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CATEGORY _____ Physical Properties _____

RELATED
METHODS _____ See "Additional Information" _____

CAUTION:

This Test Method may include safety precautions which are believed to be appropriate at the time of publication of the method. The intent of these is to alert the user of the method to safety issues related to such use. The user is responsible for determining that the safety precautions are complete and are appropriate to their use of the method, and for ensuring that suitable safety practices have not changed since publication of the method. This method may require the use, disposal, or both, of chemicals which may present serious health hazards to humans. Procedures for the handling of such substances are set forth on Safety Data Sheets which must be developed by all manufacturers and importers of potentially hazardous chemicals and maintained by all distributors of potentially hazardous chemicals. Prior to the use of this method, the user must determine whether any of the chemicals to be used or disposed of are potentially hazardous and, if so, must follow strictly the procedures specified by both the manufacturer, as well as local, state, and federal authorities for safe use and disposal of these chemicals.

Identification of Wire Side of Paper *(Five-year review of Standard Practice T 455 sp-20)*

1. Scope

1.1 This method describes procedures for identifying the wire side of paper made on a fourdrinier paper machine with a single wire or forming fabric. The term "wire side" will be used throughout this method and relates to the side of the sheet made in contact to either the machine wire or forming fabric.

1.2 It is not always possible to identify the difference between sides, particularly with coated and other surface-treated papers, corrugating medium, papers made with certain multiply forming fabrics, certain high-grade papers made from well-beaten rag stock, and specialties made with some variation from usual papermaking practices. Nevertheless, if any one of the following procedures gives a clear result, identification is established.

1.3 These procedures are not applicable to paper made on cylinder, twin-wire, or other special machines.

2. Summary

The method consists of a series of six procedures found suitable for identifying the wire side of paper, as follows: direct observation, carbon smudge, wetting, wetting and charring, tearing, and marking with a soft metal.

3. Significance

The wire and felt sides of a sheet of paper generally differ in some physical and optical characteristics (*I*), so it is desirable to have some means of distinguishing between them.

4. Definitions

Wire side: The side of the paper that was in contact with the wire or forming fabric of the paper machine; the other side is termed the *felt side*.

5. Procedures

5.1 *Direct observation*

5.1.1 Fold a specimen sheet of paper to view both sides at the same time (*I*). Observe the relative surface appearance or structure of the two sides by holding the specimen in a horizontal position with the light striking at a very low angle, less than 10°, and the line of vision normal to the light path. Varying the angles of illumination and viewing and rotating the sheet in a horizontal plane may more clearly bring out the wire marks. Look for rectangular or diamond-shaped or other impressions with a regular pattern that have been made by the forming fabric, which identify the wire side.

5.1.2 A low-power binocular microscope is helpful. Do not confuse the larger and irregular pattern of felt marks with the regular and finer pattern of wire marks. These wire marks are invariably smaller than 2 mm.

5.2 *Carbon smudge*

5.2.1 Make a black smudge or mark on both sides of a specimen of paper by wiping it with a small piece of carbon paper held between the thumb and forefinger, pressing the black surface of the carbon paper firmly onto the specimen. Using considerable pressure, slowly pull the carbon paper over the surface of the specimen to produce a black mark about 10 mm wide and 50 or more mm long. Make such a mark in both the machine and cross directions. Use a fresh spot on the carbon paper for making each mark.

5.2.2 The carbon smudge can enhance the distinctive pattern described in 5.1.

5.2.3 Examine as in 5.1.

5.3 *Wetting*

5.3.1 Dip a specimen of paper in water or in a weak sodium hydroxide solution (1-2% NaOH) (*I*), drain the excess liquid and allow the specimen to stand for a few minutes. This treatment tends to restore the texture that the paper had prior to calendering. Coated sheets may need to be lightly rubbed after wetting to remove some of the coating.

5.3.2 Examine as in 5.1.

5.4 *Wetting and charring*

5.4.1 Wet the paper surface with a mixture of 50% saturated ammonium chloride and 50% ethyl alcohol. Then char the surface using an electric heat gun. Repeat on the other side of the sheet and visually compare sides for appearance of the wire pattern.

5.5 *Tearing*

5.5.1 Place a specimen sheet of paper on a table in such a way that the grain (machine) direction is parallel to the line of vision and the sheet surface is approximately horizontal. Holding the sheet in this position with one hand, pull upward with the other to start a tear in the sheet so that the line of tear follows the grain of the paper. As the tear progresses, gradually guide it so that it moves in the cross direction and toward the outer edge of the sheet, producing a tear line following a curved path. Turn the sheet over with the opposite side facing upward and make a similar tear. Observe the feathering caused by the splitting of the sheet at the edge of each of the two tears. One of these will show a more pronounced feathering than the other, especially in the curved portion of the tear. The tear with the more feathered edge is produced when the wire side of the sheet faces upward. This procedure often gives a positive determination when others fail. Its successful use requires some experience, which may be gained by applying it to papers with identified sides.

5.6 *Marking with soft metal*

5.6.1 Fold a specimen sheet of paper to view both sides at one time. Using the edge of a piece of soft metal, such as solder or a silver alloy coin, mark both sides with a single stroke of the metal. Compare the darkness of the marks so produced. Because of the lower concentration of filler on the wire side of the sheet, that side will give a lighter mark on papers containing an abrasive filler. With unfilled or with coated papers, however, identification

cannot be made because the marks will be of equal intensity. Papers containing titanium dioxide fillers give especially clear results with this procedure.

6. Report

Report the specific procedure used to identify the wire side of the submitted sample.

7. Precision

A statement of precision, as defined in TAPPI T 1200 “Interlaboratory Evaluation of Test Methods to Determine TAPPI Repeatability and Reproducibility” is not applicable to this practice.

8. Keywords

Paper, Wire side, Sides, Felt side, Identification

9. Additional information

9.1 Effective date of issue: To Be Assigned.

9.2 This document is a Standard Practice based on the definition of Standard Practices in the Test Method Guidelines; i.e., it is a document that gives general guidance for determining the wire side of paper in order to use this information in determining other physical properties of paper.

9.3 The 1988 revision added a new section on “wetting and charring,” specifies a low angle under “direct observation,” and replaced “coin” by “soft metal” since silver coins are no longer available. This 1993 revision extends the concept of wire marks to include the marks made by synthetic forming fabrics.

9.4 Papers made on a twin-wire machine will have two wire sides.

9.5 Related methods: Scandinavian, SCAN-P 10; Canadian, PAPTAC D 2; The Netherlands, Standard 1764.

Literature cited

1. Casey, J. P., *Pulp and Paper Chemistry and Chemical Technology*, 2nd edn., Vol. 3, Interscience, New York, 1961, pp. 1256, 1257.

Your comments and suggestions on this procedure are earnestly requested and should be sent to the TAPPI Standards Department. ■