>
</tr>
<tr>
<td>110-43</td>
<td>Earthenware (vitreous-glazed) plumbing fixtures.</td>
</tr>
<tr>
<td>111-44</td>
<td>Bituminized-fibre drain and sewer pipe.</td>
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<tr>
<td>112-45</td>
<td>Grading of diamond powder.</td>
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<tr>
<td>114-45</td>
<td>Women's slip sizes (woven fabrics).</td>
</tr>
<tr>
<td>115-47</td>
<td>Cast aluminum cooking utensils (metal composition).</td>
</tr>
<tr>
<td>116-47</td>
<td>Size measurements for men's and boys' shorts (woven fabrics).</td>
</tr>
<tr>
<td>117-47</td>
<td>Work gloves.</td>
</tr>
<tr>
<td>118-47</td>
<td>Insect wire screening.</td>
</tr>
<tr>
<td>119-47</td>
<td>Convectors: testing and rating.</td>
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</tbody>
</table>

Notice.—Those interested in commercial standards with a view toward accepting them as a basis of everyday practice may secure copies of the above standards, while the supply lasts, by addressing the Commodity Standards Division, National Bureau of Standards, Washington, 25 D. C.

1 Where "(E)" precedes the CS number, it indicates an emergency commercial standard, drafted under war conditions with a view toward early revision.