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Standard Practice for Image Evaluation of Electrostatic Business Copies[1]

This standard is issued under the fixed designation F360; 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 (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

The evaluation of the images obtained from various types or models of office copy systems can become a complicated process, requiring carefully prepared test masters and expensive test equipment. The copying needs of individuals and firms also vary considerably as does their ability to evaluate results reported in technical terms. It is, however, within the capability of most persons interested in the results obtained from copying systems to subjectively and visually compare prints reproduced from originals that are pertinent to their copying requirements.

1. Scope

1.1 This practice guides the user toward preparing an original test subject, meaningful to his specific copying needs and to suggest ways in which the test subject may be used to evaluate images from office copy systems.

1.2 Additional evaluation of image characteristics are covered in Practice F807 and Test Method F875.

1.3 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F807 Practice for Determining Resolution Capability of Office Copiers

F875 Test Method for Evaluation of Large Area Density and Background on Office Copiers

3. Summary of Practice

3.1 This practice involves the preparation of one or more test originals and their reproduction. Subjective comparisons of the test original(s) to the copies allow the user to evaluate the usefulness of the copy system for his needs.

4. Significance and Use

4.1 Subjective evaluations of copies made from test originals can be used to determine the usefulness of a given copy system in a specific user application. Since many variables operate to affect the copy quality at any given time, small changes in quality may not have any practical significance for many users.

5. Interferences

5.1 Many copy systems are subject to variation due to fluctuations of line voltage. It is conceivable that such fluctuations may cause a normally useful system to give poor results. The manufacturer should be consulted regarding the need for voltage-stabilizing devices which can usually be easily installed.

5.2 Results from copy systems can vary depending upon the length of time the system has been operating. The first print after a system has been shut down for a weekend, for instance, can be of a different quality than subsequent prints made after some time of operation.

5.3 Excessively high or low relative humidity can also cause variations in performance, not encountered under normal conditions.

5.4 Variations in copy system performance over relatively long periods can occur. It is recommended that the test procedure be replicated after a sufficient period to determine long-term stability.

5.5 Suppliers for copy systems are often purchased from several sources and can affect the results obtained from a given copy system.

5.6 Due to normal cycling within some copiers, minor variations in copy quality attributes such as density may be observed from one copy to the next within a given copy run.

[1] This practice 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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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

6. Test Original

6.1 More than one test subject may be required due to varying copying needs. The test subject or subjects should reflect the users specific copying needs and might be single sheets of paper, or bulky objects, such as books or magazines, should copying such items be considered important. Assuming most copying is of single sheets of material, guides for preparation of such a test original are given:

6.1.1 Pick an original of the dimension, basis weight, caliper, stiffness, brightness, gloss, and color pertinent. One can use letterheads, invoices, accounting sheets, purchase orders, or whatever else might be meaningful.

6.1.2 On the sheet chosen, produce images with, for instance, carbon paper, typewriter ribbons, pens, pencils, rubber stamps, halftones, continuous tones, and colors of the density or contrast of interest. One can use tape or glue to fasten specific images to the test sheet. Care must be taken in certain copiers, that this does not cause jamming of the original. Large blocks of solid density can be added if desired.

6.1.3 An area free of any image should be left on the test sheet. It should be at least 1½ by 1½ in. (38.1 by 38.1 mm) and located, preferably at the bottom edge of the test sheet. This can be used to evaluate background coloration of the copy.

6.1.4 Have some reference lines or printing extending to each edge of the test subject. This will allow evaluation of the ability to copy to an edge.

6.1.5 It is useful to have lines of known length drawn horizontally and vertically across the test sheet. Measurements of these lines on the copy will yield information regarding magnification or reduction in the copy.

7. Procedure

7.1 Using the test subject prepared above a procedure must be established for producing copies in a controlled manner. The copy system is best evaluated at the site of its proposed installation under the line voltage conditions which normally apply. Manufacturer's instructions on operation of the copier must be read, understood, and followed.

7.1.1 Load supplies into the copier. Follow manufacturer's directions for adjustments of various controls.

7.1.2 Turn on the copier.

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

7.1.4 Using test subject, 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.

7.1.5 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.

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

7.1.7 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 original 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.

7.1.8 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.

8. Copy Evaluation

8.1 In evaluating the optimum result from a copy system under test, the following points might be examined:

8.1.1 Density or relative blackness of characters.

8.1.2 Development of large solid image areas; are they filled in evenly or is there a density variation?

8.1.3 Color and cleanliness of background.

8.1.4 Fixation or drying speed.

8.1.5 Freedom from streaks.

8.1.6 Uniformity of copy.

8.1.7 Size reduction or enlargement from original.

8.1.8 Fidelity of copy compared to the original in reproducing varying densities and, if the copy system can reproduce colors as they appear in the original, how well this is done.

8.1.9 Ability to read copy to the edge.

8.1.10 Distortion of characters.

8.1.11 Reproduction of pictorial illustrations.

8.1.12 Reproduction of colored lines and characters.

8.2 The results generated during the performance of this recommended practice may be filed for reference against results obtained after a suitable period of time in order to note any long term variation of quality.

9. Precision and Bias

9.1 When this practice is used to compare equipment or test supplies, or both, the results have been found to be repeatable within a laboratory if the equipment, supplies, test conditions, and personnel are held as constant as possible. Because the interpretation of results is dependent upon the subjectivity of the observations and varying preferences from one consumer to the next, repeatability is not necessarily anticipated between laboratories particularly when more than one piece of equipment or set of supplies are compared.

10. Keywords

10.1 business copiers; image quality; image quality evaluation; office copiers