

T 220 sp-10

TENTATIVE STANDARD – 1942
OFFICIAL TEST METHOD – 1946
REVISED – 1971
OFFICIAL TEST METHOD – 1983
REVISED – 1988
STANDARD PRACTICE – 1996
CORRECTED – 1997
REVISED – 2001
REVISED – 2006
REVISED – 2010
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Physical testing of pulp handsheets

1. Scope and significance

1.1 This procedure describes the testing of pulp handsheets, prepared in accordance with TAPPI T 205 “Forming Handsheets for Physical Tests of Pulp,” for their strength and other physical properties as well as their light-scattering coefficient.

1.2 Information derived from handsheet testing is a measure of the potential contribution of the pulp to the strength of the finished paper product.

2. Summary

2.1 The measurements of handsheet properties to be described are as follows: mass per unit area (grammage), thickness, specific volume, apparent density, opacity, scattering coefficient, tensile strength, stretch, tensile energy absorption, bursting strength, tearing resistance, and MIT folding endurance.

2.2 Five sheets are generally enough for routine control work in a mill on a specified pulp. Ten sheets should be used wherever possible and when testing mechanical pulp in order to provide enough paper to make four tears of ten strips each. This makes it possible to use five sheets for tearing resistance and five other sheets for all other strength tests. Do not change the sample size as this will change the amount of pulp in the beater and, therefore, change the beating time.

2.3 Results are reported in SI units and strength indexes are calculated on conditioned weight.

Approved by the Standard Specific Interest Group for this Test Method



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3. Conditioning

Inspect the sheets and discard any that are abnormal, (e.g. containing holes, uneven thickness, damaged, containing contaminants such as dirt, plastic, metal bits). Condition in an atmosphere in accordance with TAPPI T 402 “Standard Conditioning and Testing Atmospheres for Paper, Board, Pulp Handsheets, and Related Products” and test the sheets for each characteristic of interest according to the appropriate TAPPI test method for paper but with modifications as specified below.

4. Mass per unit area (grammage)

Determine the average mass per unit area of five conditioned sheets by weighing them together on a balance sensitive to 0.001 g. The area of each sheet is approximate and is taken to be 200 cm². The grammage is ten times the weight of the five sheets.

5. Thickness

5.1 Apparatus¹

5.1.1 *Micrometer*, see TAPPI T 411 “Thickness (Caliper) on Paper and Paperboard.”

5.2 Procedure

5.2.1 Before cutting the test sheets, obtain their average thickness as follows: Place five sheets in a pile with their glazed surfaces in one direction. Using a motor-driven micrometer as specified in T 411, measure the thickness of the pile of sheets at ten randomly selected points recording the thickness at each point to the nearest 2 µm (0.0001 in.).

5.2.2 If any reading is more than 5% above the others, make a measurement on an adjacent spot to determine if the high reading is caused by a shive, speck, foreign materials such as dirt, glass, plastic, etc. or fiber bundles resulting from a short disintegration time. If so, discard the high readings and note in report.

6. Light-scattering coefficient

6.1 Apparatus¹

6.1.1 *Opacimeter*, see TAPPI T 425 “Opacity of Paper (15°/Diffuse, Illuminant A) 89% Reflectance Backing and Paper Backing.”

6.1.2 *Working standard of reflectance*, calibrated to absolute scale as described in T 425.

6.2 Procedure

6.2.1 Place the working standard over the opening of the opacimeter and adjust the instrument reading to the value of the absolute reflectance of the working standard.

6.2.2 Obtain the reading R_0 by placing each sheet in the opacimeter with its glazed side against the black body and reading the reflectivity without adjustment of the instrument.

6.2.3 Place the pile of five sheets in the opacimeter with the glazed sides toward the specimen holder and take a reading. Increase the number of sheets in the pile by inserting five more sheets of the same test or, if these are unavailable, sheets from another test that are similar in reflectance between the pile and the specimen holder. Take another reading. If there is a significant difference between the two readings, add additional sheets to the pile until no significant change occurs with the addition of five more sheets. Using this pile of sheets, measure the reflectivity R_∞ of each of the five test sheets keeping the other four test sheets immediately behind the sheet being tested.

6.2.4 Use the average values of R_0 and R_∞ to calculate light scattering coefficient as described in 13.3.4.

NOTE 1: For greater accuracy, the two measurements should be made on the same specimen area and the weight per unit area of the actual test area used.

NOTE 2: The R_∞ value must be obtained using the opacimeter as described. A brightness reading cannot be used.

¹ Names of suppliers of testing equipment and materials for this method may be found on the Test Equipment Suppliers list, available as part of the CD or printed set of Standards, or on the TAPPI website general Standards page.