INTERNATIONAL STANDARD

ISO 10594

Second edition
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Micrographics — Rotary camera systems — Test target for checking performance

Micrographie — Systèmes de caméras cinétiques — Cible de contrôle pour vérifier la performance

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Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10594 was prepared by Technical Committee ISO/TC 171, *Document management applications*, Subcommittee SC 1, *Quality*.

This second edition cancels and replaces the first edition (ISO 10594:1997), which has been technically revised.

Introduction

This International Standard has been prepared to provide a means of checking the quality of output of rotary camera systems. Rotary cameras have certain characteristics that require a different form of test target from that specified for checking planetary cameras in ISO 10550.

The processes of microfilming may result in the production of an image that is in some way inferior to that of the original document. In order to keep such deterioration within acceptable limits, the output of the camera needs to be checked regularly so that faults can be corrected and any necessary adjustments made.

Micrographics — Rotary camera systems — Test target for checking performance

1 Scope

This International Standard specifies a test target and a method for checking the optical and mechanical performances of rotary cameras used for producing 16 mm microfilm.

This test target and method can be used for

— evaluating the performance of cameras (e.g. before purchase to establish initial reference),

— acceptance tests (e.g. confirming purchase specifications after maintenance), and

— routine checking (e.g. weekly or monthly).

NOTE The characteristics of a rotary camera are indicated in Annex A.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5-2:2001, *Photography — Density measurements — Part 2: Geometric conditions for transmission density*

ISO 5-3:1995, *Photography — Density measurements — Part 3: Spectral conditions*

ISO 5-4:1995, *Photography — Density measurements — Part 4: Geometric conditions for reflection density*

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

ISO 2471:1998, *Paper and board — Determination of opacity (paper backing) — Diffuse reflectance method*

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

ISO 6196-1, *Micrographics — Vocabulary — Part 1: General terms*

ISO 6196-2, *Micrographics — Vocabulary — Part 2: Image positions and methods of recording*

ISO 6196-3, *Micrographics — Vocabulary — Part 3: Film processing*

ISO 6196-4, *Micrographics — Vocabulary — Part 4: Materials and packaging*

ISO 6196-5, *Micrographics — Vocabulary — Part 5: Quality of images, legibility, inspection*

ISO 6196-6, *Micrographics — Vocabulary — Part 6: Equipment*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6196-1, ISO 6196-2, ISO 6196-3, ISO 6196-4, ISO 6196-5 and ISO 6196-6 apply.

4 Description of the test target

4.1 Characteristics of the base

The test target shall be made on a white opaque base. Its visual diffuse reflection density, measured as specified in ISO 5-3 and ISO 5-4, shall not be more than 0,08. Its opacity, measured as specified in ISO 2471, shall be over 85 %. This test target shall be positive-appearing.

4.2 Test target layout

The test target shall comprise the following, arranged as shown in Figures 1 and 2 (ISO test chart No. 1 shall comply with ISO 446 and ISO test chart No. 2 shall comply with ISO 3334):

— 3 double columns, one each at the right, centre, and left of the target, consisting of groups either of ISO test chart No. 1 characters, ranging from character 56 to character 280, in a line, or of ISO test chart No. 2 patterns, ranging from 7.1 to 1.4;

— 2 series of lines composed of upper-case and lower-case printed characters arranged in portrait form in the centre of the left side of the target and in landscape form in the centre of the right side;

— 2 series of 2 columns of frequency ladder patterns of 1.8, 2.0 line pairs/millimetre, to the left of centre; and 2.5, 3.2 line pairs/millimetre, to the right of centre;

— at least one reference scale, graduated in millimetres, between 2 frequency ladder patterns;

— an arrow to indicate the direction of feed, large enough to permit measurement of density (see 4.3) and parallel to the columns of frequency ladder patterns;

— 2 perpendicular lines, one 220 mm in length, the other 200 mm in length (parallel to the frequency ladders), that cross within the target. The intersection is marked with a circle to indicate their use as an orthogonality check. The ends of the lines are clearly marked and their lengths shown on the test target, for use in checking effective reduction ratio.

4.3 Contrast

When measured in accordance with ISO 5-3 and ISO 5-4, the minimum difference in visual diffuse density between the base of the target and the printed features, e.g. the arrow (see 4.2), shall be 1,3.

4.4 Identification

The following elements shall appear, as text (excluding quote marks), on the test target:

— “rotary camera test target”;

— “certifying agent /source of issue”.

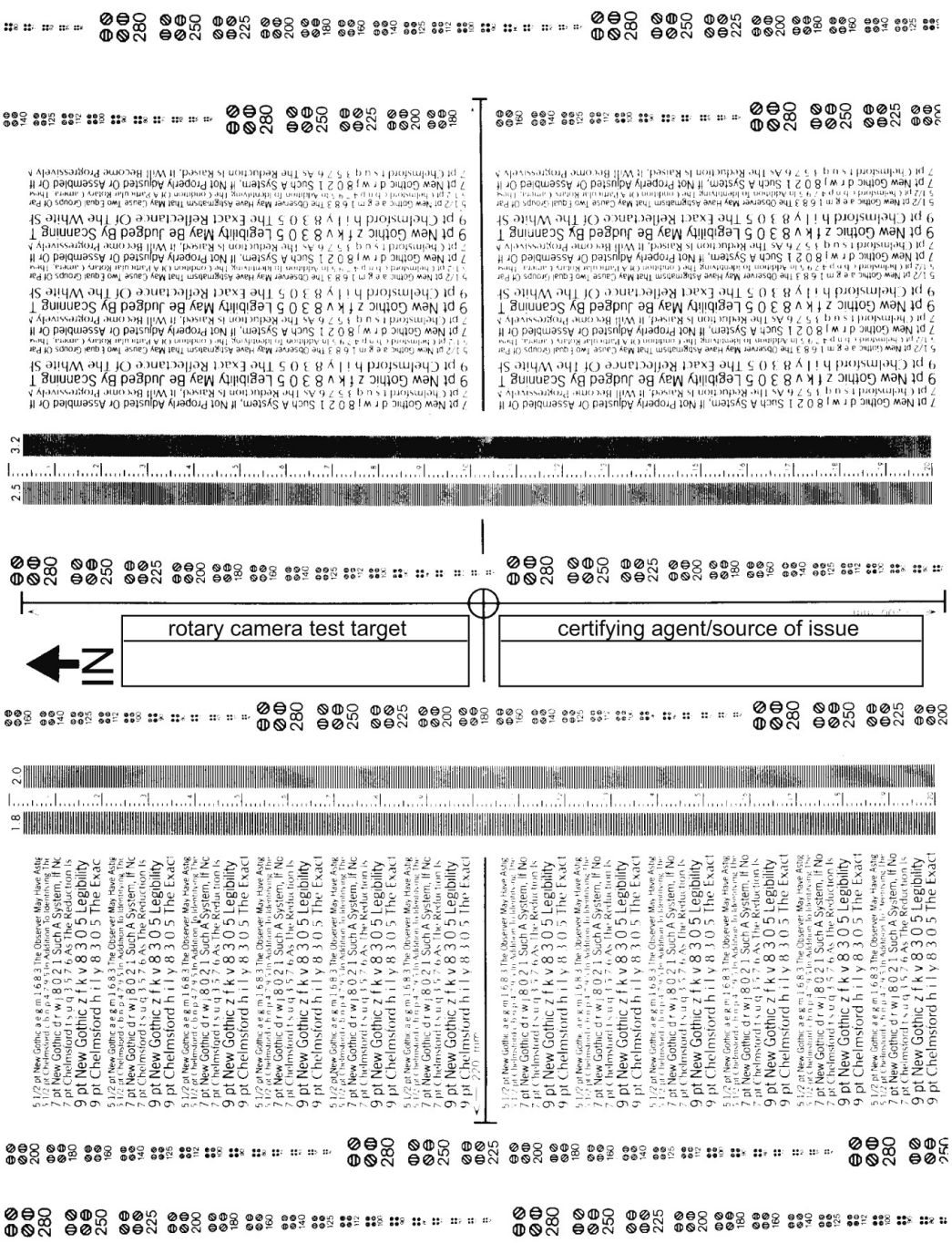


Figure 1 — Layout for test target with ISO test chart No. 1

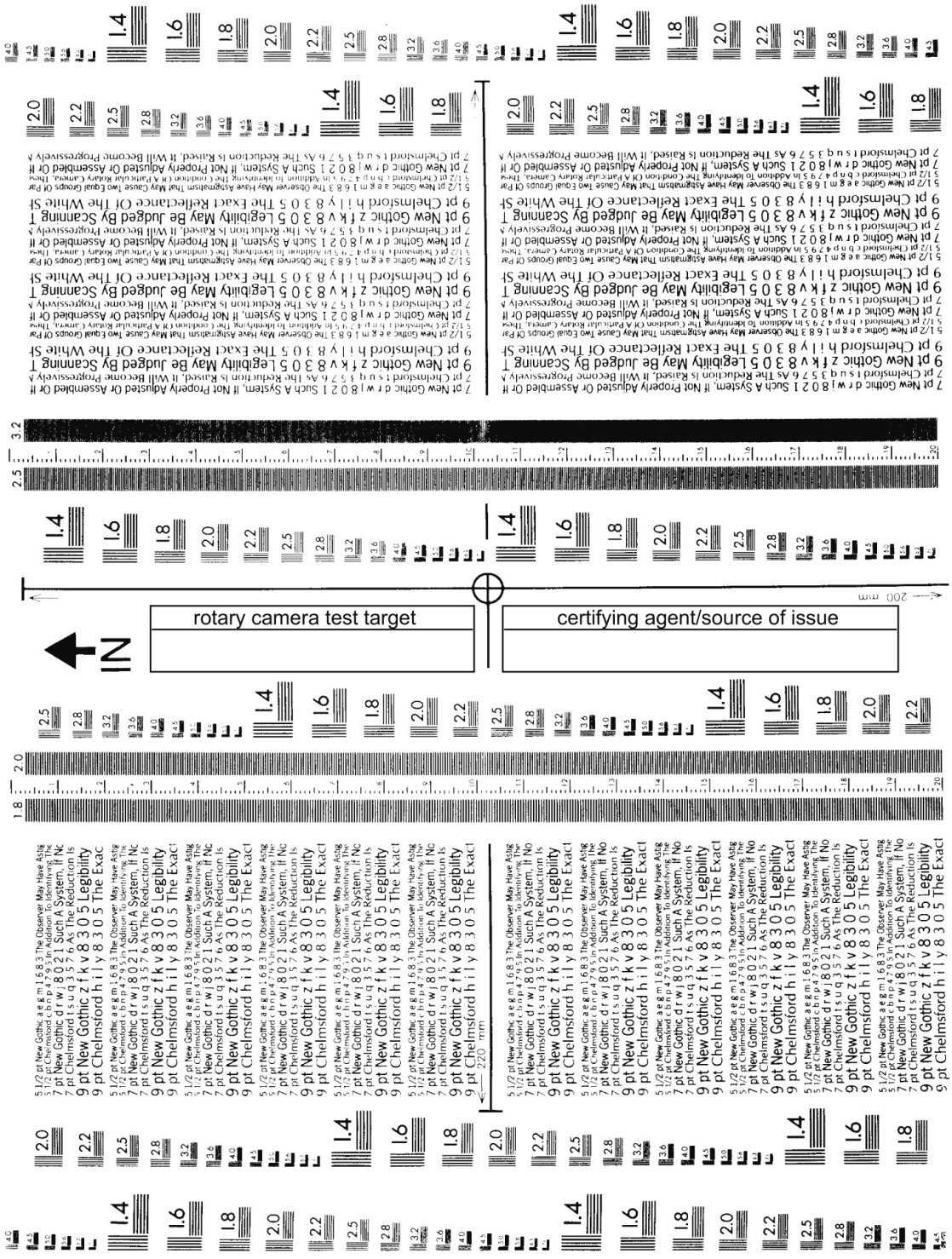


Figure 2 — Layout for test target with ISO test chart No. 2

5 Microfilming of the test target

5.1 Exposure setting

The exposure should be set to produce a background density of the microimage of the test target within the range 1,0 to 1,3, measured in accordance with ISO 5-2 and ISO 5-3. To check the background density, film a blank sheet of the same type of paper if available from the supplier, as used for the test target and measure the density of the microimage. If blank target stock is not available, use a plain white paper of 85 % reflectance as measured in accordance with ISO 5-4:1995. Be certain to re-set the camera exposure to the correct value for the documents being filmed.

5.2 Feed

Feed the test target into the rotary camera in the direction of the arrow (see Figures 1 and 2).

If the width of the camera aperture exceeds the size of the test target, move the target along the aperture and film it as many times as are necessary to cover the entire width.

If the width of the camera aperture is less than the size of the test target, cut the test target in the direction of the arrow, into strips that fit the aperture and film all the strips in succession.

5.3 Number of exposures

For set up and after major repairs, microfilm the test target a minimum of 10 times. Number the microimages from 1 to 10 for the control. For routine production, it is not necessary to film the target 10 times. In the case of a camera that microfilms the front and back sides of the document simultaneously (duplex), the test shall be performed checking both the front and rear field. If the camera is capable of microfilming multiple rolls of film simultaneously, the above evaluation method shall be repeated for each roll.

If only a portion of the photographic field is used in production, the above evaluation method may be applied to evaluate only that portion of the photographic field used.

6 Test target evaluation procedure

6.1 Microscope

Use a microscope that has a good quality achromatic objective, a magnification between 50:1 and 150:1 and some means of measuring image size.

6.2 Mechanical performance

If there is any defect in the mechanical transport of the test target or film, some lines of the ladder patterns will appear blurred on the microimage. Examine the ladder patterns for signs of blurring whether general or intermittent (see 6.3).

6.3 Optical quality (resolving power)

Examine the microimages of the test charts and determine the resolving power in accordance with ISO 446 or ISO 3334, paying particular attention to any blurring (see 6.2).

6.4 Reduction ratio

Check the camera's reduction ratio by comparing the length of the reference lines on the original test target with the length of their microimage.

6.5 Legibility test

To check legibility, examine the lines of characters on the microimage.

7 Results of the tests

Record the results of the tests and keep them.

For microimages recorded in modes other than simplex or on multiple rolls simultaneously, record the least favourable results for each arrangement.

Record the information listed on the data sheet shown in Figure 3.

DATA SHEET

1 Microfilming procedure

— date of microfilming;

— testing purpose (performance, routine, maintenance, reception, …);

— camera number;

— type of camera used;

— type of film used;

— nominal reduction ratios used;

— microimage background density;

— camera operator.

2 Results on each of the microimages produced

2.1 Transport evenness, checked on frequency ladder patterns

2.2 Actual reduction ratio measured

— dimension of the microimage of the reference scale.

2.3 Patterns resolved (ISO test chart No. ...)

Smallest character or pattern read in the centre on each side.
Note its location.

2.4 Size of smallest printed characters read

Horizontal characters	Vertical characters
pt/mm	pt/mm

3 Comments

Figure 3 — Information for data sheet

Annex A
(informative)

Characteristics of rotary camera

A.1 General

The primary appeal of rotary cameras is a high throughput rate. To satisfy the needs of the business community, endorsers and sequential imprinters stamp the documents while in motion, thus introducing the possibilities of hesitation in the transport of the documents or produce vibrations of the optical image during exposure. These functions may reduce the microimage quality.

A.2 Film and document movement

A.2.1 Synchronization

Keeping the film and document in synchronization is one of the most important aspects of rotary microfilming. Generally, a ladder test target is used to observe the lack of synchronization between the movement of the film and the document allowing examination of the mechanical operation of the camera.

If there is a momentary synchronization problem, often called “loss line” or “glitch”, it will appear as a blurring of a small group of lines in the ladder patterns in the test target. As the blur occurs in the direction of travel of the film, lines perpendicular to the direction of travel will be blurred in that narrow area across the width of the film; however, lines parallel to the direction of travel will not show such a loss in resolution. This effect will extend across the entire frame as a narrow band of slightly degraded image quality but legibility may still be maintained. In a printed document, it may affect only one line of printing (see Figure A.1).

Normal wear in both the film and document drive may cause a lack of synchronization.

A.2.2 Focus

The film is generally driven around the circumference of a capstan drive roller. This roller must be a precise cylinder or the image will move in and out of focus. This is even more critical at high reduction ratios where the depth of focus of the lens is very small.

A.2.3 Maintenance

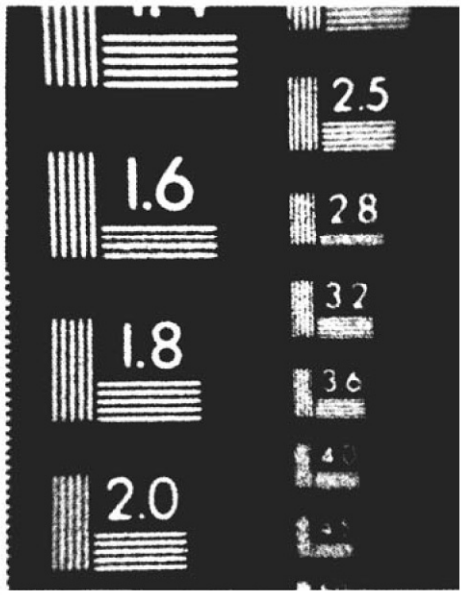
Because of the high speed movement of the documents and the method of transport, a large quantity of paper dust is generated in the camera. Glass-guides, mirrors, as well as other components within the machine become very dirty and require continuous and proper maintenance to maintain quality. When the camera is determined to be in optimum operating condition, a test target should be filmed and recorded as a reference base. Comparison of future test results with the reference base should help to determine when service is required.

A.3 Quality of original documents

The quality of the original documents to be microfilmed is very critical for several reasons. Various thicknesses, sizes, and surface finishes of papers make the documents difficult to handle through the document transport. Some poor quality documents produce excessive dust and, therefore, increase the frequency of machine maintenance. Documents with carbon back make the optical components of the camera dirty. Extremely thin

documents may have a tendency to wrinkle. Should the document encounter a momentary hesitation (glitch) at the time it is in the exposing position, the image of the document will be momentarily out of synchronization with the film and a line or two of the information will be blurred perpendicular to the direction of travel.

Figure A.1 shows how a glitch can mislead the observer to read a lower value of resolution than the photographic system is capable of producing.



NOTE Pattern 1.6 is not resolved while patterns 1.8 and 2.0 are resolved.

Figure A.1 — Effect of glitch on the patterns of ISO test chart No. 2

Bibliography

[1] ISO 10550, *Micrographics — Planetary camera systems — Test target for checking performance*

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