Melamine Panel Scratch Resistance Test

1.0 Objective & Quality Standard

The objective of this procedure is to verify that the melamine surface of finished panels resists scratching under a defined load, ensuring the coating meets durability standards for cabinet and furniture applications.

Acceptable Quality Standard: No visible scratch or surface disruption under normal lighting conditions after applying a 5N load with a standardized scratch tool. Any visible scratch, whitening, or groove constitutes a defect.

2.0 Required Tools & Gauges

- Calibrated scratch tool with a hardened steel tip (radius 0.5mm ±0.05mm)
- Digital force gauge (range 0-10N, resolution 0.1N) or calibrated spring scale
- Clean, lint-free microfiber cloth
- Inspection light source (LED, 4000K, positioned at 45° angle)
- Magnifying glass (5x) for detailed inspection
- Test sample (finished melamine panel, minimum 100mm x 100mm)

3.0 Safety & Material Handling

- Wear clean, lint-free gloves when handling test panels to avoid oil or dirt contamination.
- Place panels on a clean, soft work surface to prevent accidental scratches during testing.
- Ensure the scratch tool tip is free of burrs or debris before each test.
- Do not apply excessive force beyond the specified 5N load to avoid damaging the tool or panel.

4.0 Step-by-Step Procedure

1. Select a finished melamine panel that is representative of the production batch. Ensure the surface is clean and free of dust or grease.
2. Place the panel on a flat, stable work surface. Use a soft mat underneath to prevent movement.
3. Attach the hardened steel tip to the scratch tool. Verify the tip radius is 0.5mm ±0.05mm using a calibrated gauge.
4. Set the digital force gauge to 5N. If using a spring scale, adjust the tension until the indicator reads exactly 5N.
5. Position the scratch tool perpendicular to the panel surface. Lower the tip gently until it contacts the panel.
6. Draw the tool across the panel surface at a steady speed of approximately 50mm per second for a distance of 100mm. Maintain the 5N load throughout the stroke.
7. Remove the tool and wipe the scratched area with a clean microfiber cloth to remove any loose particles.
8. Inspect the scratch under the LED light source positioned at a 45° angle. Use the magnifying glass to check for any visible groove, whitening, or surface disruption.

9. Record the result: Pass (no visible scratch) or Fail (any visible scratch or whitening). Document the test date, panel batch number, and inspector name.

10. Repeat the test on three different locations on the same panel to ensure consistency. All locations must pass for the panel to be accepted.

5.0 Verification & Defect Reporting

1. If any scratch is visible, immediately flag the panel as a defect and isolate it from the production flow.

2. Attach a red tag to the defective panel with the following information: date, inspector name, batch number, and reason for rejection.

3. Report the defect to the QA supervisor and log it in the ShopDocs QA module for root cause analysis.

4. If the panel fails, re-test a second panel from the same batch. If the second panel also fails, quarantine the entire batch for further evaluation.

5. Rework options: If the scratch is superficial, the panel may be lightly sanded and re-laminated. If the scratch penetrates the melamine layer, the panel must be scrapped.