INTERNATIONAL STANDARD

ISO 8514-2

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Micrographics — Alphanumeric computer output microforms — Quality control —

Part 2: Method

Micrographie — Microformes COM alphanumériques — Contrôle de la qualité —
Partie 2: Méthode

Reference number
ISO 8514-2:1992(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8514-2 was prepared by Technical Committee ISO/TC 171, *Micrographics and optical memories for document and image recording, storage and use.*

ISO 8514 consists of the following parts, under the general title *Micrographics — Alphanumeric computer output microforms — Quality control*:

— *Part 1: Characteristics of the test slide and test data*

— *Part 2: Method*

Annex A of this part of ISO 8514 is for information only.

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Introduction

The continued advancement and expansion of alphanumeric computer output microforms (alphanumeric COM) for the storage of information indicates that there is a need to establish valid, reliable methods by which the quality of the images can be controlled. This is necessary if consistent usable output is desired. Of primary importance in the production of microforms containing alphanumeric information is the legibility of the information presented to the user. This is true whether the microform used is the original (first generation) or a duplicate.

ISO 8514 specifies a method for setting up and controlling the quality of computer output microforms (COM) and specifies a test form slide and test data to be used for applying this method. It applies to microforms containing variable data produced using a cathode-ray tube, light-emitting diodes or a laser, and fixed data such as that contained on a form slide, with effective reduction ratios of 1:24 through 1:48, in accordance with ISO 9923. This International Standard applies only to COM recorders that use a physical form slide.

Since it is not possible to supply a single International Standard for all the various systems and equipment configurations that are in use, it is necessary to establish test guidelines whereby the user can establish and maintain a given level of performance using the minimum of sophisticated equipment. To carry out the testing described in this part of ISO 8514, the most that is required is a densitometer and a microscope. If they are not available it is possible to conduct the tests, once a reference sample is established, using only a microform reader.

The method requires a test form slide, hereunder called a "test slide", and test data generated from the COM image generator.

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Micrographics — Alphanumeric computer output microforms — Quality control —

Part 2:
Method

1 Scope

This part of ISO 8514 describes a method for defining and controlling the quality of alphanumeric COM microforms. It also provides a means for controlling the intensity (exposure) settings of the image generator.

ISO 8514-1 specifies the characteristics of the test slide and of the test data used for applying the method.

ISO 8514-1 and ISO 8514-2 apply only to COM recorders that use a physical form slide.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8514. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8514 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5-2:1991, *Photography — Density measurements — Part 2: Geometric conditions for transmission density.*

ISO 5-3:1984, *Photography — Density measurements — Part 3: Spectral conditions.*

ISO 446:1991, *Micrographics — ISO character and ISO test chart No. 1 — Description and use.*

ISO 3334:1989, *Micrographics — ISO resolution test chart No. 2 — Description and use.*

ISO 6196-7:—[1], *Micrographics — Vocabulary — Part 07: Computer micrographics.*

ISO 8514-1:1992, *Alphanumeric computer output microforms — Quality control — Part 1: Characteristics of the test slide and test data.*

ISO 9923:—[1], *Micrographics — Transparent A6 microfiche image arrangements.*

3 Definitions

For the purposes of this part of ISO 8514, the definitions given in ISO 6196-7 and the following definition apply.

3.1 test slide: A form slide, conforming to ISO 8514-1, designed for use in monitoring the quality of output from a COM system.

4 Outline of the method

The method described is used initially to set up the COM system to yield satisfactory images and later as a means to maintain consistent performance on a day-to-day basis. If several COM recorders are in use, it also provides the means to ensure that equivalent performance is being obtained from each COM recorder.

The method first uses the test slide specified in ISO 8514-1 to determine if optimum focus of the im-

1) To be published.

age of the test slide is being achieved. This is carried out using the ISO No. 1 or No. 2 test chart.

The E-H patterns and density areas and/or halftone screen scale are then used to establish the proper exposure. The data from the character generator is used to adjust and determine the registration accuracy of the data with the test slide. This is accomplished using the addressing area ①. The "E" and "H" characters are used to set up the exposure from the image generator. In general, this exposure level is established by the user in relation to his own needs.

The typical set of COM characters and the characters of similar appearance in area ⑦ are used to establish that the data from the image generator are legible.

5 Test procedure

The following procedure consists of obtaining first the best image of the test slide and then of establishing the best image from the image generator.

5.1 Optimizing the test slide image

5.1.1 Optical focus of the test slide

Since, in almost all cases, the form slide imaging system is prefocused by the manufacturer, this test is used to confirm that the minimum resolution specified in 5.1.4 is being achieved. If not, the necessary adjustment shall be made before any other operation is initiated.

For that purpose the optical image at the film plane or the real image on the film shall be checked. In the latter case the value obtained is dependent not only on the COM recorder lens focus but also on the exposure conditions, film type, and processing.

The maximum resolving power shall be determined through several tests carried out at various exposure settings ranging from underexposure, through normal exposure to overexposure. To measure the resolution, use either the ISO test chart No. 1 or the ISO resolution test chart No. 2.

NOTE 1 Maximum resolution is rarely achieved when practical exposure conditions are used.

5.1.2 Test slide exposure — Test "A"

Fill a microfiche (or its microfilm equivalent) with images of the test slide using a series of gradually increasing form-flash intensities (line by line or column by column). Choose the exposure level for the test slide that gives an image in which the thinnest E-H pair (A1) appears underexposed and the heaviest E-H pair (D5) appears overexposed. If more than one pair appears underexposed or overexposed, choose the image in which the amount of under- and overexposure is equal. Note the exposure setting that gives these results.

Once the proper exposure level is chosen, if a densitometer is available, measure the visual diffuse transmission density in accordance with ISO 5-2 and ISO 5-3 of the appropriate density area. For positive-appearing COM images measure the maximum density on the density measuring area Ⓑ and for negative-appearing COM images measure the minimum density on the density measuring area Ⓑ and note the density of the density measuring area Ⓐ. Record the related coordinates of the numbers as "read" on the test microform corresponding to the optimum exposure. This can be used for future checking of the system to ensure that proper exposure and processing is maintained.

If a densitometer is not available, the density balancing areas ④ may be used as a visual comparison reference.

To read the density balancing scale, consider areas as "read" only those having enough visual contrast to distinguish both the white and the black numbers from the background of the areas in which they are located.

5.1.3 COM reduction ratio

The reduction ratio shall be in accordance with ISO 9923.

The actual reduction ratio of the COM recorder can be checked by taking the ratio between any element of which the initial dimension on the artwork is indicated (see ISO 8514-1), and the actual dimension on the same element on the microimage.

To do this accurately the use of a travelling microscope can be required. It is also essential that the proper reduction has been used during preparation of the test slide. In most COM systems, using a particular lens, the reduction ratio is fixed, hence this test is useful only in determining if the specifications of this part of ISO 8514 have been met.

5.1.4 COM resolving power

The test charts located in area ③ are used to determine the resolving power obtained on the microform and to check the focus of the test slide image. When the microform is examined in accordance with ISO 446 or ISO 3334, it should be possible to read, at a reduction ratio 1:48, the character 125 of the ISO test chart No. 1 or the test pattern 3.2 of the ISO resolution test chart No. 2.

5.1.5 Legibility control of the test slide image

Check the quality of the characters located in area ⑥. In routine work the overall area should be easily legible. The characters located in area ⑥ are a sample of standard characters recommended for use in making standard (or working) form slides.

This test is used to check that a working form slide is of adequate quality.

5.2 Optimizing the image of the image generator

5.2.1 Setting of the image generator luminance — Test "B"

Set the test slide exposure to the value determined to be optimum in test "A". Next, generate data (see ISO 8514-1, figure 3) using the image generator. Prior to recording on film, align the dynamic data to the test slide grid. Fill a microfiche (or its microfilm equivalent) with images from the test slide and image generator using gradually increasing generator exposure.

5.2.2 Legibility and exposure determination

Choose the exposure level from the image generator that produces the best images and then using a microscope or a full size blowback microform reader, compare the E-H pairs to those having the same height and line width as a pair from the test slide. Do this for each of the five areas ⑤ on the test slide image. Note the number and letter position of each comparable E-H set.

5.2.3 Control of the alignment

The grid of area ① can be used to check the alignment accuracy of the image generator, the stability of deflection, frame to frame, and any possible character distortion or aberration.

5.2.4 COM character set

The typical set of COM characters is generated in area ⑦. Examine each character to ensure legibility, particularly the sequence of similar characters, e.g. I, 1, 0, O, Q, B, 8, G, 6, 5, S, Z, 7, 2, etc.

6 Density of first generation microform

Produce images of the test slide on film and make density measurements on these images as follows:

6.1 Density test areas

There are two areas ② used for the measurement of density. The clear area of the test slide (area B) is used to measure the maximum density when conventional processing is used or to measure the minimum density when reversal processing (or direct positive film) is used. The halftone screen (area A) is used principally with reversal processing to monitor the consistency of exposure and processing.

In addition, the microform background can be used to measure the minimum density (base plus fog) on conventionally processed film and the maximum density for reversal processed film.

6.2 Density values

Table 1 gives recommended visual diffuse transmission density values measured in accordance with ISO 5-2 and ISO 5-3.

Table 1 — Summary of acceptable density limits

Film type	Process	Density measurement method	Minimum D_{max}	Maximum D_{min}	Minimum density difference
Silver gelatin (1P)	Conventional	Printing or visual diffuse	1,00	0,15 or 0,10 plus base[1)]	0,85
Silver gelatin (1N)	Full reversal or direct positive	Printing or visual diffuse	1,50 (1,80 preferred)	0,20 plus base[1)]	1,30
Thermally processed silver (1P)	Heat	Printing ISO type 1	1,00	0,40 plus base[1)]	0,60 (0,80 preferred)

1) Base equals the density of the uncoated base.

7 Applications

The following checks shall be performed:

— installation and maintenance testing;

— routine checking.

7.1 Installation and maintenance testing — Test "C"

— Perform all the tests described in clause 5, particularly tests "A" and "B", using fresh solutions for the processing.

— Choose the optimum settings, and record them.

— Check these settings and use them to generate a complete microfiche (or its microfilm equivalent) with composite images as shown in figure 1.

— Record the densities obtained from the density test areas ②, the identifying coordinates of the E-H sets which produce the best results from both test slide and COM generated data in area ⑤, the number of the smallest ISO No. 1 character or ISO No. 2 test pattern read in area ③, and the effective reduction ratio used.

This microform shall be considered as a reference.

When a COM recorder is installed, the equipment shall be checked in accordance with the above method. The testing conditions as well as the results obtained shall be recorded. The results can be used subsequently as references for performing routine testing of the equipment.

7.2 Routine checking

Repeat test "B" (see 5.2.1).

This test can be carried out on a regular basis or for determining the reason for unsatisfactory output.

— Generate a complete microfiche (or its microfilm equivalent) with composite images, as shown in figure 1), with the same exposure and processing conditions as recorded during test "C".

— Check that the results obtained are identical with those recorded for the reference microform obtained by test "C".

— Make the necessary adjustments if they are not identical.

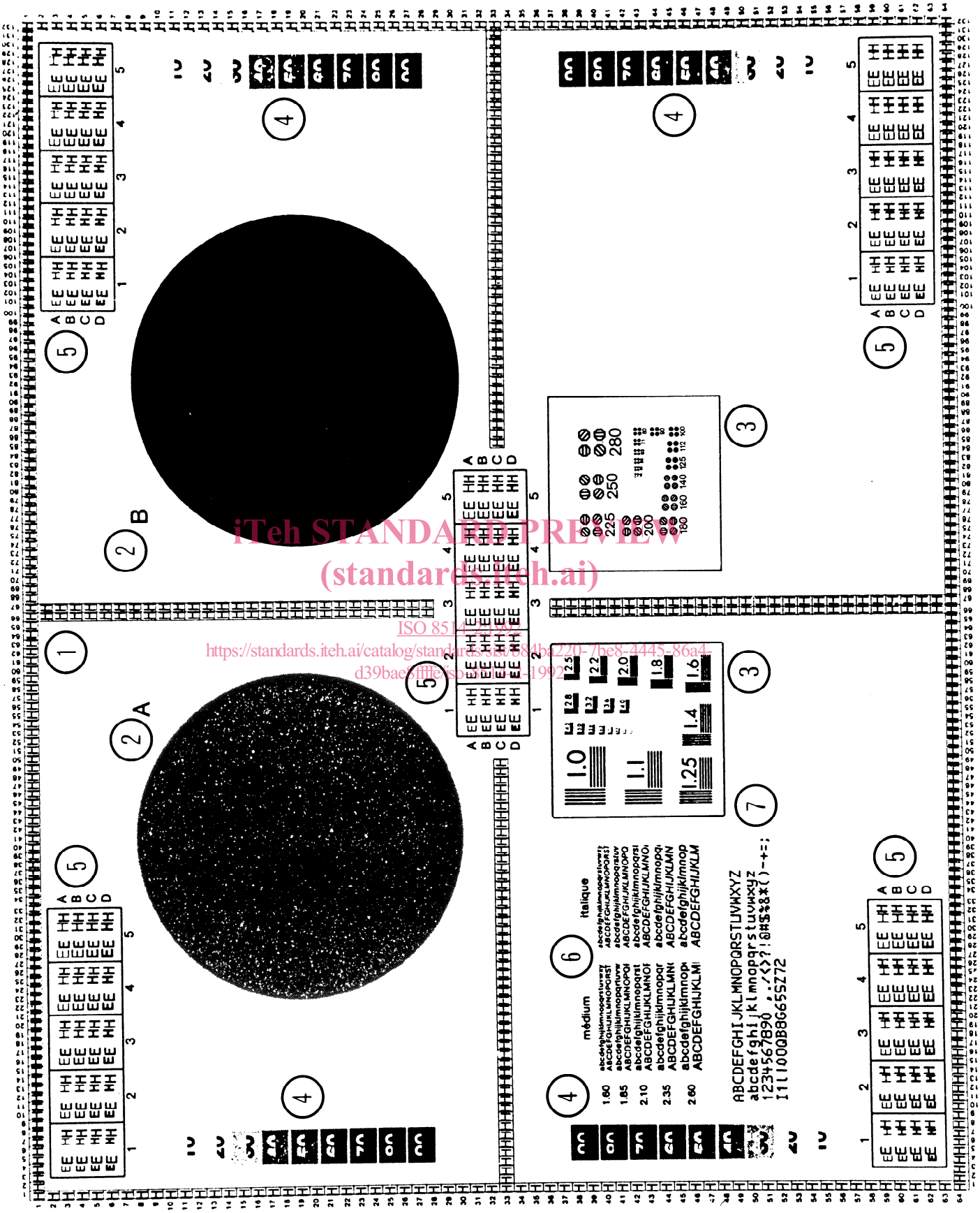

Figure 1 — Image frame combining test slide and the generated test data