

Differences Between Wheel Types in Taber Abrasion Testing

Introduction

Taber abrasion testing is a widely used method to evaluate a material's resistance to wear by subjecting it to abrasive wheels under controlled conditions. The choice of wheel type, such as CS-10 or H-18, significantly impacts the test's abrasiveness and suitability for different materials. This document explains the differences between common Taber wheel types, focusing on their composition, abrasiveness, and applications.

Taber Wheel Types

Taber abrasion wheels vary in material, texture, and abrasiveness, allowing testers to simulate different wear conditions. The most common wheels include CS-10, CS-17, H-10, H-18, and H-22, each designed for specific material types and testing objectives. Below is a detailed comparison:

Key Differences

- **Composition:**
 - *CS-series* (Calibrase): These wheels are resilient, made of rubber impregnated with mild abrasives. CS-10 is finer, while CS-17 is slightly coarser, making them suitable for softer or more delicate surfaces.
 - *H-series* (Calibrade): These are non-resilient, vitrified wheels with harder, ceramic-like compositions. H-10, H-18, and H-22 increase in coarseness, designed for tougher materials.
- **Abrasiveness:**
 - CS-10 is the least abrasive, ideal for testing thin coatings or fragile materials without causing excessive damage.
 - CS-17 offers moderate abrasion for slightly more durable surfaces.
 - H-10 provides a step up in severity, suitable for harder substrates.
 - H-18 and H-22 are highly abrasive, used for rigorous testing of robust materials where significant wear is expected.

Table 1: Comparison of Common Taber Abrasion Wheels

Wheel Type	Composition	Abrasiveness	Typical Applications
CS-10	Resilient, rubber-based with mild abrasive	Mild	Delicate materials (e.g., plastics, coatings, textiles, paper)
CS-17	Resilient, rubber-based with coarser abrasive	Moderate	Slightly tougher materials (e.g., painted surfaces, laminates)
H-10	Non-resilient, vitrified (ceramic-like)	Moderately severe	Hard materials (e.g., ceramics, metals, rigid plastics)
H-18	Non-resilient, vitrified with coarse abrasive	Severe	Durable materials (e.g., metals, composites, heavy-duty coatings)
H-22	Non-resilient, vitrified with very coarse abrasive	Very severe	Extremely tough materials (e.g., industrial components, thick coatings)

- **Applications:**

- CS-10 and CS-17 are commonly used for plastics, coatings, textiles, and other surfaces where mild to moderate wear is relevant (e.g., consumer electronics, upholstery).
- H-10, H-18, and H-22 are suited for metals, ceramics, and heavy-duty coatings, such as those used in industrial tools or automotive parts.

- **Test Outcome:** The choice of wheel affects the wear index or weight loss. For example, a coating tested with CS-10 might show 10 mg loss after 1,000 cycles, but the same coating tested with H-18 could show significantly higher loss due to its harsher abrasiveness.

Selecting the Right Wheel

Choosing the correct wheel depends on the material and the intended application:

- **Material Type:** Use CS-10 or CS-17 for soft or thin materials to avoid excessive damage. Use H-10, H-18, or H-22 for hard, durable surfaces.
- **Test Objective:** For quality control of delicate coatings, CS-10 ensures sensitivity. For simulating harsh wear (e.g., industrial environments), H-18 or H-22 is more appropriate.
- **Standards Compliance:** Refer to standards like ASTM D4060 or ISO 7784-2, which may specify wheel types for specific industries (e.g., CS-17 for automotive coatings).

Practical Considerations

- **Load and Cycles:** Wheel abrasiveness interacts with applied load (e.g., 500g or 1,000g) and cycle count. Ensure consistency when comparing results.
- **Wheel Maintenance:** Wheels wear over time, so calibrate or replace them per manufacturer guidelines to maintain test accuracy.
- **Real-World Correlation:** Wheel choice should mimic real-world wear. For example, CS-10 may simulate light handling, while H-18 replicates heavy abrasion.

Conclusion

The choice of Taber wheel type (e.g., CS-10, H-18) directly influences the test's severity and applicability. CS-series wheels are milder, ideal for softer materials, while H-series wheels are harsher, suited for durable surfaces. Understanding these differences ensures accurate material evaluation, informed selection, and reliable quality control tailored to specific use cases.