



Standard Test Method for Determining the Yield of Wide Inked Computer Ribbons¹

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1. Scope

1.1 This test method covers the determination of the yield of a wide (7 to 17 in. in width) inked computer ribbon.

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.*

2. Referenced Documents

2.1 ASTM Standards:²

D 3460 Specification for White Watermarked and Unwatermarked Bond, Reprographic, and Laser Printer Cut-Sized Office Papers³

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

F 909 Terminology Relating to Printers

F 1174 Practice for Using a Personal Computer Printer as a Test Instrument

F 1232 Practice for Generating a Test Pattern for Single-Pass Film Ribbons

2.2 ANSI Standards:

PH 2.17 Density Measurements—Geometric Conditions for Reflection Density⁴

PH 2.18 Density Measurements—Spectral Conditions⁴

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³ Withdrawn.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 (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

3. Terminology

3.1 Definitions:

3.1.1 *end-of-life point, n*—the point at which the image quality produced from an inked computer ribbon is determined to be incomprehensible, expressed in terms of optical density. Prior to testing, the concerned parties mutually determine an end-of-life-point.

3.1.2 *yield, n*—the end-of-life point of an inked computer ribbon, expressed as the number of printed lines.

4. Summary of Test Method

4.1 This test method consists of testing a computer ribbon under actual use conditions by employing a high-speed printer to use the ribbon to an end-of-life point. All tests are to be made consecutively on the same printer, using the same type font, program, impact, alignment, forms, forms-thickness setting, and manufacturer's lot, grade, and basis weight of paper.

5. Significance and Use

5.1 This test method is used to determine the yield (expressed in the number of printed lines) obtainable under actual use conditions on a given computer ribbon of a definite length.

5.2 This test method is suitable for service evaluation and research and development.

6. Interferences

6.1 Many printers are subject to imaging system variations due to fluctuation of line voltage. Voltage stabilizing devices may be used. If a stabilizing device is not used, tests should be run where the line load is low or stabilized.

6.2 The densitometer reading may also vary with voltage fluctuations. Use the same instructions as in 6.1.

6.3 Fluctuations in temperature and humidity can affect the paper used for image reception. Tests run on different days could show variation in results. All tests should be dated, with temperature and relative humidity recorded.

6.4 The printing element of the printer gradually wears under use, which may cause variation in the results. During the course of a test, it is recommended that the printing element be periodically inspected, cleaned, calibrated, or replaced, and any of these actions recorded.

6.5 The optical density of the paper may cause variations in the results. Ensure that the paper is optically uniform (within 0.01 optical density units), without background print.

6.6 The type of paper used may cause variation in the results. Ensure that paper from the same manufacturer, lot, basis weight, and grade is used.

7. Apparatus and Materials

7.1 *Printer*, using the ribbons to conduct yield test.

7.2 *Reflection Densitometer*—A reflection densitometer meeting the geometric condition of ANSI PH 2.17 and the spectral conditions of ANSI PH 2.18.

7.3 *Paper*, in accordance with Specification D 3460, Type 4, bond in roll or continuous form, single part. Other paper, as normally used in typewriters or printers may also be selected.

7.3.1 Ensure that the paper is optically uniform (within 0.03 optical density units), without background print.

7.3.2 Ensure that paper from the same lot and of the same basis weight and grade is used in all comparison tests as the paper may affect the result.

8. Test Specimen

8.1 The test ribbons should be entire ribbons or a known portion of each. It is advisable that if a portion is used, that they be the same portion (for example, the first half or the first five feet of each). In all cases, the specimens should be unused and fresh (not subjected to unnecessary handling or abnormal storage conditions).

9. Calibration

9.1 Adjust the printer used to conduct the test method in accordance with the manufacturer's instructions or in accordance with Practice F 1174.

9.2 Calibrate the densitometer (7.2) in accordance with the manufacturer's instructions.

10. Conditioning

10.1 Condition the ribbon samples to be tested and test paper for 24 h in the same atmospheric conditions as those where the test is to be conducted.

10.2 Run all comparison tests under the same conditions of temperature and humidity.

11. Procedure

11.1 Run the test ribbons using an alphanumeric ripple test program or a program using a test pattern that conforms to Practice F 1232. Conclude the test method at the point where the density of the image has decreased to a value that is below

that of the predetermined end-of-life point. If a ribbon shows failure before the end-of-life point, immediately stop the test method to avoid damage to the printer.

11.2 Identify and record all elements of the test method and printed pages.

11.3 Read and record the density at the start and at every 100th page of the printed pages, using a black backing with an ISO reflection density above 1.50. The same characters on the first line of the page in the same impact positions must be used at all times, on all specimens.

11.4 The density versus the number of lines may be plotted to show the decrease in density versus the yield.

12. Calculation

12.1 For a full-length ribbon, determine the yield of the ribbon (expressed in the number of lines printed). This is the number of pages multiplied by the number of lines per page.

12.2 Where only a portion of the ribbon was used, calculate the portion as related to the full length or area of the ribbon. To determine the yield of a full ribbon, multiply the number of printed lines by the total length of the actual inked ribbon and divide by the test length of the printed ribbon.

NOTE 1—For example:

Full ribbon = 25 ft

Test length = 5 ft

Test yield = 1000 pages

Full length yield = 5000 pages

13. Report

13.1 Report the following information:

13.1.1 The agreed-upon end-of-life point.

13.2 All pertinent information on the ribbon, manufacturer, length, width, etc.

13.3 The manufacturer, lot, grade and, basis weight of the paper used.

13.4 The total number of printed lines for the total length and width of ribbon. Alternatively, report the number of printed lines per foot.

13.5 Details of any maintenance or service actions performed on the printer.

14. Precision and Bias

14.1 This test method will provide repeatable ranking order results within a laboratory using the same printer and tester.

14.2 Ranking order may not necessarily be reproduced between laboratories because of differences in operator, printer, test apparatus, printer components, printer actions, and ambient conditions.

14.3 Since there is no acceptable reference material for determining the yield and bias for the procedure in this test method, no statement on bias is being made.

15. Keywords

15.1 computer printer; ribbons; ribbon yield; wide ribbon

APPENDIX**(Nonmandatory Information)****X1. DETERMINING THE END-OF-LIFE POINT IN THE YIELD OF WIDE INKED COMPUTER RIBBONS**

X1.1 *General*—This test method states that when determining the yield of a wide inked computer ribbon, prior to testing, the concerned parties mutually determine an end-of-life-point. This appendix suggests a possible method for establishing end-of-life parameters.

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

X1.3 *Preparing 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 participant 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 the pages produced per ribbon with a reflection density ranging from the lower limits of the densitometer's range of operation to 0.2 (minus the reflection density of the paper). Query each participant as to: (1) which sample page represents the lower limit of readability or when they would change the ribbon themselves; and (2) which sample page is no longer readable.

X1.3.2 From the results of the survey, determine the density of the samples chosen. Two reference points may be established as follows:

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

X1.3.2.2 *End-of-Life*—The point at which the text is no longer readable.

X1.4 *Establishing an End-of-Life Point*—Use the density figures derived from the survey to establish an end-of-life point in testing.

X1.5 *Report*—Plot a graph of density versus yield. Include reference lines on the graph for Useful Life and End-of-Life. Use these reference points as an aid in comparing the yield of one ribbon to another.

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