COMMERCIAL STANDARD **CS122-60**

Supercedes CS 122- 56

WESTERN SOFTWOOD PLYWOOD

WITHDRAWN

A recorded voluntary standard of the trade published by the U.S. Department of Commerce

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. - Price 15 cents

U.S. DEPARTMENT OF COMMERCE
BUSINESS AND DEFENSE SERVICES ADMINISTRATION
OFFICE OF TECHNICAL SERVICES
Commodity Standards Division

EFFECTIVE DATE

Having been passed through the regular procedures of the Commodity Standards Division, and approved by the acceptors hereinafter listed, this Commercial Standard is issued by the U.S. Department of Commerce, effective December 31, 1960.

FREDERICK H. MUELLER, *Secretary.*

COMMERCIAL STANDARDS

Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Commodity Standards Division of the Office of Technical Services, Business and Defense Services Administration, and with the National Bureau of Standards. Their purpose is to establish quality criteria, standard methods of test, rating, certification, and labeling of manufactured commodities, and to provide uniform bases for fair competition.

The adoption and use of a Commercial Standard is voluntary. However, when reference to a Commercial Standard is made in contracts, labels, invoices, or advertising literature, the provisions of the standard are enforcible through usual legal channels as a part of the sales contract.

Commercial Standards originate with the proponent industry. The sponsors may be manufacturers, distributors, or users of the specific product. One of these three elements of industry submits to the Commodity Standards Division the necessary data to be used as the basis for developing a standard of practice. The division by means of assembled conferences or letter referenda, or both, assists the sponsor group in arriving at a tentative standard of practice and thereafter refers it to the other elements of the same industry for approval or for constructive criticism that will be helpful in making any necessary adjustments. The regular procedure of the division assures continuous servicing of each Commercial Standard through review and revision whenever, in the opinion of the industry, changing conditions warrant such action.

SIMPLIFIED PRACTICE RECOMMENDATIONS

Under a similar procedure the Commodity Standards Division cooperates with industries in the establishment of Simplified Practice Recommendations. Their purpose is to eliminate avoidable waste through the establishment of standards of practice for sizes, dimensions, varieties, or other characteristics of specific products; to simplify packaging practices; and to establish simplified methods of performing specific tasks.

TS-5545
October 16, 1961

AMENDMENT NO. 1

TO

WESTERN SOFTWOOD PLYWOOD

COMMERCIAL STANDARD CS122-60

EFFECTIVE DATE: NOVEMBER 16, 1961

(To be inserted in printed edition of CS122-60)

1. Page 3, Paragraph 1.1 - Delete wording in parenthesis, lines 4, 5 and 6 and substitute:

"of species covered in paragraph 4.4 2/ "

2. Page 3, Footnote 2 - Delete in entirety and substitute:

" 2/Grading rules for Douglas fir and Western larch plywood are given in Commercial Standard CS45-60. Grading rules for ponderosa pine, sugar pine and Idaho white pine plywood, other than sheathing and underlayment grades, are given in Commercial Standard CS157-56 (amended)."

3. Page 4, Paragraph 4.4 - Delete remainder of first sentence following "(Abies concolor)," and delete second sentence. Substitute:

"Douglas fir (Interior North and Interior South), Western poplar, red alder, lauan (red and white), and lodgepole pine. Also included are sheathing and underlayment grades, only, of ponderosa pine, sugar pine and Idaho white pine."

4. Page 4, Paragraph 4.4.1 - Insert in Group 3:

"lodgepole pine."

USCOMM-DC-45,757

TS-5554

AMENDMENT NO. 2

TO

WESTERN SOFTWOOD PLYWOOD

COMMERCIAL STANDARD CS122-60

(Effective Date: February 1, 1962)

(To be inserted in printed edition of CS122-60)

1. Paragraph 4.5.2 Veneers. - Add the following sentence:

"The average veneer thickness shall conform to the limitations given in this standard within a tolerance of 5% of the specified nominal thickness, measured before layup." *

* See Section 11, Nomenclature and Definitions.

2. Paragraph 4.6.3 Thickness and Construction of C-D Interior Sheathing. - Modify the second sentence to read:

"In addition, all of these constructions except 5/16 inch and 1/2 inch shall have minimum 1/8 inch thick faces and backs."

3. Section 11, Nomenclature and Definitions. - Add the following definition:

"Nominal thickness. - Full designated fractional thickness. For example, 1/10 inch nominal is 0.10 inch, 1/2 inch nominal is 0.50 inch."

COMMODITY STANDARDS DIVISION
OFFICE OF TECHNICAL SERVICES
U. S. DEPARTMENT OF COMMERCE

January 2, 1962
USCOMM-DC-46,193

TS-5566

AMENDMENT NO. 3

TO

WESTERN SOFTWOOD PLYWOOD

COMMERCIAL STANDARD CS122-60

(Effective Date: April 16, 1962)

(To be inserted in printed edition of CS122-60)

Paragraph 4.5.3.5 Grade D Veneer -

Under caption "White Pocket" delete

"In inner plies only."

Also delete caption "On Backs" and the sentence under that caption.

COMMODITY STANDARDS DIVISION
OFFICE OF TECHNICAL SERVICES
U. S. DEPARTMENT OF COMMERCE

March 16, 1962
COMM-DC-46,609

TS-5584

AMENDMENT NO. 4
TO
WESTERN SOFTWOOD PLYWOOD
COMMERCIAL STANDARD CS122-60
(Effective Date: July 1, 1962)

(To be inserted in printed edition of CS122-60)

1. Paragraph 4.1 Workmanship - Add the following sentence:

"Gaps between adjacent pieces of core or centers shall not exceed 1 inch*, and the average of all gaps occurring in a panel shall not exceed 3/4 inch**. Every effort shall be made to produce closely butted core joints, however."

"* See "Core Gaps", Section 11, Nomenclature and Definitions.
"** See Appendix."

2. Section 11, Nomenclature and Definitions - Amend definition or "Core Gaps" by adding the following sentence:

"A core gap (center gap) shall be considered to exceed the maximum 1 inch limitation specified in Paragraph 4.1 when the width of such gap exceeds 1 inch for a depth of 8 inches measured from the panel edge."

3. Appendix - Add new paragraph as follows:

"In addition to the above 5% grade tolerance a 5% tolerance shall apply separately to the core gap limitations set forth in Paragraph 4.1."

4. Paragraph 4.5.2 Veneers - To clarify the wording, to include material given in previous Amendment No. 2 and to cover 1/12 inch core veneer, rearrange the paragraph as follows:

"Except as noted below, veneers shall be 1/10 inch or thicker in panels 3/8 inch rough thickness or over, 1/12 inch or thicker in panels of lesser thickness. Veneers 1/16 inch or thicker may be used in 5-ply 3/8 inch Exterior type panels and as centers only in other 5-ply panels. Veneers 1/12 inch or thicker may be used as core in 5-ply 1/2 inch panels. In no case, however, shall veneer be thicker than 1/4 inch. The average veneer thickness shall conform to the limitations given in this standard within a tolerance of 5% of the specified nominal thickness*, measured before layup. Sound firm stain shall not be considered a defect. End butt joints are prohibited in any veneer. Plywood thicker than 3/8 inch sanded or 7/16 inch rough shall have a minimum of 5 plies."

"* See Section 11, Nomenclature and Definitions."

COMMODITY STANDARDS DIVISION
OFFICE OF TECHNICAL SERVICES
U. S. DEPARTMENT OF COMMERCE

June 1, 1962
USCOMM-DC-47,027

TS-5618

AMENDMENT NO. 5

TO

WESTERN SOFTWOOD PLYWOOD

COMMERCIAL STANDARD CS122-60

(Effective Date: March 1, 1963)

(To be inserted in printed edition of CS122-60)

1. Paragraph 4.5.2 Veneers. - Modify last sentence as follows:

" Plywood thicker than 3/8 inch sanded or 7/16 inch rough shall have a minimum of 5 plies except that in the C-D Interior and C-D (Plugged) Interior grades only, 1/2 inch thick panels may have a minimum of 3 plies."

2. Table 4. - Modify footnote 4 as follows:

"4. Minimum number of plies required for standard constructions:

3 plies for 1/4, 5/16, and 3/8 inch.

3 plies for 1/2 inch C-D Interior sheathing and C-D plugged only.

5 plies for 1/2, 5/8, and 3/4 inch, except as noted above.

7 plies for 7/8 to 1-3/16 inch."

COMMODITY STANDARDS DIVISION
OFFICE OF TECHNICAL SERVICES
U. S. DEPARTMENT OF COMMERCE

USCOMM-DC- 48,078

TS-5622
March 1, 1963

AMENDMENT NO. 6

TO

WESTERN SOFTWOOD PLYWOOD

COMMERCIAL STANDARD CS122-60

(Effective Date: April 1, 1963)

(To be inserted in printed edition of CS122-60)

Page 14. - Insert a new paragraph as follows:

"9.3 Grademarks or trademarks which refer to this Standard shall denote adhesive type only by means of the following designations: 'EXTERIOR', 'EXT.', 'INTERIOR', 'INT.', 'STRUCTURAL INTERIOR', or 'STRUC-INT.' In addition, the notation 'EXTERIOR GLUE' may be used, where applicable, to supplement the designations 'STRUCTURAL INTERIOR' or 'STRUC-INT.' Any further references to adhesive bond, including those which imply premium performance or special warranty by the manufacturer, as well as manufacturer's proprietary designations, shall be separated from the grademarks or trademarks of the testing agency by not less than 6 inches."

COMMODITY STANDARDS DIVISION
OFFICE OF TECHNICAL SERVICES
U. S. DEPARTMENT OF COMMERCE

USCOMM-DC-48,162

TS-5655

A M E N D M E N T No. 7

COMMERCIAL STANDARD CS122-60

WESTERN SOFTWOOD PLYWOOD

Effective May 8, 1964

This amendment forms part of Commercial Standard CS122-60. All copies of the standard should include the following changes:

Page 6. Modify Table 1 by inserting footnote 9 for unsanded grades, as shown below:

Table 1. Interior Type Grades -- Minimum Quality of Veneers

Grade	Face	Back	Inner Plies	Additional Limitations
(Grades N-N through C-D (Plugged) to be unchanged)				
C-D Int. (Sheathing, Int.)8/ with Exterior Glue (See Section 7, Special Constructions)	C	D	D	Unsanded grade 9/
C-D, Int. (Sheathing, Int.)8/	C	D	D	Unsanded grade 9/

9/ Shall not be sanded, touch-sanded, or sized by any mechanical means.

Page 8. Modify Table 2 by inserting footnote 5 for unsanded grade, as shown below:

Table 2. Exterior Type Grades -- Minimum Quality of Veneers

Grade	Face	Back	Inner Plies	Additional Limitations
(Grades A-A, Ext. through C-C (Plugged) to be unchanged)				
C-C, Ext. (Sheathing, Ext.)4/	C	C	C	Unsanded grade 5/

5/ Shall not be sanded, touch-sanded, or sized by any mechanical means.

OFFICE OF COMMODITY STANDARDS
NATIONAL BUREAU OF STANDARDS
U. S. DEPARTMENT OF COMMERCE

USCOMM-NBS-DC-

TS-5662

A M E N D M E N T No. 8

COMMERCIAL STANDARD CS122-60

WESTERN SOFTWOOD PLYWOOD

Effective April 1, 1965

This amendment forms part of Commercial Standard CS122-60. All copies of the standard should include the following changes:

Paragraph 4.4.1. Intermixing of species

1. Reclassify western white pine (P. monticola) from Group 3 to Group 1.

2. Reclassify lodgepole pine (P. contorta) from Group 3 to Group 2.

TS-5670A

AMENDMENT NO. 9
TO
WESTERN SOFTWOOD PLYWOOD, COMMERCIAL STANDARD CS122-60

(Insert in printed editions of the standard)

The Amendment will require the following changes in the printed edition:

1)

Section 7, Special Constructions. Add a STRUCTURAL grade as follows:

STRUCTURAL GRADE

STRUCTURAL, a panel designed for engineered applications, is C-D grade bonded with Exterior glue meeting the following special limitations:

- White pocket in any area larger than the size of the largest knothole, pitch pocket, or split specifically permitted in D grade shall not be permitted in any ply.

- Sound, tight knots shall not exceed 2-1/2 inches measured across the grain in D grade veneer.

- Plugs (circular, "dog bone", and leaf shaped), including multiple repairs, shall not exceed 4 inches in width in D grade veneer.

- Panels 1/2 inch and greater in thickness shall consist of a minimum of 5 plies.

- Panels shall not be sanded, touch-sanded, or sized by any mechanical means.

In addition to the above, all requirements for C-D sheathing shall be met.

Bond: STRUCTURAL grade shall be bonded with an adhesive identical to those for Exterior plywood and meeting the Exterior performance requirements of this Standard.

Classes: Class I -- All plies of Coast type Douglas fir or Western larch (Covered under CS45-60)

Class II -- Group I and Group 2 WSP species, separately or in combination. Coast type Douglas fir and Western larch may also be used.

5122-60

(2)

Modify Table I to include STRUCTURAL as follows:

TABLE I. INTERIOR TYPE GRADES -- MINIMUM QUALITY OF VENEERS

Grade	Face	Back	Inner Plies	Additional Limitations[1]
(Grades N-N through C-D (Plugged) to be unchanged)				
Structural (See Section 7, Special Constructions)				Unsanded grade[9]
C-D, Int. (Sheathing, Int.)[8] with Exterior glue. (See Section 7, Special Constructions).	C	D	D	Unsanded grade[9]
C-D, Int. (Sheathing, Int.)[8]	C	D	D	Unsanded grade[9]

[9] Panels shall not be sanded, touch-sanded, or sized by any mechanical means. (Footnote added by amendment May 8, 1964).

CS122-60

Modify Table 4 to include STRUCTURAL as follows:

TABLE 4. STANDARD STOCK WESTERN SOFTWOOD PLYWOOD SIZES[1] - INTERIOR TYPE

Grade	Width[2] (Inch)	Length[2] (Inch)	Thickness[2 3 4 5] (Inch)				
(Grades N-N through C-D (Plugged) to be unchanged)							
Structural	48 60	96 120	5/16 5/16	3/8 - -	1/2 - -	5/8 5/8	3/4 - -
C-D Int. (Sheathing, Int.) with Exterior glue. (See Section 7 Special Constructions)	48 60	96 120	5/16 5/16	3/8 - -	1/2 - -	5/8 5/8	3/4 - -
C-D, Int. (Sheathing, Int.) unsanded.	48 60	96 120	5/16 5/16	3/8 - -	1/2 - -	5/8 5/8	3/4 - -

[5] Sand two sides, except Underlayment C-D (Plugged), Structural, C-D sheathing with Exterior glue, and C-D sheathing.

[7] See Section 7, Special Constructions.

WESTERN SOFTWOOD PLYWOOD[1]

Fourth Edition

Effective December 31, 1960

1. PURPOSE

1.1 The purpose of this Commercial Standard is to establish nationally recognized standards for the principal grades and sizes of Western softwood plywood (other than "Coast type" Douglas fir, Western larch, ponderosa pine, sugar pine, and Idaho white pine)[2]. Because of the extended application of this plywood to a large number of new uses, the standard grades given herein are offered as a common basis of understanding throughout the industry. The Standard is intended as an aid to the procurement of the proper grade of material and the proper type as to moisture resistance for its varied uses, and to serve as a guide to buyers, sellers, architects, engineers, contractors, industrial users, and home owners in meeting their needs by use of nationally accepted standard grades.

2. SCOPE

2.1 This Commercial Standard covers the principal grades of Interior type, Exterior type, and overlaid plywood. It includes tests, standard sizes, size tolerances, marking and certification, and nomenclature and definitions.

3. DEFINITION

3.1 **Western softwood 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 adequately 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 of each contiguous layer of wood equalizes the strains and in this way minimizes shrinkage and warping of the product, and prevents splitting. Overlaid plywood is produced in a like manner with the special facings added.

3.2 **Panel designation.** – In every panel, the same species of wood used for the face shall also be used for the back, or opposite face, and this species shall serve to designate the kind of plywood for that panel.

4. REQUIREMENTS

4.1 **Workmanship.** – Unless otherwise specified, Western softwood plywood shall be sanded on two sides and meet veneer requirements as set forth in Paragraphs 4.5.2 and 4.5.3. When specified rough or unsanded, plywood may have paper tape on either face or back, or both, except that in C-C Exterior no tape used for veneer splicing shall be permitted. It shall be well manufactured, and free from blisters, laps and defects, except as permitted in the specific rules for the various grades. Exposed veneer on both sides of panel shall have bark or tight surface out. Plies directly under surfaces of overlaid panels are not considered exposed veneers. Faces and backs of panels shall be full length and width except as specified. Inner plies shall be full width and length, except that one edge or end void not exceeding ⅛ inch in depth or 8 inches in length per panel will be acceptable. Shims or strips of veneer shall not be used to repair such voids. However, filling with approved plastic fillers neatly applied shall be admitted. Staples are prohibited.

4.2 **Bonding.** – The entire area of each contacting surface of the plywood shall be bonded with an adhesive conforming to the performance requirements for its type as set forth in the tests described in Section 5. No tape shall be used in any glueline.

4.3 **Loading or packing.** –The plywood shall be securely loaded or packed to insure delivery in a clean, and serviceable condition.

[1] This standard also covers structural grades of hardwood plywood of red and white lauan (Philippine mahogany), and hardwood plywood of red alder and Western poplar as commonly utilized by West Coast plywood manufacturers. For other grades of red and white lauan (Philippine mahogany), see Commercial Standard CS 35-61, Hardwood Plywood.

[2] Grading rules for Douglas fir and Western larch plywood are given in Commercial Standard CS45-60 and for pine plywood in Commercial Standard CS157-56.

4.4 **Species.** – For the purpose of this Standard, the species of plywood include cedar (Alaska, Port Orford and Western red), California redwood, Sitka spruce, Engelmann spruce, Western hemlock, noble fir, silver fir, grand fir, California red fir, white fir (Abies concolor), and Douglas fir (Interior North and Interior South). Western poplar, red alder, and lauan (red and white) are also included. Because of similarity in veneer appearance, Western hemlock, noble fir, silver fir, California red fir and grand fir are grouped in this Standard under the general name of "silver fir" and may be furnished interchangeably, or intermixed in any order or shipment calling specifically for one of these kinds of plywood. However, because the veneer of these species cannot readily be distinguished from that of white fir (Abies concolor), plywood of the "silver fir" woods may be identified as Group 1 only following species certification. (See Section 9).

Grand fir, unless grown north of the natural growth range of white fir, shall be classed as white fir (that is, grown north of the southern boundary of Lane County and Deschutes County, Oregon, or a line projected due east of the latter; or grown in Curry County north of (but including) the Rogue River drainage; in Coos County, or in Douglas County north of Oregon State Highway 42 and west of U. S. Highway 99).

4.4.1 **Intermixing of species.** – Inner plies of panels of one species may be of veneer of any species of Group 1, Group 2 or Group 3 except that inner plies of C-D Int. (sheathing), B-B Int. (Concrete Form), C-C Ext. (sheathing), and B-B Ext. (Concrete Form) panels must be from the same group or lower-numbered group, not from a higher-numbered group (see grouping below).

Coast type Douglas fir may be used for inner plies of all panels unless otherwise specified.

Group 1	Group 2	Group 3
Western hemlock	white fir (Abies concolor)	Engelmann spruce
noble fir (A. procera)	redwod	white pine
silver fir (A. amabilis)	Alaska cedar	ponderosa pine
grand fir (A. grandis)	red alder	sugar pine
California red fir (A. magnifica)	Douglas fir, Interior South*	Western red cedar
Sitka spruce		Western poplar (Populus trichocarpa)
Port Orford cedar		
lauan (red, white)		
Douglas fir, Interior North*		

*See Paragraph 11 for definition

4.5 **Types of plywood.** – Western softwood plywood is made in two types, Interior (Int.) and Exterior (Ext.), with the type referring to the durability of the adhesive bond between plies. Within each type there are several grades, which are established by the quality of the veneer 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.

4.5.1 **Moisture content.** – Moisture content of panels at time of shipment from mill shall not exceed 18% of dry weight as determined by oven-dry test.

4.5.2 **Veneers.** – Veneers shall be 1/10 inch or more thick before lay-up in panels 3/8 inch rough thickness or over. Veneers shall be 1/12 inch or more thick before lay-up in panels of lesser thickness, except that veneers not less than 1/16 inch thick before lay-up may be used in 5-ply, 3/8 inch thick Exterior type panels, and as centers only in other 5-ply panels. In no case, however, shall veneer be thicker than 1/4 inch. Sound firm stain shall not be considered a defect. End butt joints are prohibited in any veneer. Plywood thicker than 3/8 inch sanded or 7/16 inch rough shall have a minimum of 5 plies.

4.5.2.1 **Scarfed veneers**[3] – Veneer scarfed joints shall not have a slope steeper than 1 to 8, but may be specified as less than 1 to 8. Veneer in the scarf area shall not contain defects which reduce its effective cross section by more than 20%. Veneer scarfed joints shall be glued with a waterproof adhesive meeting the Exterior type glueline performance test of this Standard.

4.5.3 **Veneer classification.** – All veneers used in the different plywood grades shall be one of the following, grade N being the best of the five classifications.

4.5.3.1 **Grade N Veneer (Intended for natural finish)**

General

Shall be – smoothly cut 100% heartwood, free from knots, knotholes, pitch pockets, open splits, other open defects, and stain.

–of not more than 2 pieces.

–well matched for color and grain and well joined with joint parallel to edges, when of more than one piece.

Permits – suitable plastic fillers to fill:

(a) small cracks or checks not more than 1/32" wide.

(b) small splits or openings up to 1/16" wide if not exceeding 2" in length.

(c) small chipped areas or openings not more than 1/8" wide by 1/4" long.

Growth Characteristics

Permits – pitch streaks averaging not more than 3/8" in width and blending with color of wood.

Repairs

Shall be – neatly made and parallel to grain.

–limited to a total of six in number in any 4 foot x 8 foot face, with proportionate limits for other sizes.

–well matched for color and grain.

[3] See Paragraph 6.2 for Scarfed Panels.

Permits – patches limited to three "router" patches not exceeding ¾" in width and 3½" in length.

–no overlapping.

–shims not exceeding 12" in length that occur only at the ends of the panel.

4.5.3.2 **Grade A Veneer (Suitable for painting)**

General

Shall be – firm, smoothly cut and free from knots, pitch pockets, open splits and other open defects.

–well joined when of more than one piece.

Permits – suitable plastic fillers to fill:

(a) small cracks or checks not more than 1/32" wide.

(b) small splits or openings up to 1/16" wide if not exceeding 2" in length.

(c) small chipped areas or openings not more than ⅛" wide by ¼" long.

Growth Characteristics

Permits – pitch streaks averaging not more than ⅜" in width, blending with color of wood.

–sapwood.

–discolorations.

–small black streaks in Western hemlock.

Repairs

Shall be – neatly made and parallel to grain, limited to a total of 18 in number, excluding shims, in any 4 foot by 8 foot face; proportionate limit on other sizes.

Permits – patches:

(a) Which are symmetrical and of "boat," "router" and "sled" type only, including die-cut patches if edges are cut clean and sharp.

(b) Not exceeding 2¼" in width singly.

(c) Multiple, consisting of not more than 2 patches, neither of which may exceed 7" in length if either is wider than 1".

–shims, except over or around patches.

4.5.3.3 **Grade B Veneer**

General

Shall be – solid and free from open defects except as noted.

Permits – slightly rough but not torn grain.

–minor sanding and patching defects, including sander skips not exceeding 5% of panel area.

–suitable plastic fillers to fill:

(a) small splits or openings up to 1/16" wide if not exceeding 2" in length.

(b) small chipped areas or openings not more than ⅛" wide by ¼" long.

Growth Characteristics

Permits – knots up to 1" if both sound and tight.

–pitch streaks averaging not more than 1" in width.

–discolorations.

Open Defects

Permits – splits not wider than 1/32".

–vertical holes not exceeding 1/16" in diameter (caused by ambrosia beetles) if not exceeding an average of 1 per square foot in number.

–horizontal or surface tunnels limited to 1/16" across, 1" in length, and to 12 in number in a 4 foot x 8 foot panel, or proportionately in panels of other dimensions.

Repairs

Shall be – neatly made.

Permits – patches ("boat", "router" and "sled") not exceeding 3" in width individually where occurring in multiple repairs or 4" in width where occurring singly.

–plugs (circular, "dog bone" and leaf shaped) not exceeding 3" in width individually where occurring in multiple repairs or 4" in width where occurring singly.

–shims.

–synthetic plugs which present solid, level, hard surface not exceeding above dimensions.

4.5.3.4 **Grade C Veneer**

General

Permits – sanding defects that will not impair the strength or serviceability of the panel.

–C grade backs to be narrow on one edge or short on one end only, but by not more than ⅛" for ½ panel length or width.

Growth Characteristics

Permits – knots, if tight and not more than 1½" in least dimension.

Open Defects

Permits – knotholes not larger than 1" across grain.

–open pitch pockets not wider than 1".

–splits not wider than 3/16" that taper to a point.

–worm and borer holes not more than ⅝" wide and 1½" long.

Repairs

Shall be – neatly made.

Permits – patches (boat, including die cut) not exceeding 3" in width individually where occurring in multiple repairs or 4" in width where occurring singly.

–plugs (circular, "dog bone" and leaf shaped) not exceeding 3" in width individually where occurring in multiple repairs or 4" in width where occurring singly.

Table 1. — Interior Type Grades — Minimum Quality of Veneers

Interior Grades	Face	Back	Inner Plies	Additional Limitations[1]
N-N, Int. (Natural finish two sides)[2]	N	N	C[3]	Sanded 2 sides.
N-A, Int. (Natural finish)	N	A	C[3]	Sanded 2 sides.
N-D, Int. (Natural finish one side)[4]	N	D	D	Sanded 2 sides.
A-A, Int.	A	A	D	Sanded 2 sides.
A-B, Int.	A	B	D	Sanded 2 sides.
A-D, Int.	A	D	D	Sanded 2 sides.
B-B, Int. (Concrete Form, Int.)	B	B	C	Sanded 2 sides, edge-sealed and otherwise specified mill-oiled.
B-B, Int.	B	B	D	Sanded 2 sides.
B-D, Int.	B	D	D	Sanded 2 sides.
Int. Underlayment	C (Plugged)[5]	D	C[6] and D	Sanded 2 sides, or touch-sanded[7].
C-D (Plugged)[5], Int.	C (Plugged)[5]	D	D	Unsanded or touch-sanded[7]
C-D Int. (Sheathing, Int.)[8] with Exterior Glue (see section 7, Special Constructions)	C	D	D	Unsanded grade.
C-D, Int. (Sheathing, Int.)[8]	C	D	D	Unsanded grade.

[1] See also paragraphs 4.1 to 4.5, incl.

[2] A "two sides Natural Finish" item, intended primarily for cabinet work, generally only in ¾ in. thickness. Available only from certain mills.

[3] All inner plies shall consist of C veneer with crossbands jointed.

[4] A "one side Natural Finish" item, intended primarily for paneling and wainscoting, generally only in ¼ inch thickness. Available only from certain mills.

[5] See section 11 for definition.

[6] Veneer immediately adjacent to face shall be C or better.

[7] Available touch-sanded when so specified (see section 11 for definition).

[8] See paragraph 4.6.3.

—shims.

—synthetic plugs which present solid, level, hard surface not exceeding above dimensions.

4.5.3.5 **Grade D Veneer (May be used only in Interior type Panels)**[4]

General

Permits — except as otherwise specified, any number of plugs, patches, shims, worm or borer holes, sanding defects, and other characteristics, provided they do not seriously impair the strength or serviceability of the panel.

—D grade backs to be narrow on one edge or short on one end only, but by not more than ⅛" for ½ panel length or width.

Open Defects

Permits — knotholes not exceeding 2½" in maximum dimension.

—pitch pockets not exceeding 2" wide by 4" long or of equivalent area if of lesser width.

—splits.

½" by one-fourth panel length.

¼" by one-half panel length.

3/16" by full panel length.

Required to taper to a point.

Shall not exceed ½" width at widest point.

White Pocket[5]

In inner plies only —

Any area 24 inches wide across the grain and 12 inches long, in which light or heavy white pocket occurs, shall not contain more than three of the following characteristics, in any combination:

(a) 6 inch width of heavy white pocket.

[4] See also Section 7, Special Constructions.

[5] White pocket is a form of decay (fomes pini) that attacks most conifers. "It has never been known to develop in woods in service," (J. S. Boyce, "Forest Pathology"). In plywood, the routine drying veneer at temperatures of 350° F. or more, effectively removes any possibility of the decay surviving. The degree and extent of white pocket permitted under this Standard in Paragraph 4.5.3.5 (describing D veneer), has been established through a two-year research project at the U.S. Forest Products Laboratory.

(b) 12 inch width of light white pocket.

(c) One knot or knotholes, 1½ inches to 2½ inches, or two knots or knotholes, 1 inch to 1½ inches; knots and knotholes less than 1 inch shall not be considered. Size of any knot or knothole shall be measured in greatest dimension. Any repair in white pocket area shall be treated for grading purposes as a knothole.

On Backs —

White pocket in any area larger than the size of the largest knot hole, pitch pocket or split, specifically admitted in this paragraph, shall not be permitted.

4.6 **Interior type plywood.** — This type of plywood has a high degree of moisture resistance and is suitable for constructions 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. Interior type plywood shall meet the test requirements set forth in Paragraphs 5.2 and 5.4.1. This type is available in the grades given in Table 1.

4.6.1 **Mold-Resistance.** — Interior Sheathing, Interior Underlayment, C-D Plugged, Int., and Concrete Form grades shall be made with an adhesive possessing a mold resistance equivalent to that created by adding 5 pounds of pentachlorophenol, or its sodium salt, per 100 pounds of dry glue base to plain protein glues.

4.6.2 **Resistance to Elevated Temperatures.** — Interior Sheathing, Int. Underlayment, C-D Plugged, and Concrete Form grade shall be made with an adhesive possessing resistance to temperatures up to 160° F. at least equal to that of plain protein glue. Urea resin glue shall not be used in these grades unless evidence is submitted indicating performance equivalent to plain protein glues.

4.6.3 **Thickness and Construction of C-D Interior Sheathing.** — C-D Interior sheathing, of any Group 1 wood, if so identified as of Group 1, shall be manufactured 1/32 inch thicker than the standard nominal thicknesses of 5/16 inch, ⅜ inch, ½ inch, ⅝ inch, and ¾ inch. In addition, all of these constructions, except 5/16 inch shall have ⅛ inch thick faces and backs.

However, panels of C-D Interior Sheathing of Group 1 woods may be manufactured in standard nominal thicknesses of 5/16 inch, ⅜ inch, ½ inch, ⅝ inch, and ¾ inch, in which case they shall be considered as of Group 2 woods and shall be so clearly marked.

4.7 **Exterior type plywood.** — 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 weather, and which is suitable for permanent exterior use. It shall be free from core gaps that impair the strength or serviceability of the panel. All patches and shims shall be set with adhesives meeting performance standards for Exterior plywood. All veneer used in Exterior type panels shall be of C grade, or better (see Par. 4.5.3). All Exterior panels shall be so designated by a distinctive symbol, "Ext.", branded or stamped on each panel. Plywood of this type shall meet the test requirements set forth in Pars. 5.3 and 5.4.2. This type is available in the grades given in Table 2.

4.7.1 All Group 1 Exterior C-C Sheathing shall be manufactured to same panel and veneer thickness requirements and be identified as per Par. 4.6.3.

4.8 **Overlay.** — Overlaid plywood is Western softwood plywood to which has been added resin-impregnated fiber faces on one or both sides. It is made in two standard types, "High-Density" and "Medium Density" with the type referring to the surfacing materials as hereinafter defined. In addition, there may be other surfacing materials having special characteristics which do not fit the exact description of High Density or Medium Density. These must meet the test requirements in Paragraph 5.3 and 5.4.2 and shall be identified as "special". The resin-impregnated faces are permanently fused to the base panel under heat and pressure. Although designed for either exterior or interior service, all overlaid plywood is made in the Exterior type. This refers to the adhesive bond between plies, between the overlay surface and the base panel, and to the durability of the surface itself.

4.8.1 **High Density type.** — The surfacing on the finished product shall be hard, smooth, and of such character that further finishing by paint or varnish is not required. It shall consist of a cellulose-fiber sheet or sheets, in which not less than 40 percent by weight of the laminate shall be a thermosetting resin of the phenol or melamine type. The resin-impregnated material shall be not less than 0.009 inch thick and shall weigh not less than 60 pounds per 1,000 sq. ft. of single face before pressing, including both resin and fiber. The resin impregnation shall be sufficient to attach the surfacing material to the plywood. This bond shall be equal in performance to the gluelines between the sheets of veneer which make up the plywood. The overlay face usually comes in natural translucent color, but certain other colors are available or may be used by manufacturers for identification.

4.8.2 **Medium Density type.** — The resin-impregnated facing on the finished product shall present a smooth, uniform surface suitable for high-quality paint finishes. It shall consist of a cellulose-fiber sheet in which not less than 20 percent by weight of the laminate shall be a thermosetting resin of the phenol or melamine type. The resin-impregnated material shall be not less than

Table 2. — Exterior Type Grades — Minimum Quality of Veneers

Exterior Grades	Face	Back	Inner Plies	Additional Limitations[1]
A-A, Ext.	A	A	C	Sanded 2 sides.
A-B, Ext.	A	B	C	Sanded 2 sides.
A-C, Ext.	A	C	C	Sanded 2 sides.
B-B, Ext. (Concrete Form, Ext.)	B	B	C	Sanded 2 sides. Edge-sealed and, unless otherwise specified, mill-oiled.
B-C, Ext.	B	C	C	Sanded 2 sides.
C-C (Plugged)[2], Ext.	C (Plugged)[2]	C	C	Sanded 2 sides. or touch-sanded[3]
C-C, Ext. (Sheathing, Ext.)[4]	C	C	C	Unsanded grade.

[1] See also Paragraphs 4.1 to 4.5 inclusive.
[2] See Section 11 for definition.
[3] Available touch-sanded when so specified (see Section 11 for definition).
[4] See Paragraph 4.7.1.

Table 3. — Overlaid Plywood — Minimum Quality of Veener

Grade	Face[1]	Back[1]	Inner Plies
A-A, Ext. — High Density Overlay	A	A	B
B-B. Ext. — High Density Overlay	B	B	B
B-B, Ext. — High Density Concrete Form Overlay	B	B	B
B-B, Ext. — Medium Density Overlay	B	B	C[2]

[1] For overlaid plywood, the grade designation for face or back refers to the veneer directly underlying the surface. These veneers may be of any of the Group 1, Group 2, or Group 3 species. All overlaid plywood is surfaced on two sides unless otherwise specified. When only one side is surfaced, the exposed back shall be C or better.
[2] Medium Density Overlay also available with B grade inner plies.

0.012 inch thick and shall weigh not less than 65 pounds per 1,000 sq. ft. of single face before pressing, including both resin and fiber. An integral phenolic resin glueline shall be applied to one surface of the facing material to bond it to the plywood. This bond shall be equal in performance to the gluelines between the sheets of veneer which make up the plywood. The overlay face shall be a solid color. Some evidence of the underlying grain may appear, but, compared to the nature of the "High Density" surface, there shall be no consistent show-through.

4.8.3 **Overlaid plywood.** — Table 3 gives the types of overlaid plywood that are available.

5. SAMPLING AND TESTING

5.1 **Sampling.** — Ten sample panels for testing shall be taken at random from those being sampled. These panels shall be selected to represent as many variations in grades and thicknesses as possible and shall also be selected from locations distributed as widely as is practicable throughout those being sampled. From each Exterior panel selected for testing, three pieces shall be cut at random and from each piece ten test specimens shall be cut. From each Interior panel selected, three test specimens 2 inches wide by 5 inches along the grain shall be cut from each end approximately at mid-width of the panel, and from each edge approximately at mid-length of the panel, while a fifth set of three test specimens shall be cut from somewhere near the middle or center of the panel. Overlaid plywood shipments shall be sampled in the same manner as Exterior plywood.

5.2 **Test for Interior type.** — The test specimens shall be submerged in water at room temperature for a period of 4 hours, and then dried at a temperature between 100° F. and 105° F. for a period of 19 hours with sufficient air circulation in drying cabinet to lower moisture content of specimens to a maximum of 8%, based on oven-dry weight. This test procedure shall be conducted through three cycles, unless all specimens have failed.

5.3 **Tests for Exterior type.** —

5.3.1 **Preparation of Exterior Test Specimens.** — Ten shear specimens from each piece, five for cold and five for boil test, shall be cut 3¼ inches long and one inch wide and kerfed one-third of the length of the specimen from each end, as illustrated in figure 1, so that a 1 inch square test area in the center results. Specimens shall be oriented so that the grain direction of the ply under test runs at a 90° angle to the length of the specimen. Kerfing shall extend two-thirds of the way through the ply under test, and shall not penetrate the next glueline.

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

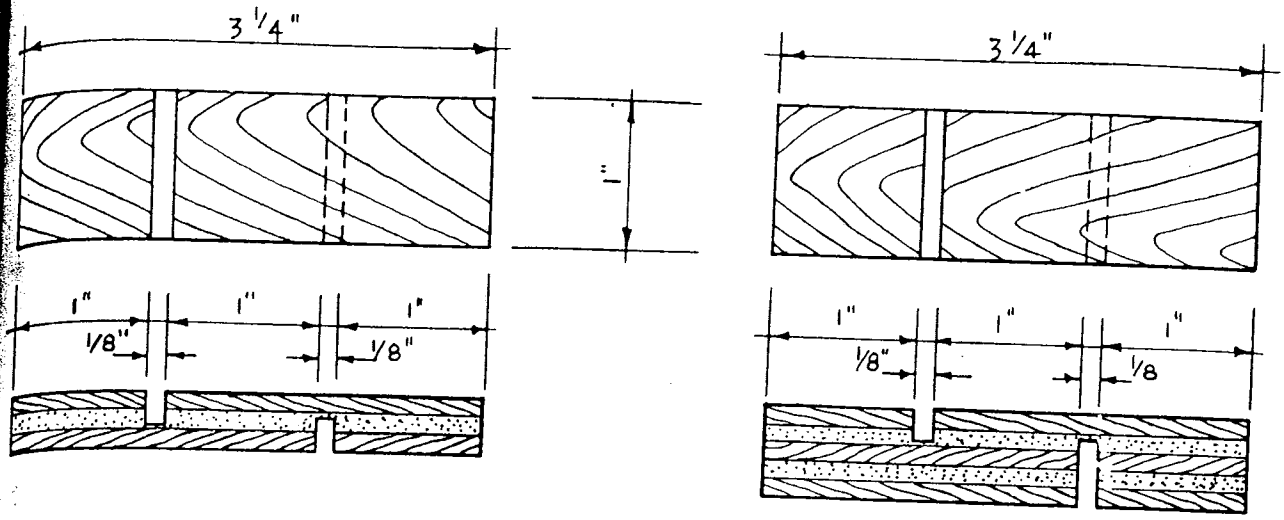


Figure 1. Shear Test Specimens

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

5.3.2 **Cold-Soaking test.** — 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. (±5° F.) with sufficient air circulation to lower moisture content of the specimens to a maximum of 8%, based on oven-dry weight, 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, by placing them in the jaws of the device, to which a load shall be applied until failure. The percentage of wood failure of the specimens shall be estimated with specimens in a dry condition.

Overlaid plywood shall be evaluated in an identical manner, but in addition to estimating wood failure at the plywood gluelines tested, specimens shall be examined for separation of the resin-impregnated face from the plywood.

5.3.3 **Boiling test.** — Shear specimens shall be taken as described in Paragraph 5.3.1, boiled in water for 4 hours, and then dried for 20 hours at a temperature of 145° F. (±5° F.) with sufficient air circulation to lower moisture content of the specimens to a maximum of 8%, based on oven-dry weight. The shear specimens shall be boiled again for a period of 4 hours, cooled in water, and tested while wet, as described in Paragraph 5.3.1. The percentage of wood failure of the specimens shall be estimated with specimens in a dry condition.

Overlaid plywood shall be subjected to the above cycles and evaluated as described in Paragraph 5.3.2.

5.3.4 **Fire test.** — A 5½ inch by 8 inch test specimen shall be taken from each of five selected panels and shall be placed on the stand as illustrated in Figure 2 and subjected to an 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 gluelines 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.

When testing overlaid plywood, blisters or bubbles in the surface caused by combustion shall not be considered delamination.

5.4 **Interpretation of test results.** —

5.4.1. **Interior type.** — Total continuous visible delamination of ¼ inch or more in depth and over 2 inches in length along the edges of a 2 inch by 5 inch test specimen shall be considered as failure. When delamination occurs by reason of a localized defect other than white pocket permitted within the grade, that test specimen shall be discarded. Ninety-five percent of all test specimens shall pass the first cycle, and eighty-five percent of all test specimens shall pass three cycles. If the test specimens fail to meet these requirements, an additional ten panels shall be selected and tested as described in Paragraphs 5.1 and 5.2. Then the test specimens from both groups of ten, considered together, shall meet the above test requirements, or all material represented by the samples is considered as failing to comply with this standard.

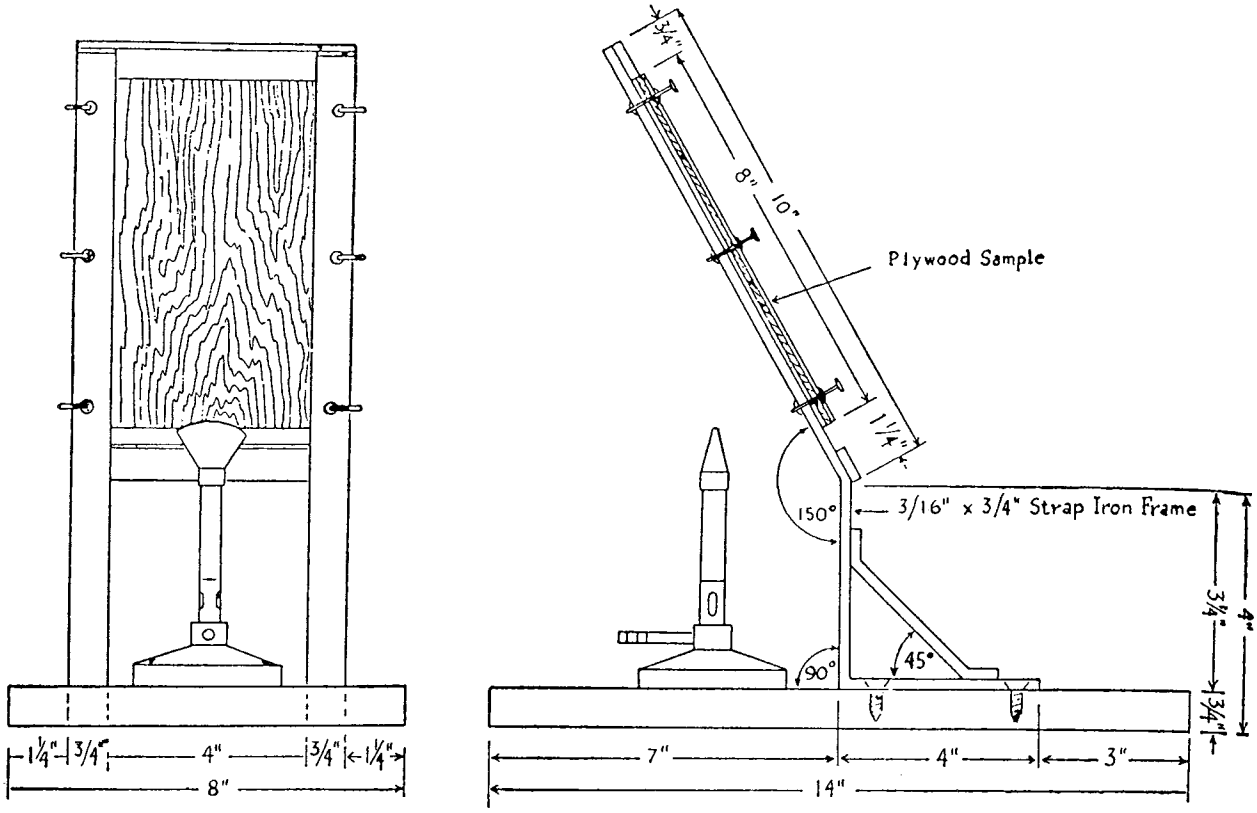


Figure 2. Apparatus for Fire Test

5.4.2 **Exterior type.** – Specimens cut through localized defects permitted in the grade shall be discarded. A piece shall be rated by the combined results of both the cold-soaking test and the boiling test – generally ten specimens in all. If the average wood failure of the ten specimens is below 60 percent, or if more than one of the specimens is below 30 percent, the piece fails. A test specimen showing any delamination shall be rated as 0 percent wood failure. If more than one piece fails, that panel fails. If one or none of the ten panels fails, all material represented is accepted; if more than two fail, all material represented is rejected. If two fail, another series of ten panels is tested. If one or none of the panels fails in this series, all material represented is accepted; otherwise, it is rejected. If the average wood failure of the first ten panels is less than 80 percent, a second series of ten is tested, regardless of the number of failures. If the average wood failure of the twenty panels combined is less than 80 percent, all material represented by the samples is considered as failing to comply with this Standard.

The same interpretation shall apply to overlaid plywood. In addition, separation of the resin-impregnated face from the plywood, in other than the fire test, shall be considered failure.

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

5.5 **Scarf Joint Tests.** –

5.5.1 **Strength.** – Three test specimens shall be cut at random along each scarf joint from panels selected as directed in 5.1. Type, grade, and species of the panels shall be recorded. The specimens shall be cut so as to include the joint and shall be prepared as illustrated in Figure 3.

Insofar as possible, the joint test area shall contain no localized natural defects permitted within the grade.

At the joint, the thickness and width of plies parallel with the load shall be recorded. Each specimen shall then be placed in the tension grips of a testing machine and loaded continuously at a rate of crosshead travel of 0.035 inches per minute until failure, and the ultimate load recorded. The ultimate stress in pounds per square inch shall be computed using the ultimate load and area of those plies whose grain is parallel with direction of load. Moisture content of specimens at time of testing shall not exceed 16%.

If the average ultimate stress of the three test specimens of any one panel is less than 3200 psi for panels of Group 1 or Group 2 species or 2400 psi for panels of Group 3 species, then that panel fails. If one or none of the ten panels fails, the jointed panels in the shipment are accepted. If more than two fail the jointed panels are rejected. If two fail, another series of ten panels is tested. If one or none of the panels in this series fails, the jointed panels are accepted; otherwise they are rejected.

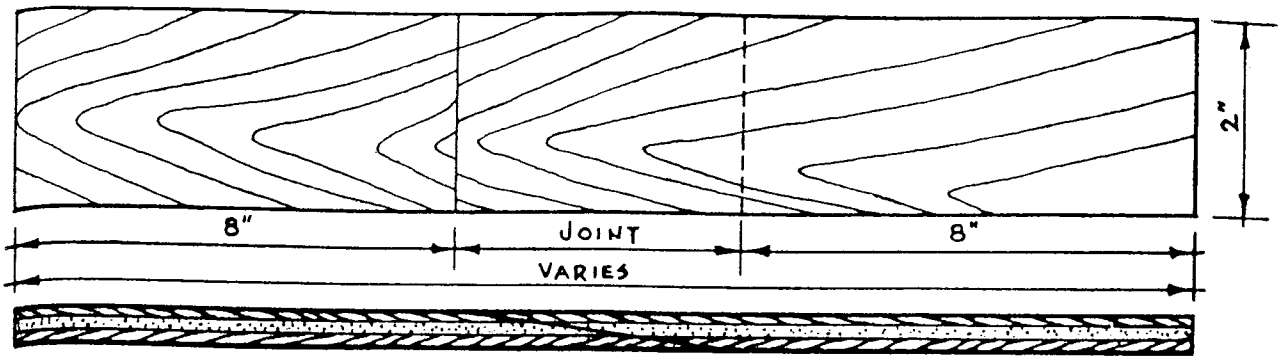


Figure 3. Tension Specimen

5.5.2 **Scarf joint durability of Interior type panels.** — Ten test specimens shall be cut at random along each scarf joint from panels selected as directed in 5.1. Specimens shall be prepared following the general procedure in 5.1, but in addition, shall be cut so that the scarf joint occurring on one surface of the panel runs across the middle of five specimens and the joint occurring on the opposite surface runs across the middle of the other five specimens.

The specimens shall be subjected to the same test procedure as outlined in 5.2.

Test specimens showing continuous delamination in excess of 1/16 inch deep and ½ inch long at the scarf glueline shall be considered as failing. More than one failing specimen in a panel shall constitute failure of that panel. If one or none of the panels fails, the jointed panels in the shipment are accepted. If more than two panels fail, the jointed panels are rejected. If two panels fail, an additional ten panels shall be selected and tested, all of which must pass or the jointed panels are rejected; otherwise, they are accepted.

5.5.3 **Scarf joint durability of Exterior type panels.** — Ten test specimens shall be cut at random along each scarf joint from panels selected as directed in 5.1. The specimens shall be prepared following the general procedure described in 5.3.1 but, in addition, shall be cut so that the scarf joint runs through the test specimen as shown in Figure 4.

Five specimens shall be subjected to the cold soaking test of 5.3.2, and five to the boiling test of 5.3.3.

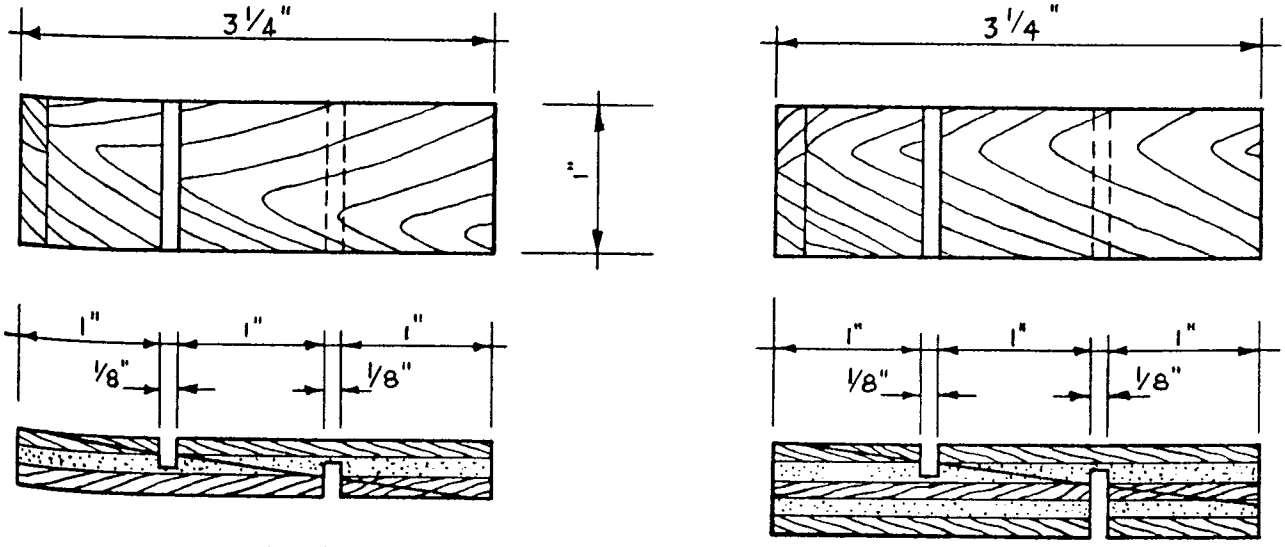
The panels shall be evaluated as described in 5.4.2.

6. STANDARD STOCK SIZES

6.1 Western softwood plywood is commonly made in the sizes listed in Tables 4, 5, and 6 but other sizes, including 4-, 14-, and 16-foot lengths may also be available from mills on order.

6.2 **Scarfed panels.** — Neither panels with N and A faces, nor the faces of such panels unless longer than 10 ft., shall be scarfed except when specifically so ordered, but other panels may be scarfed. Panels longer than 12 ft. are necessarily scarfed.

Scarfed joints shall not have a slope steeper than 1 to 8 but may be specified as less than 1 to 8. Scarfed panel joints shall be glued with a



(a) 3-ply specimen

(b) 5-ply specimen

Figure 4. Exterior Scarf Joint Durability Specimens

Table 4. — Standard Stock Western Softwood Plywood Sizes[1] — Interior Type

Grade	Width (in.)[2]	Length (in.)[2]	Thickness (in.)[3 4 5]				
N-N, Int.	48	96	1/4				3/4
N-A, Int.	48	96	1/4				3/4
N-D, Int.	48	96	1/4				
A-A, Int.	36	72	1/4				3/4
		96	1/4	3/8	1/2		3/4
A-A, Int.	48	72	1/4	3/8	1/2	5/8	3/4
		84	1/4	3/8	1/2	5/8	3/4
		96	1/4	3/8	1/2	5/8	3/4
	60[6]	108	1/4	3/8			3/4
		120	1/4	3/8	1/2	5/8	3/4
		144	1/4				3/4
A-B, Int.	36	96	1/4	3/8	1/2	5/8	3/4
A-B, Int.	48	72	1/4	3/8	1/2	5/8	3/4
		84	1/4	3/8	1/2	5/8	3/4
	60[6]	96	1/4	3/8	1/2	5/8	3/4
		108	1/4				3/4
		120	1/4	3/8	1/2	5/8	3/4
		144	1/4				3/4
A-D, Int.	30	60	...				3/4
		72					3/4
		84	1/4				3/4
		96	1/4				3/4
		120					3/4
A-D, Int.	36	60					3/4
		72	1/4	3/8	1/2	5/8	3/4
		84	1/4	3/8	1/2	5/8	3/4
		96	1/4	3/8	1/2	5/8	3/4
		120	1/4				3/4
A-D, Int.	48	60	1/4	3/8	1/2	5/8	3/4
	60[6]	72	1/4	3/8	1/2	5/8	3/4
		84	1/4	3/8	1/2	5/8	3/4
		96	1/4	3/8	1/2	5/8	3/4
		108	1/4	3/8	1/2	5/8	3/4
		120	1/4	3/8	1/2	5/8	3/4
		144	1/4	3/8	1/2	5/8	3/4
B-B, (Concrete Form, Int.)	48	96	.....	.....	.....	5/8	3/4
	60[6]						
B-B, Int.	48	60	1/4	3/8	1/2	5/8	3/4
	60[6]	72	1/4	3/8	1/2	5/8	3/4
		84	1/4	3/8	1/2	5/8	3/4
		96	1/4	3/8	1/2	5/8	3/4
		108	1/4	3/8	1/2	5/8	3/4
		120	1/4	3/8	1/2	5/8	3/4
		144	1/4	3/8	1/2	5/8	3/4
B-D, Int.	48	84	1/4	3/8	1/2	5/8	3/4
	60[6]	96					
Int. Underlayment	48	96	1/4	3/8	1/2	5/8	3/4
	60[6]		1/4	3/8	1/2	5/8	3/4
C-D (Plugged) Int.	48	96	1/4	3/8	1/2	5/8	3/4
	60[6]						
C-D, Int. (Sheathing, Int.) with Exterior Glue (See Section 7, Special Constructions)	48	96	5/16	3/8	1/2	5/8	3/4
	60[6]	120	5/16			5/8	...
C-D, Int. (Sheathing, Int.)	48	96	5/16	3/8	1/2	5/8	3/4
	60[6]	120	5/16			5/8	...

[1] Sizes most commonly available from distributors.

[2] A tolerance of 1/32 (0.0312) in. over or under the specified width and/or length shall be allowed, but all panels shall be square within 1/8 (0.125) in. All panels shall be sawn so that a straight line drawn from one corner to the adjacent corner shall fall within 1/16 in. of panel edge.

[3] A tolerance of 1/64 (0.0156) in. over or under the specified thickness shall be allowed on sanded panels, and a tolerance of 1/32 (0.0312) in. on unsanded panels.

See section 11 for definition of touch-sanding.

[4] Minimum number of plies required for standard construction:
- 3 plies for 1/4-, 5/16-, and 3/8-in.
- 5 plies for 1/2-, 5/8-, and 3/4-in.
- 7 plies for 7/8- to 1-3/16-in.

[5] Sanded two sides, except Underlayment, C-D (Plugged), C-D Sheathing-Exterior Glue, and C-D Sheathing.

[6] Available from a considerable number of mills, but not all.

NOTE: Any panel furnished in dimensions ordered conforming in all other respects to the various requirements of this standard shall be considered as conforming to this standard. However, panels manufactured to other than standard nominal thicknesses shall be clearly identified on each panel as to the manufactured thickness.

Table 5. — Standard Stock Western Softwood Plywood Sizes[1] — Exterior Type

Grade	Width[2] (in.)	Length[2] (in.)	Thickness (in.)[3] [4] [5]						
A-A, Ext.	48	60	1/4	3/8	1/2	5/8	3/4		
		84	1/4	3/8	1/2	5/8	3/4		
		96	1/4	3/8	1/2	5/8	3/4	7/8	1
		108	1/4	3/8	1/2	5/8	3/4		
		120	1/4	3/8	1/2	5/8	3/4		
		144	1/4	3/8	1/2	5/8	3/4		
A-B, Ext.	48	84	1/4	3/8			3/4		
		96	1/4	3/8	1/2	5/8	3/4		1
	60[6]	120	1/4	3/8	1/2	5/8	3/4		
		144	1/4	3/8	1/2		3/4		
A-C, Ext.	36	96	1/4	3/8	1/2	5/8	3/4		
A-C, Ext.	48	72	1/4	3/8	1/2	5/8	3/4		
		84	1/4	3/8	1/2	5/8	3/4		
		96	1/4	3/8	1/2	5/8	3/4		1
	60[6]	108	1/4	3/8	1/2	5/8	3/4		
		120	1/4	3/8	1/2	5/8	3/4		
		144	1/4	3/8	1/2	5/8	3/4		
B-B (Concrete Form) Ext.	48 60[6]	96				5/8	3/4		
B-C. Ext.	48 60[6]	96	1/4	3/8	1/2	5/8	3/4		
C-C (Plugged) Ext.	48 60[6]	96	1/4	3/8	1/2	5/8	3/4		
C-C (Sheathing) Ext.	48 60[6]	96	1/4	3/8	1/2	5/8	3/4		

[1] Sizes most commonly available from distributors.

[2] A tolerance of 1/32 (0.0312) in. over or under the specified width and/or length shall be allowed, but all panels shall be square within 1/8 (0.125) in. All panels shall be sawn so that a straight line drawn from one corner to the adjacent corner shall fall within 1/16 in. of panel edge.

[3] A tolerance of 1/64 (0.0156) in. over or under the specified thickness shall be allowed on sanded panels, and a tolerance of 1/32 (0.0312) in. on unsanded panels. See section 11 for definition of touch-sanding.

[4] Minimum number of plies required for standard construction:
- 3 plies for 1/4-, 5/16-, and 3/8-in.
- 5 plies for 1/2-, 5/8-, and 3/4-in.
- 7 plies for 7/8- to 1-3/16 in.

[5] Sanded 2 sides except C-C Plugged and C-C- Sheathing.

[6] Available from a considerable number of mills, but not all.

NOTE: Any panel furnished in dimensions ordered conforming in all other respects to the various requirements of the standard shall be considered as conforming to this standard. However, panels manufactured to other than standard nominal thicknesses shall be clearly identified on each panel as to the manufactured thickness.

Table 6. — Standard Stock Western Softwood Plywood Sizes[1] — Overlaid Plywood

Grade	Width[2] (in.)	Length[2] (in.)	Thickness (in.)[3]
A-A High Density, Ext.	48	96	5/16 (3-ply)[4] 3/8 (3-ply) 1/2 (5-ply) 9/16 (5-ply) 5/8 (5-ply) 3/4 (5-ply) 7/8 (7-ply) 1 (7-ply) 1 1/8 (7-ply)
B-B High Density, Ext.	48	96	Same as for grade A-A, above.
B-B High Density, Ext. (Concrete Form)	48	96	1/2 (5-ply) 9/16 (5-ply) 5/8 (5-ply) 3/4 (5-ply)
B-B Medium Density, Ext.	48	96	Same as for grade A-A, above.

[1] Sizes most commonly available from distributors.

[2] A tolerance of 1/32 (0.0312) inch over or under the specified width and/or length shall be allowed, but all overlaid panels shall be square within 1/8 (0.125) inch. All panels shall be sawn so that a straight line drawn from one corner to the adjacent corner shall fall within 1/16 inch of panel edge.

[3] A tolerance of 1/32 (0.0312) inch over or under the specified thickness shall be allowed on overlaid panels.

[4] Number of plies refers to veneers. Resin-impregnated surfaces are not included.

NOTE: Any panel furnished in dimensions ordered conforming in all other respects to the various requirements of this Standard shall be considered as conforming to this Standard. However, panels manufactured to other than standard nominal thicknesses shall be clearly identified on each panel as to the manufactured thickness.

waterproof adhesive and shall meet the test requirements for scarf joints set forth in paragraph 5.5.

7. SPECIAL CONSTRUCTIONS

C-D Interior (Exterior Glue)

A standard C-D Interior panel, except bonded with an adhesive identical to those for Exterior plywood and meeting the exterior performance requirements in Section 5.

Decorative Panels

Specialty panels with decorative face treatments in the form of striations, grooving, embossing, brushing, etc., which, except for the special face treatment, meet all of the requirements of this standard including veneer qualities, glueline performance, and workmanship, shall be considered as conforming to the Standard.

8. INSPECTION

8.1 All plywood designated as complying with this Commercial Standard shall be subject to inspection in the white only, except that concrete form material may have a priming coat of oil or other clear preparation before inspection.

Note: See Appendix for information on reinspection.

9. MARKING AND CERTIFICATION

9.1 In order to assure the purchaser that he is getting Western softwood plywood of the grade and quality specified, producers may include with each shipment a Certificate of Inspection which states that the plywood conforms with this Commercial Standard. Each panel so certified shall bear the stamp of any qualified inspection and testing agency which (1) either inspects the manufacture (with adequate sampling, testing of glueline, and examination for quality of all veneers), or which (2) has tested a randomized sampling of the finished panels in the shipment being certified for conformity with this Commercial Standard and which has examined each sample panel for quality of veneer in every ply; and which (3) provides species certification, where required. (See Paragraph 4.4). All plywood that is grade-trademarked or otherwise designated as being in conformity with this Commercial Standard shall be accompanied by such Certificates of Inspection and applicable trademarks or grademarks of such inspection and testing agency as outlined above.

9.1.1 A qualified inspection and testing agency is defined to be one that (1) has facilities and personnel to do the inspection and testing as above described, (2) which has no financial interest in any company manufacturing any portion of the product inspected and tested, and (3) which is not owned, operated, or controlled by any such company.

9.1.2 An agency providing species certification is defined to be one that:

(1) Maintains current records of the manufacturers' sources of logs and/or veneer.

(2) Where veneer is produced in Oregon or California, but the plant does not intentionally procure white fir logs, – regularly inspects log supply for assurance as to exclusion of white fir.

(3) Where a mill procures "silver fir" veneer from another plant located in Oregon or California, – certifies and clearly identifies the species of such veneer at the plant where it is peeled.

(4) Where manufacturer utilizes either white fir logs or uncertified veneer from sources in Oregon or California, – offers certification of "silver fir" species only when based on positive identification of individual logs prior to barking, and on an adequate system of tracing veneers during manufacture into plywood until final grade-trademarking.

(5) Retains the services of inspectors fully qualified to identify hemlock and various true fir species based on bark characteristics.

9.2 No reference shall be made to this Standard in the certification or trademarking or grademarking of panels not conforming to all provisions of the standard, except that where species of inner plies is other than as provided under Paragraph 4.4.1, conformance to the Standard may be indicated, providing the exception is clearly and legibly noted on trademarks or grademarks.

10. METHOD OF ORDERING

10.1 The regular method of specifying size and grade of Western softwood plywood is to name the species, the number of plies, width, length, grade, type, finished thickness, and whether sanded or unsanded.

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

10.3 If, for example, the requirement is 100 pieces of Sitka spruce plywood ¼ inch thick, 48 inches wide, and 96 lines long, are required for interior 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:

Sitka spruce plywood: 100 pcs., 3-ply, 48 in. by 96 in. Interior type, A-D Grade, sanded 2 sides to ¼ inch thickness.

10.4 For most uses, sanded panels are desirable, except for sheathing grades C-D and C-C, but there are occasional uses where unsanded panels, of an A-D or other grade, are satisfactory. Such panels should be specified unsanded.

10.5 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 silver fir[6] Exterior type, A-A Grade panel of 3/8 inch thickness, the order should read:

Silver fir[6] plywood: 100 pcs., 3-ply, 48 in. by 96 in., Exterior type, A-A Grade, sanded 2 sides to 3/8 in. thickness. (Add further special requirements.)

10.6 When ordering overlaid plywood, "High Density Overlay," "Medium Density Overlay," or "Overlaid Plywood Concrete Form" should be specified. The number of pieces, size, and thickness are noted in the same way as for other kinds of plywood. Special requirements, such as "High Density A-A, Medium Density B Inner Plies, surfaced 1 side only," or special weights of surfacing material, should be stated after the standard specification.

11. NOMENCLATURE AND DEFINITIONS

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

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

Centers. — Inner plies running parallel to the panel face.

Check. — A partial separation of veneer fibers, usually small and shallow, running parallel to the grain of the wood, and caused chiefly by strains produced in seasoning.

Core Gaps. — Rectangular or square openings, extending through or partially through a panel which occur where the adjacent inner ply veneers have separated at an edge joint.

Cores. — Inner plies running perpendicular to the panel face.

Crossbanding. — Same as core.

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

Douglas fir, Interior North. — Douglas fir grown in Washington east of the Columbia and Okanogan Rivers, in Oregon east of the 120th meridian, and in the states of Idaho, Montana and Wyoming.

Douglas fir, Interior South. — Douglas fir grown in the states of Nevada, Utah, Colorado and New Mexico.

Edge Splits. — Wedge-shaped openings in the inner plies caused by splitting of the veneer during handling or pressing.

Exterior Type. — 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 paragraphs 4.5 and 4.7). 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 a 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 Type. — Refers to the type of plywood intended for inside uses and for construction applications where subjected to occasional wetting or deposits of moisture. (See paragraphs 4.5 and 4.6). There are several grades within this type.

Knot. — 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 are so misplaced that one piece overlaps the other rather than making a smooth butt joint.

Patches. — Insertions of sound wood in veneers or panels for replacing defects. Boat patches shall be oval-shaped but sides shall taper each direction to a point or to a small rounded end; in A faces the rounded ends shall have a radius not exceeding 1/8 inch. Router patches shall have parallel sides and rounded ends. Sled patches shall be rectangular with feathered ends.

Pitch Pocket. — A well-defined opening between rings of annual growth, usually containing, or which has contained pitch, either solid or liquid.

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

Plugged. — Relates to a face in Int. Underlayment, C-D Plugged and C-C Plugged grades. Such faces may contain knotholes, worm and borer holes, and other open defects not larger than 1/4 inch by 1/2 inch, sound and tight knots up to 1 1/2 inches in greatest dimensions, splits up to 1/8 inch wide, ruptured and torn grain, pitch pockets if solid and tight, plugs, patches, and shims.

Plugs. — Sound wood of various shapes including, among others, circular, dog-bone and leaf shapes, for replacing defective portions. Plugs usually are held in veneer by friction only until veneers are bonded into plywood; also synthetic plugs of fiber and resin aggregate used to fill openings and provide a smooth, level, durable surface.

Repair. — Any patch, plug or shim.

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

[6] See Paragraph 4.4.

Shim. — A long, narrow repair not more than 3/16 inch wide.

Shop-Cutting Panel. — Panels which have been rejected as not conforming to the grade requirements of standard grades covered in this Commercial Standard. Identification of these panels shall include the notation, "For remanufacture only." Blistered panels are not considered as being within the category covered by this stamp.

Solid Core. — Inner ply construction of solid B-Veneer pieces. No special limitation on core gaps is implied.

Split. — Complete separation of veneer fibers parallel to grain, caused chiefly by manufacturing process or handling.

Streaks. — See Pitch streak.

Struct. Int. —

> The FHA Minimum Property Standards FHA No. 300, Nov. 1, 1958, and revisions require for many construction applications that panels be identified as Exterior or Structural-Interior. Both must conform to all provisions of the appropriate Commercial Standard, and Structural-Interior must meet the following requirements:
> Glue shall have resistance to temperature up to 160° F. at least equal to that of plain protein glue. Urea resin glues shall not be used in this type unless evidence is submitted indicating performance equivalent to that of plain protein glue.
> Glue shall have resistance to mold at least equal to that of plain protein glue to which 5 lbs. of pentachlorophenol have been added per 100 lbs. of dry glue base.

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

Touch-Sanding. — A sizing operation consisting of a light sanding in a standard sander. Sander skips are admissible. Where rough panels are specified to be "touch-sanded," the thickness tolerance of each piece shall be plus or minus 1/32 inch (0.0312) of the nominal thickness specified.

Veneer. — Thin sheets of wood.

White Pocket. —

Light white pocket. — Advanced beyond incipient or stain stage to point where pockets are present and plainly visible, mostly small and filled with white cellulose; generally distributed with no heavy concentrations; pockets for the most part separate and distinct; few to no holes through the veneer.

Heavy white pocket. — May contain a great number of pockets, in dense concentrations, running together and at times appearing continuous; holes may extend through the veneer but wood between pockets appears firm. At any cross section extending across the width of the affected area, sufficient wood fiber shall be present to develop not less than 40 percent of the strength of clear veneer. Brown cubicle and similar forms of decay which have caused the wood to crumble are prohibited.

60/60, 65/65, 93/93, etc. — Such optional symbols may be used by manufacturers of overlaid plywood to indicate the weight of the overlay in pounds per 1,000 sq. ft. on each side of the panel. The weight of the overlay includes resin and carrier sheet (or sheet) together, before pressing.

APPENDIX

The following material based on industry practices, is offered for the information of purchasers of Western softwood plywood:

All complaints regarding the quality of any shipment must be made within 15 days from receipt thereof.

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.

The buyer need not accept those panels established as below grade, but shall accept the balance of the shipment as invoiced.

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

HISTORY OF PROJECT

First edition.—On March 17, 1944, the Douglas Fir Plywood Association requested the cooperation of the National Bureau of Standards in the establishment of a Commercial Standard for western hemlock plywood. A draft of the proposed standard was submitted to producers, interested testing laboratories, and distributor and user organizations for their review and comment. After the requirements had been harmonized and adjusted so that the draft represented the composite views of all interested groups, the recommended standard was circulated to the trade for acceptance. Upon receipt of official acceptances estimated to represent a satisfactory majority of the production volume, and in the absence of active valid opposition, the standard was promulgated as Commercial Standard CS122-45, effective for new production from March 5, 1945.

First revision.—On April 6, 1949, the Douglas Fir Plywood Association submitted a proposed revision in which the major changes were the inclusion of plywood made from cedar (Alaska, Port Orford, and western red), California redwood, western (Idaho) white pine, Sitka spruce, western larch, western hemlock, noble fir, and the commercial white firs; the addition of eight Exterior type grades; and changing the "moisture-resistant" type to Interior type. These changes were approved by the standing committee, and the recommended revision was circulated on August 11, 1949 to the trade for consideration. An announcement was issued on November 21, 1949, that the standard as revised had been approved for promulgation as CS122-49, effective from December 20, 1949.

Second revision.—On July 22, 1955, the Douglas Fir Plywood Association submitted a proposed revision of CS122-49 which included the following principal changes: (1) Grouping of western hemlock, noble fir, and white fir in a category to be known as "white fir" because of the similarity of the veneer from these three species and the physical impossibility of distinguishing one from the other in production; (2) deletion of Idaho white pine;[7] (3) inclusion of definitions for short core, core void, and core gap; and (4) revision of requirements to bring CS122 more closely in line with requirements of Commercial Standard CS45-55.

The proposed revision was approved by a majority of the standing committee, and the recommended revision was circulated on April 30, 1956, to the trade for acceptance. Upon receipt of acceptances representing a satisfactory majority of the production volume, and a sufficient cross section of the industry to insure successful application of the standard, the completion of the revision was announced on June 20, 1956. Identified as CS122-56, the revised standard was made effective from July 20, 1956.

Third revision.—The preliminary draft of a proposed revision of CS122-56 was prepared by the Douglas Fir Plywood Association and circulated to all segments of the industry in February 1960. On April 7, 1960 an adjusted draft was submitted to the Division, for consideration by the standing committee. Following adjustment of the proposal to reflect the Committee views, the Recommended Revision was circulated to the industry for consideration and acceptance on November 14, 1960.

Acceptances received were considered to be sufficiently representative to insure successful application of the revision and on December 15, 1960 an announcement was issued establishing the revised standard as Commercial Standard CS122-60, effective from December 31, 1960.

The principal changes involve (1) species identification; (2) regrouping of species; and (3) inclusion of specified hardwood veneers and scarfed panels as well as more rigid test requirements.

Project Manager: H. A. Bonnet, Commodity Standards Division, Office of Technical Services.

STANDING COMMITTEE

The function of the Standing Committee is to review, prior to circulation for acceptance, changes proposed to keep the standard abreast of progress. Comments concerning the standard and suggestions for revision may be addressed to the Commodity Standards Division, Office of Technical Services, U. S. Department of Commerce, which acts as secretary for the committee, or to any of its members listed below:

H. W. McClary, Simpson Logging Co., Shelton, Wash. (Chairman)
A. E. Anderson, Cascades Plywood Corp., Public Service Bldg., Portland, Oreg.
Thomas Birchfield, Southern Sash & Door Jobbers Association, 3340 Poplar Ave., Memphis 11, Tenn.
W. T. McHugh, Assistant to the President, Pittsburgh Testing Laboratory, Stevenson and Locusts Sts., Pittsburgh 19, Pa.
John Martinson, Puget Sound Plywood, Inc., Tacoma, Wash.
M. S. Munson, Secretary, National Plywood Distributors Association, 1220 South West Morrison St., Portland 5, Oreg.
L. A. Patronsky, Manager, Timber Engineering Co., Western Division, 143 South Second St., P. O. Box 826, Corvallis, Oreg.
N. S. Perkins, Special Assistant to the Vice President, Douglas Fir Plywood Association, 1119 A St., Tacoma 2, Wash.

[7] Idaho white pine is covered in Commercial Standard CS157-56.

J. A. Reidelbach, Technical Director, Home Manufacturers Association, 910 17th Street, N. W., Washington, D. C.

Louis G. Riecke, Tulane Hardwood Lumber Co., Inc., 4200 Tulane Ave., New Orleans 19, La. (Representing National Plywood Distributors Association).

William A. Russell, Structural Engineer, Federal Housing Administration, 811 Vermont Ave., N. W., Lafayette Bldg., Washington 25, D. C. (Non-voting observer).

Milton W. Smithman, Assistant Director, Construction Department, National Association of Home Builders, 1625 L St., N. W., Washington 6, D. C.

WITHDRAWN

CS122-60

ACCEPTANCE OF COMMERCIAL STANDARD
WESTERN SOFTWOOD PLYWOOD

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
Office of Technical Services
Business and Defense Services Administration
U. S. Department of Commerce
Washington 25, D. C.

Gentlemen:

We believe that this Commercial Standard 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 this commodity.

We reserve the right to depart from the standard 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 _____

(Cut on this line)

[1] Underscore the applicable words. 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 interest, 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 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 nationwide 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 of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

The manufacturers, distributors, users and others listed below have individually indicated in writing their acceptance of this Commercial Standard prior to its publication. The acceptances indicate an intention to utilize the standard as far as practicable but reserve the right to depart from it as may be deemed desirable. The list is published to show the extent of recorded public support for the standard, and should not be construed as indicating that all products made by the acceptors actually comply with its requirements.

Products that meet all requirements of the standard may be identified as such by a certificate, grade mark or label. Purchasers are encouraged to require such specific evidence of compliance, which may be given by the manufacturer whether or not he is an acceptor.

ASSOCIATIONS
(General Support)

Carolina Lumber & Building Supply Association, Charlotte, N. C.
Douglas Fir Plywood Association, Tacoma, Wash.
Home Manufacturers Association, Washington, D. C.
Michigan Association of the Traveling Lumber and Sash and Door Salesmen, The, Detroit, Mich.
National Plywood Distributors Association, Portland, Oreg.
National Woodwork Manufacturers Association, Chicago, Ill.
Southern California Retail Lumber Association, Los Angeles, Calif.
Southern Sash and Door Jobbers Association, Memphis, Tenn.
The Associated General Contractors of America, Inc., Washington, D. C.

FIRMS AND OTHER INTERESTS

Aberdeen Plywood and Veneers, Inc., Aberdeen, Wash.
Addison-Rudesal, Inc., Atlanta, Ga.
Allen Millwork Mfg., Corp., Shreveport, La.
American Specification Institute, Chicago, Ill.
Anacortes Veneer, Inc., Anacortes, Wash.
Andrews, C. E., Lumber Co., New Bethlehem, Pa.
Balfour, Guthrie & Co., Limited, Tacoma, Wash. (General Support)
Baxter, C. B., & Company, Kansas City, Mo.
Becker Builders Supply Co., The, Wilmington, N. C.
Bingen Veneer & Plywood Co., Bingen, Wash.
Binswanger Glass Co., Richmond, Va.
Bohemia Lumber Co., Inc., Culp Creek, Oreg.
Boise Cascade Corp., Valsetz Division, Portland, Oreg.
Brookings Plywood Corp., Brookings, Oreg.
Bruett, T. A., Lumber Inc., Milwaukee, Wisc.
Buell and Company, Dallas, Tex.
Buffelen Woodworking, Tacoma, Wash.
Building Supplies Co., Division of R. F. Trant Distributing Corp., Norfolk, Va.
California Panel & Veneer Co., Los Angeles, Calif.
Camlet, J. Thomas, Architect & Engineer, Garfield, N. J.
C&C Plywood Corporation, Kalispell, Mont.
Cascades Plywood Corp., Portland, Oreg.
Central of Georgia Railway Co., Savannah, Ga.
Central States Plywoods, Inc., Chigago, Ill.
Centralia Plywood Inc., Centralia, Wash.
Cloverdale Plywood Co., Cloverdale, Calif.
Cole Manufacturing Co., Knoxville, Tenn.
Columbia Plywood Co., Seattle, Wash.
Combs Lumber Co., Inc., Lexington, Ky.
Conrad & Cummings, Associated Architects, Binghamton, N. Y.
Coos Head Timber Co., Coos Bay, Oreg.
Davidson Sash & Door Co., Inc., Lake Charles, La.
Davidson Sash & Door Co., Austin, Tex.
Detroit Edison Co., The, Detroit, Mich.
Diamond Lumber Co., Portland, Oreg.
Dickerson Lumber Co., Huntington, W. Va.
District of Columbia, Government of, Dept. of General Administration, Procurement Office, Washington, D. C. (General Support)
Donlin Co., The, St. Cloud, Minn.
Dwight Hinckley Lumber Co., The, Cincinnati, Ohio
Dwyer Lumber & Plywood Co., Portland, Oreg.
Edward Hines Lumber Co., Chicago, Ill.
Elliott Bay Mill Co., Seattle, Wash.
Elma Plywood Corp., Elma, Wash.
Eugene Plywood Co., Eugene, Oreg.
Evans Products Co., Coos Bay, Oreg.
Finley Lumber Co., Norristown, Pa.
Fir-Ply, Inc., Medford, Oreg.
Flannagan, Eric G. and Sons, Architects and Engineers, Henderson, N. C.
Flint Sash and Door Co., Inc., Flint, Mich.
Fort Vancouver Plywood Co., Vancouver, Wash.
Frontier Wholesale Co., Inc., Lubbock, Tex.
Frost Hardwood Lumber Co., San Diego, Calif.
Fuller Goodman Co., Oshkosh, Wis.
General Millwork Corp., Utica, N. Y.
Georgia-Pacific Corp., Portland, Oreg.
Giustina Veneer Co., Eugene, Oreg.
Glenwood Lumber Co., The, Bridgeport, Conn.
Grants Pass Plywood Inc., Grants Pass, Oreg.
Groffmann, Louis C., St. Louis, Mo.
Gulf States Plywood Co., New Orleans, La.
Harbor Sales Co., Inc., The, Baltimore, Md.
Hardel Mutual Plywood Corp., Olympia, Wash.
Hardwood Lumber Co., Inc., Rochester, N. Y.
Hardwood Plywood Institute, Arlington, Va. (General Support)
Henrich Plywood Corp., Buffalo, N. Y.
Hirzel, Charles K., A.I.A. New York, N. Y. (General Support)
Houston Sash & Door Co., Houston, Tex.
Hub City Plywood Corp., Albany, Oreg.
Hult Plywood Co., Junction City, Oreg.
Huttig Sash & Door Co., Jacksonville, Fla.
Huttig Sash & Door Co., Atlanta, Ga.
Huttig Sash & Door Co., Louisville, Ky.
Huttig Sash & Door Co., Inc., Knoxville, Tenn.
Huttig Sash & Door Co., Nashville, Tenn.
International Paper Co., Long-Bell Division, Longview, Wash.
Interstate Container Corp., Red Bluff, Calif.
Interstate Sash & Door Co., The, Canton, Ohio
Jackson Sash & Door Co., Inc., Jackson, Miss.
Jefferson Plywood Co., Madras, Oreg.
Jenkins Wholesale Supply Co., Inc., North Wilkesboro, N. C.
Jones Veneer & Plywood Co., Eugene, Oreg.
Klamath Hardwoods, Inc., Klamath Falls, Oreg.

Krauss Bros. Lumber Corp., Tampa, Fla.

Lacey Plywood Co., Inc., Lacey, Wash.
Lane Plywood, Inc., Eugene, Oreg.
Lewis Lumber Co., Birmingham, Ala.
Linnton Plywood Association, Portland, Oreg.
Lord & Bushnell Lumber Co., Chicago, Ill.
Lumbermen's Supply Co., Inc., Monroe, La.
Lund Plywood & Manufacturing Co., Crescent City, Calif.

Madison Millwork, Inc., Jackson, Tenn.
Mann & Co., Architects & Engineers, Hutchinson, Kans.
Martin Bros. Container & Timber Products Corp., The, Oakland, Oreg.
Maynard Sash & Door Co., Amarillo, Tex.
McPhillips Manufacturing Co., Inc., Mobile, Ala.
Memphis Sash & Door Co., Memphis, Tenn.
Menasha Plywood – Division of Menasha Wooden Ware Corp., North Bend, Oreg.
Menasha Sales Corp., North Bend, Oreg.
Miller, Vrydagh & Miller, Architects, Terre Haute, Ind.
Moore & Co., Dallas, Tex.
Mt. Baker Plywood Inc., Bellingham, Wash.
Multnomah Plywood Corp., Portland, Oreg.
M W Distributors, Rocky Mount, Va.

National Plywood Inc., Roseburg, Oreg.
National Plywoods Inc., Chicago, Ill.
National Woodworks Inc., Birmingham, Ala.
Neal-Blun Co., Savannah, Ga.
Neiman-Reed Lumber Co., Inc., Van Nuys, Calif.
New Orleans Sash & Door Co., Inc., New Orleans, La.
Niagara Plywood Co., Inc., Buffalo, N. Y.
Nordic Plywood, Inc., Sutherlin, Oreg.
Northern Plywood & Door Co., Minneapolis, Minn.
Northwest Door Co., Division of St. Regis Paper Co., Tacoma, Wash.

Oklahoma Sash & Door Co., The, Oklahoma City, Okla.
Oregon-Washington Plywood Co., Garibaldi, Oreg.

Pacific Coast Co., The, Plywood Division, Sonoma, Calif.
Pacific Lumber Co., The, San Francisco, Calif. (General Support)
Pacific Plywood Co., Dillard, Oreg.
Pacqua Division of Pacific Plywood Co., Dillard, Oreg.
Patterson-Buck Hardwood Co., Dearborn, Mich.
Payette Plywood Corp., Payette, Idaho.
Pehrson, G. A., & Associates, Spokane, Wash.
Peninsula Plywood Corp., Port Angeles, Wash.
Pickering Lumber Corp., Standard, Calif.
Portsmouth Lumber Corp., Portsmouth, Va.
Puget Sound Plywood, Inc., Tacoma, Wash.

Rinn-Scott Lumber Co., Chicago, Ill.
Ritchie, James H., & Associates, Boston, Mass.
Roseburg Lumber Co., Roseburg, Oreg.

Sash Door & Glass Corp., Richmond, Va.
Scott Sash & Door Co., Inc., Little Rock, Ark.
Sears, Roebuck and Co., Chicago, Ill.
Simpson Timber Co., Shelton, Wash.
Snellstrom Lumber Co., Eugene, Oreg.
Southwestern Sash & Door Co., Joplin, Mo.
Standard Lumber Co., Pine Bluff, Ark.
Standard Lumber Co., Spokane, Wash.
Steele & Hibbard Lumber Co., St. Louis, Mo.
Stevenson Co-Ply, Inc., Stevenson, Wash.
Stiles Lumber & Veneer Co., Inc., Grand Rapids, Mich.
Sunset Plywood Co., Inc., Los Angeles, Calif.
Swan Lake Moulding Co., Klamath Falls, Oreg.
Sweetwater Sash & Door Co., Sweetwater, Tex.

Teachout Sash, Door & Glass Co. of Michigan, The, Detroit, Mich.
Thorne, Henry Calder, Ithaca, N. Y.
Three Rivers Plywood & Timber Co., Darrington, Wash.
Tillamook Veneer Co., Tillamook, Oreg.
Timber Products Co., Orlando, Fla.
Timberline, Inc., Kansas City, Mo.
Toombs and Co., Springfield, Mo.
Trexler Lumber Co., Allentown, Pa.
Tri-State Plywood Co., Santa Clara, Calif.
Tulane Hardwood Lumber Co., Inc., New Orleans, La.

United States Plywood Corp., New York, N. Y.
United States Testing Co., Inc., Hoboken, N. J.

Vaughan, George C., & Sons, San Antonio, Tex.
Victoria Sash & Door Co., Inc., Shreveport, La.

Washington Woodworking Co., Inc., Washington, D. C.
Welch, Carroll E., Registered Architect, Huntington, N. Y.
Welch Sash & Door Co., Port Huron, Mich.
West Coast Plywood Co., Aberdeen, Wash.
Western States Plywood Cooperative, Port Orford, Oreg.
Weyerhaeuser Co., Lumber & Plywood Division, Tacoma, Wash.
Wichita Building Material Co., Inc., Wichita, Kans.
Wimberly & Thomas Hardware Co., Inc., Birmingham, Ala.
Winton Lumber Co., Martell, Calif.
Woodward Lumber Co., Seattle, Wash.

Yamhill Plywood Co., McMinnville, Oreg.

Zuber Lumber Co., Atlanta, Ga.

U. S. GOVERNMENT

Atomic Energy Commission, Property & Supply Management Branch, Division of Construction & Supply, Washington, D. C.

Department of Interior, Office of the Secretary, Division of Property Management, Washington, D. C.

Headquarters, Dept. of the Army, Office of the Chief of Engineers, Washington, D. C. (General Support)

Post Office Department, Bureau of Facilities, Washington, D. C.

Veterans Administration, Washington, D. C

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