
INTERNATIONAL STANDARD



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Microfilming of technical drawings and other drawing office documents — Part II : Quality criteria and control

*Micrographie des dessins techniques et autres documents de bureau d'études —
Partie II : Critères et contrôle de la qualité.*

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Descriptors: reproduction (copying), microcopies, engineering drawings, technical documents, commercial documents, quality control, physical properties, legibility, mire.

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3272/II was developed by Technical Committee ISO/TC 46, *Documentation*, and was circulated to the member bodies in September 1976.

It has been approved by the member bodies of the following countries :

| | | |
|---------------------|-------------|-----------------------|
| Australia | Hungary | Poland |
| Belgium | India | Romania |
| Brazil | Israel | South Africa, Rep. of |
| Canada | Italy | Sweden |
| Czechoslovakia | Japan | Switzerland |
| Denmark | Mexico | Turkey |
| Egypt, Arab Rep. of | Netherlands | United Kingdom |
| Finland | Norway | U.S.A. |
| France | Philippines | Yugoslavia |

The member body of the following country expressed disapproval of the document on technical ground :

Germany



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Microfilming of technical drawings and other drawing office documents — Part 2 : Quality criteria and control

AMENDMENT 1

Amendment 1 to International Standard ISO 3272/2 was developed by Technical Committee ISO/TC 171, *Micrographics*. It was submitted directly to the ISO Council for acceptance, in accordance with sub-clause 5.10.1 of part 1 of the Directives for the technical work of ISO.

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5.4 Curl

Delete the text and substitute the following :

“The microfilm shall be free from excessive curl. When measured in accordance with Method A of ISO 4330, but with samples of the same dimensions as the film segment which is to be inserted in the aperture card, the maximum curl of exposed and processed film shall not exceed the following limits :

- transverse curl : 6
- longitudinal curl : 8”

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Microfilming of technical drawings and other drawing office documents —

Part II : Quality criteria and control

0 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 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.

Part II of this International Standard is concerned with the quality requirements for microfilms produced by the operating procedures given in part I. Part III deals with unitized microfilm carriers, and part IV with the microfilming of drawings larger than A0.

1 SCOPE

This International Standard specifies the procedures for maintaining and checking the quality and reproducibility of microfilms made on black-and-white silver-image film. It covers requirements for first and second generation and distribution silver copies.

It deals with the requirements for the quality and performance, and the image quality.

Annexes are included for the measurement of background density, the determination of resolution and contact-printing control.

2 FIELD OF APPLICATION

This International Standard applies to the microfilming of all documents prepared by drawing offices, such as technical drawings, architect's plans, calculation notes, specifications and parts lists.

3 REFERENCES

ISO 5, *Photography — Determination of diffuse transmission density.*

ISO 446, *Microcopying — ISO No. 1 Mire — Description and use in photographic documentary reproduction.*

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

ISO 3334, *Microcopying — ISO test chart No. 2 — Description and use in photographic documentary reproduction.*

ISO 4330, *Photography — Methods for determining the curl of photographic materials.*¹⁾

ISO 4331, *Photography — Processed photographic film for archival records — Silver-gelatin type on cellulose ester base — Specifications.*

ISO 4332, *Photography — Processed photographic film for archival records — Silver-gelatin type on polyethylene terephthalate base — Specifications.*

ISO 5466, *Photography — Practice for storage of processed safety photographic film.*¹⁾

ISO 6196, *Micrographics — Vocabulary.*¹⁾

4 DEFINITIONS

For definitions of the terms used in this International Standard, see ISO 6196.

1) At present at the stage of draft.

5 PHYSICAL QUALITY

5.1 General

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

5.2 Processing

The microfilm shall be processed to give a stable image in accordance with ISO 4331 or ISO 4332.

5.3 Defects

The film 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.

5.4 Curl

The microfilm shall be free from excessive curl. When measured in accordance with method A of ISO 4330, the maximum curl of exposed and processed film to be mounted in aperture cards shall not exceed the following limits :

- transverse curl : 6
- longitudinal curl : 8

5.5 Protective coating

If a protective coating is applied to the film, it shall not impair the quality and longevity required by this International Standard and by ISO 5466.

5.6 Rejection

Any microfilm frame not complying with the requirements of this International Standard shall be suitably defaced.

5.7 Gross background density

When determined by the method given in annex A, the background density of the document image area of a negative or positive silver-image film shall be within the appropriate range given in table 1. All densities shall be visual diffuse transmission densities of type V1-b specified in ISO 5.

TABLE 1 — Background density requirements

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

5.8 Base-plus-fog density

Base-plus-fog density shall not exceed 0,12, determined as visual diffuse transmission density of type V1-b specified in ISO 5.

6 LEGIBILITY

When a first or second generation or a distribution microform is examined in accordance with 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.

7 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 for 35 mm film, and at the end of the roll the test target may be microfilmed once for each reduction ratio used to microfilm documents within the roll, or the test target may be filmed each time the reduction ratio is changed.

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

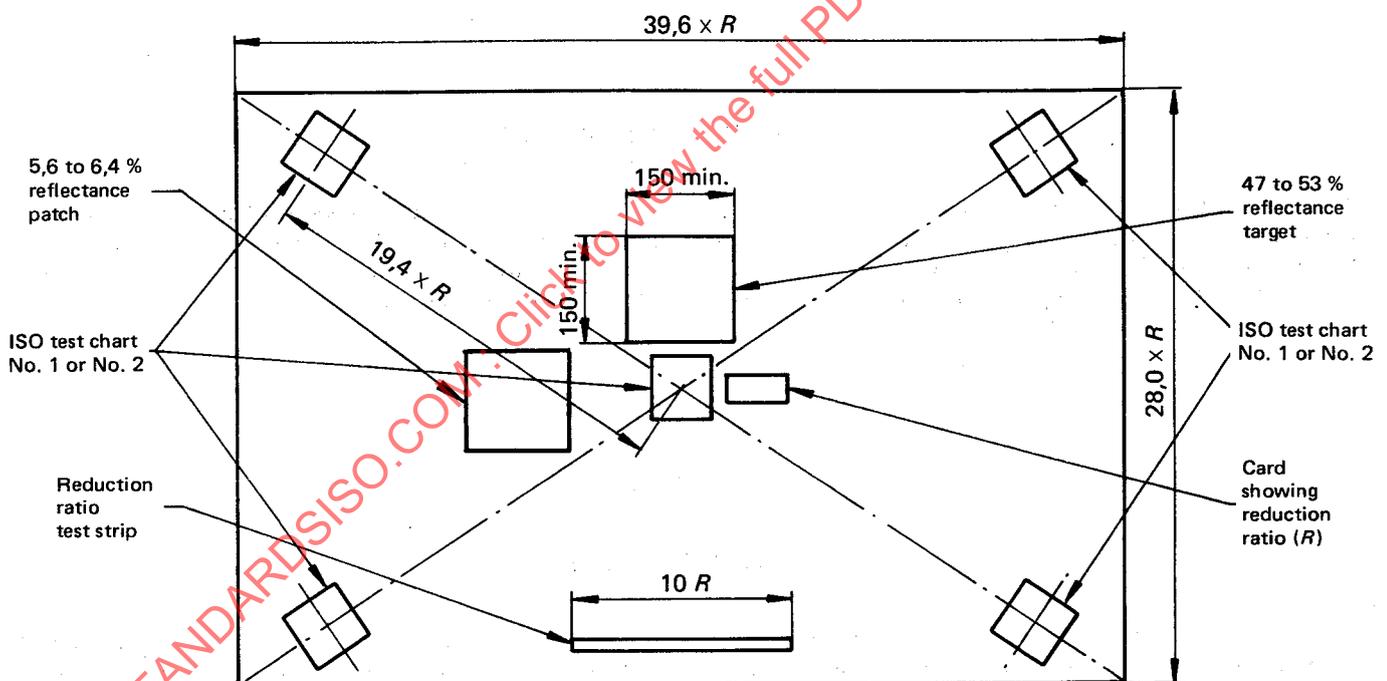
- a) five ISO test charts of the same type, located as shown in the figure;
- b) a card showing the reduction ratio used for filming the target, having white numerals at least 25 mm high on a black background;
- c) a reflectance target, i.e. a grey, spectrally neutral, matt-finished patch at least 150 mm x 150 mm with a reflectance within the range 47 to 53 %, and a dark, spectrally neutral, matt-finished patch with a reflectance 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 used;
- e) a card showing roll identification information placed on a clear space on the test target and microfilmed at the start of the roll;
- f) a test target for each reduction ratio or, alternatively, test target formats for several reduction ratios combined on one test target.

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

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 | 70 | 80 | 90 | 5,6 | 5,0 | 4,5 |
| 1/16 | 56 | 63 | 70 | 7,1 | 6,3 | 5,6 |
| 1/15 | | | | | | |

Dimensions in millimetres



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 corner test charts shall be so positioned that the centre of the array of test patterns in ISO test chart No. 1 or No. 2 is within 6 mm of the 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 1, for example those used for documents of sizes other than those in the A series, the targets 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.

FIGURE – Test target

ANNEX A

DETERMINATION 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.

The number of frames so examined 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.

A.3 MEASUREMENT

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

ANNEX B

DETERMINATION OF RESOLUTION

The test target shall be exposed so that the density of the grey (50 % reflectance) patch is between 1,0 and 1,2. Each of the five resolution test charts on each frame shall be examined under a microscope. When ISO No. 1 mire is used (see ISO 446), the magnification of the microscope shall be between 50 : 1 and 60 : 1. When ISO No. 2 test chart is used (see ISO 3334), the magnification shall be between 0,5 and 1 times the number of line pairs/mm to be resolved.

ANNEX C

CONTACT-PRINTING CONTROL

The dark (6 % reflectance) patch provides a means of measuring the minimum density of film under those conditions of exposure and development which enable the 50 % reflectance patch area to be within the values given in annex B (1,0 to 1,2).

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