

Screw Holding Power Test In Particleboard

1.0 Objective & Quality Standard

The objective of this procedure is to verify that screws driven into particleboard achieve a minimum pull-out resistance of 250 N (Newton) when tested with a calibrated pull-out gauge. This ensures the joint integrity and structural reliability of assembled products. The acceptable tolerance is ± 10 N; any reading below 240 N constitutes a defect requiring immediate corrective action.

2.0 Required Tools & Gauges

- Calibrated screw pull-out force gauge (range 0-500 N, resolution 1 N)
- Particleboard test specimen (pre-drilled with pilot hole per engineering specification)
- Standard production screws (type and size per BOM)
- Torque screwdriver (calibrated, range 0.5-5 Nm)
- Digital caliper (0-150mm range, resolution 0.01mm)
- Test fixture or clamp to secure specimen during pull-out
- Data collection sheet or ShopDocs QA module

3.0 Safety & Material Handling

- Wear safety glasses to protect against particleboard dust and potential screw ejection.
- Use cut-resistant gloves when handling test specimens to avoid splinters.
- Ensure the pull-out gauge is securely attached to the screw head to prevent slipping.
- Handle particleboard specimens on a clean, flat surface to avoid edge damage.
- Dispose of tested specimens in designated scrap bin to prevent reuse.

4.0 Step-by-Step Procedure

1. Select a particleboard test specimen that matches the production material grade and thickness.
2. Measure and record the specimen thickness using a digital caliper; acceptable range is 18mm $\pm$ 0.5mm.
3. Pre-drill a pilot hole in the center of the specimen using the specified drill bit diameter (e.g., 2.5mm for a #8 screw).
4. Insert the production screw into the pilot hole and drive it to a depth of 15mm $\pm$ 1mm using the calibrated torque screwdriver set to 2.0 Nm.
5. Secure the test specimen in the test fixture so it cannot move during pull-out.
6. Attach the pull-out gauge hook to the screw head, ensuring full engagement without bending the screw.
7. Apply a steady, axial pull force perpendicular to the board surface at a rate of approximately 10 mm/min.
8. Record the peak force reading (in Newtons) at the moment the screw pulls out or the board fails.

9. Repeat the test on three separate specimens from the same production batch.
10. Calculate the average pull-out force; the batch passes if the average is ≥ 250 N and no individual reading is below 240 N.

5.0 Verification & Defect Reporting

1. If the average pull-out force is below 250 N or any individual reading is below 240 N, flag the batch as non-conforming.
2. Red-tag all affected material and isolate it in the quarantine area.
3. Notify the QA Supervisor and Production Lead immediately for root cause analysis.
4. Document the defect in the ShopDocs QA module, including batch number, test results, and operator ID.
5. Initiate a corrective action request (CAR) to investigate potential causes: pilot hole size, screw type, board density, or driving torque.
6. Rework is not permitted for failed screw holding power; the batch must be scrapped or returned to supplier.

Regulatory Disclaimer: This document is a generic quality assurance template. The end-user assumes all liability for validating all dimensional tolerances, testing procedures, and engineering specifications against actual production requirements before deployment.