INTERNATIONAL STANDARD

ISO 3272-1

Second edition
2003-03-15

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

Reference number
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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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 3272-1 was prepared by Technical Committee ISO/TC 171, *Document imaging applications*, Subcommittee SC 2, *Application issues*.

This second edition cancels and replaces the first edition (ISO 3272-1:1983), which has been technically revised.

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 diazo duplicating of microfilm images in aperture cards*

— *Part 6: Quality criteria and control of systems for enlargements from 35 mm microfilm*

Introduction

Drawing offices produce, in addition to drawings, documents that 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 exchanges 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 aperture cards for international exchange can circumvent the problems associated with the procedural differences in producing microforms.

ISO 3272-1 is concerned with operating procedures for microfilming technical drawings not larger than A0 (or of maximum size 912 mm × 1 230 mm). ISO 3272-2 deals with quality requirements, ISO 3272-3 deals with aperture cards, ISO 3272-4 deals with drawings larger than A0, ISO 3272-5 deals with diazo aperture card duplicators and ISO 3272-6 deals with systems for producing enlargements from 35 mm microfilm.

Microfilming of technical drawings and other drawing office documents —

Part 1: Operating procedures

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, such as architects' plans, calculation notes, specifications, vocabularies and parts lists.

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 part of ISO 3272.

This part of ISO 3272 does not apply to images created by a COM device.

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 5457:1999, *Technical product documentation — Sizes and layout of drawing sheets*

ISO 6148:2001, *Photography — Micrographic films, spools and cores — Dimensions*

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

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

ISO 6196-3: 1997, *Micrographics — Vocabulary — Part 3: Film processing*

ISO 6428:1982, *Technical drawings — Requirements for microcopying*

3 Terms and definitions

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

4 Unexposed film stock

The unexposed film shall be unperforated film in accordance with ISO 6148.

5 Originals

5.1 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 are dealt with in ISO 3272-4.

5.2 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 be in accordance with ISO 6428.

5.3 Centre markings

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

5.4 Orientation marks

Two orientation marks shall be provided on each drawing, one on a short side and one on a long side, as specified in ISO 5457.

5.5 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, as specified in Table 1 and ISO 5457.

Table 1 — Border widths

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

5.6 Metric graduation

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

5.7 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.

6 Filming procedures

6.1 Frame area, image area, frame pitch

Frame area, image area and frame pitch are given in Figure 1 and Table 2.

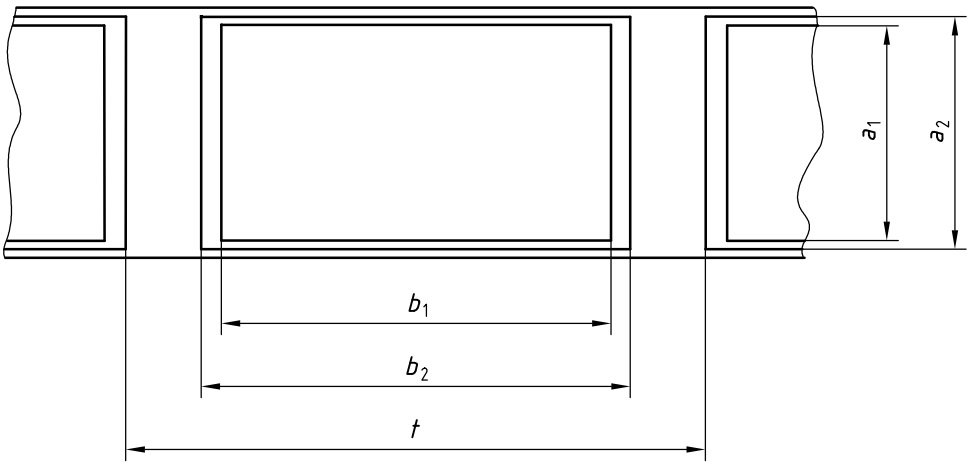

Figure 1 — Frame area $(a_2 \times b_2)$**, image area,** $(a_1 \times b_1)$ **and frame pitch** (t)

Table 2 — Dimensions of frame area, image area and frame pitch

35 mm microfilm	Dimensions mm
Frame area $(a_2 \times b_2)$	$32^{\ 0}_{-0,5} \times 45^{\ 0}_{-0,5}$
Image area $(a_1 \times b_1)$	30,4 × 41,0 (max.)
Frame pitch	$52^{\ 0}_{-1,2}$

6.2 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 and Table 3. Nominal reduction ratios of 1/30, 1/24 and 1/16 are acceptable for all document sizes as given in Table 4. The tolerance on the nominal ratios shall be $^{+4}_{0}$ %. (These tolerances apply to the denominator, see Table 3.)

Table 3 — Recommended reduction ratios for A-sizes

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

Table 4 — Acceptable reduction ratios for all sizes

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

[a] If the document is not within both limits, the next applicable reduction ratio shall be used.

6.3 Drawings to be reproduced to scale

If drawings are to be reproduced to scale, a graduated scale shall be filmed with each document, as specified in Annex A.

6.4 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.

6.5 Arrangement of multiple sheets

If more than one sheet or page 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.

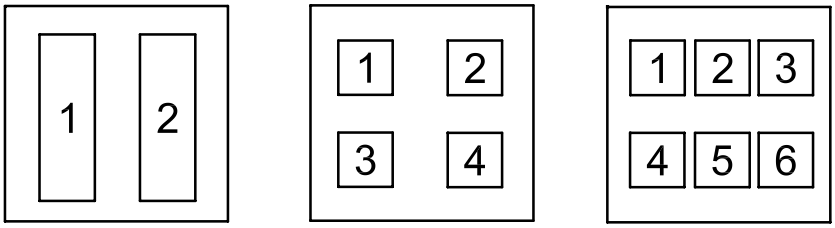

Figure 2 — Examples of multiple sheets on single frames

7 Enlargement

The nominal enlargement ratios for A-size documents shall be

— $\times 14{,}9\,^{0}_{-0{,}6}$

— $\times 21{,}0\,^{0}_{-0{,}8}$

— $\times 29{,}9\,^{0}_{-1{,}2}$

Recommended enlargement ratios and sizes of reproductions are given in Table A.1 of Annex A.

Annex A
(normative)

Enlargement ratios and sizes of reproduction for A-size documents

Table A.1 — Example of enlargement ratios and sizes of reproduction for A-size documents

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

Bibliography

[1] ISO 3272-2:1994, *Microfilming of technical drawings and other drawing office documents — Part 2: Quality criteria and control of 35 mm silver gelatin microfilms*

[2] ISO 3272-3:2001, *Microfilming of technical drawings and other drawing office documents — Part 3: Aperture card for 35 mm microfilm*

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

[4] ISO 18906:2000, *Imaging materials — Photographic films — Specifications for safety film*

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