



Standard Practice for Evaluation of One-Time Carbon Paper in Carbon-Interleaved Business Forms by Use of an Electric Typewriter¹

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1. Scope

1.1 This practice covers a standardized procedure using an electric typewriter to determine the image quality of one-time carbon paper for use in carbon-interleaved business forms.

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:

D 585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, and Related Product²

F 221 Terminology Relating to Carbon Paper and Inked Ribbon Products and Images Made Therefrom²

F 497 Practice for Use of the Electric and Electronic Typewriter as a Test Instrument²

3. Terminology Definitions

3.1 Refer to Terminology F 221.

4. Summary of Practice

4.1 This practice consists of a comparison test under actual use conditions whereby a sample of one-time carbon paper is interleaved side by side with a control carbon of known image quality into a business form (or with forms bond paper to simulate a business form) and imaged on an electric typewriter at a designated setting and pressure. A visual comparison is made of the typed images from both sample and control carbon.

4.2 This practice is used primarily to determine whether or not a one-time carbon will produce a satisfactory image in a business form of predetermined composition with a quality similar to that of the control carbon.

5. Significance and Use

5.1 This practice is used primarily to evaluate the image quality of a one-time carbon paper by comparison with a control carbon of known performance in a business form of predetermined composition on an electric typewriter.

5.2 This practice can also be used for the selection of a one-time carbon for a particular business form where a control carbon does not exist.

5.3 This practice can be used for production, quality control, and research and development.

6. Interferences

6.1 Different pressures and settings on the same typewriter can affect the carbon-image quality.

6.2 Platens of different durometer in the same typewriter can affect the carbon-image quality.

6.3 Different typewriters can affect the carbon-image quality.

6.4 The length of time, the pressure, and the temperature during which the carbons are interleaved in the form can affect the carbon-image quality.

6.5 The length of time that the carbon paper was originally coated and the storage conditions during that period can affect the image quality.

6.6 Weight, thickness, and finish of form bond paper can affect image quality.

6.7 Basis Weight of carbon substrate and carbon ink hardness, coat weight or thickness, can affect image quality.

6.8 Typewriter platen misalignment could produce lighter images on the left of the form than on the right or reverse.

6.8.1 To check the platen make write with control carbons, remove carbons, cut vertically, replace in form in the same order, but reverse the left and right positions of each carbon sheet. Repeat exactly the same write and examine carbon copy for evidence of variation.

7. Apparatus

7.1 *Commercial Electric Typewriter*, see Practice F 497.

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.

8. Material

- 8.1 *Carbon-Interleaved Business Forms.*
- 8.2 *One-Time Carbon, for control.*
- 8.3 *Forms Bond Paper.*

9. Sampling

9.1 Sample the roll carbon or carbon sheets in accordance with Practice D 585.

10. Test Specimen and Sample Preparation

10.1 *Comparison with Carbon-Interleaved in a Form*—Cut the test specimens to the same length and half the width of the carbon interleaved in the form, and in the same machine and cross-direction dimensions as the interleaved carbon. The number of specimens will be one less than the number of parts in the form.

10.2 *Comparison with Control Carbon in a Form of Specified Dimensions, Without Interleaved Carbon*—Cut the sample and control specimens to half the width and the same length as the form, the length being in the machine direction of the carbon paper. The number of specimens will be one less than the number of parts specified for the form.

10.3 *Form Dimensions Not Specified*—Cut the specimens of both sample and control carbons 4¼ by 11 in. (108 by 279.4 mm) with the machine direction of the carbon paper being parallel to the 11-in. dimension.

10.3.1 Cut the forms bond paper 8½ by 11 in. (215.9 by 279.4 mm) the machine direction being parallel to the 11-in. dimension.

11. Preparation of Apparatus

11.1 Prepare the commercial electric typewriter according to Practice F 497.

12. Conditioning

12.1 It is not necessary to condition the carbon papers and bond papers to a standard percent relative humidity and temperature.

13. Procedure

13.1 *Preparation of Forms with Interleaved Carbon (Control) Already Inserted:*

13.1.1 Measure the width of the carbon paper in the form and remove the left half of each sheet of carbon by cutting with scissors parallel to the length of the form.

13.1.2 Cut the sample carbons to the same dimensions as the control carbons removed from the form, taking care that the length is in the machine direction, and that there are the same number of specimens as in the form.

13.1.3 Interleave in the left side of the form and staple all carbons through the form. The form is now prepared for typing.

13.2 *Preparation of Forms without Carbons Interleaved:*

13.2.1 On the paper cutter, cut both sample and control carbons to half the width of the form with the machine direction parallel to the length of the form and the number of specimens one less than the number of parts in the form.

13.2.2 Interleave the sample carbons in the left side between the forms paper and staple together.

13.2.3 Interleave the control carbons in the right side between the forms paper and staple together. The form is now prepared for typing.

13.3 *Preparation of Forms without Interleaved Carbons or Specified Forms Paper:*

13.3.1 Cut the form paper to 8½ by 11 in. (215.9 by 279.4 mm) with the 11-in. dimension in the machine direction.

13.3.2 Cut both control and sample carbons 4¼ by 11 in. (108 by 279.4 mm) with the 11-in. dimension in the machine direction.

13.3.3 Interleave the sample carbons in between the forms paper on the left side, to the number of parts selected, and staple together.

13.3.4 Interleave the control carbons in between the forms paper on the right side, and staple together. The form is now prepared for typing.

13.4 *Identification:*

13.4.1 Identify control and sample carbons on all forms with appropriate information such as color, grade, manufacturer, roll numbers, and date of manufacture.

13.4.2 Write date interleaved and information of forms paper such as grade, basis weight, and manufacturer.

13.5 *Procedure for Producing Carbon Images on the Electric Typewriter:*

13.5.1 Refer to Practice F 497.

13.5.2 Release gripper rolls tension to platen (to avoid the staples ruining the platen) and insert the test form at the stapled end and pull around the platen manually until in the desired position for typing.

13.5.3 Apply tension to the platen by returning the gripper rolls to the correct position.

13.5.4 Adjust typing pressure and set controls correctly for the form thickness used and the intensity of image required.

13.5.5 Type across the web using keys that are close to the center (“G”, “H”).

13.5.6 Type each letter alternately in one line across the form with lower-case type at a steady rate. Repeat with upper-case type to give a total of two lines across the form with single spacing.

13.5.7 Write the date typed above the lines of typing and below the identification. The form is prepared for image evaluation.

14. Comparative Image Quality Evaluation

14.1 Visually compare the images from the sample and control carbons for each part of the form. For relative quality, retain the carbons interleaved in the form. The image quality is a composite of the following:

- 14.1.1 Intensity,
- 14.1.2 Sharpness (edge),
- 14.1.3 Fill-in,
- 14.1.4 Granularity, and
- 14.1.5 Spread.

15. Report

15.1 Report the relative quality of the carbon images produced from the test specimen (sample carbon) as equal to, greater to, or less than the quality produced from the control carbons. These are obtained by visual observation without the

use of optical instruments or devices and include the image characteristics listed in 14.1.1 through 14.1.5.

15.2 Because some carbon papers change with aging in a form repeat 13.5, 14, and 15.1 of the test after aging the form for three days at room temperature at a pressure of $\frac{1}{3}$ psi (2.3 kPa). Identify new test write with new date. This is the average pressure exerted at the bottom of a box of business forms. Obtain this pressure by placing a known weight over a given area of the form to be typed (for example 7 by 9 in. = 63 in.² weight applied for $\frac{1}{3}$ psi is 21 lb).

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16. Precision and Bias

16.1 This practice will provide repeatable ranking order results or repeatable relationship to a control within a laboratory using the same typewriter. Ranking order and comparative results may not be reproduced between testing locations because of differences in typewriter actions and conditions.

17. Keywords

17.1 business forms; continuous forms; image quality; one-time carbon paper