

AERONAUTICAL MATERIAL SPECIFICATION

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AMS 39 21

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Revised

PLYWOOD; MEDIUM DENSITY

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1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. **FORM:** Flat panels.
3. **APPLICATION:** For use where moderate strength characteristics are required, such as panelling and sheathing of shipping containers.
4. **MATERIAL AND FABRICATION:** Laminated wood veneers bonded with synthetic resin glue, in accordance with the following:
 - (a) **Wood Species.** - Unless otherwise specified, shall be one or a combination of the following species:
 - Douglas Fir
 - Birch
 - Gumwood
 - Southern Yellow Pine
 - (b) **Glue.** - Shall be of either cold-setting or hot-press, thermosetting synthetic resin type, and shall be resistant to the formation and growth of molds and fungi.
 - (c) **Number and Arrangement of Plies.** - Plywood shall consist of an odd number of plies. All plies, except the center ply, shall occur in pairs and the two plies of each pair shall be of the same species, thickness and direction of grain, and placed on opposite sides of the center ply. The grain of each ply shall be essentially at right angles to that of adjacent plies and to the edges of finished panel. The grain of face plies shall be essentially parallel to the long dimension of the finished panel. No single ply shall be greater than 0.313 inch in thickness.
 - (d) **Seams.** - Seams in individual plies are permissible provided that the following requirements are met:
 - (1) All joints in face plies shall be close with no overlapping.
 - (2) Joints parallel to the grain of a given ply may be either butt or scarfed and shall be essentially parallel to the grain of both veneers.
 - (3) Joints perpendicular to the grain of a given ply shall be scarfed and shall be essentially at right angles to the grain of both veneers.
 - (4) Metal staples shall be used only when no other means of fastening is practicable; such staples shall be removed from finished panels.

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5. **TECHNICAL REQUIREMENTS:** Shear strength and Wood Failure.- Shear test specimens shall show wood failures not less than the following percentages of the shear areas for the average shear strengths found; values shall be based on tests of 5-15 specimens for each condition (dry and wet):

Shear Strength, psi, ave	Wood Failure, % min	
	Individual	Average
Under 250	30	60
250 - 350, incl.	10	30
Over 350	10	15

In addition, specimens tested wet shall show no delamination or separation at glue lines at any time.

(a) **Test Method.**-Specimens shall be prepared and tests shall be conducted in accordance with ASTM D805-45T, Sections 68-73, inclusive.

(b) **Conditioning.**- Specimens to be tested dry shall be suitably conditioned if necessary, to have a moisture content of 8-12%. Specimens to be tested wet shall be completely submerged in boiling water for 4 hours, dried for approximately 20 hours at $140\text{ F} \pm 5$, resubmerged in boiling water for 4 hours, removed and placed in cold water until cooled to approximately room temperature and then tested while still water-soaked.

6. **QUALITY:** (a) **Veneer.** - Veneer for face plies shall be firm and smoothly cut, and free from knots, splits, pitch pockets and other open defects; streaks, discolorations, sapwood, shims and neatly made patches will be permitted. Veneer for center plies may contain gaps and voids provided they do not materially impair the strength or serviceability of the panel into which such veneer is incorporated.

(b) **Plywood.** - Finished panels shall be smooth, flat and free from blisters, wrinkles and laps, from dried glue, oil, wax and other materials detrimental to adhesion of glue or paint finishes, and from internal and external defects detrimental to fabrication or to performance of parts. Sanding is permissible provided thickness of panel is not less than the minimum permitted by allowable tolerances. Plywood in which defects are revealed during fabrication will be subject to rejection.

7. **TOLERANCES:** Unless otherwise specified, tolerances shall conform to the following requirements; thickness tolerances apply to plywood having a moisture content of 8-12%:

(a) **Thickness.** - A tolerance of ± 0.016 inch will be allowed on thickness of panels.

(b) **Length, Width and Squareness:** A tolerance of ± 0.031 inch will be allowed on length and on width of panels. Panels shall be square within 0.125 inch.

8. **REPORTS:** (a) Unless otherwise specified, the vendor of plywood shall furnish with each shipment three copies of a notarized report showing the results of tests to determine conformance to the requirements of this specification, or stating that the plywood conforms to the requirements specified. This report shall include the purchase order number, material specification number, size and quantity.