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STANDARD

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**Micrographics — Rotary camera for 16 mm  
microfilm — Mechanical and optical  
characteristics**

*Micrographie — Caméras cinétiques pour microfilms de 16 mm —  
Caractéristiques mécaniques et optiques*



Reference number  
ISO 10198:1994(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 10198 was prepared by Technical Committee ISO/TC 171, *Micrographics and optical memories for document and image recording, storage and use*.

Annex A of this International Standard is for information only.

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# Micrographics — Rotary camera for 16 mm microfilm — Mechanical and optical characteristics

## 1 Scope

This International Standard specifies the mechanical and optical characteristics of rotary cameras used for recording documents onto 16 mm microfilms as specified in ISO 6199.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 5-1:1984, *Photography — Density measurements — Part 1: Terms, symbols and notations.*

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 5-4:1983, *Photography — Density measurements — Part 4: Geometric conditions for reflection density.*

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

ISO 1116:1975, *Microcopying — 16 mm and 35 mm microfilms, spools and reels.*

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

ISO 6148:1993, *Photography — Film dimensions — Micrographics.*

ISO 6196-1:1993, *Micrographics — Vocabulary — Part 01: General terms.*

ISO 6196-2:1993, *Micrographics — Vocabulary — Part 02: Image positions and methods of recording.*

ISO 6196-6:1992, *Micrographics — Vocabulary — Part 06: Equipment.*

ISO 6199:1991, *Micrographics — Microfilming of documents on 16 mm and 35 mm silver-gelatin type microfilm — Operating procedures.*

ISO 7779:1988, *Acoustics — Measurement of airborne noise emitted by computer and business equipment.*

ISO 10594:—<sup>1)</sup>, *Micrographics — Rotary camera systems — Test target for checking performance.*

IEC 417:1987, *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets. Eighth supplement.*

IEC 950:1991, *Safety of information technology equipment including electrical business equipment.*

## 3 Definitions

For the purposes of this International Standard, the definitions given in ISO 6196 and the following definition apply.

**3.1 synchronization of a rotary camera:** Timed movement of documents and microfilm in relation to the reduction ratio to record an accurate image on the film.

1) To be published.

## 4 Operating procedures

### 4.1 Image format

The camera shall record images according to one or more of the formats specified in ISO 6199 (simplex, duplex, duo or duo-duplex).

### 4.2 Documents

#### 4.2.1 Document width

The camera manufacturer shall state the maximum document width that can be filmed across the width of the film. This dimension depends on camera throat width, filming format, reduction ratio and whether coding is used (for guidance, see tables A.1 and A.2).

#### 4.2.2 Other characteristics

The camera manufacturer shall provide the minimum document length that can be photographed parallel to the axis of the film. This dimension depends on the characteristics of the mechanical transport device. Normally, there is no maximum length in this direction. The camera manufacturer shall provide the specifications of the paper to be used with the camera, such as the weight and thickness, in the accompanying operator's manual.

### 4.3 Rawstock film

The camera shall use 16 mm rawstock microfilm as specified in ISO 6148 and spools as specified in ISO 1116. The manufacturer shall state the acceptable thickness of film in the operator's manual.

## 5 Mechanical characteristics

### 5.1 Synchronization of film and document

The camera shall keep the film and document in synchronization during the filming, in order to meet image quality specification.

### 5.2 Positioning of documents

The camera shall be equipped with a guiding device to facilitate the entry of the document and their transport within the camera.

### 5.3 Document feeding

Usually, documents are fed face up with heading forward and oriented according to the width of the

throat. Documents can be fed into the cameras by hand or by automatic feeder. Automatic document feeders shall separate papers, sheet by sheet, for feeding into the camera, provided that the documents are similar in weight and thickness.

### 5.4 Document protection

If the transport mechanism fails, it shall be possible to remove the document without irreparable damage.

### 5.5 Optional features

The camera may be equipped with the following features:

- ability to record in duplex, duo or duo-duplex mode;
- dual film (magazines);
- removable camera heads;
- an exposure signal, indicating shutter opening and/or film transport operation;
- an automatic document counter/recorder capable of being reset to zero;
- indicators for lamp failure;
- information coding devices [imprinters, cancelling devices, date and time stamps, film image marks (blips), frame numbering devices, etc.];
- devices for indicating the length of film available and the film movement;
- advance warning before running out of film;
- method to prevent or detect the simultaneous entry of more than one document at a time;
- automatic stop upon machine malfunction.

### 5.6 Document delivery tray

The documents, once microfilmed, should be delivered in their original order. The delivery tray shall be visible and easily accessible to the operator.

### 5.7 Noise emission

The noise emitted by the camera, measured in accordance with ISO 7779, shall not exceed 70 dB(A) during normal operation. Impulse noise of equipment shall not exceed 75 dB.

## 5.8 Temperature

The temperature of camera surfaces shall not exceed the values given in table 1 after the camera has been operated in an area with an ambient temperature of  $23\text{ °C} \pm 2\text{ °C}$  for 1 h.

## 6 Optical characteristics

### 6.1 Exposure

Lighting, lenses, and mirrors shall be adjusted so that when a full-size sheet of paper with uniform reflectance is filmed, the image density shall meet the following requirements:

- a) When measured in accordance with ISO 5-2 and ISO 5-3, the background density of a sheet of white paper with 80 % reflectance shall be within the range 0,8 to 1,5 density units, this provides enough exposure latitude for (coloured) documents with a reflectance density as low as 50 %.
- b) When measured in accordance with ISO 5-2 and ISO 5-3, the difference in background density between any two points on the document shall be no greater than 0,3 density units.
- c) When recording the same type of document the background density from image to image from start of roll to end of roll shall not vary by more than 0,3 density units when measured in a non-information area on the centreline in the direction of travel of the document image. This also applies to images in the duplex format.
- d) If both front and back of the documents are filmed then the background density shall not vary by more than 0,3 from front to back provided they are the same colour.

- e) When automatic exposure control is available and used, it shall respond in such a manner as to minimize underexposure of the leading and trailing edges of the document.
- f) A shutter shall be provided to protect the film from unwanted exposure when no document is being filmed.
- g) The camera shall be light tight to prevent film fog during extended periods of nonoperation.

NOTE 1 If a roll is partially exposed, completed later and then processed, latent image fade could cause density variations larger than 0,2 from one end of the roll to the other.

### 6.2 Image quality

A maximum variation of four test chart groups of characters of ISO test chart No. 1 or test chart patterns of ISO test chart No. 2 is allowed either within one document image or between any two images.

## 7 Alternative components

If alternative components are available, e.g. camera heads, document feeders, etc., the user should not need tools to change or remove them.

## 8 Climatic conditions

The camera shall be capable of normal operation at temperatures within the range  $15\text{ °C}$  to  $32\text{ °C}$  and relative humidity within the range 20 % to 75 %.

Table 1 — Camera part temperature

Camera part	Temperature
All controls, areas in front of camera, surfaces near the controls, any part used in film loading, handling or positioning or normally touched during operation of the camera	35 °C
Areas at the bottom of the camera and other exterior parts not included in the above	55 °C
Internal parts which may be touched or handled in routine maintenance, lighting device changing and cleaning etc.	No limit specified
— if labelled with warning (e.g. "CAUTION — HOT")	60 °C
— not labelled	
— lighting devices and lamps	Warning required (no temperature limit)

## 9 Electrical supply

The camera shall meet the voltage and frequency specifications of the country where it will be used. If power supply voltage has a wide variation, a constant voltage device can be required. Such a device is usually subject to the camera manufacturer's approval.

## 10 Electrical safety

The camera shall meet the requirements of IEC 950 for electrical safety.

## 11 Controls

All operator controls shall be easy to access and operate.

## 12 Markings

The information below shall be legibly displayed on the camera in a durable manner:

- a) manufacturer's or supplier's name or trademark;
- b) model or type of camera;

- c) serial number;
- d) nominal voltage, wattage and frequency of the electricity supply in hertz;
- e) controls marked in the language acceptable to the country in which the camera will be sold or in symbols specified in IEC 417;
- f) reduction ratio;
- g) lamp identification specifications shall be in the area of the lamp housings;
- h) fuse specifications shall be adjacent to the fuse holder.

## 13 Operator manual

The camera shall be delivered with a manual containing operation and maintenance instructions written in a language acceptable to the country in which the camera will be used. A list of commonly required replacement parts that includes identification numbers, if used, shall accompany or be part of the operator manual.

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## Annex A (informative)

### Approximate sizes

The figures and tables in this annex give the approximate frame or page size which can be microfilmed in the various formats (simplex, duo or duplex) with no

edge coding or with single- or double-edge coding at various reduction ratios.

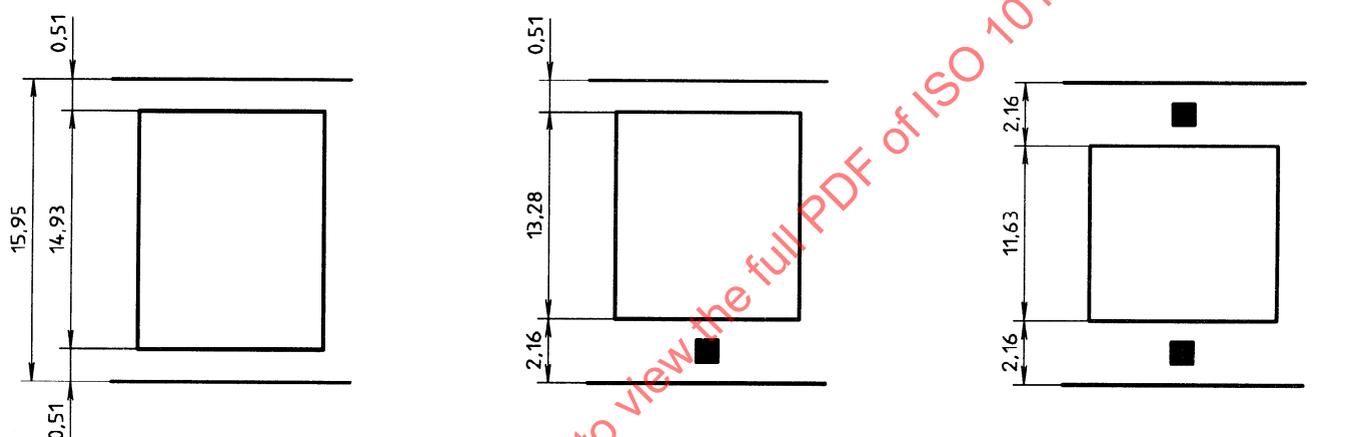


Figure A.1 — Simplex formats

Table A.1 — Dimensions for maximum document length or width (simplex)

Dimensions in millimetres

Reduction ratio <sup>1)</sup>	No edge coding	Single-edge coding	Double-edge coding
1/20	299	266	233
1/24	358	319	279
1/30	448	398	349
1/36	538	478	418
1/42	627	558	488
1/48	716	638	558
1/50	747	664	581

1) Reduction ratio selected is based on the size of the document, desired quality level, and the available image area. If some other reduction ratio is used, the maximum sheet width permitted can be deduced from the table. These are maximum dimensions based on reduction ratio only. The camera field width may be narrower and some allowance should be made for skew.

Dimensions in millimetres

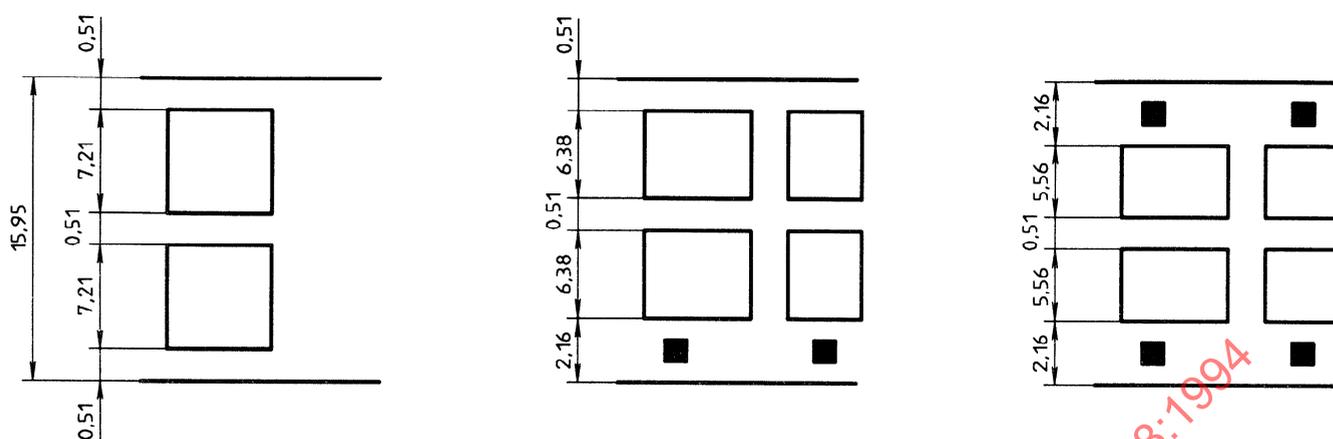


Figure A.2 — Duplex format and duo format

Table A.2 — Dimensions for maximum document length or width (duplex or duo)

Dimensions in millimetres

Reduction ratio <sup>1)</sup>	No edge coding	Single-edge coding	Double-edge coding
1/20	144	128	111
1/24	173	153	133
1/30	216	191	166
1/36	260	230	200
1/42	303	268	233
1/48	346	306	266
1/50	360	319	278

1) Reduction ratio selected is based on the size of the document, desired quality level, and the available image area. If some other reduction ratio is used, the maximum sheet width permitted can be interpreted from the table. These are maximum dimensions based on reduction ratio only. The camera field width may be narrower and some allowance should be made for skew.

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