Designation: F 92 – 93 (Reapproved 2003)

# Standard Practice for Determination of Character Yield of Inked Fabric Typewriter and Printer Ribbons[1]

This standard is issued under the fixed designation F 92; 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 covers the determination of the usable image producing life of an inked fabric typewriter ribbon or an inked fabric printer ribbon expressed as the number of impressions obtainable from a given unit.

1.2 This practice is not applicable to one-time typewriter ribbons such as carbon ribbons.

1.3 This practice is suitable for narrow printer ribbons with a width of 2 in. (50.8 mm) or less.

1.4 The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are for information only.

1.5 *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:*

D 685 Practice for Conditioning Paper and Paper Products for Testing[2]

D 725 Method for Identification of Wire Side of Paper[3]

D 3460 Specification for White Watermarked and Unwatermarked Bond, Mimeograph, Duplicator, and Xerographic Cut-Sized Office Papers[2]

F 149 Terminology Relating to Optical Character Recognition[2]

F 221 Terminology Relating to Carbon Paper and Inked Ribbon Products and Images Made Therefrom[2]

F 497 Practice for Use of the Electric and Electronic Typewriter as a Test Instrument[2]

F 1174 Practice for Using a Personal Computer as a Test Instrument[2]

2.2 *ANSI Standards:*

PH 2.17 Density Measurements—Geometric Conditions for Reflection Density[4]

PH 2.18 Density Measurements—Spectral Conditions[4]

## 3. Terminology

3.1 *Definitions:*

3.1.1 For definition of terms related to this practice refer to Terminology F 149 and F 221.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *hot spotting*—printed images produced with an inked fabric ribbon where occasional individual images are darker than those around them. This condition occurs when the amount of ink is not consistent throughout the fabric ribbon.

## 4. Summary of Practice

4.1 This practice consists of testing a ribbon under simulated use conditions by employing a programmed electric typewriter or computer printer to use the ribbon completely.

## 5. Significance and Use

5.1 This practice is used to determine the number of useful impressions obtainable under normal operating conditions of a given typewriter or printer ribbon. It is suitable for service evaluation or research and development. This practice is generally not considered practical for manufacturing control specification acceptance because of the length of time required to obtain results.

5.2 Interpretation of the test result is to be made on a comparative basis, not on the basis of absolute values.

## 6. Interferences

6.1 Different typewriters, printers, print speeds, platens, type or font styles, impact adjustments, and print modes will cause variation in results. Calibration as described in Section 10 will give the same results.

6.2 Type, thickness, and weight of fabric will cause variations in image quality.

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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 F05.02 on Inked Transfer Imaging Products.

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

[3] Discontinued 1980; replaced by D5039 in 1990.

[4] Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.

6.3 Each specimen should be tested using equal time schedules and equivalent environmental conditions.

6.4 Ribbons with reinking systems may exhibit fluctuations in image density that will effect the reliability of graphic analysis as described in 14.2.

6.5 Cartridge internal construction can cause variation in print density.

## 7. Apparatus

7.1 *Electronic Typewriter or Printer*, that has been conditioned and calibrated in accordance with Sections 10 and 11 of Practice F 497, or in accordance with Sections 9 and 10 of Practice F 1174.

7.2 *Reflection Densitometer*—A reflection densitometer meeting the geometric conditions of PH 2.17 and the spectral conditions of PH 2.18. The specimen shall be backed with an infinite pad of the paper.

7.3 *Typewriter or Printer Driver*—An electro-mechanical robot device or computer program to activate the print mechanism to produce a uniform, repeatable print pattern at a constant speed.

7.4 *Type Font*, which produces a printed image with a stroke width exceeding 0.008 in. (0.2 mm).

7.5 *Alarm Clock*, or other time-measurement device.

## 8. Materials

8.1 *Paper*, in accordance with Specification D 3460, Type 1, bond, in roll or fanfold form, single part. Other paper, as normally used in typewriters or printers may also be selected. It is important that the same paper be used in all comparison tests as the paper type may effect the result.

## 9. Test Specimen

9.1 The test specimen should be a ribbon or known portion thereof that is unused and fresh (not subject to excessive handling or abnormal storage conditions).

## 10. Calibration and Standardization

10.1 Adjust the typewriter or printer used to conduct the character yield test in accordance with Practice F 497 or Practice F 1174.

10.2 *Typewriter or Printer Driver*—If an electro-mechanical robot device is used, adjust in accordance with the instructions supplied by the manufacturer. If a computer or self test program is used, prepare for appropriate start-stop cycles.

10.3 Calibrate the densitometer (see 7.2) in accordance with the manufacturer's instructions for visual measurement.

## 11. Conditioning

11.1 Condition the samples to be tested and test paper in accordance with Method D 685.

11.2 If standard condition is not available, make certain that wide changes in temperature and humidity do not take place while test is conducted.

## 12. Procedure

12.1 Insert the sample ribbon in the typewriter or printer in the normal manner prescribed by the manufacturer. Be certain that the imaging ribbon feeds properly and is taut across the print head.

12.2 Insert the test paper in the normal manner using pin drives if available. Insert the paper in such a manner so that the test pattern is produced on the felt side of the paper if possible. Refer to Method D 725 to determine wire or felt side of paper. If paper side cannot be determined, always use the same side as drawn from package or box.

12.3 Adjust the bail rails, margin guides, and platen settings to ensure free travel of paper and production of a uniform, unimpeded print pattern.

12.4 Determine the test pattern.

12.5 *Time Schedule*—The time schedule selected should approximate the actual use condition of the printer. Examples of time schedules: 1-h run, 15-min wait, repeat, and 4-h run, 30-min wait, repeat. A nonstop wear test may be conducted should the printing condition require continuous printing to exhaustion. Set alarm clock or other time-measurement device to ensure adherence to the time schedule.

12.6 Operate the typewriter or printer at the print speed recommended by the manufacturer. Where a printer can be set at varying speeds, choose a mid-range setting to duplicate average use. The characters must be even with proper spacing both vertically and horizontally between them. They must not overlap.

12.7 Following the selected time schedule, continue running the test print pattern until printed image is illegible or unsatisfactory. A predetermined measurement can be agreed upon as the point of illegibility between concerned parties. (See Appendix.)

NOTE 1—Different inks may have differing color tones that will affect the visual appearance as compared to reflectance readings. For best results, continue running the test pattern well past the agreed point of illegibility.

12.8 Number pages beginning at "1" and at convenient intervals (50, 100, etc). If roll paper is used, each 11 in. (279 mm) is equivalent to a standard letter size page.

12.9 Remove the paper upon which the test pattern has been produced from the typewriter or printer being careful to avoid any smudging of the pattern.

## 13. Interpretation of Results

13.1 *Image Density Requirements*:

13.1.1 Standardize the reflection densitometer as selected in 7.2.

13.1.2 Place the test specimen under the viewing head of the instrument and read the value of the reflection density as follows:

13.1.3 *Initial Write*—At the top of page 1, measure the density of the beginning impressions in at least three areas across the top of Page 1. Record the resulting average as "D1—Initial Write."

13.1.4 *Progressive Wear*—Measure additional density values at set intervals, that is, every 50 pages, every 100 pages. Measure characters in the middle of the page using the same characters on each page. Record the resulting average as "D2,"" D3," etc.

NOTE 2—The time schedule chosen in 12.5 should be compatible with the intervals chosen for measurement.

13.1.5 *Final Write*—At the last page of the test run, measure the density of the last line of impressions. Record the resulting average as "DF—Final Write."

13.2 Count the number of impressions per page or per 11-in. length if roll paper. Total the number of satisfactory impressions produced to the predetermined limit (see 12.7).

13.3 Plot the reflection density versus the number of impressions to show rate of image density loss.

## 14. Report

14.1 Report the number of impressions per unit tested,

14.2 Plot the results (D1 ... DF) with reflection density units on the vertical axis and number of impressions on the horizontal axis of the graph.

14.3 A horizontal line may be drawn to indicate the bottom limit of reflection density producing impressions (see 12.7). Any of several methods of depicting results may be used provided all interested parties agree. Possible methods are: the simple chain linking of data points, the drawing of a straight trend line, statistical analysis by means of a root-mean-square fit of the best straight line, the best fitting r-m-s curve, and whatever else is agreed on.

14.4 Report temperature and relative humidity of test climate.

14.5 Report time schedule used for wear test.

14.6 Report test conditions such as model of printer or typewriter used, print speed, type font, pitch, and impact pressure setting.

## 15. Precision and Bias

15.1 This practice provides repeatable ranking order results or repeatable relationship to a control within a laboratory using the same typewriter or printer and operator.

15.2 Rank order and comparative results may not necessarily be reproduced between laboratories because of differences in operators, typewriter, printers, ambient conditions, and end-point determination (see 12.7).

## 16. Keywords

16.1 fabric ribbon; longevity; printer ribbon character yield; typewriter ribbon; typewriter ribbon character yield; wear of fabric ribbons

# APPENDIX

**(Nonmandatory Information)**

## X1. DETERMINATION OF THE END POINT IN FABRIC RIBBON CHARACTER YIELD TESTING

X1.1 *General*—When determining the character yield of a fabric loop ribbon, 12.7 suggests: "Following the selected time schedule, continue running the test print pattern until printed image is illegible or unsatisfactory. A predetermined measurement can be agreed upon as a point of illegibility." This appendix suggests a possible method for establishing end point/illegibility parameters.

X1.2 *Sample Preparation*—Using this method, run the ribbon until exhaustion. Ensure samples have unfamiliar text and the same font or typeface (Courier 10 is the most widely available). Using a densitometer, measure the reflection density on eight characters located on the same area on each page. Average and record the readings for each page.

**X1.3** *Prepare a Survey:*

X1.3.1 Establish a base of a minimum of 15 survey participants. It is recommended to select the participants from various backgrounds such as: marketing/sales; editorial; technical; shipping/receiving; and data processing. This will ensure the solicitation of information from users who have a variety of printing needs. Explain to each participate that theoretically, this is the only printer available for them to use and do not compare the output with that of any other printing technology. Select a sampling of pages produced per ribbon with reflection density ranging from 0.01 to 0.2. Query each participant as to: which sample page represents the lower limit of readability or when they would change the ribbon themselves; and which sample page is no longer readable.

X1.3.2 From the results of the survey, average the reflection density of the samples chosen. Two reference points can be established:

X1.3.2.1 *Useful Ribbon Life*—That is, the lower limit of text readability or the point at which the ribbon should be changed.

X1.3.2.2 *Ribbon Life*—That is, the point at which the text is no longer readable.

**X1.4** *Establish an End Point:*

X1.4.1 Use the reflectance density figures for "ribbon life" derived from the survey to establish an end point in testing. One laboratory, upon using the methodology in this appendix derived figures of:

X1.4.1.1 *Useful Ribbon Life*—A reflection density of less than 0.09.[5]

X1.4.1.2 *Ribbon Life*—A reflection density of less than 0.036.[5]

X1.5 *Report*—Plot a graph of density versus character yield. Include reference lines on the graph for "useful ribbon life" and "ribbon life." Use these reference points as an aid in comparing the character yield of one ribbon versus another.

[5] Using a reflection densitometer equipped with 3.4-mm aperture.