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International Standard



3272/1

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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**Microfilming of technical drawings and other drawing  
office documents —  
Part 1 : Operating procedures**

*Micrographie des dessins techniques et autres documents de bureau d'études — Partie 1 : Techniques opératoires*

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**Descriptors :** reproduction (documents), microforms, microfilm, motion-picture film 35 mm, technical drawings, technical documents, dimensions, scale (ratio), framing.

Price based on 4 pages

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (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 authorized 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 3272/1 was developed by Technical Committee ISO/TC 171, *Micrographics*, and was circulated to the member bodies in May 1982.

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

Australia	Egypt, Arab Rep. of	Romania
Austria	Germany, F. R.	South Africa, Rep. of
Belgium	Jamaica	Sweden
Canada	Netherlands	Switzerland
Czechoslovakia	New Zealand	United Kingdom
Denmark	Poland	USA

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The member bodies of the following countries expressed disapproval of the document on technical grounds :

France  
Japan

# Microfilming of technical drawings and other drawing office documents —

## Part 1 : Operating procedures

### 0 Introduction

Drawing offices produce, in addition to drawings, documents which differ in purpose, form and intention. Microfilming enables the information contained in these documents to be reduced 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 ISO 6428. Progress towards the adoption of ISO 5457 varies in different countries and many organizations have large holdings of documents which are not of the standardized sizes because they were produced before the publication of ISO 5457. These documents are still used and microfilming can provide a common carrier that will facilitate international exchange of the information contained in these documents and those of ISO 5457 sizes.

Microfilming procedures, systems and methods differ from country to country. These differences will not adversely affect the exchange of technical drawings and other drawing office documents if the specifications in this International Standard are followed. Microforms of technical drawings are generally produced on 35 mm unperforated film. The use of unitized microfilm carriers for international exchange can circumvent the problems associated with the procedural differences in producing microforms.

Part 1 of this International Standard is concerned with operating procedures for microfilming technical drawings not larger than A0 (or of maximum size 912 mm × 1 230 mm). Part 2 deals with quality requirements, Part 3 deals with unitized microfilm carriers, and Part 4<sup>1)</sup> will deal with drawings larger than A0.

### 1 Scope

This part of ISO 3272 specifies reduction ratios, enlargement ratios, sizes of enlargement and the resulting image sizes for recording on 35 mm unperforated microfilm technical drawings and other drawing office documents, for example architects' plans, calculation notes, specifications, vocabularies and parts lists.

### 2 Field of application

This part of ISO 3272 applies to the microfilming of documents no larger than A0 with dark lines and characters on a light background, preferably prepared in accordance with ISO 5457 and ISO 6428. It may also apply to sizes other than those specified in ISO 5457, provided they are no larger than 912 mm × 1 230 mm and can be accommodated within a single frame of 35 mm microfilm as specified in this International Standard.

Images created by a COM device are excluded.

### 3 References

ISO 543, *Cinematography — Motion-picture safety film — Definition, testing and marking.*

ISO 3272, *Microfilming of technical drawings and other drawing office documents*

*Part 2 : Quality criteria and control.*

*Part 3 : Unitized 35 mm microfilm carriers.*

1) In preparation.

ISO 5457, *Technical drawings — Sizes and layout of drawing sheets.*

ISO 6148, *Photography — Film (silver-gelatin and non-silver-gelatin types) for micrographic uses — Dimensions of sheet and roll material.*<sup>1)</sup>

ISO 6196, *Micrographics — Vocabulary*

*Section 01 : General terms.*

*Section 02 : Image placement and method of recording.*

*Section 03 : Film processing.*<sup>1)</sup>

ISO 6428, *Technical drawings — Requirements for microcopying.*

## 4 Vocabulary

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

## 5 Unexposed film stock

The unexposed film shall be unperforated film complying with ISO 543 and ISO 6148.

## 6 Originals

### 6.1 Size

It is recommended that originals of A-series as specified in ISO 5457 be used.

NOTE — All documents larger than 912 mm × 1 230 mm are excluded from this part of ISO 3272; they will be dealt with in part 4 of ISO 3272.

### 6.2 Preparation

The original is usually a document that has been drawn, typed or prepared by automatic means or by a combination of these methods. The original should comply with ISO 6428.

### 6.3 Centre markings

Centre markings shall appear on all four sides of the original, projecting at right angles from the border lines towards the edge of the sheet. They shall be located with an accuracy of ± 0,5 mm (see ISO 5457).

### 6.4 Orientation marks

Two orientation marks shall be provided on each drawing, one on a short side and one on a long side (see ISO 5457).

## 6.5 Borders

The borders of the original shall be wide enough to accommodate all the tolerances required for microform reproduction. Borders of the following minimum widths shall be provided on all four sides of A-size originals (see ISO 5457) :

Designation	Millimetres
A0	20
A1	20
A2	10
A3	10
A4	10

## 6.6 Metric graduation

For reduction and enlargement purposes a metric graduation, 100 mm long, shall be provided on the border of each drawing.

## 6.7 Position of documents on table of planetary-type cameras

The centre markings of the original and the centre markings on the document base of the camera shall coincide within a tolerance of ± 3 mm.

## 7 Filming procedures

### 7.1 Frame area, image area, frame pitch

Frame area, image area and frame pitch are shown in figure 1 and table 1.

**Table 1 — Dimensions of frame area, image area and frame pitch**

Dimensions in millimetres	
35 mm microfilm	Dimensions
Frame area ( $a_2 \times b_2$ )	$32 - \begin{smallmatrix} 0 \\ 0,5 \end{smallmatrix} \times 45 - \begin{smallmatrix} 0 \\ 0,5 \end{smallmatrix}$
Image area ( $a_1 \times b_1$ )	$30,4 \times 41,0$ (max.)
Frame pitch ( $t$ )	$52 - \begin{smallmatrix} 0 \\ 1,2 \end{smallmatrix}$

### 7.2 Reduction ratios

Nominal reduction ratios of 1/30, 1/21,2 and 1/15 are recommended for filming A-size documents specified in ISO 5457 (see table 2). Nominal reduction ratios of 1/30, 1/24 and 1/16 are acceptable for all document sizes (see table 3). The tolerance on the nominal reduction ratios shall be  $\begin{smallmatrix} + 4 \\ 0 \end{smallmatrix} \%$ . (These tolerances apply to the denominator, see table 2.)

1) At present at the stage of draft.

**7.3 Drawings to be reproduced at full size**

If drawings are to be reproduced at exactly full size, i.e. 1/1, special precautions will be required at both the filming stage and the enlargement stage.

**7.4 Leader and trailer**

Each reel or complete length of exposed 35 mm microfilm shall have at the beginning and the end  $500^{+200}_0$  mm of unexposed film.

**7.5 Arrangement of multiple sheets**

If more than one sheet is to be microfilmed on a single frame, the arrangement (text in the right-reading position) and order of reading of the originals should be as shown in figure 2. This

method is not recommended if the information on a single sheet is subject to revision.

**8 Enlargement**

The nominal enlargement ratios for A-size documents shall be :

$$\times 14,9 \begin{matrix} 0 \\ - 0,6 \end{matrix}$$

$$\times 21,0 \begin{matrix} 0 \\ - 0,8 \end{matrix}$$

$$\times 29,9 \begin{matrix} 0 \\ - 1,2 \end{matrix}$$

Recommended enlargement ratios and sizes of reproduction are given in table 4. See also 7.3

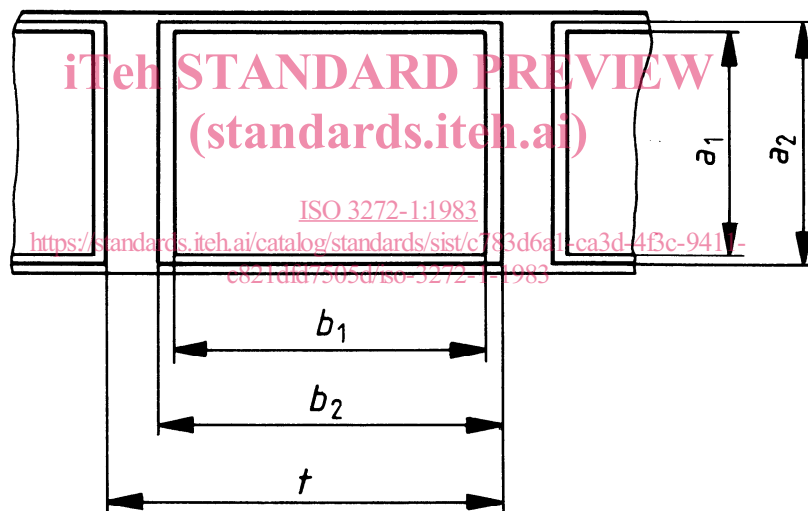


Figure 1 – Frame area ( $a_2 \times b_2$ ), image area ( $a_1 \times b_1$ ) and frame pitch ( $t$ )

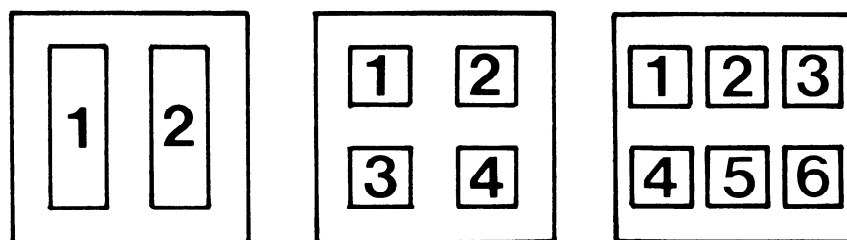


Figure 2 – Examples of multiple sheets on single frames

**Table 2 – Recommended reduction ratios for A sizes**

Document size	Reduction ratio	Image size
<b>A0</b> : 841 mm × 1 189 mm	$1 / \left( 30 + \begin{smallmatrix} 1,2 \\ 0 \end{smallmatrix} \right)$	28,0 mm × 39,6 mm
<b>A1</b> : 594 mm × 841 mm	$1 / \left( 30 + \begin{smallmatrix} 1,2 \\ 0 \end{smallmatrix} \right)$	19,8 mm × 28,0 mm
	$1 / \left( 21,2 + \begin{smallmatrix} 0,85 \\ 0 \end{smallmatrix} \right)$	28,0 mm × 39,6 mm
<b>A2</b> : 420 mm × 594 mm	$1 / \left( 21,2 + \begin{smallmatrix} 0,85 \\ 0 \end{smallmatrix} \right)$	19,8 mm × 28,0 mm
	$1 / \left( 15 + \begin{smallmatrix} 0,6 \\ 0 \end{smallmatrix} \right)$	28,0 mm × 39,6 mm
<b>A3</b> : 297 mm × 420 mm	$1 / \left( 21,2 + \begin{smallmatrix} 0,85 \\ 0 \end{smallmatrix} \right)$	14,0 mm × 19,8 mm
	$1 / \left( 15 + \begin{smallmatrix} 0,6 \\ 0 \end{smallmatrix} \right)$	19,8 mm × 28,0 mm
<b>A4</b> : 210 mm × 297 mm	$1 / \left( 15 + \begin{smallmatrix} 0,6 \\ 0 \end{smallmatrix} \right)$	14,0 mm × 19,8 mm

**Table 3 – Acceptable reduction ratios for all sizes**

Document sizes <sup>1)</sup>	Nominal reduction ratios	Image sizes
Width : not more than 457 mm Length : not more than 609 mm	1/16	Not more than 28,6 mm × 38,1 mm
Width : from 457 mm to 609 mm Length : from 609 mm to 912 mm	1/24	Not more than 25,4 mm × 38,0 mm
Width : from 609 mm to 912 mm Length : from 912 mm to 1 230 mm	1/30	Not more than 30,4 mm × 41,0 mm

1) If the document is not within both limits, the next applicable reduction ratio shall be used.

**Table 4 – Example of enlargement ratios and sizes of reproduction for A-size documents**

Original document size	Nominal reduction ratios	Nominal enlargement ratios	Sizes of reproduction
<b>A0</b>	1/30	× 14,9 × 21,0 × 29,9	<b>A2</b> <b>A1</b> <b>A0</b>
<b>A1</b>	1/30	× 14,9	<b>A3</b>
	1/21,2	× 14,9 × 21,0	<b>A2</b> <b>A1</b>
	1/15	× 14,9	<b>A3</b> <b>A2</b>
<b>A2</b>	1/21,2	× 14,9	<b>A4</b>
	1/15	× 14,9	<b>A3</b>
<b>A3</b>	1/15	× 14,9	<b>A4</b>

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