



General Criteria

200-G-1

Scope

Includes:

The purpose of this section is to define, describe, illustrate, and establish quality grades of all the panel products used throughout this standard.

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There are a great variety of panels manufactured with differences in core materials, adhesives or binders, forming techniques, surface treatments, etc., which affect characteristics of the panels.

In addition, constant research gives rise to the production of new panel products. These new products are usually accompanied by data on test results of important characteristics for end-use purposes. In selecting new panel products for architectural woodworking, such data should be considered with reference to the Standards contained in this section.

Many prefinished wood panels and decorative overlays have aesthetic and performance characteristics that meet or exceed these standards, and should be evaluated, approved, and specified by the design professional when desired.

Excludes:

Solid lumber edge glued into a panel which is defined in Section 100. Adjoining cabinet doors and drawer faces which are described in Section 400. The matching of adjoining panels when used as wall paneling which is defined and illustrated in Section 500.

200-G-2

Types of Panel Cores

There are a wide range of core materials available for the fabrication of architectural woodwork. The primary core materials are covered in this standard as follows.

INDUSTRIAL GRADE PARTICLEBOARD CORE — WOOD PARTICLES OF VARIOUS SIZES THAT ARE BONDED TOGETHER WITH A SYNTHETIC RESIN OR BINDER UNDER HEAT AND PRESSURE.

Medium Density Industrial Particleboard is used in the broadest applications of architectural woodwork. It is especially well suited as a substrate for high quality veneers and decorative laminates.

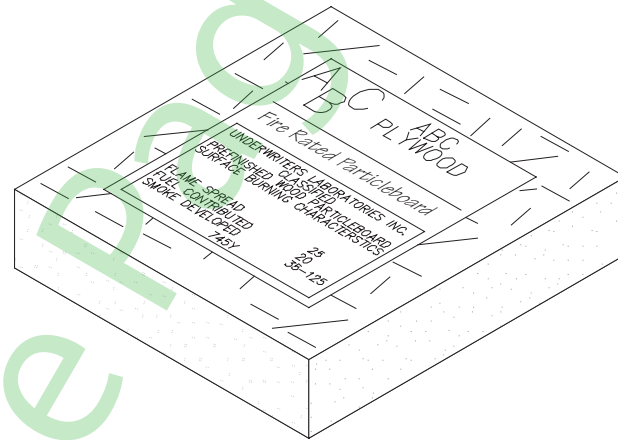
When used as panels without any surface plies, the product is referred to as particleboard. *When used as an inner core with outer wood veneers, the panel is referred to as particle core plywood.* Industrial particleboard is commercially classified by “density,” which is measured by the weight per cubic foot of the panel product.

- Low Density [LD series] = generally less than 640 kg per m³ (40 pounds per ft³)
- Medium Density [M series] = generally between 640-800 kg per m³ (40-50 pounds per ft³)
- High Density [H series] = generally above 800 kg per m³ (50 pounds per ft³). Rarely used for woodwork.

MOISTURE RESISTANT PARTICLEBOARD CORE

Some Medium Density Industrial Particleboard is bonded with resins more resistant to swelling when exposed to moisture. The most common grades are ANSI 208.1-1999 Type M-2-Exterior Glue and M-3-Exterior Glue. Availability to the architectural woodworker is limited in some markets.

FIRE-RETARDANT PARTICLEBOARD CORE



Fire-Retardant Core - Figure 200-01

Some Medium Density Industrial Particleboard has been treated during manufacture to carry a UL stamp for Class I fire rating (Flame spread 20, Smoke developed 450). This material is often used as a substrate for paneling requiring a Class I rating. Fire-retardant Medium Density Fiberboard is also available in some markets.

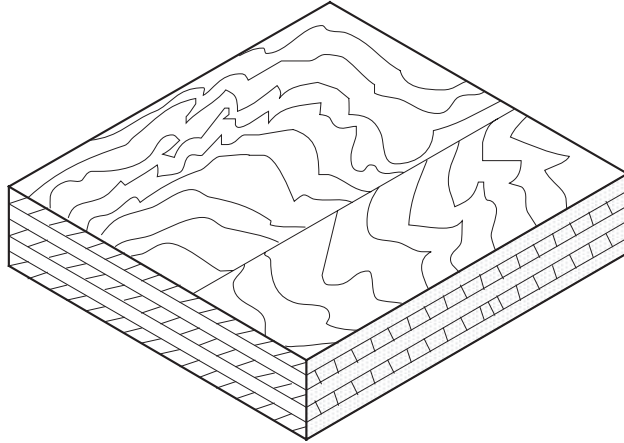
MEDIUM DENSITY FIBERBOARD (MDF) CORE — WOOD PARTICLES REDUCED TO FIBERS IN A MODERATE PRESSURE STEAM VESSEL, COMBINED WITH A RESIN, AND BONDED TOGETHER UNDER HEAT AND PRESSURE.

Due to the finer texture of the fibers used in manufacturing Medium Density Fiberboard (MDF) it is smoother than Medium Density Particleboard. The uniform texture and density of the fibers create a homogenous panel that is very useful as a substrate for paint, thin overlay materials, veneers and decorative laminates. MDF is among the most stable of the mat-formed panel products. *When used as an inner core with outer wood veneers, the panel is referred to as MDF core plywood.*

MOISTURE RESISTANT MDF CORE

Some MDF is made to meet the ANSI 208.2-2002 reduced thickness swell criteria. Availability to the architectural woodworker is limited in some markets.

VENEER CORE — THREE OR MORE LAYERS (PLIES) OF WOOD VENEERS PRESSED AND GLUED INTO A SINGLE SHEET.



Veneer Core - Figure 200-02

What many think of as traditional “plywood,” a panel made up of alternating layers of thin veneers, is called veneer core. Adhesive is placed between the veneer layers, and the panels are assembled under heat and pressure until the adhesive is set. The two outside layers of veneer are often selected for species, grain, and appearance; and are called the “face veneers.”

COMBINATION CORE - A BALANCED BLEND OF PARTICLEBOARD OR FIBERBOARD WITH VENEER LAYERS.

A combination of veneer core and particleboard/fiberboard core technologies, utilizing some of the advantages of each. This material should be evaluated and approved by the customer. Many products will meet these standards.

HARDBOARD CORE - HARDBOARD IS DEFINED AS INTER FELTED FIBERS CONSOLIDATED UNDER HEAT AND PRESSURE TO A DENSITY OF 500 KG PER M³ (31 POUNDS PER CUBIC FOOT) OR GREATER.

Often used for casework backs, drawer bottoms, and divider panels, hardboard is available with either one side (S1S) or two sides (S2S) smooth. There are typically two types of hardboard core used by architectural woodworkers: Standard (untempered) and Tempered, which is standard hardboard subjected to a curing treatment increasing its stiffness, hardness, and weight.

AGRIFIBER CORE - PANEL PRODUCTS MADE FROM STRAW AND SIMILAR FIBER ARE APPEARING IN THE MARKETPLACE. BOARDS WHICH MEET THE ANSI 208.1 OR 208.2 STANDARDS FOR MEDIUM DENSITY ARE ACCEPTABLE FOR USE UNDER THIS STANDARD.

THE CHARACTERISTICS OF AGRIFIBER CORE MATERIAL PERFORMANCE VARY BY MANUFACTURER, AND ARE NOT INCLUDED IN THE FOLLOWING TABLE.

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200-G-3

Characteristics of Core Material Performance

NOTE: It is important for the reader to understand the difference between “flatness” and “dimensional stability” characteristics. Particleboard and MDF are the recommended substrates for high pressure decorative laminate and wood veneer work because of their excellent flatness. Fair dimensional stability (expansion/contraction in panel size) is acceptable unless the product is exposed to wide swings in relative humidity, generally below 20% or above 80% with swings of more than 30 points.

Panel Core Type	Flatness	Visual Edge Quality	Surface Uniformity	Dimensional Stability	Screw-holding	Bending Strength	Availability
Industrial Particleboard (Medium)	Excellent	Good	Excellent	Fair	Fair	Good	Readily
Medium Density Fiberboard (MDF)	Excellent	Excellent	Excellent	Fair	Good	Good	Readily
Veneer	Fair	Good	Fair	Excellent	Excellent	Excellent	Readily
Lumber	Good	Good	Good	Good	Excellent	Excellent	Limited
Combination Core with composite crossbands	Excellent	Good	Excellent	Good	Excellent	Excellent	Limited
Combination Core with composite inner ply	Good	Fair	Good	Good	Good	Good	Limited
Moisture Resistant Particleboard	Excellent	Good	Good	Fair	Fair	Good	Limited
Moisture Resistant MDF	Excellent	Excellent	Excellent	Fair	Good	Good	Limited
Fire Rated Particleboard	Excellent	Fair	Good	Fair	Fair	Good	Limited

Notes: Various characteristics above are influenced by the grade and thickness of the core and specific gravity of the core species. Visual Edge Quality is rated before treatment with edge bands or fillers and Visual Edge Quality of lumber core assumes the use of “clear edge” grade. Surface Uniformity has a direct relationship to the performance of fine veneers placed over the surface. Dimensional Stability is usually related to exposure to wide swings in relative humidity. Screw-holding and Bending Strength are influenced by proper design and engineering.

200-G-4

Plywood

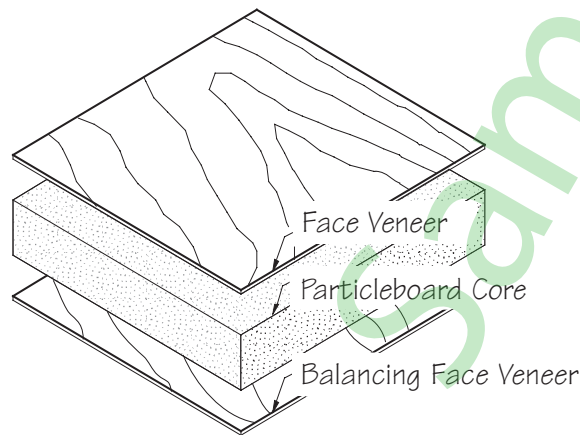
The term “plywood” is defined as a panel manufactured of three or more layers (plies) of wood or wood products (veneers or overlays and/or core materials), generally laminated into a single sheet (panel). Plywood is separated into two groups according to materials and manufacturing:

Hardwood plywood - manufactured of hardwood or decorative softwood veneers over a core material, such as medium density particleboard, medium density fiberboard, low density lumber, and/or other veneers.

Softwood plywood - Panels manufactured with softwood face veneers are described in standards published by the APA-The Engineered Wood Association. Softwood plywood is seldom incorporated into finished architectural woodworking project, except to achieve specific design aesthetics. Softwood (construction) plywood is not recommended for use as a core material due to poor stability and core voids.

Panel Construction Balance

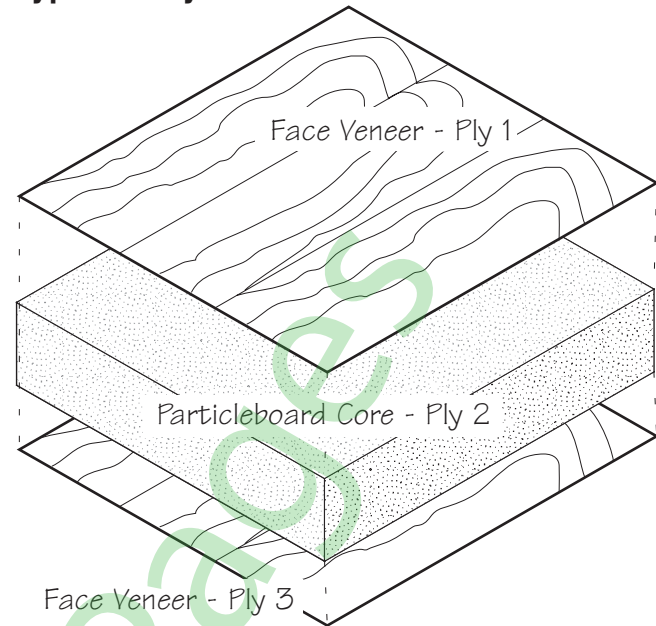
To achieve balanced construction, panels must be an odd number of layers (plies) symmetrical from the center line, i.e., all inner plies, except the innermost ply, should occur in pairs, using materials and adhesives on both sides that contract and expand, or are moisture permeable, at the same rate. A ply may consist of a single veneer, particleboard, medium density fiberboard, or hardboard. Each pair of inner plies should be of the same thickness and direction of grain. Each ply of each pair is placed on opposite sides of the innermost ply or layer, alternating grain directions from the center out. (Particleboard and MDF do not have a specific grain orientation.)



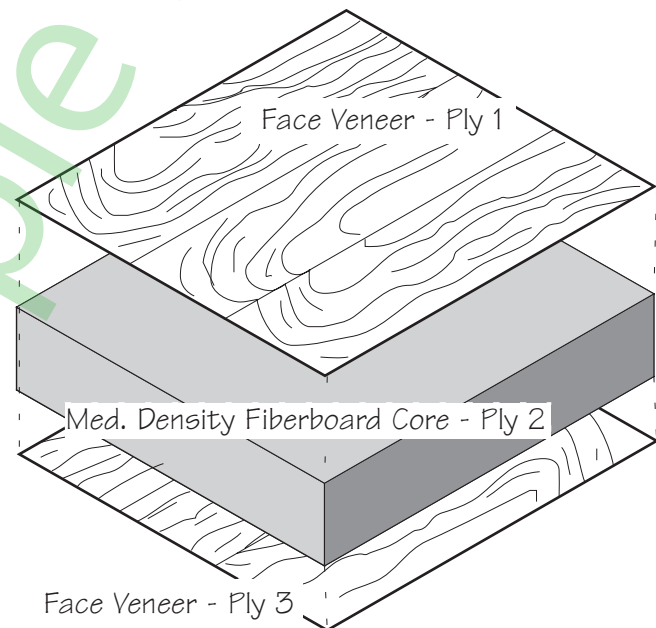
Balanced Construction - Figure 200-03

General Rules: The thinner the facing material, the less force it can generate to cause warping. The thicker the substrate, the more it can resist a warping movement or force.

Types of Plywood



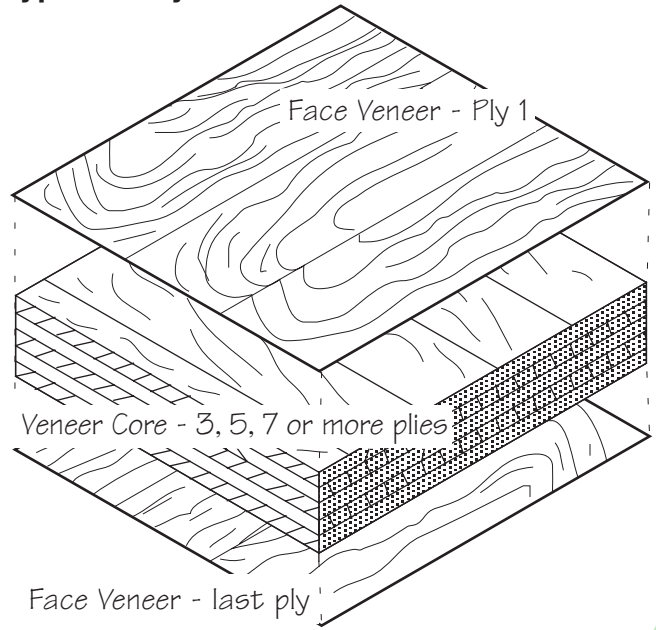
Particleboard Core Plywood - Figure 200-04



Medium Density Fiberboard Core Plywood - Figure 200-05

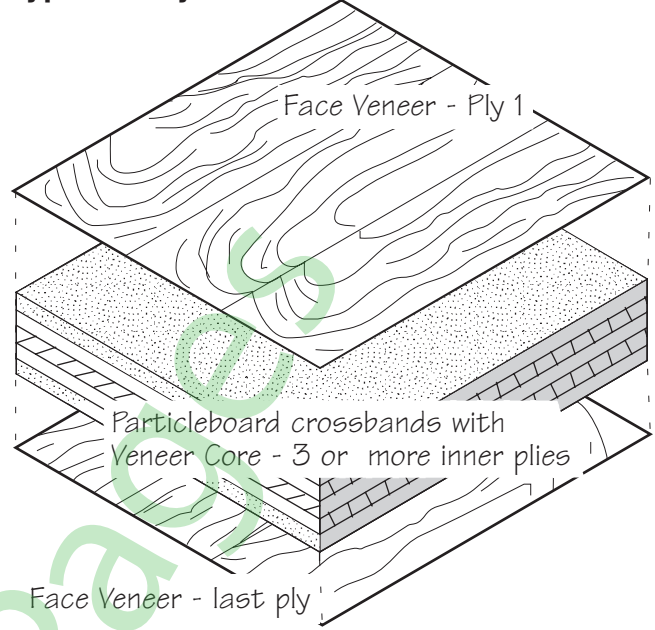


Types of Plywood



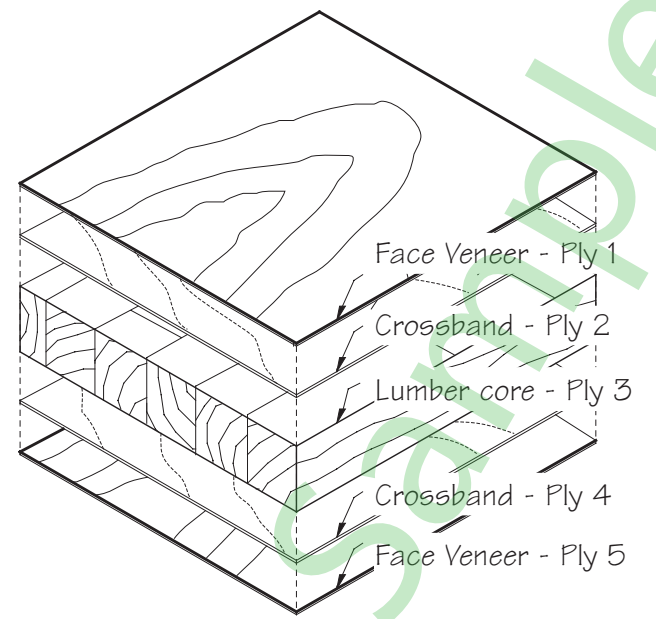
Veneer Core Plywood - Figure 200-06

Types of Plywood

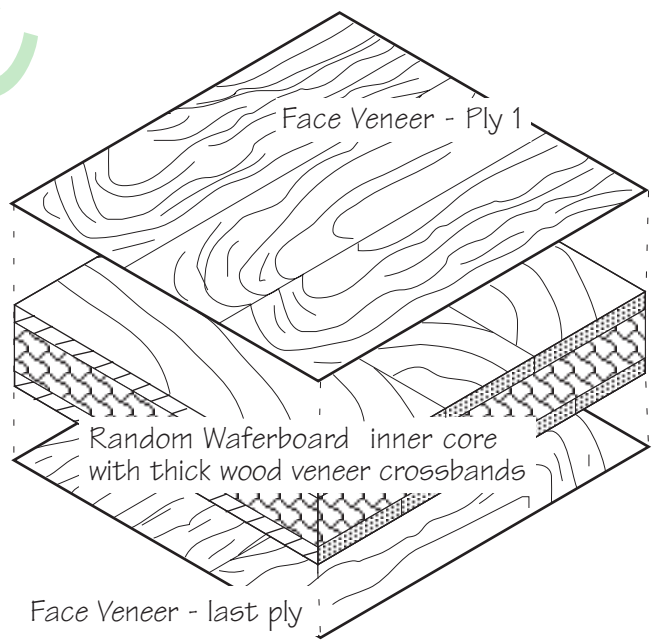


Combination Core Plywood - Figure 200-08

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Lumber Core Plywood - Figure 200-07



Combination Core Plywood - Figure 200-09



200-G-5

Types of Facing Materials

Wood Veneers

Wood veneer is produced by veneer manufacturers in a variety of "industry standard" thicknesses. The slicing process is controlled by a number of variables. The thickness of the raw veneer has little bearing on the ultimate quality of the end product so long as show-through and sand-through is avoided.

HARDWOOD VENEER

Species: Available in many domestic and imported wood species.

Cut: Normally cut as plain sliced. Rift sliced and quarter sliced available in certain species at additional cost. Some species available as rotary cut.

SOFTWOOD VENEER

Species: Most common is Douglas-fir; Pines are available; other softwoods in limited supply.

Cut: Most softwood veneer is Rotary cut. Plain sliced softwood veneer and "vertical grain" (quarter sliced) softwood veneer are limited in availability with the long lead times and higher prices associated with special orders.

Decorative Laminates, Overlays, and Prefinished Panel Products

Decorative surfacing materials are often applied to wood product substrates such as industrial particleboard, fiberboard, hardboard, etc.. Terminology and definitions of these overlay products follow, broadly grouped as:

Thermoset Decorative Overlay

Decorative thermally fused panels flat pressed from a thermoset polyester or melamine resin-impregnated web. Most products are pre-laminated to Industrial Particleboard or Medium Density Fiberboard substrates when they arrive at the woodwork fabricator. Performance characteristics are similar to High Pressure Decorative Laminate.

Medium Density Overlays

Pressed resin-impregnated paper overlays, highly resistant to moisture, applied to suitable cores for both interior and exterior uses. The seamless panel face and uniform density furnishes a sound base for opaque finishes and paint.

Thermoplastic Sheet

Semirigid sheet or roll stock extruded from a nonporous acrylic/polyvinylchloride (PVC) alloy solid color throughout. Withstands high impact. Minor scratches and gouges are less conspicuous due to the solid color. Thickness ranges from 0.7 mm [.028"] to 6.4 mm [.250"]. Not recommended for horizontal surfaces where hot items may be placed and in areas near heat sources.

High Pressure Decorative Laminates

Resin-impregnated kraft paper substrates with decorative plastic face materials and a clear protective top sheet, formed under heat and pressure. The assembly offers resistance to wear and many common stains and chemicals. Common uses include casework exteriors, countertops, and wall paneling.

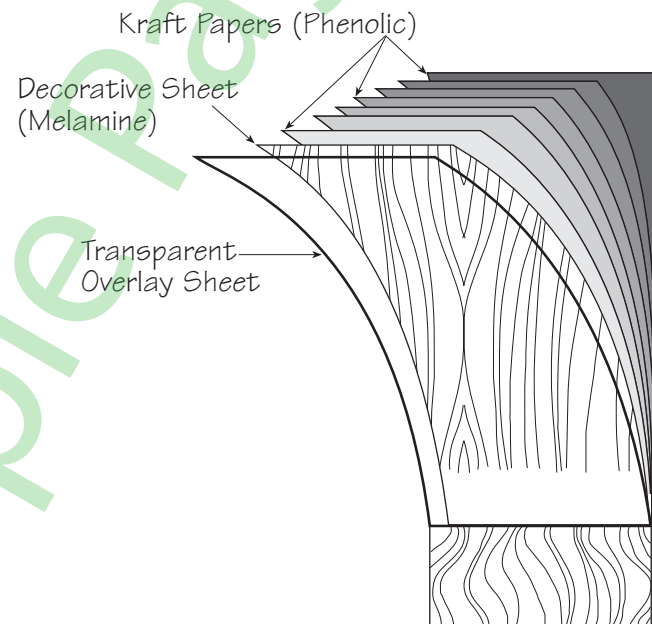


Figure 200-10 - HPDL Elements

Vinyl Films

Polyvinyl chloride (PVC) film, either clear or solid color, used extensively for decorative vertical surfaces in mobile homes, recreational vehicles, commercial panels and movable walls. Product thicknesses range from 0.5 mm to 8 mm. Some films are available with scuff-resistant top coatings. (Of limited use in custom architectural woodworking.)



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