

Standard Test Method for Equivalent Black Area (EBA) of Dirt in Pulp, Paper and Paperboard by Image Analysis¹

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INTRODUCTION

The level of visible dirt present in pulp, paper or paperboard can impact its usefulness in a specific end use application. In such cases, the presence of visible dirt specks that are high in number, easily noticed in visual examination, or both, may detract more from the apparent usefulness of the paper material than does a lower number of specks, or specks that are less easily noticed by the eye. Both the number of dirt specks and their visual impact may be important. For someone controlling or monitoring the papermaking process, the absolute physical area of dirt, or the number of dirt specks present in an inspection area may be of greatest importance. For the end user of the paper material, the overall visual impression may be the critical parameter.

1. Scope

1.1 This test method covers the use of image analysis to determine the level of dirt in pulp, paper, and paperboard in terms of Equivalent Black Area (EBA) of dirt specks within the physical area range of 0.02 to 3.0 mm² reported in parts per million as well as the number of dirt specks per square meter of sample. Using the algorithm prescribed in this test method, the maximum dirt size is limited to 3.0 mm². Extension to other speck sizes (for example those greater than 3.0 mm² in physical area), may require changes in equipment, calculation procedures, or both, and is not covered in this test method. This test method cannot be used for physical area measurements since it does not correctly measure the dirt specks for that mode of measurement.

1.2 The specimen to be evaluated must have a brightness, as determined by Test Method D 985, of 30 % or greater. It may be necessary to reform some pulp sheets into handsheets if the surface is too rough or textured.

1.3 This test method is an instrumental equivalent of Test Method D 2019, TAPPI T 437, and TAPPI T 213, all three of which report the equivalent black area of dirt in parts per million, and TAPPI T 537, which reports the number of specks of 0.02 mm² or larger per square meter. This test method can be implemented using any image analysis system, provided that it meets the criteria specified herein.

2. Referenced Documents

2.1 ASTM Standards:

- D 585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, and Related Products²
- D 985 Test Method for Brightness of Pulp, Paper, and Paperboard (Directional Reflectance at 457 nm)²
- D 2019 Test Method for Dirt in Paper and Paperboard²
- E 122 Practice for Choice of Sample Size to Estimate a Measure of Quality for a Lot or Process³

2.2 TAPPI Standards:⁴

- T 213 Dirt in Pulp
- T 272 Forming handsheets for reflectance testing of pulp (sheet machine procedure)
- T 437 Dirt in Paper and Paperboard
- T 537 Dirt Count in Paper (Optical Character Recognition—OCR)
- T 1206 Precision Statement for Test Methods

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *dirt, n*—any foreign matter embedded in or on the sheet, which, when examined by reflected light has a contrasting, darker color to the sheet surface and has an equivalent black area of 0.02 mm² or greater as determined by this test method.

¹ This test method is under the jurisdiction of ASTM Committee D-6 on Paper and Paper Products and is the direct responsibility of Subcommittee D06.92 on Test Methods.

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² *Annual Book of ASTM Standards*, Vol 15.09.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ Available from TAPPI, Technology Park, P.O. Box 105113, Atlanta, GA 30348-5113.

