

Thermally Fused Laminate (TFL) Melamine on Particleboard – Technical Material Specification

1.0 Material Overview & Common Uses

Thermally Fused Laminate (TFL) melamine on particleboard is a composite panel product consisting of a particleboard core overlaid with a decorative melamine-impregnated paper that is fused to the substrate under heat and pressure. The melamine resin provides a hard, durable, and moisture-resistant surface that is resistant to scratches, stains, and fading. This material is widely used in the Canadian furniture and cabinetry industry for applications such as ready-to-assemble (RTA) furniture, office desking, shelving, kitchen cabinets, closet organizers, and retail fixtures. It offers a cost-effective alternative to high-pressure laminate (HPL) while maintaining excellent surface performance for indoor, dry-environment use.

2.0 Core Technical Properties & Sizing

- Core density: 640–720 kg/m³ (particleboard substrate per ANSI A208.1 Grade M-2 or M-3).
- Overall panel thickness tolerance: ± 0.3 mm for standard 18 mm panels; ± 0.5 mm for panels 25 mm and above.
- Standard panel sizes: 4 ft x 8 ft (1220 mm x 2440 mm), 5 ft x 8 ft (1525 mm x 2440 mm), and 4 ft x 10 ft (1220 mm x 3050 mm).
- Squareness tolerance: diagonal difference ≤ 2 mm for a 4 ft x 8 ft panel.
- Surface hardness (Janka): typically 600–800 N (melamine surface provides a hard, scratch-resistant finish).
- Melamine wear resistance: meets or exceeds NEMA LD-3 Class 2 (general use) or Class 3 (vertical use) standards.
- Moisture content of core: 5–9% at time of manufacture.
- Formaldehyde emission: meets CARB Phase 2 / TSCA Title VI (≤ 0.09 ppm) and Canadian CSA O160 standards.
- Surface gloss level: typically 10–30 gloss units (matte to semi-gloss) per ASTM D523.

3.0 Processing, Machinability & Application

TFL melamine on particleboard is machinable with standard woodworking tools, but the melamine surface requires carbide-tipped or diamond-coated tooling to prevent chipping and edge blowout. The material is suitable for sawing, routing, drilling, and edgebanding. Due to the brittle nature of the melamine surface, feed rates must be controlled to avoid cracking or delamination. Dust extraction is critical as particleboard dust contains respirable crystalline silica and wood dust.

- Sawing: Use a triple-chip grind (TCG) carbide-tipped saw blade with 60–80 teeth for a 10-inch blade; feed rate 10–15 m/min; score saw recommended to prevent chipping on the bottom face.
- Routing: Use compression spiral router bits (up-cut and down-cut geometry) to minimize edge chipping; spindle speed 18,000–22,000 RPM; feed rate 4–6 m/min.
- Drilling: Use brad-point or carbide-tipped drill bits; drill speed 2,000–3,000 RPM; peck drilling recommended for holes deeper than 20 mm to clear chips.
- Edgebanding: Apply PVC, ABS, or melamine edgebanding using hot-melt adhesive (EVA or PUR) at 180–200°C; ensure edgeband thickness matches panel thickness within ± 0.1 mm.
- Gluing: Use PVA (polyvinyl acetate) or PUR adhesive for bonding; clamp pressure 0.5–1.0 N/mm²; cure time 24 hours at 20°C.

- Sanding: Avoid sanding the melamine surface as it will remove the decorative layer; only sand edges or cut faces if required, using 120–180 grit paper.
- Fastening: Pre-drill for screws to prevent surface cracking; use particleboard screws with coarse threads; pilot hole diameter 75% of screw root diameter.

4.0 Common Defects & Quality Control

- Reject if melamine surface has visible scratches, bubbles, or delamination over 2 mm in diameter when viewed under 2x magnification.
- Reject if edge chipping exceeds 1 mm depth on any cut edge after machining.
- Reject if panel is warped or bowed more than 1.5 mm over a 1 m span (measured on a flat surface).
- Reject if core has visible voids, soft spots, or loose particle clusters that affect structural integrity.
- Reject if colour or gloss variation between panels exceeds ΔE 1.0 (CIE Lab colour space) under D65 illuminant.
- Reject if moisture content of core exceeds 10% at time of delivery.
- Reject if formaldehyde emission exceeds 0.09 ppm per CARB Phase 2 test method.
- Reject if surface is not uniform in texture or has visible contamination (oil, dirt, adhesive residue).

5.0 Storage, Handling & WHMIS Guidelines

- Store panels flat on a level surface, stacked with uniform support (at least 3 stringers per 8 ft length) to prevent warping.
- Maintain storage environment at 18–24°C and 35–50% relative humidity; avoid direct sunlight and moisture exposure.
- Shelf life: 12 months from date of manufacture when stored under recommended conditions; use FIFO (first-in, first-out) inventory rotation.
- WHMIS classification: Particleboard dust is classified as a hazardous material under WHMIS 2015 (GHS). Dust is a respiratory sensitizer (Category 1) and may cause cancer (Category 1A) if inhaled over prolonged periods.
- Mandatory PPE during machining: NIOSH-approved N95 or P100 respirator, safety glasses with side shields, hearing protection (if noise > 85 dBA), and cut-resistant gloves (ANSI A2 or higher) for handling.
- Use local exhaust ventilation (LEV) with a minimum capture velocity of 1 m/s at the point of dust generation.
- Do not use compressed air to clean surfaces or clothing; use HEPA vacuum or wet cleaning methods.
- Wash hands thoroughly after handling; do not eat, drink, or smoke in work areas.
- First aid: If dust contacts eyes, flush with water for 15 minutes; if skin irritation occurs, wash with mild soap and water; if inhaled, move to fresh air and seek medical attention if symptoms persist.

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