

INTERNATIONAL
STANDARD

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Second edition
1994-02-01

**Microfilming of technical drawings and
other drawing office documents —**

Part 2:

Quality criteria and control of 35 mm silver
gelatin microfilms

*Micrographie des dessins techniques et autres documents de bureau
d'études —*

*Partie 2: Critères et contrôle de qualité des microfilms gélatino-argentiques
de 35 mm*



Reference number
ISO 3272-2:1994(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 3272-2 was prepared by Technical Committee ISO/TC 171, *Micrographics and optical memories for document and image recording, storage and use*.

This second edition cancels and replaces the first edition (ISO 3272-2:1978), of which it constitutes a technical revision.

ISO 3272 consists of the following parts, under the general title *Microfilming of technical drawings and other drawing office documents*:

- Part 1: *Operating procedures*
- Part 2: *Quality criteria and control of 35 mm silver gelatin microfilms*
- Part 3: *Aperture card for 35 mm microfilm*
- Part 4: *Microfilming of drawings of special and exceptional elongated sizes*
- Part 5: *Test procedures for duplicating diazo microfilm images in aperture cards*
- Part 6: *Enlargement from 35 mm microfilm, quality criteria and control*

Annexes A, B, C and D form an integral part of this part of ISO 3272.

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Introduction

Drawing offices produce, in addition to drawings, documents which differ in purpose, form and intention. Easy exchanges of such documentation between organizations should be possible without ambiguities arising from the use of the information they contain.

Microfilming enables the information contained in drawing office documents to be reduced to small dimensions thus facilitating survey, transport, handling and storage. Faithful reconstitution of a microform can only be accomplished readily if the microform satisfies precise requirements with respect to dimensions and quality. The quality requirements themselves can be fulfilled readily only if the original document is prepared in accordance with strict specifications adapted to microform size and the selected reduction ratios.

This part of ISO 3272 specifies particular aspects of microfilming technical drawings and other drawing office documents on black-and-white 35 mm silver microfilm.

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Microfilming of technical drawings and other drawing office documents —

Part 2:

Quality criteria and control of 35 mm silver gelatin microfilms

1 Scope

This part of ISO 3272 specifies the procedures for maintaining and checking the quality and reproducibility of 35 mm silver-gelatin-type microfilm in black-and-white. It is applicable to first generation, second generation and distribution silver copies, processed in accordance with ISO 10602 and produced on microfilm cameras from hard copy.

It is applicable to the microfilming of all documents prepared by drawing offices, such as technical drawings, architect's plans, calculation notes, specifications and parts lists.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 3272. 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 3272 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 3272-1:1983, *Microfilming of technical drawings and other drawing office documents — Part 1: Operating procedures.*

ISO 3272-3:1975, *Microcopying of technical drawings and other drawing office documents — Part 3: Unitized 35 mm microfilm carriers.*

ISO 3272-4:1994, *Microfilming of technical drawings and other drawing office documents — Part 4: Microfilming of drawings of special and exceptional elongated sizes.*

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

ISO 4330:1987, *Photography — Determination of the curl of photographic film.*

ISO 5466:1992, *Photography — Processed safety photographic films — Storage practices.*

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 6196-3:1983, *Micrographics — Vocabulary — Part 03: Film processing.*

ISO 6196-4:1987, *Micrographics — Vocabulary — Part 04: Materials and packaging.*

ISO 6196-5:1987, *Micrographics — Vocabulary — Part 05: Quality of images, legibility, inspection.*

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

ISO 10602:1993, *Photography — Processed silver-gelatin type black-and-white film — Specifications for stability.*

3 Definitions

For the purposes of this part of ISO 3272, the definitions given in ISO 6196 apply.

4 Quality requirements

4.1 General

The quality of each image recorded on the microfilm shall be such that every line and character of the document microfilmed is recorded with sufficient contrast and definition to be legible and reproducible up to and including the distribution copy.

4.2 Rejection

Any microimage frame not complying with the requirements of this part of ISO 3272 shall be suitably defaced.

4.3 Processing

To give a stable image, the microfilm shall be processed in accordance with ISO 10602.

4.4 Defects

The microfilm shall be free from scratches, finger marks, drying marks or any other defects which would impair either the quality of a reproduction made from the film or its legibility when used in a microfilm reader.

4.5 Curl

The microfilm shall be free from excessive curl, when measured in accordance with method A of ISO 4330. When using samples equal to the dimensions of the piece of film to be mounted in the aperture card, the maximum curl of microfilm, after exposure and processing, shall not exceed the following limits:

- transverse curl: 6;
- longitudinal curl: 8.

4.6 Protective coating

If a protective coating is applied to the film, it shall not impair the quality required by this part of ISO 3272 or the archival quality (see ISO 5466).

4.7 Gross background density

When determined by the method given in annex A, the background density of the document image area of a negative-appearing or positive-appearing silver microfilm shall be within the appropriate range given in table 1. All densities shall be visual diffuse transmission densities specified in ISO 5-2 and ISO 5-3.

Table 1 — Background density requirements

	First generation	Second generation	Distribution copy
Negative-appearing	0,9 to 1,2	0,9 to 1,2	0,9 to 1,3
Positive-appearing	0,16 max.	0,16 max.	0,20 max.

4.8 Base-plus-fog density

Base-plus-fog density shall not exceed 0,12 determined as visual diffuse transmission density specified in ISO 5-2 and ISO 5-3.

5 Legibility

When a microimage of a test chart on a first or second generation or a distribution microform is examined in accordance with the method given in ISO 446 (ISO test chart No. 1) or ISO 3334 (ISO test chart No. 2), the characters or patterns corresponding to the values given in table 2 shall be legible.

When tested by the method given in annex B, the quality of all processed microfilm shall be such that the character sizes or the pattern numbers shown in table 2 for the appropriate generations and reduction ratios are resolved (see ISO 446 or ISO 3334).

6 Test target

At the start of the roll, the test target shall be microfilmed once at the lowest reduction ratio that is used, for example 1:15 or 1:16. It shall also be microfilmed either at the end of the roll, once for each reduction ratio used within the roll, or each time the reduction ratio is changed.

Advice on the use of the test chart with other systems is given in annex D.

The test target shall comprise the following features, arranged as shown in figure 1:

- a) five ISO test charts of the same type either ISO No. 1 (see ISO 446) or ISO No. 2 (see ISO 3334);

- b) a card showing the reduction ratio used for filming the target, having white numerals at least 25 mm high on a black background;
- c) reflectance patches, i.e. a grey, spectrally neutral, matt-finished patch at least 150 mm × 150 mm with a reflectance factor within the range 47 % to 53 % and a dark, spectrally neutral, matt-finished patch with a reflectance factor within the range 5,6 % to 6,4 % (see annex C);
- d) a reduction ratio test strip of sufficient contrast to the background to permit easy measurement of the length of the image recorded on the microform, and having a length, in millimetres, numerically equal to ten times the reduction factor to be used.

There shall be test target formats for each reduction ratio. They shall either be microfilmed separately or several formats shall be combined and microfilmed on one test target.

The centre of the array of test patterns in the centrally placed ISO test chart No. 1 or No. 2 shall be placed

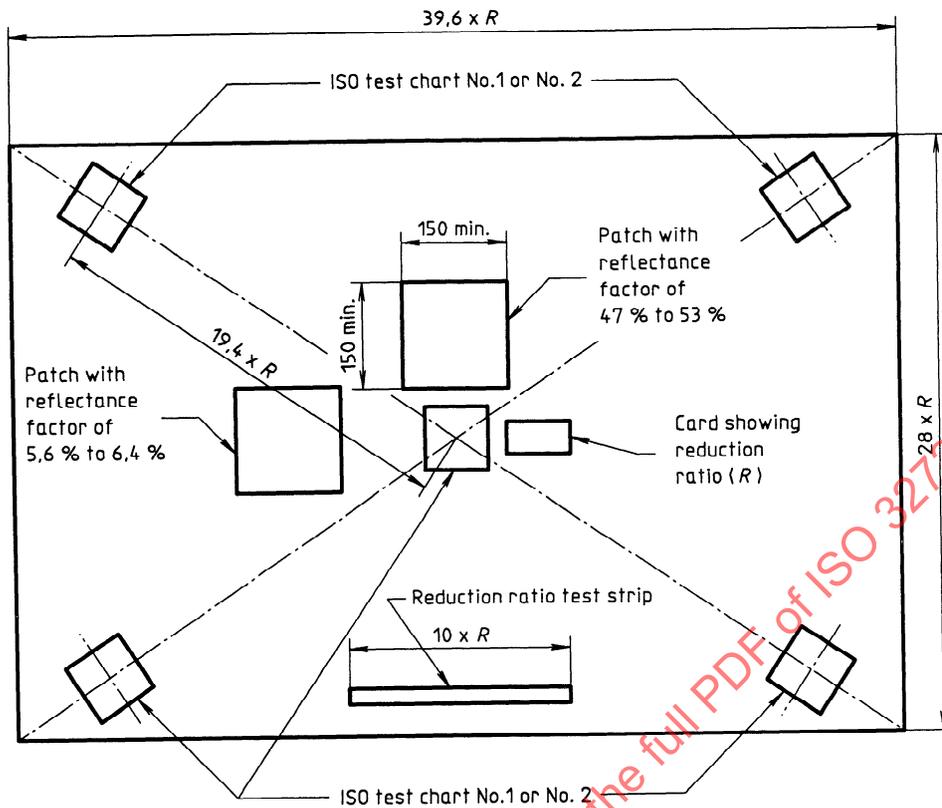
within 6 mm of the centre of the target, with the edges of the test chart parallel to the edges of the test frame and with the legend of the test chart in the same orientation as any other printed matter on the test target.

The test charts placed at the corners shall be positioned so that the centre of the array of test patterns in ISO test chart No. 1 or No. 2 is within 6 mm of a test target diagonal line, at a distance $(19,4 \times R)$ mm from the centre. If the reduction ratios do not conform to the values in table 2, for example those used for documents of sizes other than those in the A series, the test charts shall be positioned on the diagonal at the same radial distance. The corner charts shall be oriented so that one edge of the chart is parallel to the diagonal of the test target and the legend reads from left to right, viewed from the centre of the test target.

NOTE 1 The use of a test target indicates that the whole system used for filming, processing and duplication is consistent with the requirements of this part of ISO 3272 but it does not guarantee the quality of every microimage.

Table 2 — Legibility requirements

Reduction ratio	ISO test chart No. 1 character size			ISO test chart No. 2 pattern number		
	1st generation	2nd generation	Distribution	1st generation	2nd generation	Distribution
1:30	90	100	112	4,5	4,0	3,6
1:24	80	90	100	5,0	4,5	4,0
1:21,2	71	80	90	5,6	5,0	4,5
1:16	56	63	71	7,1	6,3	5,6
1:15	56	63	71	7,1	6,3	5,6



R = reduction factor

Figure 1 — Test target

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Annex A (normative)

Measurement of background density

A.1 Sampling

Microfilm shall be passed over an illuminated panel to be examined for any noticeable density changes. Densitometer readings shall be taken of frames which appear to differ from the majority. In addition, readings shall be taken from frames selected at random from the complete length of film, excluding those showing test targets. Readings shall be taken of an area that is clear of any text.

The number of frames examined in this way shall be not less than 3 % of the total on the film, and not less than 3.

A.2 Densitometer

The densitometer used shall be calibrated at frequent intervals to a standard density test sample (see ISO 5-2 and ISO 5-3).

A.3 Measurement

Density shall be measured on the darkest parts of the document image area of a negative-appearing frame or the lightest parts of a positive-appearing frame, and shall be reported as the average of at least three readings on each frame.

Annex B (normative)

Determination of resolution

The test target described in clause 6 shall be exposed so that the density of the grey patch (50 % reflectance factor) is between 1,0 and 1,2. Each of the five resolution test charts on each frame shall be examined under a microscope. When an ISO No. 1 test chart is used (see ISO 446), the magnification of the microscope shall be between x 30 and x 50.

When an ISO No. 2 test chart is used (see ISO 3334), the overall magnification of the microscope shall be between 1/3 and 1 times the number of line pairs/mm of the expected smallest resolved pattern observed on the microfilm. For example, to view 150 line pairs per millimetre, the magnification shall be between x 50 and x 150.

Annex C (normative)

Density control

The dark patch (6 % reflectance factor) of the test target provides a means of measuring the minimum density of film (which shall not exceed 0,20) under those conditions of exposure and processing which enable the density of the patch of 50 % reflectance factor to be within the values 1,0 to 1,2.

When contact-printing the microfilm, the patch of 50 % reflectance factor is used to represent the background density in a negative or positive duplicate microfilm, and the 6 % reflectance factor patch area is used to represent the line density in a negative or positive microimage.