

DOUGLAS FIR PLYWOOD

(Eighth Edition)

COMMERCIAL STANDARD CS45-48

[Supersedes CS45-47]

Effective Date for New Production From November 1, 1948



A RECORDED VOLUNTARY STANDARD
OF THE TRADE

UNITED STATES DEPARTMENT OF COMMERCE

CHARLES SAWYER, 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 Commercial Standard CS45-33, Douglas Fir Plywood. The standard was revised in 1936, 1938, 1940, 1942, 1945, and 1947.

A recommended revision submitted by the Douglas Fir Plywood Association and endorsed by the standing committee, was circulated on August 5, 1948, 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.

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COMMERCIAL STANDARD CS45-48

for

DOUGLAS FIR PLYWOOD

(EIGHTH EDITION)

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 seven grades of Interior type and six grades of Exterior type Douglas fir plywood, suitable for paneling, sheathing, concrete forms, cabinet work, and many other structural and industrial uses. In addition, there are included tests, standard sizes, size tolerances, inspection 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 sanded on two sides to meet requirements of veneer as set forth in paragraph 8a. When specified rough or unsanded, plywood may have paper tape on either face or back, or both. It shall be well manu-

factured 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*.—The plywood 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.), with the type referring to the moisture resistance of adhesives bonding the plies together. Within each type there are several grades, which are established by the quality of the veneer on both faces of the panel 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.

8a. *Veneers*.—Veneers shall be $\frac{1}{2}$ inch or more in thickness before sanding in panels $\frac{1}{4}$ inch and thicker.

All veneers used in the different plywood grades shall be one of the following except in center veneer of Interior type panels with five or more plies:

GRADE A (*Sound*) 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.

GRADE B (*Solid*) shall present a solid surface, free from open defects, but in addition to characteristics admitted in grade A (*Sound*), veneer shall admit also neatly made circular plugs, as well as synthetic plugs that present solid, level, hard surfaces, knots up to 1 inch if both sound and tight, tight splits, slightly rough but not torn grain, and other minor sanding and patching defects. The grade shall be paintable.

GRADE C (*Exterior Back*) may contain knotholes not larger than 1 inch in least dimension; open pitch pockets not wider than 1 inch; splits not wider than $\frac{3}{16}$ inch that taper to a point; worm or borer holes not more than $\frac{3}{8}$ inch wide or $1\frac{1}{2}$ inches long; knots if tight and not more than $1\frac{1}{2}$ inches in least dimension; and plugs, patches, shims, sanding defects, and other characteristics in number and size that will not impair the serviceability of the panel.

GRADE D (*Utility Back*) (may be used only in Interior type panels) shall contain no knotholes greater than $2\frac{1}{2}$ inches in maximum dimension, no pitch pockets more than 2 inches wide by 4 inches long, or equivalent area if of lesser width, no splits wider than $\frac{1}{2}$ inch; splits $\frac{1}{2}$ inch wide at widest point may be one-fourth-panel length; those not more than $\frac{1}{4}$ inch wide at widest point may be half-panel length; and those not more than $\frac{3}{16}$ inch wide may be full-panel length, but all splits shall taper to a point at one end. Any number of plugs,

patches, shims, worm or borer holes, sanding defects, and other characteristics are permitted provided they do not seriously impair the strength or serviceability of the panel.

INTERIOR TYPE

9. This type 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. Western hemlock, Sitka spruce, noble fir, commercial white fir, Alaskan cedar, Port Orford cedar, California redwood, ponderosa pine, sugar pine, Idaho white pine, and Western larch may be used for inner plies only, in Interior type grades A-A (Sound 2 Sides), A-B (Sound/Solid), A-D (Sound 1 Side), B-D (Solid/1 Side), and A-A (Door Panel). Plywood of this type shall meet the test requirements set forth in paragraphs 12 and 14a. This type is available in the grades given in table 1.

TABLE 1. Interior type grades—minimum quality of veneers

Grade	Face	Back	Inner plies ¹	Additional limitations (see also paras. 8 and 9)
A-A, Int. (Sound 2 Sides, Interior)	A (Sound)...	A (Sound)...	D (Utility)....	Sanded 2 sides.
A-B, Int. (Sound/Solid, Interior)	.....do.....	B (Solid).....	.....do.....	Do.
A-D, Int. (Sound 1 Side, Interior)	.....do.....	D (Utility)...	.....do.....	Do.
B-D, Int. (Solid/1 Side, Interior)	B (Solid).....	.....do.....	.....do.....	Do.
C-D, Int. (Sheathing, Interior)	C (Ext. Back).	.....do.....	.....do.....	Unsanded grade. No belt sanding permissible.
B-B, Int. (Concrete Form, Interior)	B (Solid).....	B (Solid).....	C (Ext. Back), (all inner plies).	Edge-sealed and, unless otherwise specified, mill-oiled. Sanded 2 sides.
A-A, Int. (Door Panel, Interior)	A (Sound)...	A (Sound)...	D (Utility)....	Sanded 2 sides.

¹ Except center ply of panels with 5 or more plies.

EXTERIOR TYPE

10. 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 which is 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. If a tape is used in the glue line, it shall be resin-impregnated. All veneer used in Exterior type panels shall be of Douglas fir and of C (Exterior Back) grade as defined in paragraph 8a, or better. 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 13a, 13b, 13c, 14b, and 14c. This type is available in the grades given in table 2.

TABLE 2. Exterior type grades—minimum quality of veneers

Grade	Face	Back	Inner plies	Additional limitations (see also pars. 8 and 10)
A-A, Ext. (Sound 2 Sides, Exterior)	A (Sound)...	A (Sound)...	C (Ext. Back)	Sanded 2 sides.
A-B, Ext. (Sound/Solid, Exterior)	.....do.....	B (Solid).....	.....do.....	Do.
A-C, Ext. (Sound 1 Side, Exterior)	.....do.....	C (Ext. Back)	.....do.....	Do.
B-C, Ext. (Solid/1 Side, Exterior)	B (Solid).....	.....do.....	.....do.....	Do.
C-C, Ext. (Sheathing, Exterior)	C (Ext. Back)	.....do.....	.....do.....	Unsanded grade. No belt sanding permissible.
B-B, Ext. (Concrete Form, Exterior).	B (Solid).....	B (Solid).....	.....do.....	Edge-sealed and, unless otherwise specified, mill-oiled. Sanded 2 sides.

TESTS

11. *Sampling.*—Ten test panels shall be taken at random from any shipment. Test panels shall be selected to represent as many variations in grades and thicknesses as possible. Test panels shall also be selected from locations distributed as widely as is practicable throughout the shipment. From each Exterior panel selected, three test pieces shall be cut at random, and from each test piece, 10 test specimens shall be cut. From each Interior panel selected, a 6- by 6-inch test piece shall be cut from each end, approximately at mid-width 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.

12. *Test for Interior type.*—The test pieces 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. This cycle shall be repeated until all samples have failed, or have completed 15 cycles.

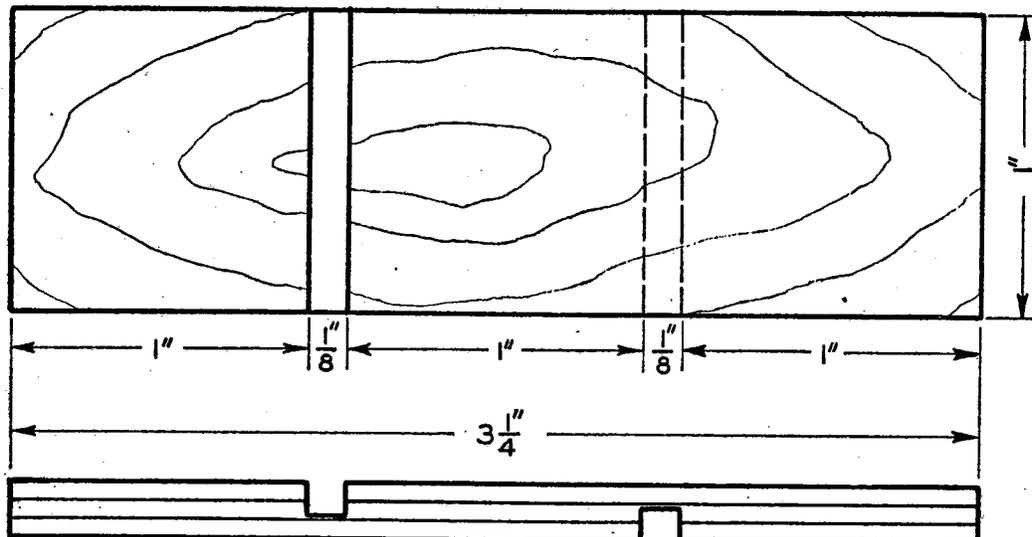


FIGURE 1. Shear specimen.

13. *Test for Exterior type.*

13a. *Cold-soaking test.*—Five shear specimens shall be cut as shown in figure 1 from each test piece.

If the number of plies exceeds three, 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 three, the choice of joints to be tested shall be left to the discretion of the inspector, but at least one-half of the tests shall include the innermost joints. The specimens 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 ($\pm 5^\circ$ 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 be soaked again 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 pounds a minute until failure. The percentage of wood failure of the specimens shall be estimated.

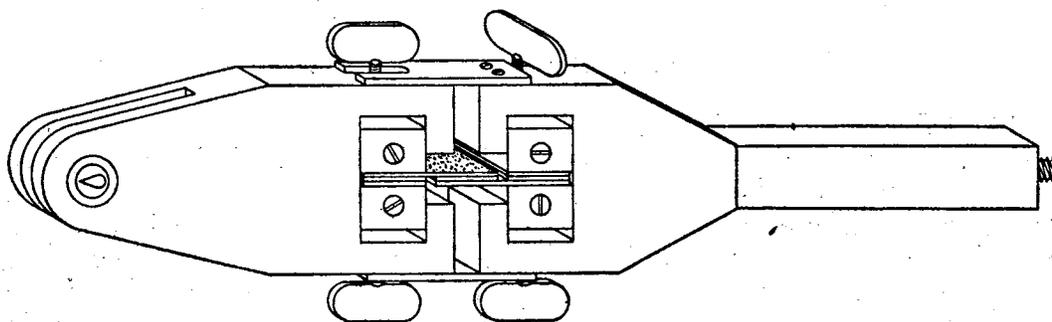


FIGURE 2. Jaws for shear test.

13b. *Boiling test.*—Shear specimens, as described in paragraph 13a, shall be boiled in water for 4 hours, and then dried for 20 hours at a temperature of 145° F ($\pm 5^\circ$ F). The specimens shall be boiled again for a period of 4 hours and tested while wet, as described in paragraph 13a. The percentage of wood failure of the specimens shall be estimated.

13c. *Fire test.*—A 5½ by 8-inch piece shall be taken from each of five selected test panels 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 minutes 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 inch from the specimen face and the flame 1½ inches high. The flame shall impinge on the face of the specimen 2 inches 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, except when occurring at a localized defect permitted in the grade.

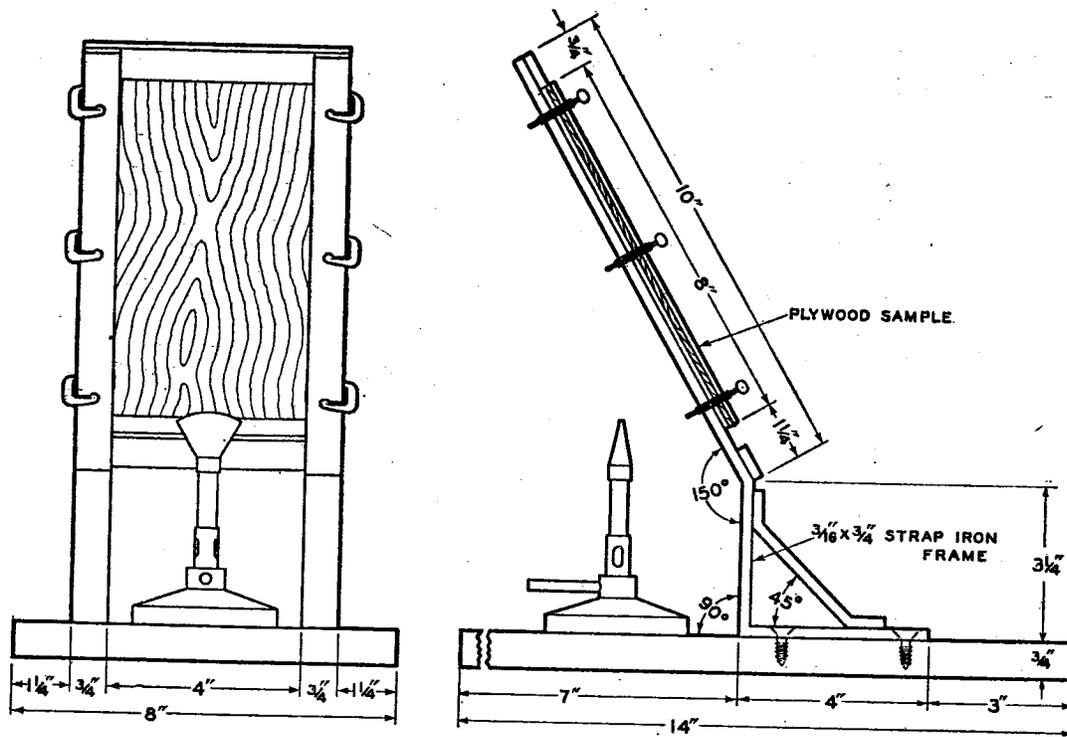


FIGURE 3. Apparatus for fire test.

14. Interpretation of tests.

14a. *Interior type.*—Total visible delamination of $\frac{1}{4}$ inch or more in depth and over 2 inches in length along the edge of a 6- by 6-inch test piece shall be considered as failure. When delamination occurs at a localized defect permitted within the grade, that test piece shall be discarded. The average number of cycles which the test pieces shall withstand is 10 or more. If the test pieces fail to meet this requirement, an additional 10 panels shall be selected and tested as described in paragraphs 11 and 12. Then the test pieces from both groups of 10, considered together, shall meet the above test requirement.

14b. *Exterior type.*—Specimens cut through localized defects permitted in the grade shall be discarded. A test piece shall be rated by the combined results of both the cold-soaking test and the boiling test—generally 10 specimens in all. If the average wood failure of the 10 specimens is below 60 percent, or if more than one of the specimens is below 30 percent, the test piece fails. If more than one test piece fails, that panel fails. If one or none of the 10 panels fails, the shipment is accepted; if more than two fail, the shipment is rejected. If two fail, another series of 10 panels is tested. If one or none of the panels fails in this series, the shipment is accepted; otherwise it is rejected. If the average wood failure of the first 10 panels is less than 80 percent, a second series of 10 is tested, regardless of the number of failures. If the average wood failure of the 20 panels combined is less than 80 percent, the shipment is rejected.

14c. If more than one panel fails the fire test, the shipment may be rejected; if one panel fails, a second series of five shall be tested, all of which must pass.

STANDARD SIZES

15. Douglas fir plywood is made in the standard sizes shown in table 3.

TABLE 3. Standard Douglas fir plywood sizes

Grade	Width	Length	Thickness ¹
INTERIOR TYPE			
A-A (Sound 2 Sides—Int.) A-B (Sound/Solid—Int.) A-D (Sound 1 Side—Int.)	<i>Inches</i> 30 36 42 48	<i>Inches</i> 60 72 84 96 108 120 144	<i>Inches</i> $\frac{3}{16}$ (3-ply; sanded 2 sides). $\frac{1}{4}$ (3-ply; sanded 2 sides). $\frac{3}{8}$ (3-ply; sanded 2 sides). $\frac{1}{2}$ (5-ply; sanded 2 sides). $\frac{5}{8}$ (5-ply; sanded 2 sides). $\frac{3}{4}$ (5-ply; sanded 2 sides).
B-D (Solid/1 Side—Int.)	Same widths, lengths, and thicknesses as for grades A-A, A-B, and A-D, above.		
C-D (Sheathing—Int.)	48	96 108 120 144	$\frac{5}{16}$ (3-ply; unsanded). $\frac{3}{8}$ (3-ply; unsanded). $\frac{1}{2}$ (5-ply; unsanded). $\frac{5}{8}$ (5-ply; unsanded).
B-B (Concrete Form panels—Int.)	48	96	$\frac{1}{4}$ (3-ply; sanded 2 sides). $\frac{1}{2}$ (5-ply; sanded 2 sides). $\frac{3}{8}$ (5-ply; sanded 2 sides). $\frac{5}{8}$ (5-ply; sanded 2 sides). $\frac{3}{4}$ (5-ply; sanded 2 sides).
EXTERIOR TYPE			
A-A (Sound 2 Sides—Ext.) A-B (Sound/Solid—Ext.) A-C (Sound 1 Side—Ext.)	30 36 42 48	60 72 84 96 108 120 144	$\frac{3}{16}$ (3-ply; sanded 2 sides). $\frac{1}{4}$ (3-ply; sanded 2 sides). $\frac{3}{8}$ (3-ply; sanded 2 sides). $\frac{1}{2}$ (5-ply; sanded 2 sides). $\frac{5}{8}$ (5-ply; sanded 2 sides). $\frac{3}{4}$ (5-ply; sanded 2 sides). $\frac{7}{8}$ (7-ply; sanded 2 sides). 1 (7-ply; sanded 2 sides). $1\frac{1}{8}$ (7-ply; sanded 2 sides).
B-C (Solid/1 Side—Ext.)	Same widths, lengths, and thicknesses as for grades A-A, A-B, and A-C, above.		
C-C (Sheathing—Ext.)	48	96 108 120 144	$\frac{5}{16}$ (3-ply; unsanded). $\frac{3}{8}$ (3-ply; unsanded). $\frac{1}{2}$ (5-ply; unsanded). $\frac{5}{8}$ (5-ply; unsanded).
B-B (Concrete Form panels—Ext.)	48	96	$\frac{5}{8}$ (5-ply; sanded 2 sides). $\frac{3}{4}$ (5-ply; sanded 2 sides).

¹ Number of plies is minimum.

SIZE TOLERANCES

16. A tolerance of $\frac{1}{32}$ (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.

17. 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

18. 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.

19. 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.

20. 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

21. 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.

22. The following sets forth the grade marking¹ and certification symbols adopted by the Douglas Fir Plywood Association to preserve the high standards of quality herein recorded and to insure that distributors and ultimate consumers receive the proper kind of plywood for their specific needs.

23. To identify the various grades within the Interior type Douglas fir plywood, these grade marks are stamped or branded on all standard size panels:

(a) Grade A-A, Int. panels are stamped on the edge:

® **INTERIOR · A-A · DFPA**

¹ Alternate marking, as new grade identification is being established, provides for either letter designations, as shown, or use of previous terminology, including "Sound" to describe the A veneer and "Solid" the B veneer. The letter designations with their alternate designations are:

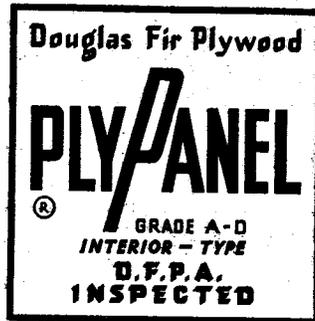
Interior type.—Grade A-A, Int. or grade Sound 2 Sides (So2S), Int. Grade A-B, Int. or grade Sound 1 Side, Solid Back (So/Sld), Int. Plypanel grade (A-D), Int. or Plypanel grade Sound 1 Side (So1S), Int. Plybase grade (B-D), Int. or Plybase grade Solid 1 Side (Sld/1S), Int. Plyscord grade (C-D), Int. or Plyscord grade, Int. Plyform grade (B-B), Int. or Plyform grade Solid 2 Sides (Sld/2S), Int.

Exterior type.—Grade A-A, Ext. or grade Sound 2 Sides (So2S) Ext. Grade A-B, Ext. or grade Sound 1 Side, Solid Back (So/Sld) Ext. Plyshield grade (A-C), Ext. or Plyshield grade Sound 1 Side (So1S), Ext. Utility grade (B-C), Ext. or Utility grade Solid 1 Side (Sld/1S), Ext. Sheathing grade (C-C), Ext. or Sheathing grade, Ext. Concrete Form grade (B-B), Ext. or Concrete Form grade Solid 2 Sides (Sld/2S), Ext.

(b) Grade A-B, Int. panels are stamped on the edge:



(c) Plypanel grade (A-D), Int. panels are stamped on the back:



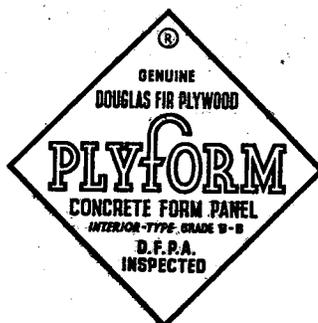
(d) Plybase grade (B-D), Int. panels are stamped on the back:



(e) Plyscord grade (C-D), Int. panels are stamped either on the face or back:



(f) Plyform grade (B-B), Int. panels are stamped on one face:



24. To identify the Exterior type of Douglas fir plywood, the symbol EXT-DFPA is branded or stamped on the edge of each standard size panel. The various grades within the Exterior type are additionally identified by the following grade marks branded or stamped on each standard size panel:

(a) Grade A-A, Ext. panels are stamped on the edge:

® **EXT-DFPA·A-A**

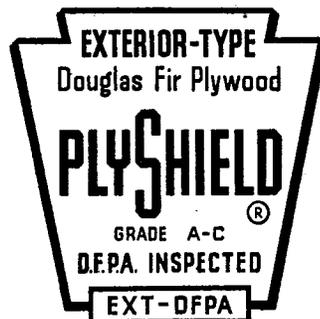
(b) Grade A-B, Ext. panels are stamped on the edge:

® **EXT-DFPA·A-B**

(c) Plyshield grade (A-C), Ext. panels are stamped on the edge:

® **EXT-DFPA·PLYSHIELD·A-C**

and may also be stamped on the back:



(d) Utility grade (B-C), Ext. panels are stamped on the edge:

® **EXT-DFPA·UTILITY·B-C**

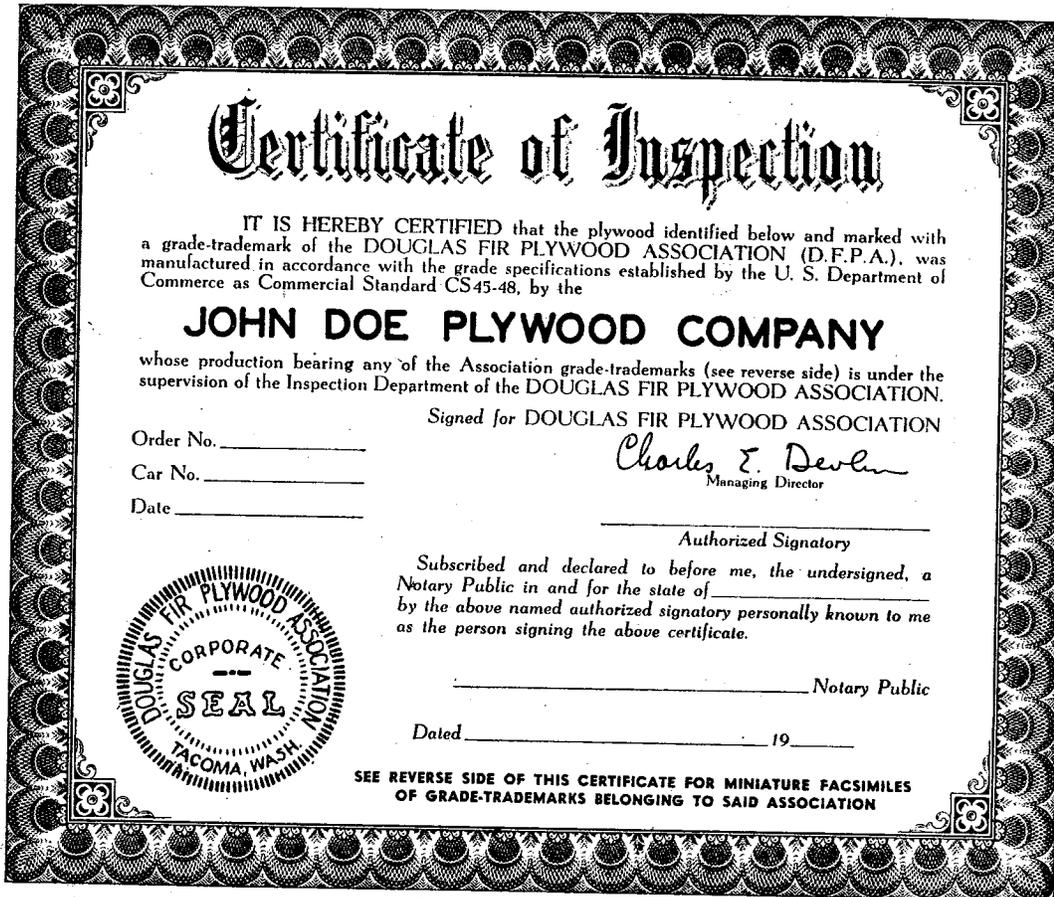
(e) Sheathing grade (C-C), Ext. panels are stamped on the edge:

® **EXT-DFPA·SHEATHING·C-C**

(f) Concrete Form grade (B-B), Ext. panels are stamped on the edge:

® **EXT-DFPA·CONCRETE FORM·B-B**

25. The Douglas Fir Plywood Association maintains an inspection service 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 type and grade specified. A facsimile of the Association's certificate of inspection is shown in figures 4 and 5.



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FIGURE 4. Inspection certificate of the Douglas Fir Plywood Association.

Registered Grade-trademarks of Douglas Fir Plywood Association

NOTE—There are two types of Douglas fir plywood: Interior type for inside uses and structural parts, such as sheathing and subflooring, and Exterior type for permanent outdoor uses, marine applications and other installations to be exposed to water or extreme humidity conditions. Within each type are several appearance grades.

Grade-trademarks, reproduced below, identify panels both as to TYPE of bond between plies and appearance GRADE of outer ply or veneers. The newly adopted system of grade designation is based upon letters to indicate appearance quality of outer plies, A being the highest.*

INTERIOR-TYPE

① INTERIOR-A-A-DFPA

Interior type plywood having Grade A (Sound) veneer on both faces of panel.

① INTERIOR-A-B-DFPA

Interior type plywood having Grade A (Sound) veneer on face of panel, and Grade B (Solid) veneer on back.



Interior type plywood having Grade A (Sound) veneer on face of panel, and Grade D (Utility) veneer on back.



Interior type plywood having Grade B (Solid) veneer on face of panel, and Grade D (Utility) veneer on back.



Interior type plywood having Grade C (Exterior Back) veneer on face of panel, and Grade D (Utility) veneer on back.



Interior type plywood having Grade B (Solid) veneer on both faces of panel, with Grade C (Exterior Back) or better veneers for inner plies.

EXTERIOR-TYPE

① EXT-DFPA-A-A

Exterior type plywood having Grade A (Sound) veneer on both faces of panel.

① EXT-DFPA-A-B

Exterior type plywood having Grade A (Sound) veneer on face of panel, and Grade B (Solid) veneer on back.

① EXT-DFPA-PLYSHIELD-A-C

Optional back stamp.



Exterior type plywood having Grade A (Sound) veneer on face of panel, and Grade C (Exterior Back) veneer on back.

① EXT-DFPA-UTILITY-B-C

Exterior type plywood having Grade B (Solid) veneer on face of panel, and Grade C (Exterior Back) veneer on back.

① EXT-DFPA-SHEATHING-C-C

Exterior type plywood having Grade C (Exterior Back) veneer on both faces of panel.

① EXT-DFPA-CONCRETE FORM-B-B

Exterior type plywood having Grade B (Solid) veneer on both faces of panel.

*—Alternate marking provides for either letter designations, as above, or use of previous terminology including "Sound" to describe the A veneer and "Solid" with reference to B veneer. Here are the alternate designations:

Interior Type. Interior-A-A-DFPA or Interior So2S DFPA (Sound 2 Sides). Interior-A-B-DFPA or Interior So/Sld DFPA (Sound 1 Side, Solid Back). Plypanel-A-D-DFPA or Plypanel So1S DFPA (Sound 1 Side). Plybase-B-D-DFPA or Plybase Sld/1S DFPA (Solid 1 Side). Plyscord Sheathing-C-D-DFPA or Plyscord Sheathing DFPA. Plyform-B-B-DFPA or Plyform Sld/2S DFPA (Solid 2 Sides).

Exterior Type. EXT-DFPA-AA or EXT-DFPA So2S (Sound 2 Sides). EXT-DFPA-A-B or EXT-DFPA So/Sld (Sound 1 Side, Solid Back). EXT-DFPA-Plyshield-A-C or EXT-DFPA Plyshield So1S (Sound 1 Side). EXT-DFPA-Utility-B-C or EXT-DFPA Utility Sld/1S (Solid 1 Side). EXT-DFPA-Sheathing-C-C or EXT-DFPA Sheathing. EXT-DFPA-Concrete Form-B-B or EXT-DFPA Concrete Form Sld/2S (Solid 2 Sides).

Douglas Fir Plywood Association, Tacoma 2, Washington

FIGURE 5. Inspection certificate of the Douglas Fir Plywood Association (reverse side).

METHOD OF ORDERING

26. 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.

27. 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.

28. If, for example, you require 100 pieces of plywood $\frac{1}{4}$ 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 in. by 96 in., Interior Type, A-D (Sound 1 Side) Grade, Sanded 2 Sides to $\frac{1}{4}$ inch thickness.

29. For most uses, sanded panels are desirable, but there are occasional uses where unsanded panels, of an A-D (Sound 1 Side) or other grade, are satisfactory. Such panels should be specified unsanded.

30. 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, if special features are desired in an Exterior Type A-A (Sound 2 Sides) panel of $\frac{3}{8}$ -inch thickness, the order should read:

Douglas Fir Plywood: 100 pcs., 3-ply, 48 in. by 96 in., Exterior Type, A-A (Sound 2 Sides) Grade, Sanded 2 Sides to $\frac{3}{8}$ inch thickness. (Add further special requirements.)

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.

Exterior.—Refers to the type of plywood intended for outdoor or marine uses; this type is bonded with adhesives, affording the ultimate in water and moisture resistance (see pars. 8 and 10). (There are several grades within this type.)

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. The quality of the face and back determines the grade of panel within either the Exterior or Interior type.

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

Interior.—Refers to the type of plywood intended for inside uses and for construction applications where subjected to occasional wetting or deposits of moisture (see pars. 8 and 9). (There are several grades within this type.)

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 boat-shaped 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.

Plugs.—Sound wood, usually circular, replacing defective portions which have been removed. Plugs usually are held in veneer by friction only until veneers are bonded into plywood. Synthetic plugs are of fiber and resin aggregate; they are used to fill openings and provide a smooth, durable surface.

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 $\frac{3}{16}$ in. wide.

Streaks.—See pitch streaks.

Torn grain.—A marked leafing or separation on veneer surface between spring and summer wood.

Veneer.—Thin sheets of wood.

EFFECTIVE DATE

31. Having been passed through the regular procedure of the Commodity Standards Division, and approved by the acceptors hereinafter listed, this commercial standard was issued by the Department of Commerce, effective from November 1, 1948.

Edwin W. Ely,
Chief, Commodity Standards Division.

HISTORY OF PROJECT

32. Pursuant to a request from the manufacturers of Douglas fir plywood, a general conference of manufacturers, distributors, and users of the product was held in 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

33. 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 Commercial Standard CS45-36, Douglas Fir Plywood (Domestic Grades) (Second Edition), effective November 1, 1936.

SECOND REVISION

34. 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, providing 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

35. 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

36. 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 superseded both CS45-40 (Domestic

Grades) and CS45E-36 (Export Grades), since Douglas fir plywood was then being 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

37. 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

38. 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 including 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.

SEVENTH REVISION

39. The Douglas Fir Plywood Association, on May 21, 1948, submitted a proposed revision of the standard in an improved and simpler form. After approval by the standing committee, the recommended revision was circulated to the trade for consideration on August 5, 1948. Following acceptance by a large majority, the establishment of the revision was announced on October 1, 1948, as Commercial Standard CS45-48. This revision gives the requirements for the four basic standard grades of veneer, and the plywood grades as made up from these veneers are covered in tables. The bondage requirements for both the Interior type and Exterior type have been made more rigid, thus insuring greater durability of the product.

STANDING COMMITTEE

40. 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 con-

cerning 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.

DEWEY YATES (chairman), Elliott Bay Mill Co., 600 West Spokane Street, Seattle, Wash.

NELSON S. PERKINS, Douglas Fir Plywood Association, Tacoma Building, Tacoma 2, Wash.

NORMAN O. CRUVER, The Wheeler, Osgood Co., 1216 St. Paul Avenue, Tacoma 1, Wash.

R. W. JACOB, John Bader Lumber Co., 2020 Clybourne Avenue, Chicago 14, Ill. (Representing National Retail Lumber Dealers Assn.)

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, Housing & Home Finance Agency, Washington 25, D. C.

C. O. CHRISTENSON, Property Requirements Section, Federal Housing Administration, Washington 25, D. C.

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 -----

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

Gentlemen:

We believe that the Commercial Standard CS45-48 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 Underscore 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.

(Cut on this line)

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 or the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

The organizations listed below have individually accepted these grading rules 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 Specification Institute, Chicago, Ill.
 Carolina Lumber & Building Supply Association, Inc., Charlotte, N. C.
 Co-op. Grange League Federation Exchange, Inc., Ithaca, N. Y.
 Douglas Fir Plywood Association, Tacoma, Wash.
 Greater New York Lumber Industries, Inc., New York, N. Y.
 1 Hardwood Plywood Institute, Chicago, Ill.
 National Association of Home Builders, Washington, D. C.
 National Hardwood Lumber Association, Chicago, Ill.
 National Lumber Exporters Association, Memphis, Tenn.
 Prefabricated Home Manufacturers' Institute, Washington, D. C.
 Southern California Retail Lumber Association, Los Angeles, Calif.
 Southern Hardwood Producers, Inc., Memphis, Tenn.
 Southern Plywood Manufacturers Association, Atlanta, Ga.
 Southern Sash & Door Jobbers Association, Memphis, Tenn.
 Southwestern Lumbermen's Association, Kansas City, Mo.
 Veneer Association, The, Chicago, Ill.
 Wood-Ply Research Foundation, Inc., Chicago, Ill.

FIRMS AND OTHER INTERESTS

Aberdeen Plywood Corp., Aberdeen, Wash.
 Ackerman, Frederick L., New York, N. Y.
 Acme Door Co., Hoquiam, Wash.
 Aerovox Corp., New Bedford, Mass.
 Albany Plywood Co., Albany, N. Y.
 Algoma Plywood & Veneer Co., Algoma, Wis.
 Allen Millwork Manufacturing Co., Shreveport, La.
 Allison & Ribbe, Los Angeles, Calif.
 American Plywood Corp., New London, Wis.
 American Sash & Door Co., Kansas City, Mo.
 Anacortes Veneer, Inc., Anacortes, Wash.
 Andrews, C. E., Lumber Co., New Bethlehem, Pa.
 Arrington Lumber, Norfolk, Va.
 Ashton, C. J., Co., Detroit, Mich.
 Associated Plywood Mills, Inc., Willamina and Eugene, Oreg.
 Atlanta Oak Flooring Co., Atlanta, Ga.
 Atlantic Plywood Co., Inc., New York, N. Y.
 Bakelite Corp., New York, N. Y., and Bloomfield, N. J.
 Baldridge, J. C., Lumber Co., Albuquerque, N. Mex.
 Bank Building & Equipment Corp. of America, St. Louis, Mo.
 Barger Millwork Co., Statesville, N. C.
 Baris, J. C., Lumber Co., New York, N. Y.

Barthmaier, Eugene V., Philadelphia, Pa.
 Baxter, C. B., & Co., Kansas City, Mo.
 Beasley & Sons Co., Nashville, Tenn.
 Becker-Danowitz Co., Inc., Maspeth, Long Island, N. Y.
 Belli Co., Trenton, N. J.
 Bellingham Plywood Corp., South Bellingham, Wash.
 Bennison, Harvey C., Co., Kansas City, Mo.
 Berger, F. E., R. L. Kelley & Associates, Champaign, Ill.
 Besch, Carl, Co., The, New York, N. Y.
 Binswanger & Co., Inc., Richmond, Va.
 Birmingham Sash & Door Co., Birmingham, Ala.
 Blackburn, Robert, Inc., Milwaukee, Wis.
 Borcharding, W. C., Co., Indianapolis, Ind.
 Borden Co., The, Chemical Division, Seattle, Wash.
 Bosman & Casson, Inc., Harrison, N. J.
 Boston & Maine Railroad, Boston, Mass.
 Brazer, Clarence W., New York, N. Y.
 Brown, Clay, & Co., Portland, Oreg.
 Bruett, T. A., Lumber, Inc., Milwaukee, Wis.
 Brust & Brust, Milwaukee, Wis.
 Bucky, Fred W., Jr., Jacksonville, Fla.
 Buell & Co., Dallas, Tex.
 Buffalo, City of, Architectural Service, Division of Buildings, Department of Public Works, Buffalo, N. Y.
 Buffalo Plywood Corp., Buffalo, N. Y.
 Buffelen Manufacturing Co., Tacoma, Wash., and Fort Worth, Tex.
 Builders Supply Co., Inc., Tullahoma, Tenn.
 California Builders Supply Co., Oakland, Fresno, and Sacramento, Calif.
 California Door Co., The, Los Angeles, Calif.
 California Panel & Veneer Co., Los Angeles, Calif.
 Cameron, Wm., & Co., Inc., Waco, Tex.
 Cameron Lumber Co., Inc., Newburgh, N. Y.
 Camlet, J. Thomas, Passaic, N. J.
 Camp, E. W., Plywood Co., Inc., The, Cincinnati, Ohio, and Indianapolis, Ind.
 Campbell & Summerhayes, Louisville, Ky.
 Cannon & Mullen, Salt Lake City, Utah.
 Cascades Plywood Corp., Portland, Oreg.
 Central Building Supply, Inc., Baltimore, Md.
 Central Wholesale Co., Inc., Shreveport, La.
 Charlottesville Lumber Co., Inc., Charlottesville, Va.
 Chicago, Milwaukee, St. Paul & Pacific Railroad Co., Milwaukee, Wis.
 Chicago & Riverdale Lumber Co., Chicago, Ill.
 Chicago, Rock Island & Pacific Railroad Co., Chicago, Ill.
 Chrysler Corp., Detroit, Mich.
 Cincinnati Butchers Supply Co., The, Cincinnati, Ohio.
 Cleverdon, Varney & Pike, Boston, Mass.
 Coast Sash & Door Co., Inc., Tacoma, Wash.
 Coffin, Ralph V., Seattle, Wash.
 Cole Manufacturing Co., Memphis, Tenn.
 Combs Lumber Co., Inc., Lexington, Ky.
 Concrete Grid Forms, Berkeley, Calif.

- Conrad & Cummings, Binghamton, N. Y.
 Coos Bay Lumber Co., Coos Bay, Oreg.
 Corddry Co., The, Snow Hill, Md.
 Crompton & Knowles Loom Works, Worcester, Mass.
 Cross, Austin & Ireland Lumber Co., Brooklyn, N. Y.
 Crowell & Lancaster, Bangor, Maine.
 Curran Bros., Pomona, Calif.
 Curtis Cos., Inc., Clinton, Iowa.
 Dakota Sash & Door Co., Aberdeen, S. Dak.
 Davidson Sash & Door Co., Inc., Lake Charles, La.
 Davis Plywood Corp., The, Cleveland, Ohio.
 Deats Sash & Door Co., Los Angeles, Calif.
 Dickerson Lumber Co., Huntington, W. Va.
 Dix Lumber Co., North Cambridge, Mass.
 Donovan, John J., Berkeley, Calif.
 Downes Lumber Co., Boston, Mass.
 Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y.
 Eastern Plywood & Door Co., Inc., Jamestown, N. Y.
 Eiler, Edward, Lumber Co., Pittsburgh, Pa.
 Elizabeth Lumber Co., Elizabeth, N. J.
 Elliott Bay Lumber Co., Seattle, Wash.
 Emery Industries, Inc., Cincinnati, Ohio.
 Empire Sash & Door Co., Ltd., Winnipeg, Manitoba, Canada.
 Evans Products Co., St. Louis, Mo.
 Evansville Sash & Door Co., Inc., Evansville, Ind.
 Exchange Lumber & Manufacturing Co., Spokane, Wash.
 Fischer, Charles F., & Co., Inc., New York, N. Y.
 Flannagan, Eric G., Henderson, N. C.
 Florence Manufacturing Co., Inglewood, Calif.
 Forest Products Corp., Port Everglades, Fla.
 Forest Products Laboratory, Ottawa, Ontario, Canada.
 Ft. Wayne Builders Supply Co., Fort Wayne, Ind.
 Frost Hardwood Lumber Co., San Diego, Calif.
 Fry-Fulton Lumber Co., St. Louis, Mo.
 Fuller, W. P., & Co., Spokane, Wash.; Portland, Oreg.; and Sacramento, Calif.
 Gaines Hardwood Lumber Co., St. Louis, Mo.
 Garratt & Co., Wayne, Pa.
 General Box Co., Chicago, Ill.
 General Electric Co., Schenectady, N. Y.
 General Millwork Corp., Utica, N. Y.
 General Paint Corp., Spokane, Wash.
 Georgia-Pacific Plywood & Lumber Co., Augusta, Ga.
 Georgia Show Case Co., Montgomery, Ala.
 Globe-Wernicke Co., The, Norwood, Ohio.
 Godfrey Lumber Co., Boston, Mass.
 Goshen Sash & Door Co., Goshen, Ind.
 Grand Rapids Store Equipment Co., Grand Rapids, Mich.
 Great Lakes Sash & Door Co., The, Cleveland, Ohio.
 Green Gable Builders, Inc., Cedar Rapids, Iowa.
 Greene & Wood, Inc., New Bedford, Mass.
 Grogan-Robinson Lumber Co., Great Falls, Mont.
 Gulf States Plywood Co., New Orleans, La.
 Hager & Cove Lumber Co., Lansing, Mich.
 Hahn, Stanley W., Chicago, Ill.
 Hallack & Howard Lumber Co., The, Denver, Colo.
 Hansen, Frank C., Co., Seattle, Wash.
 Hansen Lumber Co., Ltd., The, Quebec City, Canada.
 Haralson & Mott, Ft. Smith, Ark.
 Harbor Plywood Corp., Hoquiam, Wash., Jacksonville, Fla., and Chicago, Ill.
 Harbor Sales Co., Inc., The, Baltimore, Md., and Washington, D. C.
 Hardwood Lumber Co., Inc., Rochester, N. Y.
 Hartung, F. L., Co., Seattle, Wash.
 Haskelite Manufacturing Co., Grand Rapids, Mich.
 Hastings, A. W., & Co., Inc., Somerville, Mass.
 Hawkins Lumber & Warehouse Co., Boston, Mass.
 Hays, Warner S., New York, N. Y.
 Hermsdorf Fixture Manufacturing Co., Inc., Manchester, N. H.
 Higgins, J. E., Lumber Co., San Francisco, Calif.
 Hill, Lyman, Plywoods, Hollywood, Calif.
 Hodgdon, Charles, San Gabriel, Calif.
 Hodgson, E. F., Co., Boston, Mass.
 Hoffmann Lumber Co., Pittsburgh, Pa.
 Hogan Lumber Co., Oakland, Calif.
 Holden, McLaughlin & Associates, New York, N. Y.
 Holsman, Holsman, Klekamp & Taylor, Chicago, Ill.
 Hope, Frank L., San Diego, Calif.
 Houses, Inc., Bloomfield Hills, Mich.
 Houston Sash & Door Co., Houston, Tex.
 Humboldt Plywood Corp., Arcata, Calif.
 Hunting, R. D., Lumber Co., Cedar Rapids, Iowa.
 Huss Lumber Co., Chicago, Ill.
 Huttig Sash & Door Co., Charlotte, N. C.
 Huttig Sash & Door Co., Columbus, Ohio.
 Huttig Sash & Door Co., Dallas, Tex.
 Huttig Sash & Door Co., Jacksonville, Fla.
 Huttig Sash & Door Co., Knoxville, Tenn.
 Huttig Sash & Door Co., Louisville, Ky.
 Huttig Sash & Door Co., Miami, Fla.
 Huttig Sash & Door Co., Roanoke, Va.
 Huttig Sash & Door Co., St. Louis, Mo.
 Interstate Sash & Door Co., The, Canton, Ohio.
 Iron City Sash & Door Co., Pittsburgh, Pa.
 Jacksonville Building Material Co., Inc., Jacksonville, Fla.
 Jacksonville Sash & Door Co., Jacksonville, Fla.
 Jewson & Sons, Ltd., Norwich, Norfolk, England.
 Johnson, Chas. F., Lumber Products, Portland, Oreg.
 Kawneer Co., Niles, Mich.
 Keely, Hal, Plywood Co., Pittsburgh, Pa.
 Keith, L. J., & Son, Fairfield, Ill.
 Kellogg, Chas. C., & Sons Co., Utica, N. Y.
 Kennedy Lumber Co., Trenton, N. J.
 Kent Manufacturing Co., Danville, Ill.
 Kimball Lumber Co., Watertown, Mass.
 Koch Butchers' Supply Co., The, North Kansas City, Mo.
 Kullberg Manufacturing Co., Minneapolis, Minn.
 Lambert Lumber Co., Leavenworth, Kans.
 Law, Law, Potter & Nystrom, Madison, Wis.
 Levine, Ernest, New Brunswick, N. J.
 Lloyd, C., & Son, Ltd., Wingham, Ontario, Canada.
 Loifeaux, J. D., Lumber Co., Plainfield, N. J.
 Long-Bell Lumber Co., The, Longview, Wash.
 Lord & Bushnell Lumber Co., Chicago, Ill.
 Los Angeles, City of, Los Angeles, Calif.
 Lumber & Millwork Co. of Philadelphia, The, Philadelphia, Pa.
 Lyman Hawkins Lumber Co., The, Akron, Ohio.
 Lyon-Gray Lumber Co., Dallas, Tex.
 Lyon Metal Products, Inc., Aurora, Ill.
 Lyons Lumber & Supply Corp., Jamestown, N. Y.
 M & M Wood Working Co., Portland, Oreg.
 Mahoney Sash & Door Co., The, Canton, Ohio.
 Markland, M. B., Contracting Co., Atlantic City, N. J.
 Marsh & Truman Lumber Co., Chicago, Ill.
 Martin, Edgar, Chicago, Ill.
 Martin, Glenn L., Co., The, Baltimore, Md.
 Maryland Engineering Co., Baltimore, Md.
 Mank-Seattle Lumber Co., Seattle, Wash.
 McGowin Lyons Hardware & Supply Co., Mobile, Ala.
 McPhillips Manufacturing Co., Inc., Mobile, Ala.
 McQuinn, N. J., Lumber Co., Inc., Charlotte, N. C.
 Mears Plywood Corp., Baltimore, Md.
 Meenk Lumber Co., Everett, Wash.
 Memphis Sash & Door Co., Memphis, Tenn.
 Merritt Lumber Yards, Inc., Reading, Pa.
 Michigan Wholesalers, Inc., Jackson, Mich.
 Midland Building Industries, Inc., Indianapolis, Ind.
 Miller & Vrydagh, Terre Haute, Ind.
 Mills Industries, Inc., Chicago, Ill.
 Milwaukee Plywood Co., Milwaukee, Wis.
 Minot Builders Supply Co., Minot, N. Dak.
 Modcraft Co., Inc., The, Brooklyn, N. Y.
 Monsanto Chemical Co., Western Division, Seattle, Wash.
 Moore Dry Dock Co., Oakland, Calif.
 Moore, L. A., Lumber Co., Mason City, Iowa.
 Mooser, William, San Francisco, Calif.
 Morgan Co., Oshkosh, Wis.
 Morgan Millwork Co., Baltimore, Md.
 Morrison-Merrill & Co., Salt Lake City, Utah,
 Pocatello, Idaho, and Reno, Nev.
 Mueller, Hair & Hetterich, Hamilton, Ohio.
 Muhlenberg Bros., Reading, Pa.
 Nash, Robinson & Co., Waco, Tex.
 National Plywood Co., Inc., New York, N. Y.
 National Woodworks, Inc., Birmingham, Ala.

- Neal-Blum Co., Savannah, Ga.
 New York Wood Working Corp., Flushing, N. Y.
 Niagara Plywood Co., Buffalo, N. Y.
 Nicolai Door Sales Co., San Francisco, Calif.
 Northern Plywood & Door Co., Minneapolis, Minn.
 Northwest Door Co., Tacoma, Wash.
 Nurenberg, W. S., Fort Worth, Tex.
 O & N Lumber Co., Menomonee, Wis.
 Oakland Public Schools, Oakland, Calif.
 Officer, Gwynn, Lafayette, Calif.
 Oklahoma Sash & Door Co., The, Oklahoma City, Okla.
 Olson, E. C., Lumber Co., Spokane, Wash.
 Oregon Plywood Corp., Sweet Home, Ore.
 Oregon, State of, Board of Control, Purchasing Dept., Salem, Ore.
 Oregon-Washington Plywood Co., Tacoma, Wash.
 Ostlund & Johnson, San Francisco, Calif.
 Owens-Parks Lumber Co., Los Angeles, Calif.
 Pacific Mutual Door Co., Baltimore, Md., and Chicago, Ill.
 Palisades Park Lumber & Supply Co., Palisades Park, N. J.
 Parrish, C. A., & Co., Spencer, W. Va.
 Patten-Blinn Lumber Co., Los Angeles, Calif.
 Patterson & Buck Hardwood Co., Detroit, Mich.
 Pease Woodwork Co., Inc., Cincinnati, Ohio.
 Peninsula Plywood Corp., Port Angeles, Wash.
 Plunkett-Webster Lumber Co., Inc., Plywood Division, New York, N. Y.
 Plywood Distributing Co., Chicago, Ill.
 Porete Manufacturing Co., North Arlington, N. J.
 Portsmouth Lumber Corp., Portsmouth, Va.
 Puget Sound Plywood, Inc., Tacoma, Wash.
 Queensborough Lumber Co., Inc., Bayside, N. Y.
 Quigley, J. R., Co., Gloucester City, N. J.
 Radford & Sanders, Inc., Harrisburg, Pa., and Baltimore, Md.
 Ramsey, A. H., & Sons, Inc., Miami, Fla.
 Reed Millwork Corp., Roselle, N. J.
 Reinking, A. C., Lumber Co., North Kansas City, Mo.
 Reliable Box & Lumber Co., Port Newark, N. J.
 Richardson-Phelps Lumber Co., Grinnell, Iowa.
 Ripley-Hopping, Inc., Newark, N. J.
 Risser, Art, Lumber & Manufacturing Co., Paris, Ill.
 Robert & Co., Inc., Atlanta, Ga.
 Robinson Manufacturing Co., Everett, Wash.
 Roddis Plywood & Door Co., Inc., Cambridge, Mass.
 Rounds & Porter Co., Wichita, Kans.
 Royal Oak Wholesale Co., Royal Oak, Mich.
 Rudinger, C. R., Inc., South Kearny, N. J.
 Russell, Crowell, Mullgardt & Schwarz, St. Louis, Mo.
 Rust Sash & Door Co., Kansas City, Mo.
 St. Louis, City of, Board of Education, St. Louis, Mo.
 St. Paul & Tacoma Lumber Co., Plywood Division, Olympia, Wash.
 Sash, Door & Glass Corp., Richmond, Va.
 Schmidt, Garden & Erickson, Chicago, Ill.
 Scott Lumber Co., The, Wheeling, W. Va.
 Scranton Plywood Co., Forty Fort, Pa.
 Seaburg Manufacturing Co., Jamestown, N. Y.
 Segelke & Kohlhaus Co., La Crosse, Wis.
 Shenk, Henry, Co., Erie, Pa.
 Shepard & Morse Lumber Co., New York, N. Y.
 Simpson Logging Co., Seattle, Wash.
 Snell Sash & Door Co., St. Paul, Minn.
 Snyder Chemical Corp., Bethel, Conn.
 South Side Lumber & Supply, Toledo, Ohio.
 Southern Counties Gas Co. of Calif., Los Angeles, Calif.
 Southern Sash & Door Co., Greenville, S. C.
 Southwestern Sash & Door Co., Albuquerque, N. Mex.
 Southwestern Sash & Door Co., Joplin, Mo.
 Spokane Woodworking Co., Spokane, Wash.
 Springfield Plywood Corp., Springfield, Ore.
 Standard Cabinet Works, Inc., Los Angeles, Calif.
 Standard Lumber Co., Spokane, Wash.
 Standard Store Equipment Co., Inc., Seattle, Wash.
 Stanton, E. J., & Son, Inc., Los Angeles, Calif.
 Steele & Hibbard Lumber Co., St. Louis, Mo.
 Stoetzel, Ralph, Chicago, Ill.
 Store Kraft Manufacturing Co., The, Beatrice, Nebr.
 Stravs, Carl B., Minneapolis, Minn.
 Streeter, D. D., Brooklyn, N. Y.
 Strong & Hale Lumber Co., The, Portland, Conn.
 Swan Lake Moulding Co., Klamath Falls, Ore.
 Sweet's Catalog Service, New York, N. Y. (General support.)
 Synvar Corp., Wilmington, Del.
 Syracuse University, Syracuse, N. Y.
 Tacoma Plywood Corp., Tacoma, Wash.
 Taylor, Ellery Kirke, Haddonfield, N. J.
 Taylor, Ellis Wing, Los Angeles, Calif.
 Tennessee Glass Co., Inc., Nashville Tenn.
 Theiling-Lothman Manufacturing Co., St. Louis, Mo.
 Thompson & Lichtner Co., Inc., The, Brookline, Mass.
 Timberline, Inc., Kansas City, Mo.
 Trexler Lumber Co., Allentown, Pa.
 Trojan Cupboard Co., Burbank, Calif.
 Tulane Hardwood Lumber Co., Inc., New Orleans, La.
 Twin City Hardwood Lumber Co., St. Paul, Minn.
 Umpqua Plywood Corp., Roseburg, Ore.
 Underwood Coal & Supply Co., Mobile, Ala.
 Underwood Veneer Co., Wausau, Wis.
 United States Plywood Corp., New York, N. Y.
 Van Arsdale-Harris Co., San Francisco, Calif.
 Vancouver Plywood & Veneer Co., Vancouver, Wash.
 Vaughan, Geo. C., & Sons, Houston, Tex.
 Victoria Sash & Door Co., Inc., Shreveport, La.
 Virginia Polytechnic Institute, Blacksburg, Va. (General support.)
 Walsh, Louis A., Waterbury, Conn.
 Walton Plywood Co., Everett, Wash.
 Wanke Panel Co., Portland, Ore.
 Waples-Painter Co., Gainesville, Tex.
 Washington Door Co., Tacoma, Wash.
 Washington Veneer Co., Olympia, Wash.
 Washington Woodworking Co., Inc., Washington, D. C.
 Watertown Sash & Door Co., Watertown, S. Dak.
 Weber Veneer & Plywood Co., Shawano, Wis.
 Welch, Carroll E., Huntington, N. Y.
 Welch Sash & Door Co., Port Huron, Mich.
 West Coast Plywood Co., Aberdeen, Wash.
 Western Door & Plywood Corp., Portland, Ore.
 Western Door & Sash Co., Oakland, Calif.
 Western Electric Co., Inc., Kearny, N. J.
 Western Veneer Co., Lebanon, Ore.
 Weyerhaeuser Sales Co., Tacoma, Wash.
 Weyerhaeuser Timber Co., Longview, Wash.
 Wheeler, Osgood Co., The, Tacoma, Wash.
 Wheelock, E. U., Inc., Los Angeles, Calif.
 Whissel, L. N., Lumber Co., Inc., Buffalo, N. Y.
 White Brothers, San Francisco, Calif.
 Wholesale Building Supply, Inc., Oakland, Calif.
 Wiles-Chipman Lumber Co., St. Louis, Mo.
 Willatsen, Andrew, Seattle, Wash.
 Winner Manufacturing Co., Inc., Trenton, N. J.
 Wolverine Shingle & Lumber Co., Detroit, Mich.
 Wood Lumber Co., Birmingham, Ala.
 Woodcraft Corp., The, Bay City, Mich.
 Woodward Lumber Co., Seattle, Wash.
 Yoerg, A. F., Des Moines, Iowa.
 Youngblood Lumber Co., Minneapolis, Minn.
 Youngstown Plywood Co., Youngstown, Ohio.
 Zeesman Plywood Corp., Los Angeles, Calif.

UNITED STATES GOVERNMENT

- Agriculture, U. S. Department of, Division of Purchase, Sales & Traffic, Washington, D. C.
 Air Force, Department of, Air Material Command, Dayton, Ohio.
 Engraving & Printing, Bureau of, Washington, D. C.
 Federal Housing Administration, Washington, D. C.
 Federal Works Agency, Public Buildings Administration, Washington, D. C. (General support).
 Housing & Home Finance Agency, Washington, D. C. (General support).
 Interior, U. S. Department of, Bureau of Indian Affairs, Washington, D. C.
 Naval Base, Public Works Department, Philadelphia, Pa.
 Veterans Administration, Washington, D. C.

COMMERCIAL STANDARDS

CS No.	Item	CS No.	Item
0-40.	Commercial standards and their value to business (third edition).	56-41.	Oak flooring (second edition).
1-42.	Clinical thermometers (third edition).	57-40.	Book cloths, buckrams, and impregnated fabrics for bookbinding purposes except library bindings (second edition).
2-30.	Mopsticks.	58-36.	Woven elastic fabrics for use in overalls (overall elastic webbing).
3-40.	Stoddard solvent (third edition).	59-44.	Textiles—testing and reporting (fourth edition).
4-29.	Staple porcelain (all-clay) plumbing fixtures.	60-48.	Hardwood dimension lumber (second edition).
5-46.	Pipe nipples; brass, copper, steel and wrought-iron (second edition).	61-37.	Wood-slat venetian blinds.
6-31.	Wrought-iron pipe nipples (second edition). Superseded by CS5-46.	62-38.	Colors for kitchen accessories.
7-29.	Standard weight malleable iron or steel screwed unions.	63-38.	Colors for bathroom accessories.
8-41.	Gage blanks (third edition).	64-37.	Walnut veneers.
9-33.	Builders' template hardware (second edition).	65-43.	Methods of analysis and of reporting fiber composition of textile products (second edition).
10-29.	Brass pipe nipples. Superseded by CS5-46.	66-38.	Marking of articles made wholly or in part of platinum.
11-41.	Moisture regains of cotton yarns (second edition).	67-38.	Marking articles made of karat gold.
12-48.	Fuel oils (sixth edition).	68-38.	Liquid hypochlorite disinfectant, deodorant, and germicide.
13-44.	Dress patterns (fourth edition).	69-38.	Pine oil disinfectant.
14-43.	Boys' button-on waists, shirts, junior and sport shirts (made from woven fabrics) (third edition).	70-41.	Phenolic disinfectant (emulsifying type) (second edition) (published with CS71-41).
15-46.	Men's pajama sizes (made from woven fabrics) (third edition).	71-41.	Phenolic disinfectant (soluble type) (second edition) (published with CS70-41).
16-29.	Wall paper.	72-38.	Household insecticide (liquid spray type).
17-47.	Diamond core drill fittings (fourth edition).	73-48.	Old growth Douglas fir, Sitka spruce, and Western hemlock standard stock doors (fourth edition).
18-29.	Hickory golf shafts.	74-39.	Solid hardwood wall paneling.
19-32.	Foundry patterns of wood (second edition).	75-42.	Automatic mechanical draft oil burners designed for domestic installations (second edition).
20-47.	Staple vitreous china plumbing fixtures (fourth edition).	76-39.	Hardwood interior trim and molding.
21-39.	Interchangeable ground-glass joints, stopcocks, and stoppers (fourth edition).	77-48.	Enameled cast-iron plumbing fixtures (second edition).
22-40.	Builders' hardware (nontemplate) (second edition).	78-40.	Ground-and-polished lenses for sun glasses (second edition) (published with CS79-40).
23-30.	Feldspar.	79-40.	Blown; drawn, and dropped lenses for sun glasses (second edition) (published with CS78-40).
24-43.	Screw threads and tap-drill sizes.	80-41.	Electric direction signal systems other than semaphore type for commercial and other vehicles subject to special motor vehicle laws (after market).
25-30.	Special screw threads. Superseded by CS-24-43.	81-41.	Adverse-weather lamps for vehicles (after market).
26-30.	Aromatic red cedar closet lining.	82-41.	Inner-controlled spotlamps for vehicles (after market).
27-36.	Mirrors (second edition).	83-41.	Clearance, marker, and identification lamps for vehicles (after market).
28-46.	Cotton fabric tents, tarpaulins and covers (second edition).	84-41.	Electric tail lamps for vehicles (after market).
29-31.	Staple seats for water-closet bowls.	85-41.	Electric license-plate lamps for vehicles (after market).
30-31.	Colors for sanitary ware. (Withdrawn as commercial standard March 15, 1948.)	86-41.	Electric stop lamps for vehicles (after market).
31-38.	Wood shingles (fourth edition).	87-41.	Red electric warning lanterns.
32-31.	Cotton cloth for rubber and pyroxylin coating.	88-41.	Liquid burning flares.
33-43.	Knit underwear (exclusive of rayon) (second edition).	89-40.	Hardwood stair treads and risers.
34-31.	Bag, case, and strap leather.	90-	(Reserved for power shovels and cranes).
35-47.	Hardwood plywood (third edition).	91-41.	Factory-fitted Douglas fir entrance doors.
36-33.	Fourdriner wire cloth (second edition).	92-41.	Cedar, cypress, and redwood tank stock lumber.
37-31.	Steel bone plates and screws.	93-41.	Portable electric drills (exclusive of high frequency).
38-32.	Hospital rubber sheeting.	94-41.	Calking lead.
39-37.	Wool and part wool blankets (second edition). (Withdrawn as commercial standard, July 14, 1941).	95-41.	Lead pipe.
40-32.	Surgeons' rubber gloves.	96-41.	Lead traps and bends.
41-32.	Surgeons' latex gloves.	97-42.	Electric supplementary driving and passing lamps for vehicles (after market).
42-43.	Structural fiber insulating board (third edition).	98-42.	Artists' oil paints.
43-32.	Grading of sulphonated oils.	99-42.	Gas floor furnaces—gravity circulating type.
44-32.	Apple wraps.	100-47.	Porcelain-enameled steel utensils (third edition).
45-48.	Douglas fir plywood (eighth edition).	101-43.	Flue-connected oil-burning space heaters equipped with vaporizing pot-type burners.
46-40.	Hosiery lengths and sizes (third edition).	102-	(Reserved for Diesel and fuel-oil engines.)
47-34.	Marking of gold-filled and rolled-gold plate articles other than watchcases.	103-48.	Rayon jacquard velour (with or without other decorative yarn) (second edition).
48-40.	Domestic burners for Pennsylvania anthracite (underfeed type) (second edition).	104-46.	Warm-air furnaces equipped with vaporizing pot-type oil burners (second edition).
49-34.	Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.		
50-34.	Binders board for bookbinding and other purposes.		
51-35.	Marking articles made of silver in combination with gold.		
52-35.	Mohair pile fabrics (100-percent mohair plain velvet, 100-percent mohair plain frieze, and 50-percent mohair plain frieze).		
53-35.	Colors and finishes for cast stone.		
54-35.	Mattresses for hospitals.		
55-35.	Mattresses for institutions.		

CS No.	Item	CS No.	Item
105-48.	Mineral wool insulation for low temperatures (second edition).	129-47.	Materials for safety wearing apparel (second edition).
106-44.	Boys' pajama sizes (woven fabrics) (second edition).	130-46.	Color materials for art education in schools.
107-45.	Commercial electric-refrigeration condensing units (second edition). (Withdrawn as commercial standard September 4, 1947.)	131-46.	Industrial mineral wool products, all types—testing and reporting.
108-43.	Treading automobile and truck tires.	132-46.	Hardware cloth.
109-44.	Solid-fuel-burning forced-air furnaces.	133-46.	Woven wire netting.
110-43.	Tire repairs—vulcanized (passenger, truck, and bus tires).	134-46.	Cast aluminum cooking utensils (metal composition).
111-43.	Earthenware (vitreous-glazed) plumbing fixtures.	135-46.	Men's shirt sizes (exclusive of work shirts).
112-43.	Homogeneous fiber wallboard.	136-46.	Blankets for hospitals (wool, and wool and cotton).
113-44.	Oil-burning floor furnaces equipped with vaporizing pot-type burners.	137-46.	Size measurements for men's and boys' shorts (woven fabrics).
114-43.	Hospital sheeting for mattress protection.	138-47.	Insect wire screening.
115-44.	Porcelain-enameled tanks for domestic use.	139-47.	Work gloves.
116-44.	Bituminized-fibre drain and sewer pipe.	140-47.	Testing and rating convectors.
117-44.	Mineral wool; blankets, blocks, insulating cement, and pipe insulation for heated industrial equipment.	141-47.	Sine bars, blocks, plates, and fixtures.
118-44.	Marking of jewelry and novelties of silver.	142-47.	Automotive lifts.
(E) 119-45. ¹	Dial indicators (for linear measurements).	143-47.	Standard strength and extra strength perforated clay pipe.
120-48.	Standard stock ponderosa pine doors (third edition).	144-47.	Formed metal porcelain enameled sanitary ware.
121-45.	Women's slip sizes (woven fabrics).	145-47.	Testing and rating hand-fired hot-water-supply boilers.
122-45.	Western hemlock plywood.	146-47.	Gowns for hospital patients.
123-45.	Grading of diamond powder.	147-47.	Colors for molded urea plastics.
(E) 124-45. ¹	Master disks.	148-48.	Men's circular flat and rib knit rayon underwear.
125-47.	Prefabricated homes (second edition).	149-48.	Utility type house dress sizes.
126-45.	Tank mounted air compressors.	150-48.	Hot-rolled rail steel bars (produced from Tee-section rails).
127-45.	Self-contained mechanically refrigerated drinking water coolers.	151-48.	Body measurements for the sizing of apparel for infants, babies, toddlers, and children (for the knit-underwear industry).
128-45.	Men's sport shirt sizes—woven fabrics (other than those marked with regular neckband sizes).	152-48.	Copper naphthenate wood-preservative.

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

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.