



Standard Test Method for Dirt in Paper and Paperboard¹

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1. Scope

1.1 This test method (1, 2, 3)² is intended for the numerical estimation of dirt in paper or paperboard in terms of equivalent black area. This test method is satisfactory only for the estimation of visual dirtiness and it may be entirely inadequate when the grittiness or other nonvisual effects of dirt are of importance.

2. Referenced Documents

2.1 ASTM Standards:

- D 585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, and Related Products³
- D 985 Test Method for Brightness of Pulp, Paper, and Paperboard (Directional Reflectance at 457 nm)³
- D 1968 Terminology Relating to Paper and Paper Products³

3. Terminology

3.1 *Definitions*—Definitions shall be in accordance with Terminology D 1968 and the *Dictionary of Paper*.⁴

4. Summary of Test Method

4.1 A dirt speck is compared with black spots on a standard “dirt chart,” and the area of the black spot that gives the same visual impression as the dirt speck is recorded. The sum of all such areas (known as equivalent black areas, or e. b. a.) that are 0.04 mm² or greater is divided by the total area of the paper inspected. The result, expressed in parts per million, is used as a measure of the dirt in paper or paperboard.

5. Significance and Use

5.1 While dirt in paper is usually that found on the surface of the sheet, some particles embedded in the body of the sheet may be readily discernible, especially in papers that are transparent or translucent. Therefore, as a property, dirt content may affect both the utility and composition of the sheet. The amount of dirt present in a sheet of paper is of importance in

practically every type of paper, but especially so in the higher-quality products. For example, bond and fine writing papers are subject to close inspection for dirt content, and the amount of dirt present in the sheet is one of the factors in classifying them into different grades.

5.2 The higher grades of wrapping papers and paperboards, such as those employed for the packaging of foods or other commodities or where a fancy printed design is used, must be free of dirt particles. The value of many papers, such as glassine, waxed sulfite, and vegetable parchment, which come in direct contact with foodstuffs, is determined to a considerable extent by the amount of dirt present in the sheet.

5.3 Dirt in the form of fine gritty particles embedded in a sheet of paper is a serious defect in many printing papers. This type of dirt may cause serious pitting and wear on the printing plates and other parts of the presses. Such gritty particles are often termed “sand spots” in jute linerboard and cause a marked reduction in Mullen burst tests when they occur in the test area. Measurement of dirt content in a sheet based on the equivalent area may be entirely inadequate in such cases, since the dirt is not readily detected nor is its equivalent area a good criterion of the suitability of the sheet for the purpose intended.

6. Apparatus

6.1 *Standard Dirt Chart*⁴—A standardized photographic print of a series of round black spots of various areas on a white background. Using an instrument and method in accordance with Method D 985, Test for 45-deg. 0-deg Directional Reflectance for Blue Light (Brightness) of Paper,⁴ with luminous reflectance filter, the Y value for Illuminant C of the CIE system is 81.5 $\pm$ 1.0 % reflectance for the white background and 2.4 $\pm$ 0.4 % for the black spots.

NOTE 1—It has been found (4) that all the round spots on the original chart, except the following, are correct within 2 % or 0.005 mm² (whatever is the larger). For especial accuracy, the designated areas in square millimeters of the following round spots should be changed to those given in parentheses: 1.00 (1.08), 0.80 (0.76), 0.60 (0.58), 0.40 (0.42), 0.30 (0.31), 0.25 (0.26), 0.20 (0.21), 0.15 (0.16), 0.10 (0.11), 0.9 (0.10). Only the round spots are used for the analysis.

In examining an actual TAPPI Standard Dirt Chart, it will be noted that none of the rectangles stand out nearly so well as do the round dots having the same area. In fact, if examined with a reading glass held out of focus, with the particular shape of rectangles used in that chart, it will be seen that their equivalent black area is only about two thirds that of the round dots of the same actual area. Furthermore, in the actual photographic chart, the rectangle adjacent to the 0.02 and 0.03-mm² dots are invisible because of their thinness in relation to the resolving power of the

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² The boldface numbers in parentheses refer to the list of references at the end of this test method.

³ *Annual Book of ASTM Standards*, Vol 15.09.

⁴ Available from the Technical Association of the Pulp and Paper Industry, Technology Park/Atlanta, P.O. Box 105113, Atlanta, GA 30348.