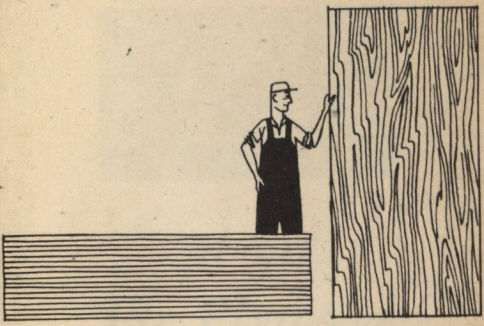
Fir Plywood FACTS



This book belongs to:

Name .....

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While this booklet relates mainly to Douglas fir plywood, West Coast plywood manufacturers also produce panels of other Western softwoods* in types and grades comparable to Douglas fir plywood. These plywoods are DFPA-tested and grade-trademarked in accordance with U. S. Commercial Standard CS 122-56. Where grades of these plywoods may be used for a given application covered in this booklet, this symbol "Also WSP" is used.

*Species include cedar (Alaska, Port Orford and western red), California redwood, Sitka spruce, Engelmann spruce, western larch, western hemlock, noble fir, and the commercial white firs.

FACTS

about
Fir Plywood

A compilation of basic grade-use data and other information for all who buy, sell or use Douglas fir plywood.

Published by
DOUGLAS FIR PLYWOOD ASSOCIATION
Headquarters — Tacoma 2, Washington

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ANSWERS TO TYPICAL PLYWOOD QUESTIONS

Typical questions which may be asked are given below together with brief answers and page references for detailed information.

1. CAN PLYWOOD BE USED OUTDOORS?

Yes, but make sure it is Exterior type. See page 14.

2. WHAT IS MARINE PLYWOOD?

Most people mean Exterior plywood with waterproof glue. However, there are panels of special inner ply construction available for boat hulls. See page 31.

3. WILL PLYWOOD ROOF SHEATHING BUCKLE?

Definitely not—if it is applied correctly. See page 22.

4. WHAT IS THIS NEW "GROOVED" PLYWOOD?

It is called Texture One-Eleven. It can be used for siding, paneling and other jobs. See page 30.

5. WHAT KIND OF PLYWOOD SHOULD BE USED FOR FARM BUILDINGS?

It must be Exterior type. Lower appearance quality grades are generally used for economy. See page 33.

6. IS PLYWOOD TOO THIN FOR MANY JOBS?

It is not generally. Cross lamination distributes strength in both directions permitting thin plywood to do the same job as other thicker material. See page 17-18.

7. ARE GRADE-TRADEMARKS IMPORTANT?

Definitely yes. DFPA grade-trademarks are positive identification of material that has been inspected in compliance with U. S. Commercial Standards. See page 11.

8. CAN INTERIOR PLYWOOD BE USED AROUND SHOWER STALLS?

No. Wherever you are likely to encounter water, weather or an excessive amount of moisture, always use EXTERIOR PLYWOOD with waterproof glue. See page 14.

9. WHY ARE THERE SO MANY GRADES OF PLYWOOD?

To meet the exact needs of any given job. There are grades with one face paintable, two faces paintable, and special structural grades. See page 15.

10. IS PLYWOOD ACCEPTED FOR HOUSES BUILT UNDER FHA FINANCING?

Yes. See page 20.

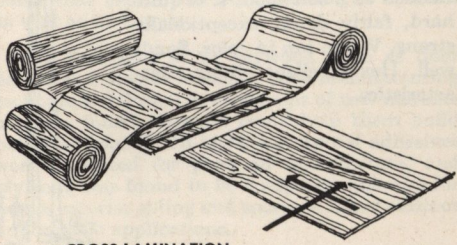
11. HOW DO YOU FINISH PLYWOOD SIDING?

Paint all edges. Give the face three coats of top quality house paint. See page 37.

WHAT IS FIR PLYWOOD?

Fir plywood is real wood in large, light, extra strong panels. Selected Douglas fir logs are peeled to form precise wood veneers. It is an engineered product made of an odd number of the thin veneers (plys)—three, five, seven—placed so the grain of one ply is at right angles to the next.

Wood is strong along the grain, relatively weak across the grain. In plywood, cross lamination distributes wood's along-the-grain strength in *both* directions. That's why plywood is strong



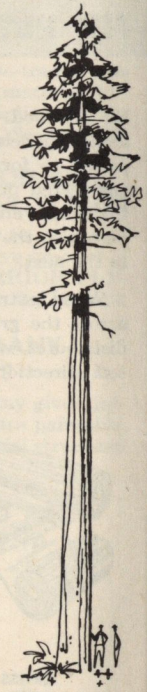
CROSS-LAMINATION GIVES 2-WAY STRENGTH

both *along* and *across* the panel . . . why it is relatively splitproof, puncture-proof. Pound for pound, it is one of the very strongest materials known.

Fir plywood retains wood's natural warmth, beauty and workability. It is a traditional material in modern form, made stronger, lighter, more serviceable, more useful.

WOOD SPECIES

The giant Douglas fir* which grows on the Pacific slope of the Cascade Mountains is ideal for plywood manufacture. It is rated as one of the two strongest structural woods commercially available, contains fewer knots and other defects. Durable by nature; resists decay, other attacks. Classed as a softwood, it is quite hard, fairly dense, exceptionally strong. Warm tan in color. Sands well. Has excellent gluing characteristics.



*Plywood is also produced in other highly suitable western softwood species; see page 2.

THE INDUSTRY

DFPA-inspected fir plywood is now manufactured in 93 modern, mass-production factories located in Washington, Oregon and California. Currently these mills produce over 4½ billion sq. ft. of plywood per year—accounting for more than two-thirds of the nation's total plywood.

HISTORY

The art of veneering fine woods for furniture and cabinet work dates back to ancient Egypt. But it was not until June 1905 in Portland, Ore., that the idea was used to create a structural building panel that capitalized on the strength of wood as well as its beauty.

The first uses of fir plywood were as door panels and drawer bottoms. New manufacturing techniques followed development of new markets as users found plywood could help them build better and faster. In 1934, waterproof adhesives were perfected for plywood manufacture, and plywood was found to be a superior material for boats, exterior siding and scores of other outdoor and marine applications.

Continued development of new and improved products in the 1940s and 50s—coupled with industry quality control and promotion programs—helped establish plywood as a basic building material for home, farm and industry. The chart below graphically shows the startling growth in the acceptance of fir plywood.

PLYWOOD USE IN RESIDENTIAL CONSTRUCTION

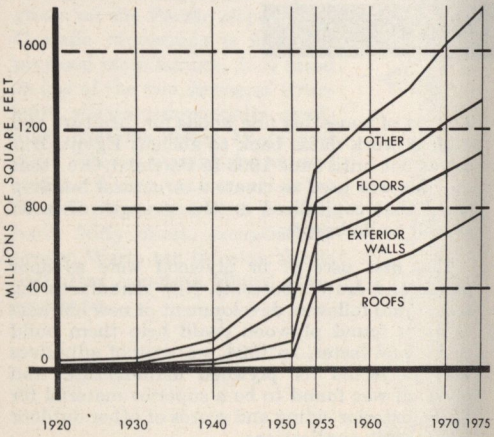


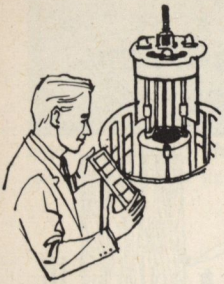
Chart from report of AMERICA'S DEMAND FOR WOOD — 1929-1975
By Stanford Research Institute for Weyerhaeuser Timber Company.

DFPA, COMMERCIAL STANDARDS, QUALITY CONTROL

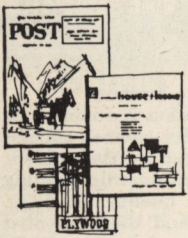
Douglas Fir Plywood Association is a non-profit organization devoted to quality control, promotion and research. Forerunner of the present DFPA was formed in 1928 to standardize grading rules, help improve product quality. In 1933, manufacturers, distributors and users adopted standardized grading rules set forth in a U. S. Commercial Standard to create a better understanding between buyer and seller with nationally accepted grade and quality standards.

Since then this Commercial Standard has been revised to meet changing customer demand and manufacturing conditions. The latest edition effective Feb. 1, 1955 is known as CS45-55. Through DFPA, the industry maintains a rigid quality control program centered on DFPA-owned grade-trademarks*. These provide positive identification of material that has been inspected in accordance with U. S. Commercial Standards, *and the even more rigid performance requirements of the Douglas Fir Plywood Association.*

*See DFPA grade-trademarks, pages 15-16.



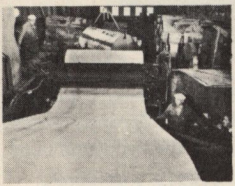
DFPA quality supervisors continually visit each mill, collect samples for exhaustive laboratory quality-testing.

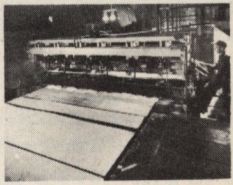


DFPA also conducts national advertising, publicity and merchandising programs, creates fir plywood sales preference.

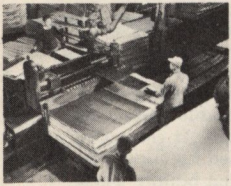
DFPA field promotion experts stationed in key areas throughout the country, work with dealers, architects and builders to further plywood use and acceptance. DFPA research work includes new product development, technical data, work with building codes, private and government agencies and laboratories.

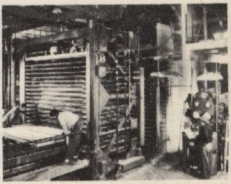
HOW FIR PLYWOOD IS MADE





Veneer is peeled, clipped, cross-bonded.





Panels are sanded, graded. Presses set glue.

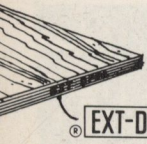
In plywood manufacture, huge fir logs are "unwound" into thin ribbons of veneer. The veneer is clipped to desired width and kiln dried to a uniformly low moisture content.

Precision machines apply glue as the veneers are cross-laminated into desired thickness. This wood and glue sandwich is then placed in giant presses which set the glue. Huge "hot" presses which apply both heat and pressure are used for all Exterior and some Interior panels.

The finished panel is then cut to proper size, sanded to satin smoothness, inspected and stamped with proper DFPA grade-trademark.

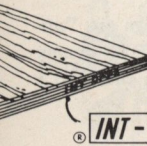
"TYPE" MEANS GLUE

Fir plywood comes in two types (as well as several *appearance* "grades" within each type.) See page 15. "Type" refers to the type glue bond used between plys.



WATERPROOF GLUE
for outdoor or structural use

EXTERIOR-TYPE
fir plywood* glue is completely waterproof. The bond is stronger, more durable than the wood itself. It cannot be weakened by time, weather or even boiling water.



MOISTURE-RESISTANT GLUE
for indoor or structural use

INTERIOR-TYPE
is made with highly moisture-resistant (but NOT waterproof) glue. It will withstand occasional wetting during construction but should never be permanently exposed.

***Certain standard quality veneers also required; see page 15.**

GRADES OF FIR PLYWOOD

"Grade" refers to appearance quality of veneer used for the face and back of the panels. (Also in some instances to quality of inner plys.) Letters (see chart below) are used to indicate the appearance quality of veneer used in plywood manufacture. Combining these veneers in different combinations enables plywood manufacturers to produce grades that meet the exact needs of any given job. For further description of veneers used in all grades, see pages 41 and 42.

VENEERS USED IN FIR PLYWOOD

A	Highest standard veneer. Smooth, paintable. May be more than one piece, well jointed; permits neatly-made repairs, etc.
B	Relatively smooth, permits circular repair plugs, small tight knots, etc.
C REPAIRED	Improved "C" used for underlayment grade.
C	Lowest permitted in Exterior-type. Knotholes up to 1", splits, tight knots, shims, sanding defects.
D	Used only for inner plys, backs of Interior panels. Permits knotholes up to 2½", pitch-pockets, other defects.
N	Special order "Natural Finish" veneer. Select, all heartwood, free from all open defects. May contain few specific small repairs if well matched.

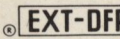
DFPA GRADE-TRADEMARKS

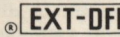
Registered grade-trademarks adopted by DFPA mills include "type" and "grade" designation. The letters "DFPA" indicate industry-wide maintenance of quality according to requirements of U. S. Commercial Standards CS45-55.

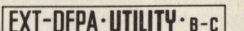
DFPA GRADE-TRADEMARKS

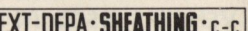
EXTERIOR-TYPE

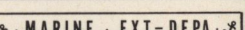
(Waterproof Glue)





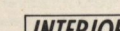


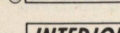


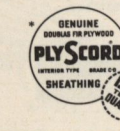


INTERIOR-TYPE

(Moisture-Resistant Glue)





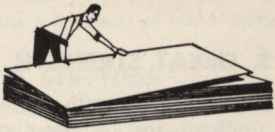


*Full-size panel marking consisting of Ply-Scord grade-trademark and lines across panel on 16" and 24" centers is used by many DFPA mills to facilitate identification and nailing.

FIR PLYWOOD

HAS ALL THESE ADVANTAGES

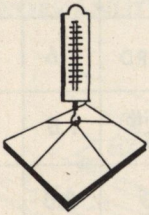
1. LARGE SIZE



Big, work-speeding sheets simplify construction, make possible time and labor savings up to 50-75%.

2. LIGHT WEIGHT

Fir plywood is lighter, easier to handle than hardboard or composition panels. Although there is some variation in weight, the following can be used as a rough guide.



PLYWOOD THICKNESS	WEIGHT PER SQ. FT.
1/4"	7/10 lb.
3/8"	1-1/8 lb.
3/4"	2-1/4 lb.

3. SPLITPROOF, PUNCTURE-PROOF

Cross-lamination makes plywood relatively splitproof, puncture-proof, gives it tremendous impact resistance.

4. DIMENSIONALLY STABLE

Fir plywood comes from the factory *dry*—never green. Cross-lamination restricts expansion or contraction of individual plys.

5. GREAT STRENGTH

Two-way strength plus large panel size (which distributes load over wide area instead of only 6 or 8 inches as in lumber) makes plywood a superior structural material as shown below.

STRENGTH AND RIGIDITY OF FRAME WALLS
From U. S. Forest Products Laboratory Tests Wall with Openings

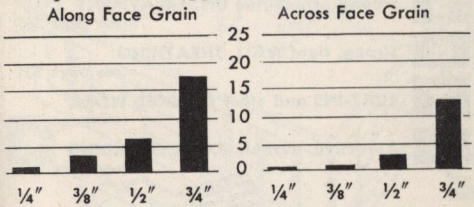
Sheathing Material	Relative Rigidity	Relative Strength
 1x8" DIAGONAL SHEATHING	1.0	1.3
 29/32" FIBERBOARD	1.6	2.1
 HORIZONTAL with LET-IN BRACES	1.5	2.2
 1/4" PLYWOOD	2.0	2.8

6. STIFFNESS
(Ability to Resist Bending)

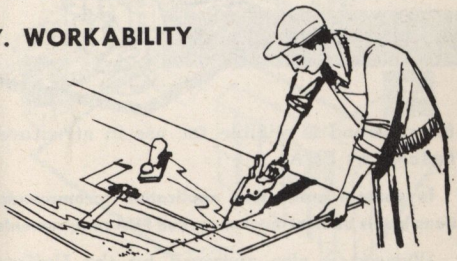
In *plate-action, with all edges supported* (such as subflooring or roof sheathing), plywood's two-way strength permits panels only ⅜" or ½" thick to do the job as well or better than 1" boards.

RELATIVE STIFFNESS

Stiffness varies markedly with thickness and direction of face grain. Apply panels perpendicular to supports for maximum stiffness. Keep this chart in mind as thickness guide if application parallel to supports is to be substituted.



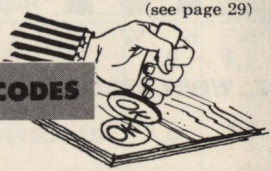
7. WORKABILITY



Fir plywood works quickly, easily with ordinary tools. Holds nails well. Won't split, or crack; can be nailed near edge. Glues well; takes any finish.

8 PLACES FIR PLYWOOD BETTERS BUILDING and REMODELING

1. **Strong ROOF SHEATHING** (see page 22)
2. **Good looking wall PANELING** (see page 26)
3. **BACKING for finish wall coverings** (see page 24)
4. **Firm, solid SUBFLOORING** (see page 25)
5. **Smooth, crack-free UNDERLAYMENT** (see page 25)
6. **Strong, rigid WALL SHEATHING** (see page 23)
7. **BUILT-INS and other CABINET WORK** (see page 28)
8. **Attractive, durable EXTERIOR SIDING** (see page 29)

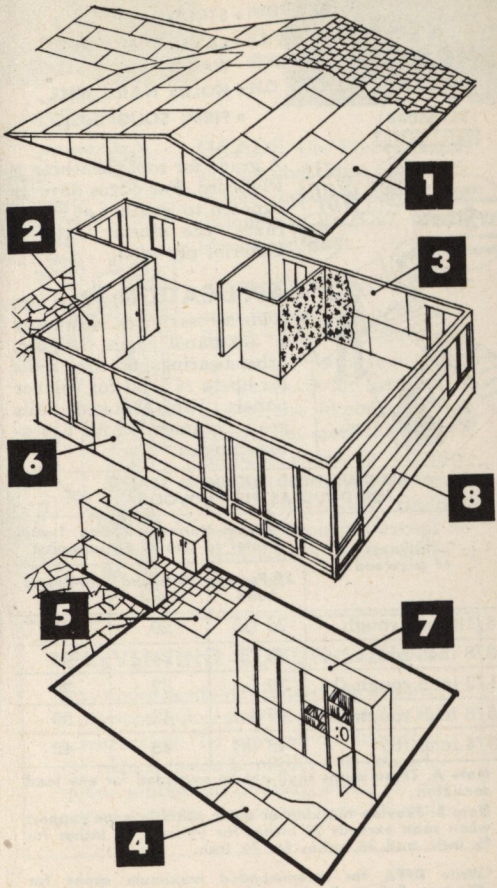


FHA, BUILDING CODES

Fir plywood is eligible for use in structures financed by FHA.

In general grade and application recommendations in this booklet meet or exceed FHA requirements.

Plywood is also approved by the Uniform Building Code, Basic Code (Building Officials Conference of America), Southern Building Code, numerous local codes.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ROOF SHEATHING

- STRONG, RIGID
- SAVES TIME, LABOR, WASTE
- HOLDS NAILS WELL
- FIRM, SOLID DECK

A grade for roof sheathing is PlyScord. For edges directly exposed to weather at eaves, rakes, use starter strip of Exterior plywood.

APPLICATION: *Place face grain across rafters.* Nail every 6″ on panel edges, 12″ o.c. other bearings; 6d com. nails for up to ½″, 8d for thicker panels. Ring-shanked nails are recommended for asbestos shingles.

RECOMMENDED MAXIMUM SPANS FOR DOUGLAS FIR PLYWOOD*

Thickness of plywood	Maximum Horizontal Span, Inches, Center to Center of Supports*		
	20-Pound Load	30-Pound Load	40-Pound Load
5/16 inch rough	20 (a)	20	20
3/8 inch rough	24 (a)	24	24
1/2 inch rough (b)	32 (a)	32	30
5/8 inch rough (b)	42 (a)	42	39
3/4 inch (b)	48 (a)	48	42

Note A. These spans shall not be exceeded for any load condition.

Note B. Provide blocking or other suitable edge support when span exceeds 28 inches for ½ inch; 32 inches for ⅝ inch; and 36 inches for ¾ inch.

***Write DFPA for recommended maximum spans for Western Softwood plywoods.**

WALL SHEATHING

- EXTRA STRENGTH AND RIGIDITY
- SAVES TIME, LABOR, WASTE
- NO CORNER BRACING

GRADE. Use PlyScord (unsanded sheathing plywood). Where unusual moisture conditions exist, use EXT-DFPA Sheathing grade.

APPLICATION: For 16″ stud spacing use 5/16″ PlyScord, 3/8″ for 24″ stud spacing. Place face grain across studs for greatest rigidity. Use 6d common nails spaced not more than 6″ o.c. on panel edges, 12″ on intermediate bearings. Corner bracing not needed. Building paper not needed except behind stucco, brick, asbestos shingles.

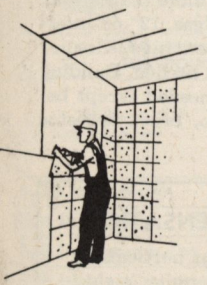
PREVENTING CONDENSATION

Any house needs ventilation, particularly a plywood house since it permits "tight" construction. To prevent condensation, (1) reduce inside humidity, (2) use adequate ventilation (louvers, etc.), (3) use vapor barriers on warm side of wall.

BACKING

- FIRM, SOLID
- EASY TO APPLY
- MAKES WALL COVERINGS LOOK BETTER, LAST LONGER

GENERAL: Plywood provides firm, solid backing for finish wall coverings—cork, tile or hardwood plywood. Simplifies construction of paneling, eliminates joint problems since joints do not have to be over studs.



GRADE DATA: Behind paneling, use PlyScord. For "soft covering" (i.e. cork) use PlyBase. For use as backing for tile, etc., around showers and drainboards, specify Utility grade Exterior-type.

APPLICATION: 6d. common nails best for up to ½" plywood, 8d. for thicker panels. Nails 6" o.c. panel edges, 12" on other bearings. Set nailheads slightly when covering is to be cork or other "soft" covering.

FLOOR CONSTRUCTION

- STRONG, RIGID
- FIRM, SOLID
- SAVES TIME, LABOR WASTE
- SMOOTH UNDERLAY

GENERAL: In floor construction fir plywood can be used to advantage in 3 separate applications. (1) subflooring, (2) underlayment, (3) combined subflooring and underlayment.

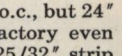
APPLICATION

USE 1 SUB-FLOORING

GRADE **

Place face grain across joists for maximum stiffness. Use 8d. com. nails for ⅝" plywood, 6d. for ½". Nail 6" o.c. panel edges, 10" other bearings. Usual installation is over joists 16" o.c., but 24" spacing is satisfactory even with ½" when 25/32" strip finish flooring is used. NOTE: Re-use plywood in concrete forms for subflooring.

USE 2 UNDERLAYMENT



GRADES

Place face grain across joists. ⅜" panels preferred; ¼" satisfactory. Ring-shanked or cement coated nails preferred; 6" on edge, 8" each way throughout panel. Set nails slightly to avoid show-through if joists shrink.

*Use panels bonded with exterior glue where excess moisture exists.

**Write DFPA for maximum span recommendations for Western Softwood Plywoods.

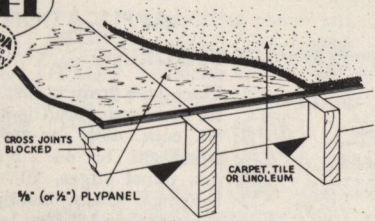
USE 3 GRADES — COMBINED SUB-FLOOR UNDERLAYMENT

INTERIOR-TYPE DOUGLAS FIR PLYWOOD PLYBASE UNDERLAYMENT DFPA GRADE QUALITY

INTERIOR-TYPE DOUGLAS FIR PLYWOOD PLYPANEL GRADE A-D DFPA GRADE QUALITY

2-4-1 ** DFPA GRADE QUALITY

Lay panels with face grain across joists. Use 5/8" or 3/4" panels for joists up to 24" o.c. Use blocking between joists to support panel edges. Nail as for subflooring. Set nails slightly. See application detail below.



PANELING

- REAL WOOD
- NATURAL BEAUTY
- STRONG, DURABLE

INTERIOR-TYPE DOUGLAS FIR PLYWOOD PLYPANEL GRADE A-D DFPA GRADE QUALITY

ALSO WSP DFPA GRADE QUALITY

Texture One-Eleven DFPA GRADE QUALITY

GRADE DATA.

PlyPanel grade is most popular standard grade. For light stain finishes, select panels for appearance, uniformity of grain pattern. A special "natural" finish item* (INT-DFPA N-D) is available for special installations.

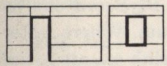
*See page 15.

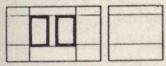
**Write DFPA for specifications and construction recommendations.

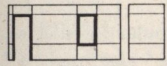
Panels with special distinctive treatments are also available, including Texture 1-11, the strikingly handsome new "grooved" plywood, "relief grain," embossed panels and various other mill specialties.

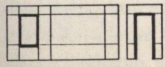
APPLICATION:

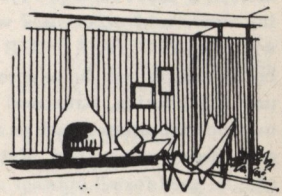
⅜" panels used for 16" stud spacing. Fasten with 6d finish or casing nails, spaced 6" o.c. ¼" panels may be used; install with 4d nails. Panels may be applied vertically or horizontally. Backing for horizontal joints may be provided for by fire stop.









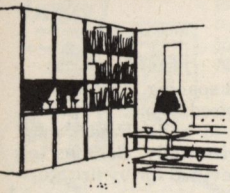


JOINTS, PANEL PLACEMENT

Joints can be vee-d or formed with recessed or inset molding. Lapping panels effective in many cases. Panel placement is easily planned by starting at opening with vertical joints and dividing wall space in any preferred orderly arrangement such as shown at left. For finishing, see page 38.

BUILT-INS

- EASY-TO-USE
- STRONG, DURABLE
- ANY DESIGN OR FINISH
- GOOD LOOKING



INTERIOR-TYPE DOUGLAS FIR PLYWOOD
PLYPANEL GRADE A-A
DFPA QUALITY

ALSO WSP
DFPA QUALITY

® INTERIOR · A-A · DFPA

® INTERIOR · A-B · DFPA

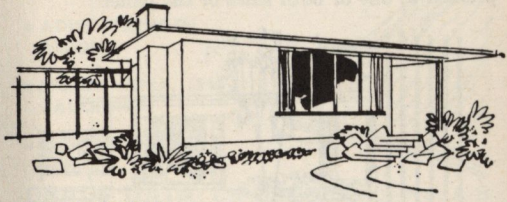
GRADE DATA. Use PlyPanel grade for sliding doors and other uses where only one side will be seen. Use A-A or A-B for doors and where both surfaces will be exposed. PlyScord can be used for backing, structural parts. Where water may be encountered such as at sink counters, use only Exterior plywood. Exterior panels should also be used for all outdoor storage facilities.

If "natural" finish is used, select panels for appearance, grain pattern. Special "natural" finish item (INT-DFPA N-N) available ¾" thick for quality installations. For ultra-smooth paint finishes, overlaid panels may be used. See page 30.

APPLICATION: ¾" most popular for shelves, hinged cabinet doors; ⅝" or ½" also used. ¼" or ⅜" panels for small sliding doors. Select hardware suitable for plywood—do not nail or screw into plywood edges. Prime edges and paint both sides of cabinet doors with equal number of coats. Gluing plywood at joints gives extra strength.

EXTERIOR SIDING

—gable ends, soffits, fences



- GOOD LOOKING
- DURABLE
- EASY-TO-APPLY
- NO SHEATHING NEEDED

FOR ALL OUTDOOR APPLICATIONS USE ONLY EXTERIOR-TYPE PLYWOOD

®EXT-DFPA

EXT-DFPA
EXTERIOR TYPE
DOUGLAS FIR PLYWOOD
PLYSHIELD
GRADE A-C
DFPA
APPROVED QUALITY

ALSO
WSP
DFPA
APPROVED QUALITY

THREE "KINDS"—Three "kinds" of Exterior-type fir plywood may be used for siding, gable ends, soffits, fences, etc.

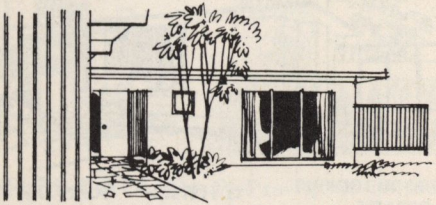
1. PLYSHIELD

The most popular standard grade for siding. Panels can be cut for wide lapped siding . . . placed vertically with wood strips for "board and batten" siding . . . used as flat panel siding with inset moldings.

⅜"-thick panels recommended and required for unsheathed walls (¼" may be used with sheathing for economy). Use non-corrosive nails. Seal all edges, use three coats top quality house paint; see "finishing," page 36.

2. OVERLAID PLYWOOD*

Smooth, durable fused resin-fiber surface that provides ideal paint base, prevents checking. May be used as for PlyShield grade. A second kind is an overlay of resin and wood fiber, hot-pressed to one or both sides of the panel.

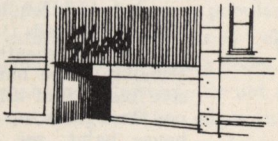


Texture One-Eleven® DFPA QUALITY

3. TEXTURE 1-11*

Popular new "grooved" siding. Very good looking. Economical.

Apply vertically for siding. Use 8d. galvanized casing nails. Drive flush—do not set. When nailed 4″ o.c. on panel edges and 8″ on intermediate studs, sheathing and diagonal bracing are not needed. Vertical edges shiplap—no special treatment needed. Horizontal joints may be lapped or shiplapped. Opaque shake or shingle stain recommended for T 1-11 siding. See "Finishing," page 38.

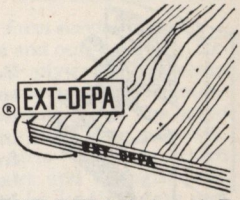


*Write DFPA for detailed information.

BOATS

—for all marine applications, use only Exterior-type fir plywood!

- **ADDS STRENGTH, RIGIDITY**
- **SPEEDS WORK, LESS CAULKING**
- **LIGHT, TIGHT**



GRADE DATA: Use EXT-DFPA A-A or A-B where both sides of panel will be in view. Where only one face will be in view, use PlyShield (A-C).

For hulls of racing craft and larger boats, Marine Exterior grade fir plywood should be used.

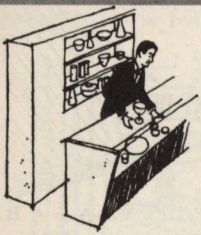
MARINE · EXT-DFPA

These panels have special inner ply construction of B veneer and limited core gaps. Glue bond is same as for other Exterior panels. Extra long panels available (see page 44).

APPLICATION: Use only plans which call for plywood. Edge-seal to reduce water absorption. Exposed edges (gunwales, etc.) should be set in rabbeted moldings and bedded in mastic. Fastenings should be rust-proof. Screws should be set flush rather than countersunk. Glued construction recommended. See "Finishing," page 38.

INDUSTRIAL USES

- STRONG, RIGID
- SMOOTH, DURABLE
- EASY TO WORK
- EASY TO FINISH



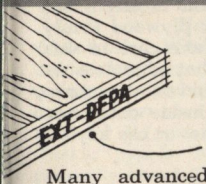
Versatile fir plywood cuts costs, improves construction in a wide range of industrial uses, ranging from signs and fixtures to boxcars and truck trailers. Fir plywood is also preferred for industrial remodeling, maintenance, and "housekeeping" jobs like pallets, temporary partitions and assembly tables.

Grade, thickness, fastening, etc., depends on use. Typical examples shown below.

TYPICAL USES	Ply-Panel (Int.)	Ply-Scord	Ply-Shield (Ext.)	Overlaid Plywood
Signs, indoor	X			X
Signs, outdoor			X	X
Displays	X			X
Counter tops				X
Counter facing	X			X
Shelving	X			X
Barricades	X	X		
Containers		X		
Shipping cases		X		
Shipping cases		X	X	
Tanks, Vats			X	X

FARM BUILDINGS

- ADDS STRENGTH, RIGIDITY
- SMOOTH, CRACK-FREE
- LABOR SAVING
- SEALS OUT DRAFTS



For all farm service building—indoors and out—use only Exterior fir plywood. For economy, lower appearance grades are recommended for most uses (See grade data, page 41). Many advanced-design farm buildings which capitalize on plywood's size and strength have been developed and tested by leading state universities and colleges of agriculture. Plans are available (see page 45).

TYPICAL DOUGLAS FIR PLYWOOD THICKNESSES FOR FARM SERVICE BUILDINGS

	FLOOR		WALLS		ROOF	
	Plywood Thickness	Joist Spacing	Plywood Thickness	Stud Spacing	Plywood Thickness	Rafter Spacing
Grain Bins*						
Round	3/8"	12"	1/4"** 3/8"		3/8"	24"
Rectangular	3/8"	12"	1/4"	12"	3/8"	24"
			3/8"	16"		
Corn Cribs*	3/8"	12"	3/8"	16"	3/8"	24"
Silos*	..	..	1/4", 3/8"		1/4", 3/8"	24"
Lining			1/4"		1/4"	
Horse Barn	..	..	1/2"	16"	3/8"	24"
Stall Partitions	..	..	3/4"	24"	..	..
Calf Barn	..	..	3/8"	16"	3/8"	24"
Loafing Barn	..	..	3/8"	16"	3/8"	24"
Milking Barn	..	..	3/8"	16"	3/8"	24"
Milk House	..	..	3/8"	16"	3/8"	24"
Hog Farrow Hse.	..	..	3/8"	16"	3/8"	24"
Portable Hse.	1/2"	16"	3/8"	16"	1/4"	16"
Wallow. Trough	5/8"	24"	1/2"	24"	..	..
Feeder	3/8"	24"	3/8"	24"	3/8"	24"
Poultry House	3/8"	16"	3/8"	24"	3/8"	24"
Port. Brooders	3/8"	16"	1/4"	24"	1/4"	24"

*Design of these structures depends on capacity and dimensions. Check with existing plans, especially for adequate nailing and bracing. ** 5/16" C-C Ext., Alternate.

HOW TO WORK FIR PLYWOOD

HAND SAWING For most work, 10 point cross-cut saw is best. Support plywood firmly, best side up. Take care in final inch of cut so that edge does not splinter. For curves, use sharp, fine-toothed coping saw. For inside cuts, start hole with drill, insert coping saw or use keyhole saw to make cut.

POWER SAWING For hand power sawing, support firmly as for hand sawing. Use a sharp combination blade for best results. Place panel so blade enters face. For table power sawing, place panel face up. Combination blade, filed with less than normal hook is best for most work. Set blade to protrude through panel ½ " or less.

DRILLING A brace and bit is generally best for cutting large holes. Support well, back with piece of scrap wood to prevent splintering. As point of bit appears, reverse panel, complete hole. For screws, nails, or making small-diameter holes, hand or power drills may be used.

ROUTING Routers can be used to vee-groove, shiplap or lip edges of panels. Special bits for molding and chamfering. Use sharp bits; take care when working across panel. Work from left to right. deep cuts in panel edges should be made in two stages. For specific instructions, see manufacturer's literature.

NAILING

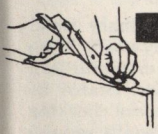
Plywood holds nails well. Nails can be placed near edge without splitting panel. For finish work, casing nails hold better than finish nails. Nailheads can be driven flush or set and filled. Where appearance is not important, use box or common nails. Spiral or ring-shanked nails give extra holding power. For exterior work, use non-corrosive nails to avoid rust. Use 4d nails for ¼"; 6d for plywood up to ⅜"; 8d for thicker panels. Nail spacing varies with job; generally about 6" on panel edges.

OTHER FASTENINGS

Screws, bolts and other special fastenings can be used. Holes for screws should be pre-drilled. Countersink with caution. When using bolts, use washers to give bearing surface.

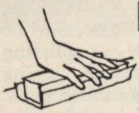
GLUING

Both edges and face can be glued. Make sure area to be glued is smooth, clean and free of dust. Apply glue to both pieces, press together firmly until "bead" squeezes out. Maintain pressure with clamps. Nails and screws can be used to hold pressure. For boat work or other uses permanently exposed to water or weather, use waterproof resorcinol type glues. For indoor jobs, animal, soybean or urea-type glues may be used. See glue manufacturer's instructions.



PLANING

In planing edges, plane in from end toward center. Use sharp blade with shallow set. Jackplane works well in cutting, smoothing and chamfering. For curved surfaces, hard-to-get-to places, easing edges, use block plane.



SANDING When finish sanding panel face, work with grain, using regular strokes, even pressure. Wrap paper around a block. For initial sanding on face, easing and smoothing edges, use No. 2 sandpaper or finer. For final sanding or sanding between paint coats, use No. 000 or steel wool. Hand power sanders can also be used.

BENDING

If one end of panel is to have abrupt curvature (e.g., boat bow), attach that end first. For critical bends, often two layers of thin panels are installed. Shorter radius may be reached (Exterior type only) by wetting or steaming but at greater risk of rupture and possible checking and grain raising. Use continuous rounded backing, such as bandsawn framing for better job and reduced risk of rupturing plywood.

APPROXIMATE MINIMUM BENDING RADII*

PANEL THICKNESS	APPROXIMATE MINIMUM RADIUS ACROSS GRAIN	APPROXIMATE MINIMUM RADIUS PARALLEL TO GRAIN
¼ inch	15 inches	24 inches
⅜ inch	36 inches	54 inches
½ inch	6 feet	8 feet
⅝ inch	8 feet	10 feet
¾ inch	10 feet	12 feet

*Due to variations in grain, texture, density, some panels cannot be bent to these sharp radii.

EXTERIOR FINISHING SUGGESTIONS

GENERAL. The best paint for ordinary wood siding is also best for Exterior plywood. High grade exterior house paints (TLZ or white lead and oil base) give excellent service. Stains do not provide a protective film, therefore checking may be expected. Natural finishes usually require extra maintenance.

EDGE-SEALING. All plywood edges should be sealed with a heavy coat of exterior primer. Prime back of panels in unusually damp localities. Inside parts of outdoor storage units, undersides of patio furniture, etc., should be given at least a primer for appearance and to protect wood. Doors should be given the same finish on both sides.

WATER REPELLENT. A brush or dip application of a top quality water repellent (toxic or nontoxic) to the bare wood will normally give additional protection and provide an improved base for the initial prime coat. For outdoor exposure the water repellent *should always* be used in addition to the regular number of paint coats.

PROCEDURE. The following 3-step system is recommended: (1) The primer coat is most important. A high-grade exterior primer, thinned 1 pt. pure linseed oil per gal., is recommended. (Note: If you use paint which manufacturer recommends *not* be thinned with linseed oil, follow directions on can.) Brush on prime coat. (2) and (3) apply second and third coats according to directions.

Top-quality 2-coat house paints also give good service, although the same dry film thickness as the 3-coat system is required for comparable weatherability.

Textured finishes, using oil or synthetic resin base paints containing mineral particles, asbestos fiber, etc., as part of the pigment have proved popular and satisfactory.

TEXTURE ONE-ELEVEN. When T 1-11 is used, a highly pigmented stain which blanks out most of the grain pattern is recommended. Shake or shingle paint will do the job. Depending on brand used and desired effect, use one or two coats. This type of finish is inexpensive and improves with age as the siding weathers.

If Texture One-Eleven is used indoors, stains, paint, enamel, or lacquer may be used.

MARINE FINISHES. On Exterior plywood boats, very satisfactory paint finishes are obtained by using high-grade marine primers, undercoats and finish coats. Seal edges and prime plywood well; for proper adhesion, be sure all paint coats are completely compatible. Finishes which retain some flexibility give best results.

INTERIOR FINISHING SUGGESTIONS

For best results, use top-quality materials, follow manufacturer's directions closely. Care in preparation and application gives more attractive finish. Clean all surfaces and fill nail holes and blemishes with spackle or wood paste. Sand lightly between coats.

PAINT OR ENAMEL. Conventional wall and woodwork paints and enamels may be used. (For surfaces which will be cleaned frequently, use washable paints or enamels.) *First*, brush on flat paint or enamel undercoat. Thin if desired. A brush or dip application of a top quality water repellent (toxic or nontoxic) to the bare wood will normally give additional protection and provide an improved base for the initial prime coat. *Second*, apply second coat of undercoat, tinted to shade of finish coat. Note: For gloss finish, mix equal parts flat undercoat and gloss enamel for second coat. *Third*, apply final coat as it comes from can. (A two-step finish without second undercoat may also be used.)

Interesting textured surfaces may be obtained by priming as above, followed by heavy coat of stippling paint. Use brush, roller or sponge to texture.

When using water-thinned paint, first seal plywood with clear resin sealer, shellac or flat white oil paint. Then paint according to directions on can for a sealed surface.

NATURAL FINISHES. For an easy, inexpensive "blond" finish, *first* apply coat of interior white undercoat thinned so grain pattern shows through. (Tint if you desire color). *Second*, apply clear shellac, flat varnish or lacquer.

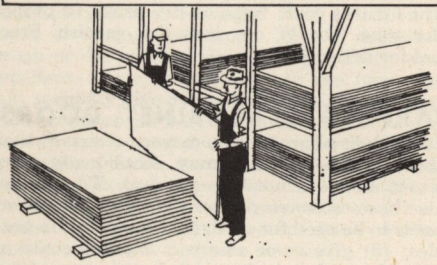
Attractive and economical one-coat stain-waxes are also available in various colors. If you prefer a dark stain, first apply coat of clear resin sealer to subdue grain contrast.

Here's a four-step system for luxurious light stain glaze: *First* apply white undercoat thinned with equal parts of turpentine or painter's thinner. Wipe or dry-brush for more grain show-through. *Second*, apply one coat thinned white shellac or clear resin sealer. Thin or omit if greater color penetration desired. *Third*, to provide color, apply interior undercoat or enamel thinned as in step one. Choose any color you want for this coat. Wipe or dry brush to proper color tone. *Fourth*, one coat flat varnish. Steel wool for added luster.

WARPING OF CABINET DOORS. Although fir plywood is more warp-resistant than other materials, panels may occasionally warp due to uneven moisture pick-up. To prevent this (1) *store panels flat* on solid base; (2) select panels to be used for straight, even grain on both sides; (3) give same number of paint coats on both sides and seal edges; (4) do not expect large panel to stay absolutely flat unless properly framed or reinforced. If panel is slightly warped before installation, place bowed face out.

STORAGE AND HANDLING

Fir plywood is a quality material and deserves care in storage and handling. The following suggestions will help keep the material in a better, more salable condition. Store panels indoors or under cover where they will keep dry. Panels should be stacked on a solid bed rather than stored on end. Faces may darken if exposed to direct sunlight; use "cover" panel to avoid. If fork lift truck is used to move stacks, use pallet to avoid damaging bottom panel.



FIR PLYWOOD GRADE-USE GUIDE

Exterior-type for all outdoor and marine uses, as well as application permanently exposed to water or weather.

FOR STANDARD GRADES ONLY: SEE PAGES 43, 44 FOR INFORMATION ON SPECIALTY PANELS

Grade-Trademark	Typical Use	Veneer Quality*			Standard Stock Sizes**							
		Face	Back	Inner Plys	Width Feet	Length Feet	Thickness (inches)*** ¼	5/16	3/8	½	5/8	¾	1
EXT-DFPA A-A	Permanent outdoor uses where appearance of both sides is important. Outdoor furniture, fences, carport enclosures, signs, boats.	A	A	C	4	8	x		x	x	x	x	x
EXT-DFPA A-B	Alternate for A-A grade where appearance of one side is less important	A	B	C	4	4	x		x	x	x	x	x
EXT-DFPA PLYSHIELD	"One side" grade for siding, soffits, fences, store fronts.	A	C	C	4	8	x		x	x	x	x	x
EXT-DFPA UTILITY	As name indicates, a utility outdoor building panel. Farm buildings, etc.	B	C	C	4	8	x		x	x	x	x	
EXT-DFPA UNDERLAY-MENT	Base for tile, linoleum, etc. Backing for wall coverings. For application where unusual moisture conditions exist.	C (Rep'd)	C	C	4	8	x		x	x	x	x	
EXT-DFPA SHEATHING	Unsanded construction panel with waterproof bond. Backing or rough construction exposed to weather or excess moisture.	C	C	C	4	8		x	x	x	x	x	
EXT-DFPA PLYFORM	Concrete form grade for maximum re-use. Can be re-used until wood is literally worn away. Edge sealed and mill oiled.	B	B	C	4	8						x	x

INTERIOR-TYPE FOR INDOOR OR STRUCTURAL USE

Grade-Trademark	Typical Uses	Veneer Quality*			Standard Stock Sizes**						
		Face	Back	Inner Plys	Width Feet	Length Feet	Thickness (inches)*** ¼	5/16	⅜	½	⅝	¾
INTERIOR A-A DFPA	All interior applications where both sides to be in view. Cabinet doors, built-ins, furniture.	A	A	D	3, 4	8	x		x	x	x	x
INTERIOR A-B DFPA	For all inside uses requiring one surface of highest appearance and opposite side solid and smooth. Alternate for A-A.	A	B	D	3, 4	8	x		x	x	x	x
PLYPANEL	The many-purpose "one side" material for interior uses. Paneling, built-ins, backing and underlayment, counters, fixtures, displays, cut-outs.	A	D	D	3, 4	8	x		x	x	x	x
INTERIOR B-D DFPA	Utility panel for uses requiring one smooth, solid side. Backing, cabinet sides.	B	D	D	4	8	x		x	x	x	x
PLYBASE	Underlayment grade. Base for tile, linoleum, carpeting.	C (Rep'd)	D	D	4	8	x		x	x	x	x
PLYSCORD	Unsanded sheathing or structural grade. Wall and roof sheathing, subflooring. Temporary enclosures, containers, barricades.	C	D	D	4	8		x	x	x	x	x
PLYSCORD Exterior Glue	Same as above (PlyScord), but with the waterproof glue used in Exterior grades. Not normally a substitute for Exterior plywood.	C	D	D	4	8		x	x	x	x	x
Interior PLYFORM	Re-usable concrete form plywood. Edge sealed and mill oiled.	B	B	C	4	8					x	x
2.4.1.	New combination subfloor and underlayment for tile, linoleum, carpeting, and wood-strip flooring. Used on 4' span grid system.	C (Rep'd)	D	D	4	8	1⅛ only					

*All grades sanded both sides except EXT-DFPA Sheathing and Interior PlyScord.

**Other sizes than those shown in tables are standard but are not normally stocked. See page 44 for Handy Panels, long lengths.

***¼" and thinner panels have minimum of 3 plys; ½" to ¾" inclusive are 5-ply minimum; thicker panels have 7-ply minimum.

SPECIALTY PLYWOODS

Produced under the DFPA quality-control program.

NAME	DESCRIPTION	USES	STANDARD STOCK SIZES* Width	Length	Thickness
Texture One-Eleven	Exterior plywood with pattern of deep parallel grooves, slightly rough (unsanded). Grooves ¼" deep, ⅜" wide, Edges shiplapped. EXT-DFPA.	Siding, gable ends, patio fences, interior paneling, ceilings, displays.	16" (grooves 2" o.c.) 32" & 48" (grooves 4" o.c.)	8', 10'	⅜"
Special Surfaces	Wood grain of panel face accented to create dimension. Includes striated, embossed, brushed. Exterior and Interior.	Interior paneling, built-ins, counter facing, displays, gable ends, siding.	4'	8'	5/16", ⅜"
Medium-density Overlaid Plywood	Exterior plywood, smooth, resin-fiber overlay. Highly paintable, blanks out grain.	Exterior siding, soffits, etc. Kitchen cabinets, signs.	4' also precut to 12", 16", 24" siding widths.	8'	⅜", ½" ⅝", ¾"
High-density Overlaid Plyw'd	Exterior plywood with hard, translucent overlay. Durable, paintable.	Concrete forms, signs, cabinets. Industrial uses.	4'	8'	⅜", ½" ⅝", ¾"
Plyron ®	Hardboard faced plywood. Combines strength of plywood with hardboard. Exterior and Interior types.	Cabinet doors, built-ins. Counters, shelving. Concrete forms.	4'	8'	½", ⅝" ¾"
Natural finish** grades INTERIOR N-N	Cabinet grade panels, with both sides of select, all-heartwood veneer. For natural or stain finishes. Interior only.	Cabinet doors, built-ins, furniture. Natural finish.	4'	8'	¾"
INTERIOR N-D DFPA	Natural finish paneling with one side of select, all-heartwood veneer.	Paneling	4'	8'	¼"
MARINE EXTERIOR	For use in boat hulls and superstructures, Waterproof glue. Available in A-A, A-B, B-B, High Density Overlay and Medium Density Overlay faces. B grade inner plys. Available in standard sizes and thicknesses. Long Lengths also available.	Boat hulls, cabins, etc. See "Boats," page 31.	Standard sizes and King Size panels. See page 44.		

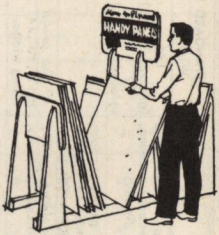
*Other sizes than shown are available but are not normally stocked.

**See "N" veneer, page 15.

PLYWOOD SIZES

Three-fourths of all fir plywood is in 4′ x 8′ panels; other sizes standard. Most thicknesses are from ¼ ″ to ¾ ″ inclusive.

HANDY PANELS



Small Handy Panels are DFPA grademarked in stock 2′ x 4′ and smaller sizes. Both Exterior (EXT-DFPA) and Interior types (INT-DFPA) in all popular thicknesses.

Over 28 per cent of all dealers sell small-size panels to advantage. Handy Panel rack (available through jobbers or DFPA) acts as combined display piece, plywood rack, silent salesman.

KING SIZE PANELS

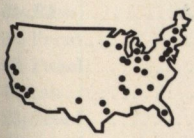
Extra long or extra-wide scarf-jointed panels available for boat hulls, siding, etc. Most are 14′, 16′ and 20′ lengths; up to 40′ can be made.

SALES AIDS

A complete line of dealer sales aids, including displays, window banners, ad mats, radio and TV commercials, envelope stuffers, plans and other literature are available from DFPA as well as plywood distributors. Also available are special Handy Panel racks (see page 45), outdoor signs, etc. Write for further information; outline specific needs where possible.

In addition, plans are available for dealer distribution covering a wide range of subjects including kitchens, toys, furniture, boats, built-ins, storage units. Single copies furnished without charge. Write DFPA, Tacoma 2, Washington for complete list and order forms.

FIELD REPRESENTATIVES



DFPA Field Promotion Representatives are stationed throughout the country and are available for special dealer meetings and to help individual dealers work out sales and promotion problems. Their locations are shown on the map. For more information write DFPA headquarters at Tacoma, Washington.

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