International Standard 6428

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Technical drawings — Requirements for microcopying

Dessins techniques — Conditions requises pour la micrographie

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Foreword

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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 6428 was developed by Technical Committee ISO/TC 10, *Technical drawings*, and was circulated to the member bodies in February 1981.

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

Austria	Hungary	Poland
Belgium	India	Romania
Canada	Italy	South Africa, Rep. of
China	Japan	Spain
Czechoslovakia	Korea, Rep. of	Sweden
Denmark	Netherlands	United Kingdom
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Finland	Norway	

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

Australia
France
Switzerland
USA

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Technical drawings — Requirements for microcopying

0 Introduction

Microcopying procedures allow the information contained in original technical drawings and other drawing office documents to be reduced to smaller sizes, thus facilitating transport, handling and storage.

However, it should be noted that the possibility of obtaining serviceable enlargements from a microform depends above all on the good quality of the microform (see ISO 3272/2) and this condition can be realized only if the original document is prepared in accordance with appropriate rules.

Usually, the original is a drawing or associated document prepared manually, by a typewriter or other means (plotter). It may also be a combination of these methods.

The draughtsman already has at his disposal several International Standards (such as ISO 128, ISO 3098, ISO 5457) containing general rules of execution which allow the establishment of documents for good reproduction. Nevertheless, for microcopying, these rules should be expanded.

The purpose of this International Standard is to compile in one document the rules to be observed when executing original documents allowing for the establishment of microforms yielding legible enlargement copies.

Due to the fact that the instructions of this International Standard are more extensive than those for other methods of reproduction, it follows that documents complying with the requirements for microcopying can also be reproduced without difficulty by any other reprographic system.

1 Scope and field of application

This International Standard specifies the requirements to be observed when executing original technical drawings and other drawing office documents which are to be microcopied. These requirements will provide for high quality microforms with which legible enlargement copies can be made.

However, the application of these rules is also very beneficial for other methods of reproduction and it is therefore recommended that all drawing office documents be executed in accordance with this International Standard, thereby being available for microcopying at a future date.

2 References

ISO 128, *Technical drawings — General principles of presentation.*

ISO 3098/1, *Technical drawings — Lettering — Part 1 : Currently used characters.*

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

Part 1 : Operating procedures.[1)]

Part 2 : Quality criteria and control.

Part 3 : Unitized 35 mm *microfilm carriers.*

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

3 Requirements of execution

3.1 Drawing sheets

3.1.1 Blanks or pre-printed sheets for drawings or other documents may be transparent, translucid or opaque, but shall preferably be matt on the face used for drafting and/or lettering. Their quality shall be chosen in view of obtaining the best possible contrast between background and lines (see 3.2.1).

NOTE — Due to its good qualities relating to dimensional stability, durability, erasability and draftability, polyester drafting film (minimum thickness 76 µm) is superior to paper.

3.1.2 The sizes to be used shall comply with those specified in ISO 5457.

3.1.3 If adhesive overlays are to be used on the original document, consideration shall be given to the effects of dust accumulation and ageing as these defects may be reflected in the microcopying process.

3.1.4 Edge binding is not recommended, unless unshrinkable adhesive tape is used.

1) At present at the stage of draft.

3.2 Density, thickness and spacing of lines

3.2.1 All lines used on the original document for executing representations, symbols, lettering, etc. including those added in any revision, shall have a matt finish and consistent density.

It is recommended that lines have a minimum contrast value of 0,7 relative to the sheet background[1].

NOTES

1 It is recommended that equipment and materials be selected to comply with these requirements and that as an aid the draughtsman be provided with a transparent reference chart of neutral grey tones.

2 The best quality of reproduction will be obtained by executing original drawings with drawing ink on polyester film. Drawing with polymer pencil on film may also provide a good quality of reproduction.

3.2.2 Thicknesses of line are specified in ISO 128 and ISO 3098/1.

In order to allow for microforms originating from size A0 or A1 documents to be enlarged for reproduction to a size smaller than that of the original document, it is recommended to use for any A0 and A1 size document a minimum thickness of line of 0,35 mm.

3.2.3 The space between parallel lines shall be not less than twice the thickness of the heaviest of these lines, with a minimum value of 0,7 mm.

3.3 Areas

Blacking of large areas shall be avoided. If needed, they shall be hatched or dotted.

Thin sections (such as for structural profiles or thin objects) may be blackened, provided their largest width, as depicted on the original representation, is not more than 3 mm. In all cases, the spaces around such sections shall be not less than 0,7 mm.

3.4 Markings

All markings figuring on the drawing shall comply with the specifications of ISO 5457.

In particular, it is required that a metric reference graduation be added to allow for determining the scale of the enlarged reproduction.

3.5 Lettering

3.5.1 All lettering used on original documents shall comply with the specifications of ISO 3098/1.

3.5.2 The choice of the height of lettering should take into account the possibility that the subsequent enlargement of a microform may be established at one or two sizes smaller than the size of the original document.

Therefore, it is recommended that dependent on the original size the minimum heights of lettering as shown in the following table, be observed.

Dimensions in millimetres

Minimum heights of lettering					
Lettering ISO 3098/1	Size A0	A1	A2	A3	A4
A (h = 14 d)	5	5	3,5	3,5	3,5
B (h = 10 d)	3,5	3,5	2,5	2,5	2,5

h = height of capital letters and numerals
d = thickness of line

3.5.3 The distances between characters and spacing lines (such as in lists and tables) or reference lines shall be not less than 2 mm.

3.5.4 When mechanical means for lettering are used (such as typewriters, plotters, etc.), the density shall, as much as possible, be the same as that of the other lines on the document. Moreover, it is recommended that the type of lettering and its dimensions be similar to those of ISO 3098/1.

Clarity of character image can be achieved by using only capital letters and using one-time printing ribbons.

NOTE — Typing on polyester material requires a special total transfer ribbon which has low reflection and a high density.

3.6 Pencil drawings

Pencil drawings are not desirable for microcopying but if, nevertheless, it is necessary to use this method, the following precautions shall be taken.

3.6.1 Pencil drawings shall be made with instruments and materials which provide adequate contrast (see 3.2.1).

3.6.2 The pencil leads selected shall produce matt finish and even density lines. In this respect, polymer type pencil leads are superior to graphite.

3.6.3 Drawing boards shall be provided with a hard and flat underlay to reduce imprint due to pencil pressure.

3.6.4 Pencil drawings shall be handled as little as possible. Smudging may be prevented by a non-toxic fixative but this may also create problems of erasure.

3.6.5 The simultaneous use of ink and pencil on the same drawing is not recommended.

1) Contrast is the difference between the optical density of a line and that of the sheet.

Optical density is the logarithm to base 10 of the reciprocal of the factor of light transmission.

3.7 Erasure

When erasure is necessary, care shall be taken to ensure that the drawing surface is impaired as little as possible. Should polymer drawing materials suffer such damage, proprietary surface restorers are available.

3.8 Storage and handling

3.8.1 For storage, original documents shall be laid flat or be suspended.

3.8.2 Original documents shall not be folded.

3.8.3 Original documents may be rolled, but exclusively for temporary transit. In such a case, they shall be wrapped and retained round a tube of not less than 75 mm diameter (this value may be reduced for polyester films), with the face for drafting on the inside of the roll which shall be placed in a protecting outer tube. After transit, the document shall be unwrapped as soon as possible.

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