
Dowel Expansion Rate Test – Quality Control Procedure

1.0 Objective & Quality Standard

The objective of this procedure is to verify that the dowel expansion rate after glue application remains within the acceptable tolerance range of 0.2 mm to 0.5 mm in diameter increase. This ensures proper joint fit without excessive swelling that could cause splitting or insufficient expansion leading to loose joints.

The test must be performed on a representative sample of dowels from each production batch (minimum 5 dowels per batch) using the specified adhesive and application method. The measured expansion rate must fall within the defined tolerance for the batch to be accepted.

2.0 Required Tools & Gauges

- Digital caliper (0-150 mm range, resolution 0.01 mm)
- Micrometer (0-25 mm range, resolution 0.001 mm) for baseline diameter measurement
- Test dowels (minimum 5 per batch, clean and dry)
- Approved wood adhesive (e.g., PVA glue, as specified by engineering)
- Disposable glue applicator or brush
- Stopwatch or timer (accuracy ± 1 second)
- Clean, lint-free cloth
- Test fixture or jig to hold dowels upright during expansion
- Data recording sheet or digital QA form (ShopDocs)

3.0 Safety & Material Handling

- Wear nitrile gloves to prevent skin contact with adhesive and to avoid contaminating dowels with oils.
- Work in a well-ventilated area to minimize inhalation of adhesive fumes.
- Handle dowels with clean hands or gloves to avoid moisture transfer that could affect expansion readings.
- Dispose of used applicators and cloths in designated waste containers.

4.0 Step-by-Step Procedure

1. Select a minimum of 5 dowels from the current production batch. Ensure dowels are free from visible defects, dust, or moisture.
2. Using the micrometer, measure and record the baseline diameter of each dowel at its midpoint. Take three measurements per dowel and record the average.
3. Apply a uniform coat of the approved adhesive to the entire surface of each dowel using the applicator. Ensure full coverage without excess pooling.
4. Immediately place each glued dowel into the test fixture in an upright position to allow free expansion without constraint.

5. Start the timer immediately after applying glue to the first dowel. Record the exact time of glue application for each dowel.
6. After exactly 5 minutes (± 10 seconds) from glue application, measure the diameter of each dowel at the same midpoint location using the digital caliper. Record the measurement.
7. Calculate the expansion rate for each dowel by subtracting the baseline diameter from the post-glue diameter. Record the result in millimeters.
8. Compare each expansion rate against the acceptable tolerance range of 0.2 mm to 0.5 mm. Mark any dowel outside this range as non-conforming.
9. If all tested dowels fall within tolerance, the batch passes. If any dowel fails, test an additional 5 dowels from the same batch. If more than 1 out of 10 fails, reject the batch.
10. Clean the caliper and micrometer with a dry cloth after use. Dispose of tested dowels in scrap bin.

5.0 Verification & Defect Reporting

1. Verify that all measurements are recorded accurately on the data sheet or in the ShopDocs QA module. Double-check calculations for expansion rate.
2. For any dowel with expansion rate below 0.2 mm, flag as insufficient expansion. Possible causes: low glue viscosity, dry dowels, or incorrect glue type. Rework by applying additional glue and retesting after 5 minutes.
3. For any dowel with expansion rate above 0.5 mm, flag as excessive expansion. Possible causes: high moisture content in dowels, excessive glue application, or wrong adhesive. Dowels must be discarded and not used in production.
4. If a batch is rejected, immediately red-tag the remaining dowels in inventory and quarantine them. Notify the QA supervisor and production lead.
5. Log all out-of-tolerance defects in the ShopDocs QA module with batch number, date, and operator name for root cause analysis and corrective action tracking.

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.