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Abrasion loss of paper and paperboard (Taber-type method)

1. Scope

1.1 This method determines the resistance of surfaces of paper and paperboard to the action of abrasion, either wet or dry, by measuring abrasion loss. This test is not applicable to the surfaces treated with wax or similar materials which would fill in the pores of the abrasive wheels.

2. Significance

2.1 Measurement of abrasion loss is quite complex and involves many factors including fiber type, material structure, and any additives or bonding agents used. Surface sizing may increase abrasion resistance.

2.2 By combining abrasion test results with actual end use results, it is possible to predict usefulness and suitability of a product for a particular application, such as study or prediction of laser printer systems from feeder mechanism abrasion of paper or evaluation of the adhesion of fused toner.

3. Definitions

- 3.1 *Abrasion*: the wearing away of any part of a material by rubbing against another surface.
- 3.2 *Resilient wheels*: wheels that are rubber-based and distort to the contour of the surface of contact.
- 3.3 *Non-resilient wheels*: vitrified wheels that do not distort to the surface of contact.

Approved by the Standard Specific Interest Group for this Test Method

4. Apparatus

4.1 *Abrading instruments*¹, consisting of a horizontal turntable with a center clamp, which revolves at 70 to 75 rpm, upon which the specimen is attached, and two weighted parallel arms, each carrying a special abrasive-embedded rubber wheel, freely rotating on a ball-bearing horizontal spindle, and each resting on the specimen with a known dead-weight load and an adjustable vacuum system for debris removal (see Fig. 1). For the dry paperboard test, 1000 gf or 500 gf is used with non-resilient wheels. For the dry paper test, 500 gf or 250 gf is used with resilient wheels. For the wet test, 500 gf is used with the same wheels as used in the dry tests. In all cases, the type and grit of wheels shall be agreed upon by user and supplier. The surface of the table is covered with a disk of soft rubberized material 0.762 mm (0.03 in.) thick. Each abrasive wheel is 44 to 51 mm (1¾ to 2 in.) in diameter and 12.7 mm (½ in.) thick and composed of a special finely screened and standardized abrasive. A revolution counter is attached to the table. The lines of contact of the wheels on the specimen are at right angles to the parallel supporting arms and situated 26.2 mm (1.03 in.) from the center of the turntable towards the axis about which the supporting arms turn. The center of the line of contact of the wheel on the arm from which the turntable revolves is 31 mm (1 7/32 in.) to the left. In this manner, when in contact with the turning specimen, the two wheels revolve in opposite directions and exert a combined abrasive, compressive, and twisting action over a circular path approximately 3000 mm² (4.6 in.²) in area, twice during each revolution of the specimen.

4.1.1 For the wet abrasion test, a rubber-covered turntable with an annular raised rim is used, to permit the surface of the specimen to be covered with water during the test.

4.2 *Brush*, soft brush about 12-13 mm (½ in.) wide with bristles about 25 mm (1 in.) long.

4.3 *Filter paper*, sintered-glass or Gooch crucible, for wet abrasion residue.

4.4 *Resurfacing turntable*, a rubber-covered turntable on which an abrasive disc is mounted, for resurfacing the wheels.

4.5 *Refacing disc*, for resurfacing of resilient wheels. The refacing disc shall be 150 grit silicon carbide coated abrasive product, approximately 102 mm diameter with a 7-mm center hole.

4.6 *Wheel refacer*, with a diamond tool for resurfacing non-resilient wheels.

4.7 *Analytical balance*, to weigh to the nearest 0.001 mg.

4.8 *Water*, distilled or demineralized (for wet abrasion test).

4.9 *Specimen mounting card*, a cardboard piece with adhesive to attach the sample. It is used to “stiffen” the test piece and make it easier to attach to the turntable (optional).



Fig. 1. Abrading instrument (vacuum not shown)

¹ Names of suppliers of testing equipment and materials for this method may be found on the Test Equipment Suppliers list in the set of TAPPI Test Methods, or may be available from the TAPPI Quality and Standards Department.