COMMERCIAL STANDARD **CS259-63**

(As amended thru February 1, 1966.)

SOUTHERN PINE PLYWOOD

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, D.C., 20402 - Price 15 cents

U.S. DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS

Office of Product Standards

With the Cooperation of the Forest Products Laboratory
Forest Service, U.S. Department of Agriculture

EFFECTIVE DATE

Having been passed through the regular procedures of the Office of Product Standards (formerly the Commodity Standards Division, Office of Technical Services; transferred to the National Bureau of Standards July 1, 1963), and approved by the acceptors hereinafter listed, this Commercial Standard is issued by the U.S. Department of Commerce, effective as amended February 1, 1966.

JOHN T. CONNOR, *Secretary.*

COMMERCIAL STANDARDS

Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Office of Product Standards of 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 enforceable 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 Office of Product Standards the necessary data to be used as the basis for developing a standard of practice. The Office 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 Office 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 Office of Product Standards 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 practice; and to establish simplified methods of performing specific tasks.

The initial printing of this Commercial Standard was made possible through the cooperation of the American Plywood Association.

Southern Pine Plywood

Effective November 15, 1963

Including October 21, 1963, June 15, 1964, and February 1, 1966 Amendments

1. PURPOSE

1.1 The purpose of this Commercial Standard is to establish nationally recognized standards for the principal grades and sizes of Southern pine plywood. Because of the extended application of southern pine 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 in 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 for 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, certification, nomenclature, and definitions.

3. DEFINITIONS

3.1 Southern pine 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. Only Southern pine veneers shall be used for face and back of the plywood panel. Southern pine is defined for the purpose of this Standard as slash (Pinus elliottii), longleaf (P. palustris), shortleaf (P. echinata), and loblolly (P. taeda) pines.

4. REQUIREMENTS

4.1 **Workmanship.**—Unless otherwise specified, plywood shall be sanded on two sides to meet requirements of veneer as set forth in paragraph 4.4.4. 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 the bark or tight surface out. Plies directly under the surface 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 $\frac{1}{8}$ 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. 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 $\frac{3}{4}$ inch. Every effort shall be made to produce closely butted core joints.

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

4.3 **Bonding.**—The entire area of each contacting surface of the plywood shall be coated with adhesive material to meet applicable tests for each use classification. No tape shall be used in any glueline.

4.4 **Kinds of plywood.**—Southern pine plywood is made in two types, Interior (Int.) and Exterior (Ext.), with the type referring to the durability of the adhesive bond between the plies. Within each type there are several standard grades, which are classified according to the quality of the veneers in the panel. The grade descriptions as set forth herein give the minimum requirements, and, therefore, the majority of panels in any shipment will exceed the specification given.

4.4.1 **Moisture Content.**—The moisture content of panels at time of shipment from the mill shall not exceed by more than 18 percent the dry weight as determined by oven-dry test.

4.4.2 **Veneers.**—Except as noted below, veneers shall be $\frac{1}{10}$ inch or thicker in panels $\frac{3}{8}$ inch rough thickness or over, $\frac{1}{12}$ inch or thicker in panels of lesser thickness. Veneers $\frac{1}{16}$ inch or thicker may be used in 5-ply panels. Veneers $\frac{1}{12}$ inch or thicker may be used as core in 5-ply, $\frac{1}{2}$-inch panels. In no case, however, shall veneer be thicker than $\frac{1}{4}$ inch. The average veneer thickness shall conform to the limitations given in this Standard within a tolerance of 5 percent 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, except that 1/2 inch C–D interior sheathing and C–D (plugged) grades may have a minimum of 3 plies.

4.4.2.1 **Scarfed veneers.**[1]—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 percent. Veneer scarfed joints shall be glued with a waterproof adhesive (see 4.6).

4.4.3 **Ring count.**—A minimum of six annual rings per inch or a minimum of four annual rings per inch if averaging one-half or more summerwood, as measured in block at time of peeling, shall be required for both faces of all grades.

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

4.4.4.1 **Grade N veneer (intended for natural finish).**

General:

Shall be—smoothly cut, free from knots, knotholes, pitch pockets, open splits, other open defects, and stain; of not more than 2 pieces; and 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 inch wide.

(b) Small splits or openings up to 1/16 inch wide if not exceeding 2 inches in length.

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

Growth characteristics:

Permits—pitch streaks averaging not more than 3/8 inch in width and blending with color of wood; and sapwood.

Repairs:

Shall be—neatly made and parallel to grain; limited to a total of six in number in any 4- by 8-foot face, with proportionate limits for other sizes; and well matched for color and grain.

Permits—patches limited to three "router" patches not exceeding 3/4 inch in width, and 3 1/2 inches in length; no overlapping; and shims not exceeding 12 inches in length.

4.4.4.2 **Grade A veneer (suitable for painting).**

General:

Shall be—firm smoothly cut and free from knots, pitch pockets, open splits and other open defects; and well joined when of more than one piece.

Permits—suitable plastic fillers to fill:

(a) Small cracks or checks not more than 1/32 inch wide.

(b) Small splits or openings up to 1/16 inch wide if not exceeding 2 inches in length.

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

Growth characteristics:

Permits—pitch streaks averaging not more than 3/8 inch in width, blending with color of wood; sapwood; and discolorations.

Repairs:

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

Permits—patches:

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

(b) Not exceeding 2 1/4 inches in width singly.

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

—shims, except as mutiple repairs.

4.4.4.3 **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 percent of panel area; and suitable plastic fillers to fill:

(a) Small splits or openings up to 1/16 inch wide if not exceeding 2 inches in length.

(b) Small chipped areas or openings not more than 1/8 inch wide by 1/4 inch long.

Growth characteristics:

Permits—knots up to 1 inch measured across the grain if both sound and tight; pitch streaks averaging not more than 1 inch in width; and discolorations.

Open defects:

Permits—splits not wider than 1/32 inch; vertical holes not exceeding 1/16 inch in diameter if not exceeding an average of 1 per square foot in number; and horizontal or surface tunnels limited to 1/16 inch across, 1 inch in length,

[1] See par. 6.2 for Scarfed Panels.

and to 12 in number in a 4- by 8-foot panel, or proportionately in panels of other dimensions.

Repairs:

Shall be—neatly made.

Permits—patches ("boat," "router," and "sled") not exceeding 3 inches in width individually where occurring in multiple repairs or 4 inches in width where occurring singly; plugs (circular, "dog bone" and leaf shaped) not exceeding 3 inches in width individually where occurring in multiple repairs or 4 inches in width where occurring singly; shims; and synthetic plugs which present solid, level, hard surface not exceeding above dimensions.

4.4.4.4 **Grade C veneer:**

General:

Permits—sanding defects that will not impair the strength or serviceability of the panel; and one edge to be narrow or to be short on one end only; but by not more than 1/8 inch for 1/2 panel length or width. This is permitted on C grade backs and is also permitted on C grade faces when used as face of C–D interior sheathing grade panels, providing that opposing back is not narrow or short at same location in the panel.

Growth characteristics:

Permits—knots, if tight and not more than 1½ inches measured across the grain.

Open defects:

Permits—knotholes not larger than 1 inch across grain; open pitch pockets not wider than 1 inch; splits not wider than 3/16 inch that taper to a point; and worm and borer holes not more than 5/8 inch wide and 1½ inches long.

Repairs:

Shall be neatly made.

Permits—patches (boat, including die cut) not exceeding 3 inches in width individually where occurring in multiple repairs or 4 inches in width where occurring singly; plugs (circular, "dog bone" and leaf shaped) not exceeding 3 inches in width individually where occurring in multiple repairs or 4 inches in width where occurring singly; synthetic plugs which present solid, level, hard surface not exceeding above dimensions; and shims.

4.4.4.5 **Grade D veneer. (May be used only in interior type panels.)**[2]

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 panels; one edge to be narrow or to be short on one end only of D grade backs but by not more than 1/8 inch for 1/2 panel length or width; knots on D grade backs, if tight and not more than 2½ inches measured across the grain.

Open defects:

Permits—knotholes not exceeding 2½ inches in maximum dimension; pitch pockets not exceeding 2 inches wide by 4 inches long or of equivalent area if of lesser width; and splits not exceeding:

1/2 inch by one-fourth panel length,
1/4 inch by one-half panel length,
3/16 inch by full panel length,
1/2 inch width at widest point required to taper to a point.

4.4.5 **Overlays.**—Overlaid plywood is Southern pine 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 paragraphs 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.

4.4.5.1 **High density.**—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 square feet 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.

4.4.5.2 **Medium density.**—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

[2] See also sec. 7, Special Constructions.

of laminate shall be a thermosetting resin of phenol or melamine type. The resin-impregnated material shall be not less than 0.012 inch thick and shall weigh not less than 65 pounds per 1,000 square feet of single face before pressing including both resin and fiber. An integral phenolic resin glueline shall be applied to one surface of the facing materal 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.

4.5 **Interior type plywood.**—This type of plywood has a high degree of moisture resistance, and is suitable for construction where its application requires it to retain its original form and practically all of its strength when occasionally subjected to a thorough wetting and subsequent normal drying. This type is available in the grades given in table 1. All veneers used in Structural I grade panels shall be of Southern pine. Veneers used in inner plies of other Interior type panels may be of Southern pine or other softwoods and hardwoods having an average published [3] specific gravity of 0.41 or more, based on green volume and ovendry weight. Plywood of this type shall meet the water soak requirements set forth in paragraph 5.4.1, when tested in accordance with paragraph 5.2.[4]

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

4.5.2 **Resistance to elevated temperatures.**—Interior Sheathing, Interior Underlayment, Interior C–D Plugged, and Structural I grades 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.**

4.6 **Exterior-type plywood.**—This type of plywood is bonded with adhesives that represent the ultimate in moisture resistance and is suitable for permanent exterior use. The grades available in this type are given in table 2. Panels 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 Southern pine and of C grade as defined in paragraph 4.4.4.4, or better. All exterior panels shall be so designated by the distinctive symbol, "Ext.," branded or stamped on each panel. Plywood of this type shall meet the requirements set for in paragraph 5.4.2. when tested in accordance with 5.3.[5]

4.7 **Construction grades.**—In addition to meeting the preceding applicable requirements, the following construction grades, B–B Exterior (concrete form), B–C Exterior, C–C Exterior Sheathing, C–C Exterior (Plugged), Structural–I (Int.), Interior Underlayment, C–D (Plugged) Interior, and C–D Interior Sheathing, shall also

TABLE 1.—*Minimum quality of veneers for interior type grades.*

Grades	Face	Back	Inner plies	Additional limitations [1]
N–N, int. (natural finish 2 sides).[2]	N	N	C	Sanded 2 sides.
N–A, int. (natural finish).	N	A	C [3]	Do.
N–D, int. (natural finish 1 side).[4]	N	D	D	Do.
A–A, int.	A	A	D	Do.
A–B, int.	A	B	D	Do.
A–D, int.	A	D	D	Do.
B–B, int.	B	B	D	Do.
B–D, int.	B	D	D	Do.
Int. underlayment	C (plugged)[5]	D	C [6] and D.	Sanded 2 sides, or touch-sanded.[7]
C–D (plugged),[5] int.	do.[5]	D	D	Unsanded or touch-sanded.
Structural I	Section 7, Special Construction			Unsanded grade.[8]
C–D int. (sheathing, int.) with exterior glue (see sec. 7, Special Constructions).	C	D	D	Do.[8]
C–D, int. (sheathing, int.).	C	D	D	Do.[8]

[1] See also pars 4.4 and 4.5.
[2] A "2-side natural finish" item, intended primarily for cabinetwork, generally, only ¾-inch thickness. Available only from certain mills.
[3] All inner plies shall consist of C veneer with crossbands jointed.
[4] A "1-side natural finish" item, intended primarily for paneling and wainscoting, generally only in ¼-inch thickness. Available only from certain mills.
[5] See sec. 11 for definition.
[6] Veneer immediately adjacent to face shall be C or better.
[7] Available touch-sanded when so specified (see sec. 11 for definition).
[8] Panels shall not be sanded, touch-sanded, or sized by mechanical means.

TABLE 2.—*Minimum quality of veneers for exterior type grades.*

Grades	Face	Back	Inner plies	Additional limitations [1]
Special ext.[2]				
A–A, ext.	A	A	C	Sanded 2 sides.
A–B, ext.	A	B	C	Do.
A–C, ext.	A	C	C	Do.
B–B, ext. (concrete form, ext.).	B	B	C	Edge-sealed and, unless otherwise specified, mill-oiled. Sanded 2 sides.
B–C, ext.	B	C	C	Sanded 2 sides.
C–C, ext. (plugged)[3]	C (plugged)[3]	C	C	Sanded 2 sides or touch-sanded.[4]
C–C, ext. (sheathing, ext.)	C	C	C	Unsanded grade.[5]

[1] See also pars. 4.4 and 4.6.
[2] See sec. 7, Special Constructions.
[3] See sec. 11 for definitions.
[4] Available touch-sanded when so specified (see sec. 11 for definition).
[5] Panels shall not be sanded, touch-sanded, or sized by any mechanical means.

[3] The Forest Products Laboratory, Madison, Wis., will be considered as final authority.
[4] See par. 9.2.

[5] See par. 9.2.

meet one of the following requirements:

A. Face and back veneers shall meet the specific gravity requirement of paragraph 4.7.1; or

B. Face and back veneers shall be 1/8 inch (nominal) or greater in thickness; or

C. Panels shall be manufactured in standard nominal thicknesses of 5/16, 3/8, 1/2, 5/8, and 3/4 inch, within a thickness tolerance of minus 1/64 inch and plus 1/32 inch.

4.7.1 **Specific gravity.**—The average specific gravity as determined in each mill in accordance with the provisions of paragraph 5.6, shall equal or exceed 0.52 based on ovendry volume and ovendry weight. This limitation allows for the variation to be expected in small-lot sampling and for the expression of green volume solid wood specific gravity in terms of ovendry volume veneer specific gravity.

4.8 **Overlaid plywood.**—Table 3 gives the minimum quality of veneer for the types of exterior overlaid plywood that are available. All overlaid panels shall meet the requirements of paragraph 5.4.2 when tested in accordance with paragraph 5.3.

TABLE 3.—*Minimum quality of veneers for overlaid grades of plywood.*

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. All overlaid plywood is surfaced on 2 sides unless otherwise specified. When only 1 side is surfaced, the exposed back shall be C or better.

[2] Medium-density overlay also available with B grade inner plies.

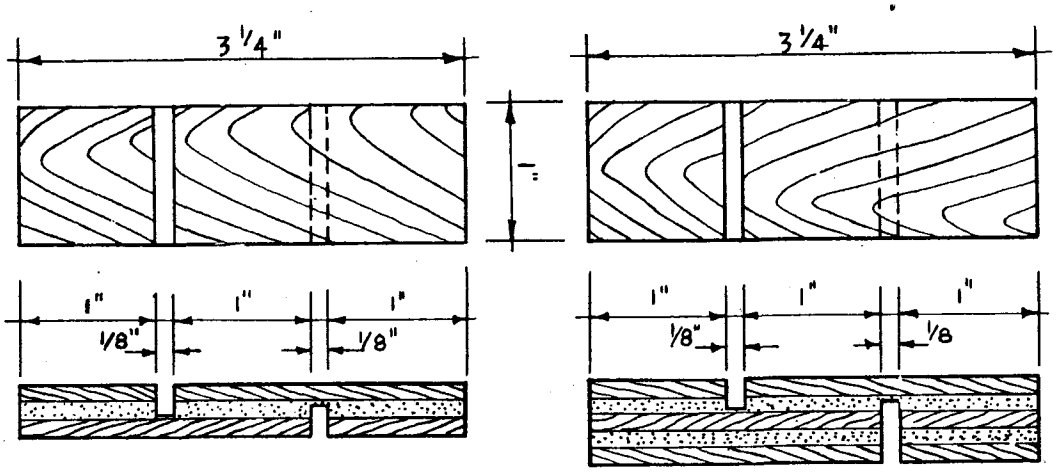
4.9 **Heat durability (Exterior).**—All Exterior plywood panels shall also meet the requirements of paragraph 5.4.2.2 when tested in accordance with paragraph 5.3.4.

5. SAMPLING AND TESTING PROCEDURES

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, 3 pieces shall be cut at random and from each piece 10 shear-test specimens, 3¼ inches long and 1 inch wide 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 midwidth of the panel, and from each edge approximately at midlength 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 **Soak test for interior type.**—The 15 test specimens from each panel as described in 5.1 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 percent, based on ovendry weight. This test procedure shall be conducted through three cycles, unless all specimens have failed.

5.3 **Test for exterior type.**



NOTE: Orient grain direction across specimen to test inner two joints.

(a) 3-ply Specimen (b) 5-ply Specimen

Figure 1. Shear Test Specimens

5.3.1 **Preparation of exterior test specimens.**—Ten shear specimens from each piece (five for cold test and five for boil test) as described in 5.1 shall be 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 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.

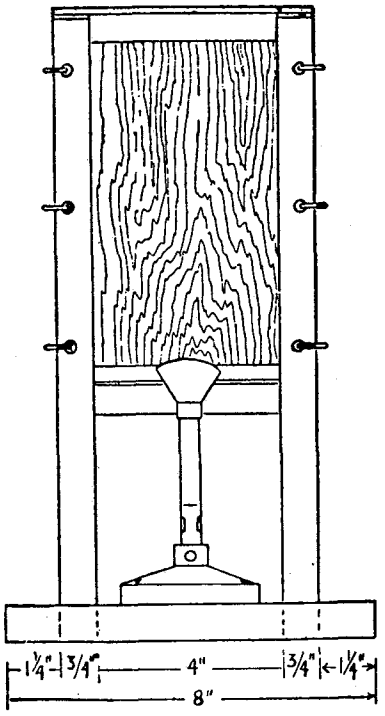
5.3.2 **Cold soaking test.**—Five shear specimens as described in 5.3.1 shall be submerged in water at room temperature for a period of 48 hours and dried for 8 hours at a temperature of 145+5° F. with sufficient air circulation to lower moisture content of the specimens to a maximum of 8 percent, based on ovendry 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 as described in paragraph 5.3.1 shall be boiled in water for 4 hours, and then dried for 20 hours at a temperature of 145±5° F. with sufficient air circulation to lower moisture content of the specimens to a maximum of 8 percent, based on ovendry 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 5.3.2. 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- 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.



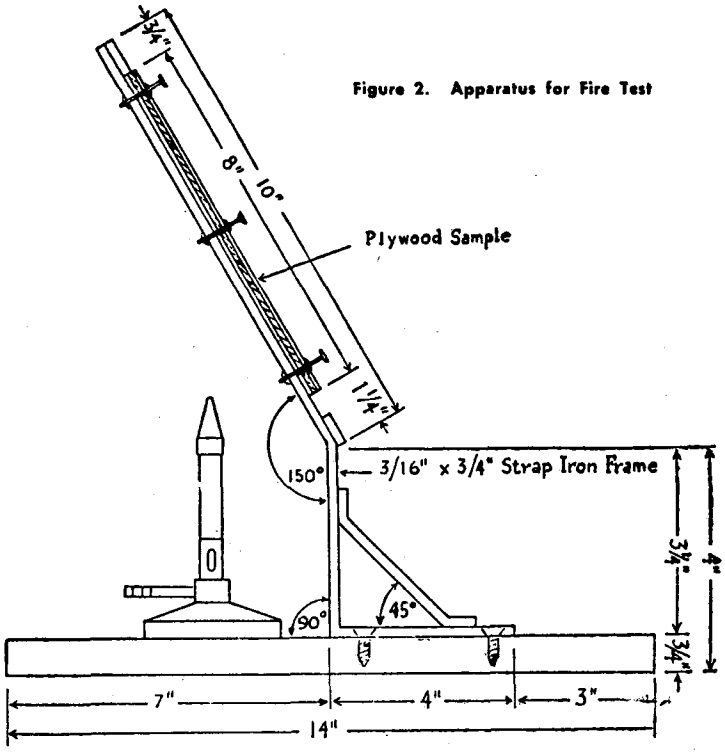


Figure 2. Apparatus for Fire Test

The flames 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- by 5-inch test specimen shall be considered as failure. When delamination occurs by reason of a localized defect, permitted with the grade, that test specimen shall be discarded. Ninety-five percent of all test specimens shall pass the first cycle, and 85 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 10 considered together shall meet the above test requirements or all material represented by the samples is considered as failing to comply with this standard.

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—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 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 10 panels fails all material represented is accepted; if more than 2 fail, all material represented is rejected. If 2 fail, another series of 10 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 10 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 20 panels combined is less than 80 percent all material represented by the samples is considered as failing to comply with this standard.

5.4.2.1. The same interpretation shall apply to overlaid plywood. In addition, separation of the resin-impregnated face from the plywood shall be considered failure.

5.4.2.2. 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, none of which shall fail.

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 paragraph 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 inch 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 the time of the testing shall not exceed 16 percent.

If the average ultimate stress of the three test specimens of any one panel is less than 4,000 p.s.i. then that panel fails. If 1 or none of the 10 panels fails, the jointed panels in the shipment are accepted. If more than two fail the jointed panels are rejected. If 2 fail, another series of 10 panels is tested. If one or none of the panels in this series fails, the jointed panels are accepted; otherwise, they are rejected.

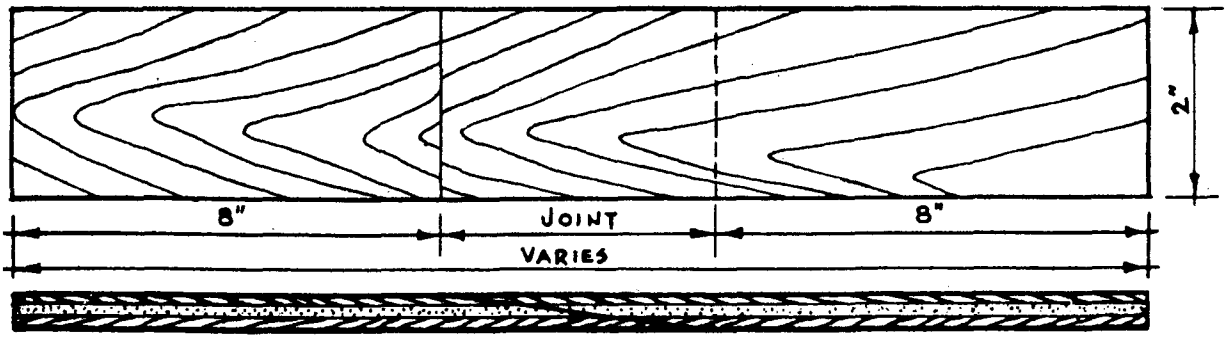


Figure 3. Tension Specimen

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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 paragraph 5.1. Specimens shall be prepared following the general procedure in paragraph 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.

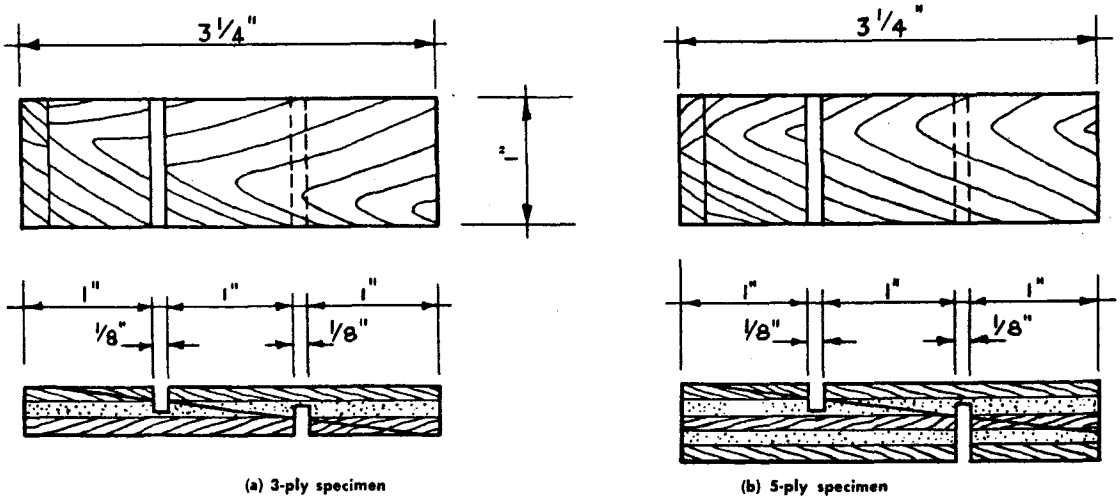
The specimens shall be subjected to the same test procedure as outlined in paragraph 5.2.

Test specimens showing continuous delamination in excess in 1/16 inch deep and 1/2 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 jointied panels are rejected. If 2 panels fail an additional 10 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 paragraph 5.1. The specimens shall be prepared following the general procedure described in paragraph 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 paragraph 5.3.2, and five to the boiling test of paragraph 5.3.3.

The panel shall be evaluated as described in paragraph 5.4.2.



(a) 3-ply specimen (b) 5-ply specimen

Figure 4. Exterior Scarf Joint Durability Specimens

5.6 **Sampling and testing for specific gravity of Southern pine veneers.**

5.6.1 **Sampling.**—In order to assure that where applicable the density limitation of paragraph 4.7 for face and back veneer is met, the average specific gravity of not less than 100 randomly selected veneer samples shall be determined each month for each mill. Veneer sheets selected for sampling shall be fully representative of all face and back veneer less than 1/8-inch nominal thickness that is produced during each sampling period. One specific gravity specimen with dimensions as described in paragraph 5.6.2.1 shall be cut from each sheet of veneer so selected. Specific gravity specimens shall be free of compression wood, knots, knotholes, and pitch pockets, and shall be representative of the defect-free areas of the veneer sheet being sampled.

5.6.2 **Method of Test.**—Specific gravity shall be determined from specimen weight and volume in the ovendry condition by the following procedure:

5.6.2.1 **Size of specimen.**—Specimens shall have nominal dimensions of 6 inches across the grain by 4 inches along the grain.

5.6.2.2 **Drying.**—The specimens shall be dried in an oven maintained between 214° and 221° F. until constant weight is reached.

5.6.2.3 **Weighing.**—The specimens shall be weighed to an accuracy of at least 0.05 gram. If specimens are not weighed while still hot, moisture adsorption from the atmosphere shall be prevented by wrapping in polyethylene film or placing in a container kept free of atmospheric moisture by means of a desiccant.

5.6.2.4 **Volume Determination.** — Specimens shall be protected from adsorption of moisture as described in paragraph 5.6.2.3 and cooled to room temperature. The downward force required to completely immerse the specimen in mercury shall then be measured to the nearest 0.5 grams.[6] The weighing device used to measure downward force shall be read initially with the probes used to hold the specimen immersed to the same depth as when taking readings on a specimen. The immersion

[6] The mercury-immersion method is an established satisfactory procedure for determining the ovendry volume of veneer. Other methods of comparable accuracy may be used to measure volume.

force is then the difference between the initial reading and the reading with the specimen completely immersed but not in contact with the sides or bottom of the container.

5.6.2.5 **Calculation.**—Specific gravity of the sample shall be calculated from the following formula:

$$\text{Sp. Gr.} = \frac{\text{Wt.} \times 13.546}{\text{IF} + \text{Wt.}}$$

Where:

Wt. = Ovendry weight in grams.
IF = Immersion force in grams.

TABLE 4.—*Standard stock sizes of interior-type Southern pine plywood* [1]

Grades	Widths (inches)[2]	Lengths (inches)[2]	Thicknesses (inch)[3 4 5]				
N-N, int.	48	96	¼	----	----	----	¾
N-A, int.	48	96	¼	----	----	----	¾
N-D, int.	48	96	¼	----	----	----	----
A-A, int.	36	72	¼	----	----	----	¾
		96	¼	3/8	½	----	¾
		72	¼	3/8	½	5/8	¾
		84	¼	3/8	½	5/8	¾
Do	48	96	¼	3/8	½	5/8	¾
	6 60	108	¼	3/8	----	----	¾
		120	¼	3/8	½	5/8	¾
		144	¼	----	----	----	¾
A-B, int.	36	96	¼	3/8	½	5/8	¾
		72	¼	3/8	½	5/8	¾
		84	¼	3/8	½	5/8	¾
Do	48	96	¼	3/8	½	5/8	¾
	6 60	108	¼	----	----	----	¾
		120	¼	3/8	½	5/8	¾
		144	¼	----	----	----	¾
A-D, int.	30	60	----	----	----	----	¾
		72	----	----	----	----	¾
		84	¼	----	----	----	¾
		96	¼	----	----	----	¾
		120	----	----	----	----	¾
Do	36	60	----	----	----	----	¾
		72	¼	3/8	½	5/8	¾
		84	¼	3/8	½	5/8	¾
		96	¼	3/8	½	5/8	¾
		120	¼	----	----	----	¾
Do	48	60	¼	3/8	½	5/8	¾
	6 60	72	¼	3/8	½	5/8	¾
		84	¼	3/8	½	5/8	¾
		96	¼	3/8	½	5/8	¾
		108	¼	3/8	½	5/8	¾
		120	¼	3/8	½	5/8	¾
		144	¼	3/8	½	5/8	¾
B-B, int.	48	60	¼	3/8	½	5/8	¾
	6 60	72	¼	3/8	½	5/8	¾
		84	¼	3/8	½	5/8	¾
		96	¼	3/8	½	5/8	¾
		108	¼	3/8	½	5/8	¾
		120	¼	3/8	½	5/8	¾
		144	¼	3/8	½	5/8	¾
B-D, int.	48	84	¼	3/8	½	5/8	¾
	60	96	¼	3/8	½	5/8	¾
Int. underlayment	48	96	¼	3/8	½	5/8	¾
	6 60		¼	3/8	½	5/8	¾
C-D (plugged) int.	48	96	¼	3/8	½	5/8	¾
	6 60		¼	3/8	½	5/8	¾
Structural I [7]	48	96	5/16	3/8	½	5/8	¾
	6 60	120	5/16	----	----	5/8	----
C-D int. (sheathing, int.) with exterior glue [7]	48	96	5/16	3/8	½	5/8	¾
	6 60	120	5/16	----	----	5/8	----
C-D, int. (sheathing, int.)	48	96	5/16	3/8	½	5/8	¾
	6 60	120	5/16	----	----	5/8	----

[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 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 1/64 (0.0156) inch over or under the specified thickness shall be allowed on sanded panels, and a tolerance of 1/32 (0.0312) inch on unsanded panels. See sec. 11 for definition of touch-sanding.
[4] Minimum number of plies for standard construction:
3 plies for ¼, 5/16, and 3/8 inch.
3 plies for ½-inch C-D interior sheathing and C-D plugged only.
5 plies for ½, 5/8, and ¾ inch, except as noted above.
7 plies for 7/8 inch to 1 inch.
[5] Sanded 2 sides, except underlayment, C-D (plugged), structural I, C-D sheathing with exterior glue, and C-D sheathing.
[6] Available from a number of mills but not all.
[7] See sec. 7, Special Constructions.

6. STANDARD STOCK SIZES

6.1 Plywood is commonly made in the panel 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. Tolerances are given in the footnotes of the tables. Any size panel conforming in all other respects to the applicable requirements of this Standard, may be

TABLE 5.—*Standard stock sizes of exterior-type southern pine plywood.* [1]

Grade	Widths (inches)[2]	Lengths (inches)[2]	Thicknesses (inch)[3 4 5]						
Special, ext. [6 7]		60	¼	3/8	½	5/8	¾	----	----
A-A, ext.	48	84	¼	3/8	½	5/8	¾	----	----
		96	¼	3/8	½	5/8	¾	⅛	1 1
	7 60	108	¼	3/8	½	5/8	¾	----	----
		120	¼	3/8	½	5/8	¾	----	----
		144	¼	3/8	½	5/8	¾	----	----
A-B, ext.	48	84	¼	3/8	----	----	¾	----	----
		96	¼	3/8	½	5/8	¾	----	1
	7 60	120	¼	3/8	½	5/8	¾	----	----
		144	¼	3/8	½	----	¾	----	----
A-C, ext.	36	96	¼	3/8	½	5/8	¾	----	----
		72	¼	3/8	½	5/8	¾	----	----
		84	¼	3/8	½	5/8	¾	----	----
Do	48	96	¼	3/8	½	5/8	¾	----	1
A-C, ext	7 60	108	¼	3/8	½	5/8	¾	----	----
		120	¼	3/8	½	5/8	¾	----	----
		144	¼	3/8	½	5/8	¾	----	----
B-B (concrete form) ext.	48	96	----	----	----	5/8	¾	----	----
	7 60								----
B-C, ext.	48	96	¼	3/8	½	5/8	¾	----	----
	7 60								
C-C (plugged) ext.	48	96	¼	3/8	½	5/8	¾	----	----
	7 60								
C-C (sheathing) ext.	48	96	5/16	3/8	½	5/8	¾	----	----
	7 60								

[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 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 1/64 (0.0156) inch over or under the specified thickness shall be allowed on sanded panels, and a tolerance of 1/32 inch (0.0312) on unsanded panels. See sec. 11 for definition of touch sanding.
[4] Minimum number of plies required for standard construction:
3 plies for ¼, 5/16, and 3/8 inch.
5 plies for ½, 5/8, and ¾ inch.
7 plies for 7/8, to 1 inch.
[5] Sanded 2 sides, except C-C plugged and C-C sheathing.
[6] See Sec. 7, Special Constructions.
[7] Available from a considerable number of mills, but not all.

TABLE 6.—*Standard stock sizes of overlaid Southern pine plywood.* [1]

Grades	Widths (inches)[2]	Lengths (inches)[2]	Thicknesses (inch)[3]
A-A high density, ext.	48	96	5/16 (3 ply).[4] 3/8 (3 ply). ½ (5 ply). 9/16 (5 ply). 5/8 (5 ply). ¾ (5 ply). 7/8 (7 ply). 1 (7 ply). 1⅛ (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	½ (5 ply). 9/16 (5 ply). 5/8 (5 ply). ¾ (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.

considered as complying with the Standard. However, each panel manufactured to other than standard nominal thicknesses shall be clearly identified as to the actual manufactured thickness.

6.2 **Scarfed panels.**—Neither panels with N and A faces, nor the faces of such panels unless longer than 10 feet, shall be scarfed except when specificially so ordered, but other panels may be scarfed. Panels longer than 12 feet 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 water proof adhesive and shall meet the requirements and test methods for scarf joints set forth in paragraph 5.5.

7. SPECIAL CONSTRUCTIONS

7.1 **Special exterior grade.**—Special Exterior grade shall be of Exterior-type meeting all requirements of this standard, and of one of the following grades: A–A, A–B, B–B, High-Density overlay, or Medium-Density overlay, all as modified below for "Special Exterior" plywood:

Veneers: "A" faces [7] shall be limited to a total of nine single repairs in a 4- by 8-foot sheet, or to a proportionate number in any other size as manufactured. "B" faces or backs where specified, and all inner plies, shall conform to "B" quality veneer requirements.

Patches: All patches shall be glued with an adhesive meeting Exterior-type performance requirements of this Standard and, in addition, shall be set in the panel using a technique involving both heat and pressure.

Edge-grain joints: When the face or any ply running parallel with the faces, consists of two or more pieces of veneer, the edges shall be joined straight, square, and tight. When the crossband veneers consist of two or more pieces of veneer, the edges shall be joined straight and square.

Core-gaps and edge-splits: [8] Neither edge of a panel shall have any core-gap or edge-split in excess of ⅛ inch wide. Core-gaps and edge-splits per 8 feet of crossband layer shall not exceed four in number. End-splits and gaps on either end of a panel shall not exceed ⅛ inch in aggregate width. Filling of core-gaps and edge-splits with materials such as putty, plastic wood fillers, and the like, or with wood shims, slivers or plugs that serve to conceal the gaps or splits is prohibited.

7.2 **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.

7.3 **C–D Interior (Exterior glue).**—Standard C–D Interior panels, except bonded with an adhesive identical to those for Exterior plywood and meeting the Exterior performance requirements in Section 5.

7.4 **Structural I Grade.**—Structural I is a panel designed for engineered applications and shall be C–D grade bonded with Exterior glue meeting the following special limitations:

—All plies shall be of Southern pine.
—Sound, tight knots shall not exceed 2½ 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 ½ inch and greater in thickness shall consist of a minimum of 5 plies.
—Panels shall not be sanded, touch-sanded, or sized by any means.

In addition to the above, all requirements for C–D sheathing shall be met. Structural I grade shall be bonded with an adhesive meeting the Exterior performance requirements of this 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 some construction grades may have a priming coat of oil or other clear preparation before inspection.

Note: See Appendix for information or reinspection.

9. MARKING AND CERTIFICATION

9.1 To assure the purchaser that he is getting Southern Pine Plywood of the grade and quality specified, producers may include with each shipment a Certificate of Inspection which states that the plywood conforms to this Commercial Standard. Each panel 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 random sampling of the finished panels in the shipment being certified for conformity with all requirements of this Commercial Standard, and which has examined each sample panel for quality of veneer in every ply. 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.

[7] When the term faces or face veneers is used, face and back veneers are implied.
[8] See sec. 11, Nomenclature and Definitions.

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 paragraphs 4.5 and 4.6, 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 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 plywood ¼ inch thick, 48 inches wide, and 96 inches long, for interior applications, one side of which is to be nailed against a wall where it will not show, but the other side to be exposed to view and painted, this material should be ordered as follows:

> Southern Pine plywood: 100 pieces, 3 ply, 48 by 96 inches, Interior type, A–D grade. Sanded two sides to ¼-inch thickness.

10.4 For most uses, sanded panels are desirable, 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. 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 panel of ⅜-inch thickness, the order should read:

> Southern Pine plywood: 100 pieces, 3 ply, 48 by 96 inches, Exterior type, A–A grade. Sanded two sides to ⅜-inch 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 one side only," or special weights of surfacing material, should be stated after the standard specification.

11. NOMENCLATURE AND DEFINITIONS

Back.—The poorer side of a panel whose outer plies are different grades.

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

Centers.—Inner plies running parallel to the outer plies of the panel.

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. 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.

Cores.—Inner ply veneers running perpendicular to the outer plies of the panel.

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.

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 water and moisture resistant. (See pars. 4.4 and 4.6.) 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 pars. 4.4 and 4.5.) 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.

Nominal thickness.—Full designated fractional thickness. For example, $\frac{1}{10}$ inch nominal $=0.10$ inch, ½ inch nominal is 0.50 inch.

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 by 1/2 inch, sound and tight knots up to 1 1/2 inches in least dimension, 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, dogbone, 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."

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

Shop cutting panel.—A panel which has been rejected as not conforming to grade requirements of standard grades in this Commercial Standard. Identification of these panels shall include the notation "Shop cutting panel for remanufacture only." No reference shall be made to the Standard in the grademark. Blistered panels are not considered as coming 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."

Structural-Interior.—Many construction applications require that panels be identified as Exterior or Structural Interior. Both must conform to all provisions of this Commercial Standard, and Structural-Interior must also meet the requirements of paragraphs 4.5.1 and 4.5.2.

Summerwood.—The portion of the annual growth ring that is formed after the springwood formation has ceased. It is usually denser and stronger mechanically than springwood.

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 (0.0312) inch of the nominal thickness specified.

Veneer.—Thin sheets of wood.

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 square feet on each side of the panel. The weight of the overlay includes resin and carrier sheet or sheets together, before pressing.

APPENDIX

The following material based on industry practices, is offered for the information of purchasers of Southern Pine 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 if the shipment is more than 5 percent below grade, and the shipment, settled for on the basis of the reinspection report.

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.

In addition to the above 5 percent grade tolerance, a 5 percent tolerance shall apply separately to the core gap limitations set forth in paragraph 4.1.

HISTORY OF PROJECT

First edition.—On December 12, 1962, an industry Technical Committee for Southern Pine Plywood Standards representing a group of potential manufacturers of Southern pine plywood requested the cooperation of the Commodity Standards Division, Office of Technical Services, now Office of Product Standards, National Bureau of Standards, in the establishment of a Commercial Standard for Southern Pine Plywood.

This group of plywood manufacturers submitted a tentative draft based on the existing Commercial Standards for other species of softwood plywood which had been developed by potential manufacturers and representatives of the U.S. Department of Agriculture's Forest Products Laboratory at a meeting in Hot Springs, Ark., on October 11, 1962.

The "Proposed" Commercial Standard (TS–5616) was circulated on January 24, 1963, to a small, representative cross section of the plywood industry and other interested organizations for advance consideration and comment. A meeting was held at the FPL in Madison, Wis., on March 28–29,

1963, for the purpose of adjusting the proposal in accordance with the comments received.

On April 15, 1963, the "Recommended" Commercial Standard (TS–5626) as adjusted, was widely circulated to the industry for final consideration, and an announcement was distributed to the press. Endorsements in the form of signed acceptances received from individual producers, distributors, consumers, and users of softwood plywood were considered sufficiently representative of the industry to insure the successful application of the voluntary trade standard. Accordingly, on July 15, 1963, the establishment of the new Commercial Standard, CS259–63, for Southern Pine Plywood, was announced to be effective on November 15, 1963.

Amendment Nos. 1 and 2.—Developments within the industry following announcement of the success of the Standard indicated that certain requirements for Southern pine plywood should be adjusted to conform to the current requirements for other species of softwood plywood. Under dates of October 21, 1963, and June 15, 1964, acceptors of CS259–63 were informed that the additional requirements had been approved as Amendments.

Amendment No. 3.—On June 7, 1965, the Chairman of the Southern Pine Plywood Technical Committee of the American Plywood Association submitted a suggested revision of CS259–63 to the Office of Product Standards with a request that it be developed under the Commodity Standards Procedures, of the U.S. Department of Commerce. Representatives of the National Bureau of Standards and of the Forest Products Laboratory assisted in the preparation of the proposal at a meeting in New Orleans on May 20–21. The principal changes were; the addition of a new Structural I grade plywood, the deletion of B–B (Interior) grade concrete form, and the addition of a test method for determining the specific gravity of face and back veneers. All of these changes were suggested to put into commercial practice the results of the latest research findings and marketing analyses of the plywood industry.

A Recommended Revision of CS259–63, designated TS–5673, was widely circulated on August 10, 1965, to all known producers of Southern pine plywood, and to a representative cross section of plywood distributors, users, home builders, contractors, etc. for consideration. A general announcement was made through the press. Responses in the form of signed statements of acceptance from individual organizations were considered sufficiently representative of the trade to indicate effective use of the Standard. Accordingly, an announcement was issued on January 5, 1966, establishing Commercial Standard CS259–63, Southern Pine Plywood, as amended effective for new production on February 1, 1966.

Project Managers: Harold A. Bonnet (Retired July 31, 1965), and Wm. H. Furcolow, Office of Product Standards, National Bureau of Standards, U.S. Department of Commerce, Washington, D.C., 20234.

STANDING COMMITTEE

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. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Office of Product Standards, National Bureau of Standards, U.S. Department of Commerce, which acts as secretary for the committee.

Representing producers:

Thomas M. Orth, Vice President and Assistant Secretary, Kirby Lumber Corp., P.O. Box 53029, Houston, Tex., 77052 (Chairman).

Joe C. Denman, Jr., Vice President, Lumber Products, Temple Industries, Diboll, Tex., 75941.

N. T. Shelton, Research Department, Potlatch Forests, Inc., Lewiston, Idaho, 83501.

T. G. Zentner, Supervisor, New Products Research, Packaging Division OLIN, P.O. Box 488, West Monroe, La., 71291.

W. H. Hunt, Vice President, Georgia-Pacific Corp., Equitable Building, Portland, Oreg., 97207.

Representing distributors:

R. M. Burns, Fleishel Lumber Co., 3910 Lindell Boulevard, St. Louis, Mo., 63108.

Roland R. Remmel, President, Southland Building Products Co., 1800 Lincoln Ave., Little Rock, Ark.

F. O. Schaefer, Jr., Central Woodwork, Inc., P.O. Box 14807, Memphis 14, Tenn.

Representing users:

George F. Bellows, W. S. Bellows Construction Corp., P.O. Box 2132, Houston, Tex., 77001.

W. F. Gerault, Vice President, Centennial Construction Co., 11111–D N. Central Expressway, Dallas, Tex., 75231.

Don G. Maffett, President, Anderson McGriff Co., 1335 Marietta Boulevard, NW., Atlanta, Ga., 30318.

Representing testing laboratories:

John M. Hess, Director, Technical Service Division, American Plywood Association, 1119 A Street, Tacoma, Wash., 98401.

W. T. McHugh, Assistant to the President, Pittsburg Testing Laboratory, P.O. Box 1646, Pittsburgh 30, Pa.

L. A. Patronsky, Manager, Timber Engineering Co., Western Research Division, P.O. Box 826, Corvallis, Oreg.

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 desirable. The list is published to show the extent to 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 representations of compliance, which may be given by the manufacturer whether or not he is listed as an acceptor.

ASSOCIATIONS
(General Support)

American Institute of Architects, Washington, D.C.
American Plywood Association, Tacoma, Wash.
Associated General Contractors of America, Washington, D.C.
Carolina Lumber & Building Material Dealers Association, Charlotte, N.C.
Home Manufacturers Association, Washington, D.C.
Retail Lumber Dealers Association of Houston, Houston, Tex.
Southern Pine Association, New Orleans, La.
Western Wood Products Association, Portland, Oreg.

FIRMS AND OTHER INTERESTS

Angelina Plywood Co., Keltys, Tex.
Ashby Veneer & Lumber Co., Jackson, Tenn.
Atchison, Topeka and Santa Fe Railway, Chicago, Ill.
Barger Millwork Co., Statesville, N.C.
Baxter, C. B., & Co., Kansas City, Mo.
Bellows, W. S., Construction Corp., Houston, Tex.
Boise Cascade Corp., Yakima, Wash.
Bruett, T. A., Lumber Inc., Milwaukee, Wis.
Builders Supply Co. of Petersburg, Inc., Petersburg, Va.
Cameron, Wm. & Co. Wholesale, Waco, Tex.
Camlet, J. Thomas, & Son, Clifton, N.J.
Centennial Construction Co., Dallas, Tex.
Central States Plywoods, Inc., Chicago, Ill.
Clarke Veneers & Plywood, Jackson, Miss.
Coale, George M., Co., Chicago, Ill.
Columbia Southern Plywood Corp., Portland, Oreg.
DeWeese, A., Lumber Co., Inc., Philadelphia, Miss.
Dierks Forests, Inc., Hot Springs, Ark.
Ewing Miller Associates, Inc., Arch. and Engrs., Terre Haute, Ind.
Fleishel Lumber Co., St. Louis, Mo.
Fort Smith Sash & Door Inc., Fort Smith, Ark.
Furman Lumber Inc., Boston, Mass.
Georgia-Pacific Corp., Portland, Oreg.
Gueydan Lumber & Plywood, Inc., Metairie, La.
H & S Lumber Co., Charlotte, N.C.
Harbor Sales Co. Inc., Baltimore, Md.
Heritage, Clark C., Tacoma, Wash.
Hill-Behan Lumber Co., St. Louis, Mo.
Hines, Edward, Lumber Co., Chicago, Ill.
Houston Sash & Door Co., Houston, Tex.
Kirby Lumber Corp., Houston, Tex.
Lewis Lumber Co., Birmingham, Ala.
Louisiana Plywood Corp., Ruston, La.
Macy's Bureau of Standards, New York, N.Y.
Marsh & Truman Lumber Co., Chicago, Ill.
Meadow River Lumber Co., Rainelle, W. Va.
Moore Dry Kiln Co., Jacksonville, Fla.
Olin Mathieson Chemical Corp., West Monroe, La.
National Plywoods, Inc., Chicago, Ill.
Panelyte Industrial Division, Trenton, N.J.
Pierce-Grassi Lumber Co., Inc., Crossett, Ark.
Pittsburgh Testing Laboratory, Pittsburgh, Pa.
Potlatch Forests Inc., San Francisco, Calif.
Rinn-Scott Lumber Co., Chicago, Ill.
Sanders Lumber Sales Inc., Meridian, Miss.
Scotch Plywood Co., Fulton, Ala.
Sears, Roebuck and Co., Chicago, Ill.
Shepherd, John C., Lumber Corp., Charlotte, N.C.
Southern Pacific Lumber Co., Inc., Jackson, Miss.
Temple Industries, Diboll, Tex.
Texas Forest Service, Forest Products Laboratory, Lufkin, Tex.
United States Testing Co., Inc., Hoboken, N.J.
United States Plywood Corp., New York, N.Y.
Urania Lumber Co., Ltd., Urania, La.
Vancouver Plywood Co., Inc., Florien, La.
Weyerhaeuser Co., Tacoma, Wash.
Williams, A. W., Inspection Co., Inc., Mobile, Ala.
Winnsboro Plywood Co., Winnsboro, S.C.

U.S. GOVERNMENT AGENCIES

Army, Department of, Office Chief of Engineers, Washington, D.C.
U.S. Army Mobility Equipment Center, Research, Development and Engineering Directorate, Fort Belvoir, Va.
U.S. Army Natick Laboratories, Natick, Mass.
Defense Construction Supply Center, Defense Supply Agency, Columbus, Ohio.
General Services Administration, Federal Supply Service, Standardization Division, Washington, D.C.
Veterans Administration, Department of Medicine and Surgery, Washington, D.C.

ACCEPTANCE OF COMMERCIAL STANDARDS

CS259–63 SOUTHERN PINE 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 _____

Office of Product Standards
National Bureau of Standards
U.S. Department of Commerce
Washington, D.C., 20234

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, State, and ZIP code _____

(Cut on this line)

[1] Underscore the applicable words. Please see that separate acceptances are filed for all subsidy companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

TO THE ACCEPTOR

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

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

2. *The acceptor's responsibility.*—The purpose of Commercial Standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the 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 on the part of producers, distributors, and users; and fourth, after acceptance, to publish the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement.*—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 publication.

U.S. GOVERNMENT PRINTING OFFICE: 1966 O—213-349