Designation: F 1051 – 00 (Reapproved 2004)

Standard Test Method for Comparing Multistrike Film Ribbons[1]

This standard is issued under the fixed designation F 1051; 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 test method covers information and techniques for evaluating several performance qualities of multistrike film typewriter/printer ribbons on a comparative basis for general office use. It is not intended for specialized applications such as optical character recognition.

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.* See Note 10 for a specific cautionary statement.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 1776 Practice for Conditioning and Testing Textiles

D 3460 Specification for White Watermarked and Unwatermarked Bond, Mimeo, Spirit Duplicator, Reprographic, and Laser Printer Cut-Sized Office Papers

F 221 Terminology Relating to Carbon Paper and Inked Ribbon Products and Images Made Therefrom

F 425 Terminology Relating to Lithographic Copy Products[3]

F 497 Practice for Use of the Electric and Electronic Typewriter as a Test Instrument

2.2 *ANSI Standards:*

PH2.17 Density Measurements—Geometric Conditions for Reflection Density[4]

PH2.18 Density Measurements—Spectral Conditions[4]

3. Terminology

3.1 For definitions of terms used in this test method, see Terminology F 221 and F 425.

4. Summary of Test Method

4.1 This test method consists of testing multistrike film ribbons under actual and simulated use conditions, employing printers, automatic typewriters, or typewriters equipped with a robot device and several simulation techniques generally accepted in the inked ribbon industry. All sample ribbons are conditioned and tested under identical conditions, so as to obtain comparative results.

5. Significance and Use

5.1 This test method should be used to evaluate several performance qualities of multistrike film ribbons on a comparative basis.

5.2 This test method is suitable for comparative service evaluation, research, and development. It may also be used for manufacturing control but only on a limited basis, due to time span required for some of the procedures.

5.3 This procedure consists of several tests that are used to evaluate different characteristics of multistrike ribbons. The user can choose any one of these, a series of tests, or all tests depending on his needs and interests.

6. Apparatus and Materials

6.1 *Electronic Typewriter or Printer*, which has been conditioned and calibrated in accordance with Practice F 497, Sections 10 and 11.

6.2 *Reflectometer*, meeting the geometric conditions of PH2.17 and the spectral conditions of PH2.18.

6.3 *Microdensitometer*, equipped with a 0.008-in. aperture and grid pattern.

6.4 *Environmental Chamber*, capable of maintaining 120 ± 2.0°F (49 ± 1°C) for 48 h at a relative humidity of 50 ± 2 %.

6.5 *Paper*, in accordance with Specification D 3460, Type I, Grade 4.

6.6 *Magnifier*—20× with measuring graduations.

6.7 *Control Multistrike Ribbon*, of known quality and performance characteristics.

[1] This test method is under the jurisdiction of ASTM Committee F05 on Business Imaging Products and is the direct responsibility of Subcommittee F05.02 on Inked Transfer 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] Withdrawn.

[4] Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

6.8 *Type font*, which produces a printed image with a stroke width that exceeds 0.008 in.

6.9 *Ink Rub Tester,* with

6.9.1 *Polishing Cloth.*

7. Test Specimen

7.1 The test specimen should be a ribbon or portion of a ribbon, or both, which has not been used or handled. It is recommended that at least three wraps of ribbon be removed or advanced to ensure that the test specimen is free of environmental contamination.

NOTE 1—If all procedures in Section 10 are to be performed, prepare all test specimens at the same time.

8. Identification

8.1 For identification of test specimens, the following is recommended:

8.1.1 Ribbon (name),

8.1.2 Manufacturer's name and address,

8.1.3 Base material (substance and thickness),

8.1.4 Color (shade etc.),

8.1.5 Nominal length, width, and thickness,

8.1.6 Core inside and outside diameter,

8.1.7 Ribbon diameter,

8.1.8 Leader material, seal, and length,

8.1.9 End of ribbon nature, seal, and length,

8.1.10 Trailer material, seal, and length, and

8.1.11 Package description (configuration, box, etc.).

9. Conditioning

9.1 Condition the test specimen and test paper in accordance with Practice D 1776.

10. Procedure

10.1 *Write*—This procedure is for the evaluation of the ribbon when used with an overstrike mode of operation. This is the normal or intended use for the ribbon.

10.1.1 Install the ribbon in a clean multistrike cartridge which is compatible with the typewriter or printer to be used for the test.

10.1.2 Type five lines of ten capital *H*'s. (See Fig. 1.) Measure the visual reflection of the seventh *H* using a microdensitometer with a 0.008-in. aperture using the following procedure.

10.1.3 Measure the reflection of the left leg at the top, center, and bottom of the *H*. Average the three readings for each line. Repeat this procedure for each of the five lines and average the five readings calling the value D_1.

NOTE 2—Do not include any area containing a void in the character.

10.1.4 Repeat measurement of the right leg of the *H* and average the readings as described in 10.1.3. The resulting average is called D_2.

10.1.5 *Calculation*:

$$\text{Write variation, \%} = \frac{D_2 - D_1 \times 100}{D_1} \quad (1)$$

10.1.6 Rank samples based on write variation number.

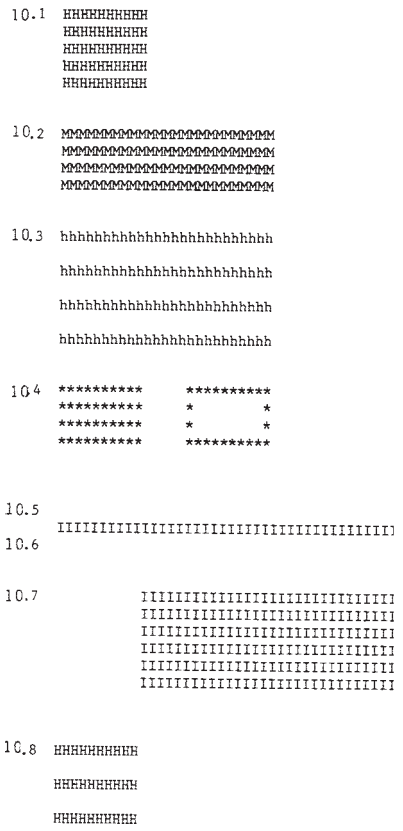

FIG. 1 Sample Test Pattern for Multistrike Film Ribbon Testing

NOTE 3—Lower is better.

10.2 *Void Test*:

10.2.1 Type 4 rows of 25 capital *M*'s on the sample sheet. Using the magnification of the microdensitometer or a separate magnification device, count the number of characters which have voids or breaks that are 0.004 by 0.004-in. or greater. Count only one void per character. Report the number of voids.

10.2.2 Rank the samples by the number of voids.

NOTE 4—Lower is better.

10.3 *Extraneous Ink and Spatter*:

10.3.1 Type 4 rows of 25 lower case *h*'s double-spaced at maximum impression setting. Use a magnification device to view and count the number of spots 0.004 by 0.004-in. or greater within the character field. Character field is defined by the rectangle described by the outermost part of the printed characters. Count the number of characters which have spatter, not the number of spots.

10.3.2 Rank the samples by the number of spots counted.

NOTE 5—Lower is better.

10.4 *Cover-up Correction Reflectance*:

10.4.1 Type four rows of ten asterisks (*) single-spaced, at nominal impact pressure. Then with the intended cover-up tape, cover up the inner asterisks of the block that was just typed.

10.4.2 Using the microdensitometer measure the centers of each of the covered-up asterisks and compute an average reflectance.

10.4.3 Rank samples based upon the highest reflection value.

NOTE 6—Higher is better.

10.4.4 A visual comparison can also be used to decide which cover-up material performs the best.

10.5 *Edge Definition*:

10.5.1 Type 50 capital *I*'s in the multistrike mode of ribbon feed. View them in the microdensitometer, measuring the peak-to-valley distance on the left-hand side of the character.

10.5.2 Count one defect for each character having any peak-to-valley distance exceeding 0.004 in. in the vertical portion of the character.

10.5.3 Rank samples by the quantity of defects.

NOTE 7—Lower is better.

10.6 *Line Spread*—Using the 50 capital *I*'s from the Edge Definition test in 10.5, determine average width of the vertical portion of the character by using the microdensitometer. Measure five of the *I*'s and compute the average print character width. Measure actual character width (font width) of the *I* from the type font. Compute line spread as a function of average print character width minus the actual character width divided by the actual character width multiplied by 100.

10.6.1 Line spread,

$$\% = \frac{(\text{Avg print character width}) - (\text{actual character width})}{\text{Actual character width}} \times 100 \quad (2)$$

10.6.2 Rank samples by percent of line spread. Smaller is better.

10.7 *Smudge Test*:

10.7.1 Type 6 rows of *I*'s with 30 characters in each row, single-spaced.

10.7.2 Place the section of paper, with the typed *I*'s facing up, onto the metal base plate of the ink rub tester. The section should be firmly held in place, directly under center of the swing of the weighted arm.

10.7.3 Tape two 1 by 2-in. pieces of ⅛-in. polyethylene foam to each end of the bottom of the 4-lb weight of the rub tester.

10.7.4 Adhere two pieces of 1 by 2-in. pieces of polishing cloth to the foam.

10.7.5 Carefully place the weight onto the section of paper; with the polishing cloth resting on the typed impressions. (Replace cloth when visual smudging occurs when using a clean sheet of paper.)

10.7.6 Lock weight into radius arm. Set timer to run for ten cycles.

10.7.7 Run tester and remove weight.

10.7.8 Null microdensitometer on a clean portion of paper. Then measure reflectance of the space between first and second *I*'s on each of the second and third rows from the top left-hand and top right-hand corners.

10.7.8.1 Position sample over detection area so that the aperture opening is between the *I*'s.

10.7.9 Report the average of four readings.

10.7.10 Rank the samples by the reflectance value of the smudged area. The highest value is the best.

NOTE 8—A densitometer may be used in place of the microdensitometer. Then ranking would be the lowest value being the best.

10.8 *Weardown/Overstrike Test*:

10.8.1 Ensure that the ribbon is stalled (not able to advance) by disconnecting the advance mechanism, or cut a 1-in. length from the spool and affix it to card holder, coated side in.

10.8.2 Using capital *H*, type ten characters not fewer than three strokes per second. Measure visual reflectance of the first *H* in three places along the center portion of the left vertical leg and determine an average (R_1).

10.8.3 Repeat the reading procedure using the fourth *H* in the row and average three readings identified as R_4.

10.8.4 Repeat the procedure to obtain three rows, advancing or changing the ribbon sample each time along with advancing the paper.

10.8.5 Determine an average for the three R_1 and R_4 readings, and calculate as follows:

$$\text{Weardown, \%} = \frac{\text{avg } R_4 - (\text{avg } R_1)}{(\text{avg } R_4)} \times 100 \quad (3)$$

10.8.6 Rank samples by percent of weardown. Smallest weardown is the best.

10.9 *Oven Test* (Effects of High Temperature):

10.9.1 Place a ribbon specimen in a preset environmental chamber at 120 ± 2°F (49 ± 1°C) at 50 % relative humidity for 48 h.

10.9.2 Remove specimen from oven, and stabilize it for at least 6 h to the original conditions in Section 9.

10.9.3 Repeat procedures 10.1-10.8 noting in particular any changes from the original observations. Record results.

10.10 *Control Specimens*:

10.10.1 Repeat procedures 10.1-10.9 for control multistrike ribbons and all other test specimens as necessary.

NOTE 9—Different typewriters and type fonts may give entirely different results in Sections 10. For general acceptance testing, the use of as many typewriters and type fonts in as many combinations as possible is recommended.

NOTE 10—**Caution:** Select type fonts which produce an image larger than the microdensitometer aperture.

11. Report

11.1 The results shall include on a comparative basis in relation to the control ribbons or the samples, the following:

11.1.1 Calculated write variation and the ranking of samples,

11.1.2 Quantity of voids and the ranking of samples,

11.1.3 Quantity of extraneous ink and the ranking of samples,

11.1.4 Cover-up reflectance values and the ranking of samples,

11.1.5 Quantity of edge definition defects and ranking of samples,

11.1.6 Line spread percentage and the ranking of samples,

11.1.7 Reflectance of the smudged area and the ranking of samples, and

11.1.8 The percent of weardown and the ranking of samples.

12. Precision

12.1 These test methods will provide repeatable ranking order results or repeatable relationship to a control ribbon within a laboratory using the same typewriter/printer. Ranking order and comparative results may not be reproduced between testing locations because of differences in typewriter/printer actions and conditions.

13. Keywords

13.1 computer printer; multistrike ribbons; typewriter; typewriter ribbons