Designation: F 995 – 09

Standard Practice for
Estimating Toner Usage in Copiers Utilizing Dry Two-Component Developer[1]

This standard is issued under the fixed designation F 995; 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.

1. Scope

1.1 This practice describes a procedure for estimating the number of copies that can be produced for a given unit of toner in a copier using dry two-component developer.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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 whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* See Section 9 for specific precautionary statements.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F 335 Terminology Relating to Electrostatic Imaging

F 875 Test Method for Evaluation of Large Area Density and Background on Office Copiers

2.2 *ASTM Adjuncts:*

K Charts[3]

3. Terminology

3.1 *Descriptions of Terms Specific to this Standard*:

3.1.1 *toner usage*—amount of toner (milligrams per copy) removed from the toner reservoir during the copying process.

3.1.2 *two-component developer*—a mixture of dry toner and carrier used for developing electrostatic images in copiers (See Terminology F 335.)

4. Summary of Practice

4.1 A copier is set up to standard operating parameters and operated under a controlled job stream and environment for a length of time sufficient for stable performance. A known, or estimated, quantity of toner is used to replenish the developer over the length of the test and this result, along with the total number of copies generated, is used to estimate the number of copies produced per unit of toner.

5. Significance and Use

5.1 This practice may be used to evaluate the performance of different toners in a common machine. It can also be used to evaluate the economics of toner usage when making machine-to-machine comparisons.

5.2 The practice provides only a point estimate that is subject to a significant number of variables that are not easily measured. As with all dry developers, two-component developer systems are not 100 % efficient. Some toner is lost to the surroundings (inside or outside the copier). This loss is also dependent on copier adjustments and may be significant enough to affect the total number of copies capable of being produced by a specific amount of toner. Anyone making a decision based on the results of this practice should carefully consider the accuracy of the results and other pertinent data.

5.3 Actual use of the copier in normal operating conditions will most likely result in toner usage values different from those generated in this practice.

6. Interferences

6.1 Variations in toner usage will occur for many reasons, among them:

6.1.1 Machine adjustments,

6.1.2 Operating environment,

6.1.3 Varying use of special copy controls,

6.1.4 Number of copies on the photoconductor and developer,

6.1.5 Variations in copy paper,

6.1.6 Operator variability,

6.1.7 Batch-to-batch toner and developer variability,

6.1.8 Machine-to-machine variability, and

6.1.9 Variation in document area coverage.

7. Apparatus

7.1 *Balance*, reading to the nearest 1 g.

7.2 Refer to Test Method F 875 for other required instruments.

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[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.

[3] Available from ASTM International Headquarters. Order Adjunct No. ADJF0995. Original adjunct produced in 1986.

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8. Reagents and Materials

8.1 Sufficient quantities of paper, toner, developer, and photoconductor to run the test (Refer to 11.6.)

8.2 *Test Targets*:

8.2.1 *Density and Background Test Sheet*—As shown in Fig. 1 of Test Method F 875.

8.2.2 *"k" Target with 1507 "k"s* —As shown in Fig. 1.[3]

8.2.3 *"k" Target with 2925 "k"s*—As shown in Fig. 2.[3]

9. Precautions

9.1 Machine-to-machine comparisons should be made, if possible, with the same manufacturing lot of toner and developer.

9.2 Any comparisons between machines or toners should carefully consider the test conditions used and should be documented.

9.3 The test must be controlled as described in this test method. A casual use of the copier during the test may affect the results.

9.4 The toner usage as estimated with this test method may not accurately predict actual field results. Actual results will depend not only on those interferences listed in Section 6, but also on a number of additional variables:

9.4.1 Type of originals used,

9.4.2 Machine and service variability,

9.4.3 User's image quality requirements,

9.4.4 Number of copies per original,

9.4.5 Use of secondary receivers, and

9.4.6 Variations in copy paper.

9.5 A copier that produces a lower average print density may have a lower average toner usage than a similar copier producing a higher average print density. This is especially important to note when making copier-to-copier comparisons using the same toner.

10. Conditioning

10.1 Condition the paper, toner, developer, photoconductor, and copier in the test environment for 24 h prior to initiating the test.

11. Procedure

11.1 The environment in which the following procedure is carried out should be controlled to reduce adverse effects. The temperature should be controlled within $\pm 5°F$ around the mean temperature selected for the test. The relative humidity should be controlled within $\pm 10\%$ around the mean relative humidity selected for the test.

11.1.1 The actual temperature and relative humidity should be measured periodically during the test and recorded for any future comparison tests.

11.2 The machine, in which the toner usage will be measured, should be thoroughly cleaned by an authorized service representative, and any prescribed preventive maintenance performed prior to loading the test toner.

11.2.1 The machine should be adequately serviced to increase the probability of a long copy run without major failure.
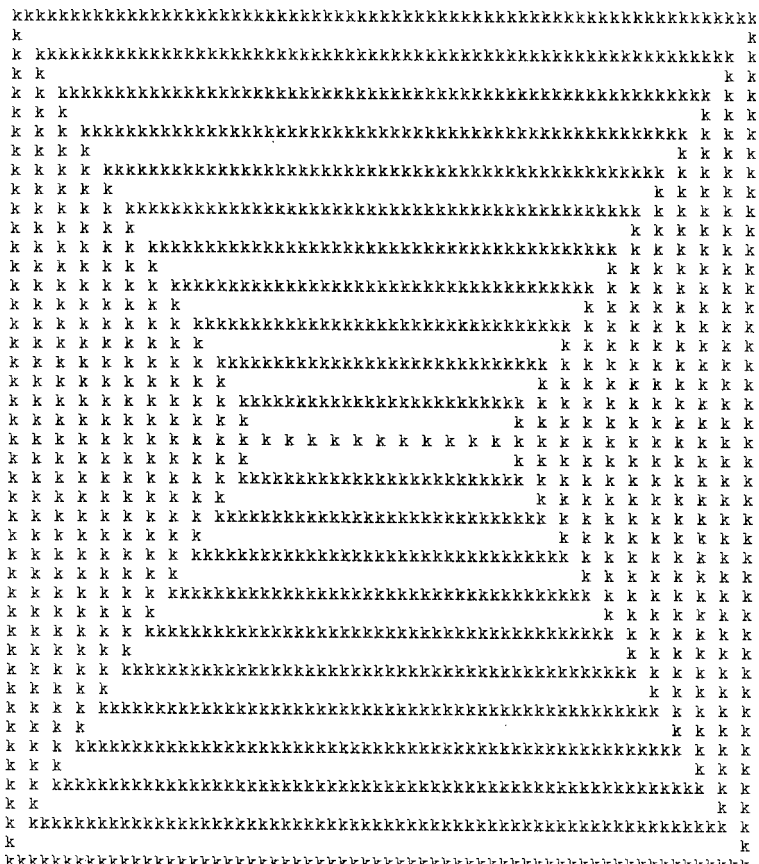

FIG. 1 "k" Chart With 1507 "k"s