



# Standard Test Method for Evaluation of Large Area Density and Background on Office Copiers<sup>1</sup>

This standard is issued under the fixed designation F875; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers the description and method of use for a density and background test target for office copier image evaluation.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements, see Section 8.

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

E1347 Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry

F335 Terminology Relating to Electrostatic Imaging

F360 Practice for Image Evaluation of Electrostatic Business Copies

2.2 *ANSI Standards:*

PH 2.17 Density measurements—Geometric conditions for reflection density<sup>3</sup>

PH 2.18 Density measurements—Spectral conditions<sup>3</sup>

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology F335.

## 4. Summary of Test Method

4.1 The standard test target is used to evaluate copy density and background. The method of image evaluation using this test target is given.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee F05 on Business Imaging Products and is the direct responsibility of Subcommittee F05.04 on Electrostatic Imaging Products.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

## 5. Significance and Use

5.1 The copy image quality is affected by many factors; including the copier, supplies, and environmental conditions. The density and background image quality is particularly significant relative to aesthetic appearance, the visual impression of blackness, and the ability to distinguish information from background.

5.2 The test target may also be used to evaluate the copier or supplies.

## 6. Apparatus

6.1 *Reflection Densitometer*, meeting the requirements of ANSI PH 1.17 and PH 1.18, capable of measuring the smallest solid circle (of the test target) which has a diameter of 6 mm.

6.2 *Reflectometer*, meeting the requirements of Test Method E1347.

## 7. Materials

7.1 *Test Target*, for the evaluation of density and background image quality. It shall have the same configuration and layout as shown in Fig. 1.

## 8. Precautions

8.1 This test target can be used to measure density and background for different copier conditions (machine adjustment, machine configuration, supplies, environment, etc.). Careful notation of these conditions should be made so that comparison tests can be made.

8.2 The color and type of copy paper used will affect the density and background measurements.

8.3 The method of fixing (fusing) of the image on the copy may affect the degree of gloss and may affect the difference between the perceived density and measured reflective density.

## 9. Procedure

9.1 Using the test target in 7.1, establish a procedure (Practice F360) for producing copies in a controlled manner. Evaluate the copy system at the site of its proposed installation under the line voltage conditions which normally apply. Read, understand, and follow the manufacturer's instructions on operation of the copier.

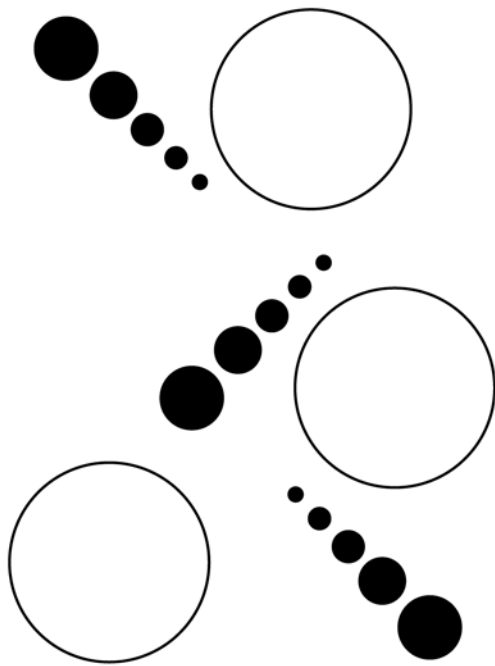


FIG. 1 Configuration and Layout of Test Target

9.1.1 Load supplies into the copier. Follow manufacturer’s directions for adjustments of various controls.

9.1.2 Turn on the copier.

9.1.3 Set exposure control, if one is provided, to either end of the exposure range.

9.1.4 Using test target, make a copy. Note exposure setting, if copier has an exposure control, and date on copy, as well as information concerning temperature and relative humidity.

9.1.5 Vary exposure control, if one is provided, and make copies at various settings. Note setting, date, temperature and relative humidity on each copy. If an exposure control is provided, it must always be varied from the same direction.

9.1.6 Visually determine optimum setting of any controls, that is the one yielding the best copy, in your opinion.

9.1.7 At the optimum setting, make the number of copies that would constitute a normal length of run. This will allow comparison of copy uniformity. The test target should be placed or fed into the copier in the same orientation each time and the optimum exposure setting must be set from the same direction on the exposure control device, should one be available.

9.1.8 At the optimum setting, reverse the orientation of the test original placed or fed into the copier and make a copy. This can then be compared to previous copies to determine possible original orientation variations.

## 10. Interpretation of Results

### 10.1 Reflection Density Measurements:

10.1.1 *Calibration*—Densitometer shall be calibrated by manufacturer’s procedures.

10.1.2 *Density Measurements*—A minimum of three density measurements shall be made on the imaged copies of the test target. The smallest circle in each of three arrays shall be measured and an average value shall be used. The measure-

ment should be made at the center of each circle and any obvious imperfections avoided. Additional measurements on the larger circles may be used and equivalent circles averaged. Higher density in the larger circles indicates better solid area fill-in.

NOTE 1—Densitometers are available in a variety of apertures. The ideal aperture is approximately one half the diameter of the smallest circle. If the instrument is equipped with a smaller aperture, a sufficient number of readings must be taken to ensure a valid value.

### 10.2 Background Percent Reflectance Measurements:

10.2.1 *Calibration*—Reflectometer shall be calibrated by manufacturer’s procedures.

10.2.2 Background reflectance measurements shall be obtained by measuring the reflectance in each of the three enclosed white circular areas on the imaged copy of the test target. The average of at least three values shall be used. If significant variation in the values is noted, the number of measurements should be increased.

10.2.3 The background reflectance change due to the copier can be determined by calculating the difference between the value obtained in 10.2.2 and the average of the three values obtained using blank copy paper. The process may affect the surface characteristics of the paper and therefore the reflectance reading.

10.2.4 Comparison of background reflectance is difficult when different copy papers are used since the untuned paper reflectance may vary. A comparison may be made if the reflectance value for each paper determined from the background areas is subtracted from the reflectance value obtained for each paper before the copy is made. This calculated value for each paper can be used to compare the overall background when different papers are used. A higher calculated reflectance difference indicates higher overall background.

10.2.5 This measurement is useful to determine the overall uniform background and can not be used to determine isolated localized particles in the nonprinted areas.

10.3 Higher reflectivity indicates lower background and cleaner copy.

## 11. Precision and Bias<sup>4</sup>

### 11.1 Precision:

11.1.1 *Repeatability*—Two test results obtained by the same operator and test apparatus under essentially the same conditions may be expected 95 % of the time to agree with each other to within 3 % of the average of the test results.

11.1.2 *Reproducibility*—Two test results obtained in different laboratories for the same sample of material may be expected 95 % of the time within 6 % of the average of the two test samples.

11.2 *Bias*—There is no acceptable reference material suitable for determining the bias, therefore bias cannot be determined.

## 12. Keywords

12.1 copier background; copier image density; image quality

<sup>4</sup> Supporting data are available at ASTM Headquarters. Request RR:F05-1001.

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