

INTERNATIONAL  
STANDARD

**ISO**  
**10135**

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**Technical drawings — Simplified  
representation of moulded, cast and forged  
parts**

**iTeh STANDARD PREVIEW**

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*Dessins techniques — Représentation simplifiée des pièces moulées,  
matricées et estampées*

ISO 10135:1994

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Reference number  
ISO 10135:1994(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 10135 was prepared by Technical Committee ISO/TC 10, *Technical drawings, product definition and related documentation*, Subcommittee SC 6, *Mechanical engineering documentation*.

Annex A forms an integral part of this International Standard.

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## Introduction

Materials which are moulded to produce parts may exist in a solid, doughy or liquid form. The resultant moulded part will exhibit deviations from the ideal geometric form. It is necessary, therefore, that such permissible deviations can be indicated on technical drawings.

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# Technical drawings — Simplified representation of moulded, cast and forged parts

## 1 Scope

This International Standard specifies rules and conventions for the simplified representation of moulded, cast and forged parts on technical drawings.

It also specifies the proportions and dimensions of the graphical symbols used for this representation.

ISO 8062:1994, *Castings — System of dimensional tolerances and machining allowances.*

ISO 13715:1994, *Technical drawings — Corners — Vocabulary and indication on drawings.*

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 128:1982, *Technical drawings — General principles of presentation.*

ISO 1101:1983, *Technical drawings — Geometrical tolerancing — Tolerancing of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings.*

ISO 1302:1992, *Technical drawings — Method of indicating surface texture.*

ISO 3461-2:1987, *General principles for the creation of graphical symbols — Part 2: Graphical symbols for use in technical product documentation.*

ISO 7083:1983, *Technical drawings — Symbols for geometrical tolerancing — Proportions and dimensions.*

## 3 Definitions

For the purposes of this International Standard, the following definitions apply.

**3.1 moulded part; cast part; forged part:** Part produced by the use of a mould, e.g. by blowing, injection, casting or forging.

NOTE 1 In the text of this International Standard, "moulded part" is used to mean moulded, cast or forged part.

**3.2 parting line:** The line of division of the individual parts of the mould.

**3.3 draft angle:** Slope of shaping elements (e.g. on enveloping surfaces), necessary to facilitate the removal of moulded parts from the mould or the separation of the parts of the permanent mould from each other.

**3.4 mismatch:** Relative displacement of the outer surfaces of a mould owing to inaccuracies in the constituent parts of multipart moulds.

**3.5 machining allowance:** Cutting allowance left on moulded parts and blanks so that any surface defects (of castings, forgings, etc.) can be removed by subsequent machining to achieve the desired surface texture and the necessary dimensional accuracy.

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**3.6 shrinkage degree:** Ration of the decrease in volume of moulded parts or blanks, after cooling or solidification, to the volume of the mould.

**3.7 burr:** Rough remainder of material at a corner, left after either machining or a forming process.

**3.8 machined part:** part which requires machining in order to achieve a quality not easily attained by moulding.

**4 General rule**



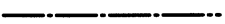
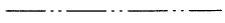
The drawings shall incorporate all the information necessary to define the moulded parts.

The representation may be complete, with dimensioning, or simplified.

**5 Line conventions**

In general only line types and line thicknesses in accordance with ISO 128 shall be used. Applications additional to those given in ISO 128 are shown in table 1. Rules for the presentation of graphical symbols are given in annex A.

**Table 1 — Lines**

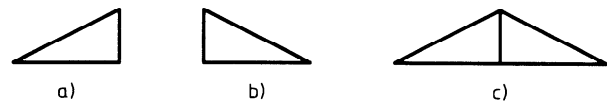
Line type in accordance with ISO 128	Description	Application
A 	Continuous thick	A1 Parting line (in views)
C 	Continuous thin freehand	C1 Structures of material
J 	Chain thick	J1 Parting line (in sections)
K 	Chain thin double-dashed	K1 Outline of blanks on drawings for machining K2 Outlines of finished parts represented on drawings for blanks

**6 Indications on the drawing**

**6.1 Draft angles**

Draft angles are not included in the ideal geometrical form, nor in the permissible deviations.

The position of the draft angle shall be indicated on the drawing by the position of the corresponding graphical symbol (see figure 1), and its size shall be indicated in terms of the corresponding angle (e.g. 2°) or ratio (e.g. 1:10).



**Figure 1**

A draft angle on external surfaces always results in an increase in the nominal dimension *a*, and on internal surfaces results in a decrease in the nominal dimension *b* (maximum material dimension) (see figure 2).

Draft angles with slopes in two directions (e.g. at the parting line) shall be indicated using the graphical symbol shown in figure 1c) together with an indication of the dimension of the slope (see figure 3).

**6.2 Parting line**

The parting line shall be indicated in views as a continuous thick line (see table 1, line type A) and in sections as a chain thick line (see table 1, line type J). The graphical symbol representing the parting line (see figure 4) shall be positioned outside the outlines, on the line representing the parting line.

The height of the permissible remaining burr (e.g. + 1,7 mm) in relation to the ideal geometrical form may be indicated adjacent to the graphical symbol (see figure 5).

If it is necessary to indicate that features (e.g. burr) may be present all around the part, the peripheral lines representing the parting lines may be indicated using the graphical symbol shown in figure 6.

**6.3 Deviations in shape**

Permissible deviations in shape shall be indicated by general tolerances (see, for example, ISO 8062 for castings) within or near the title block. Detailed indi-

cations need be shown on the drawing only where special requirements are necessary.

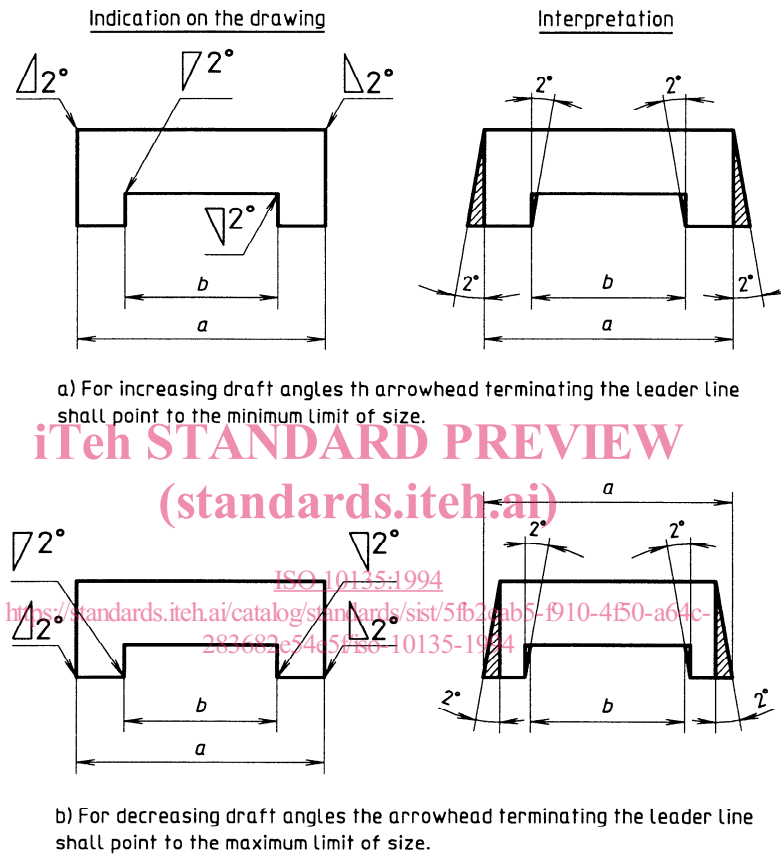
**6.3.1 Tolerances**

Requirements which differ from the general tolerances (e.g. those given in ISO 8062) shall be indicated

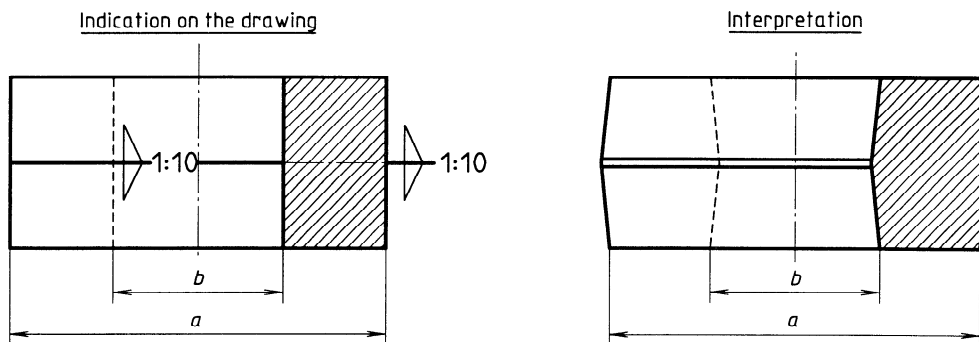
by individual tolerances at the actual nominal dimension.

**6.3.2 Mismatch**

If it is necessary to indicate the acceptable amount of mismatch, the graphical symbol shown in figure 4 shall be indicated together with the corresponding numerical value (see figure 7).



**Figure 2**



**Figure 3**

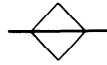


Figure 4

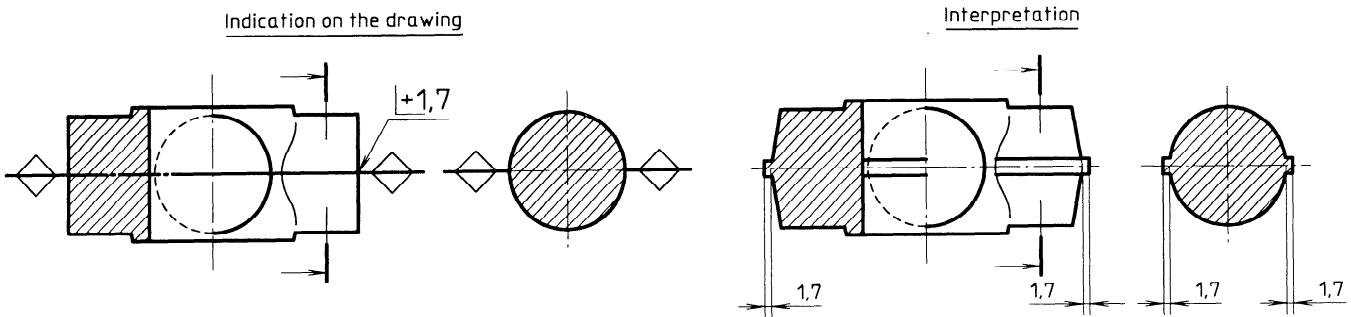


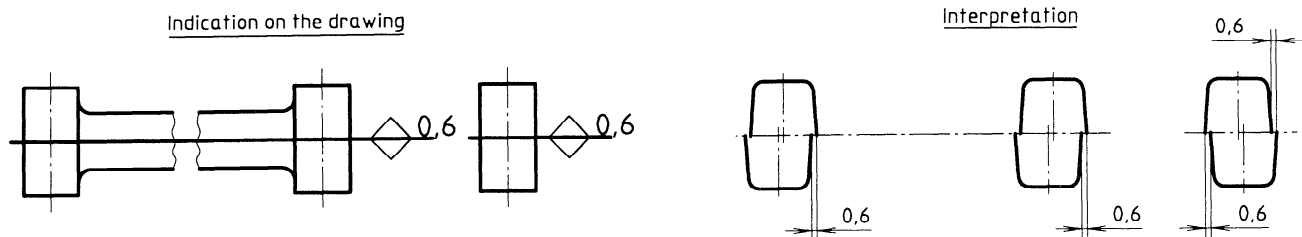
Figure 5

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Figure 6



The upper part may be displaced relative to the lower part by 0,6 mm in two directions (tolerance 1,2 mm)

Figure 7

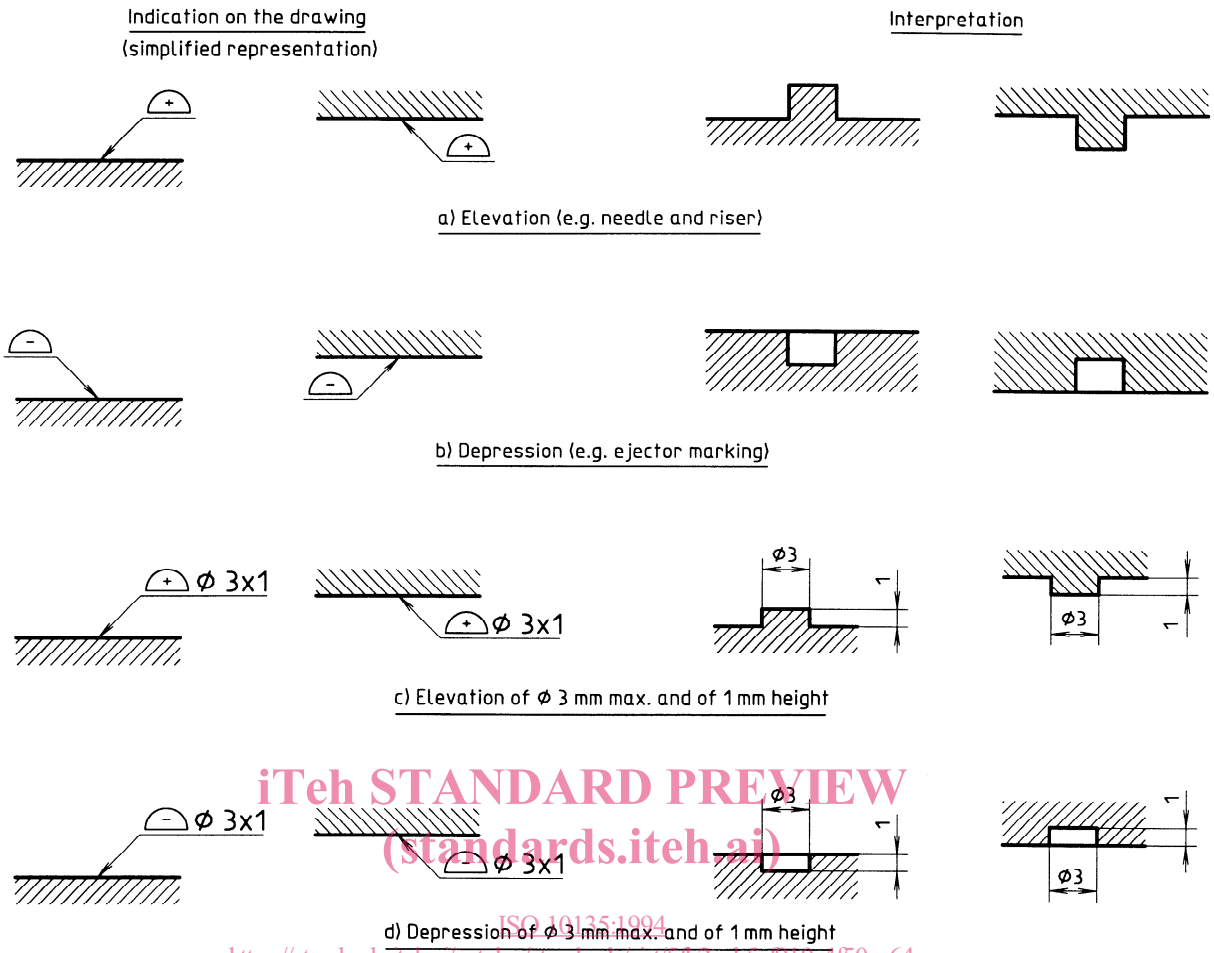
6.3.3 Other permissible deviations of form and position

If not included in the general tolerances, other requirements may be indicated in accordance with ISO 1101.

6.3.4 Sprues, needles, risers and ejector markings

When it is necessary to specify the size and position of sprues, needles, risers and ejector markings, they shall be indicated by a graphical symbol [see figure 8 a) and b)]. This shall be placed above the remote end of a leader line (see ISO 128), which is drawn parallel to the surface indicated by the arrowhead.





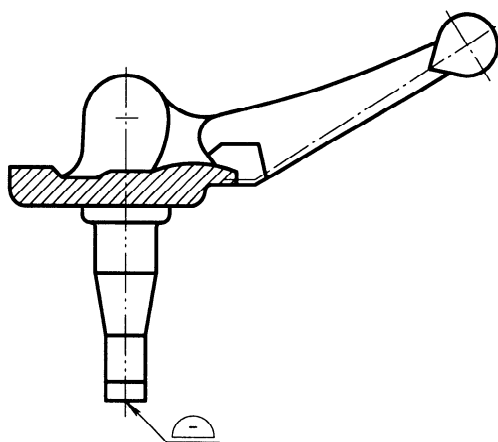
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**Figure 8**

The permissible local deviation of the feature from the surface may be indicated by adding dimensions after the graphical symbol [see figure 8 c) and d)]. The first dimension indicates the diameter or maximum dia-

gonal and the second indicates the depression below, or the rise above, the surface.

Figure 9 shows the indication of an ejector depression feature on a drop forging.



**Figure 9**

**6.3.5 Allowance for shrinkage**

In general, shrinkage is not indicated on the drawing, but is allowed for in manufacture in order to compensate for thermal expansion of the material.

**6.4 Surface texture and machining allowance**

The surface texture shall be indicated in accordance with ISO 1302.

Where it is necessary to specify the value of a machining allowance, this shall be indicated to the left of the symbol for surface treatment, as shown in figure 10. This indication may be accompanied by a circle