

Technical drawings — Dimensioning and tolerancing — Cones

ICS 01.100.01

National foreword

This British Standard reproduces verbatim ISO 3040:1990 and implements it as the UK national standard. This standard, together with BS 8888 and other implemented European and International Standards listed in annexes A and B of BS 8888, supersedes all parts of BS 308 which are withdrawn.

The European and International Standards that were implemented to form subsections of Part 3 of BS 308 and were dual numbered, are now listed by the implementation number only, e.g. BS EN ISO xxxx. The pocket guide previously available is currently under review.

The UK participation in its preparation was entrusted to Technical Committee TDW/4, Engineering drawing, metrology, precision measurement and all related documentation, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, the ISO title page, pages ii and iii, a blank page, pages 1 to 6, an inside back cover and a back cover.

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INTERNATIONAL STANDARD

**ISO
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Second edition
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Technical drawings — Dimensioning and tolerancing — Cones

Dessins techniques — Cotation et tolérancement — Cônes



Reference number
ISO 3040:1990(E)



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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.

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 3040 was prepared by Technical Committee ISO/TC 10, *Technical drawings, product definition and related documentation*.

This second edition cancels and replaces the first edition (ISO 3040:1974), of which it constitutes a technical revision.

Introduction

In this International Standard the figures illustrate the text only and should not be considered as design examples. For this reason, the figures are simplified and are not to scale.

Technical drawings — Dimensioning and tolerancing — Cones

1 Scope

This International Standard establishes the definition of cones and specifies the graphical symbol to be used for their indication and methods for their dimensioning and tolerancing.

For the purposes of this International Standard, the term "cone" relates to right-angle circular cones only.

NOTES

1 For simplicity, only truncated cones have been represented in this International Standard. However, this International Standard can be applied to any type of cone within its scope.

2 This International Standard is not intended to prevent the use of other methods of dimensioning and tolerancing.

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 1119:1975, *Series of conical tapers and taper angles*.

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

3 Definition

For the purposes of this International Standard, the following definition applies.

rate of taper C: Ratio of the difference in the diameters of two sections of a cone to the distance between them. It is expressed by the following formula (see also figure 1):

$$C = \frac{D - d}{L} = 2 \tan\left(\frac{\alpha}{2}\right)$$

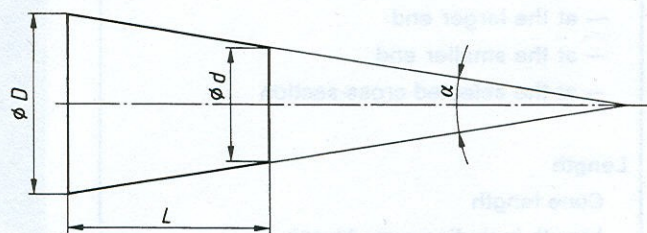


Figure 1

4 Graphical symbol for a cone

A cone shall be indicated using the graphical symbol illustrated in figure 2 positioned on a reference line (see figure 7). The orientation of the graphical symbol shall coincide with that of the cone (see figure 7 and figure 8).

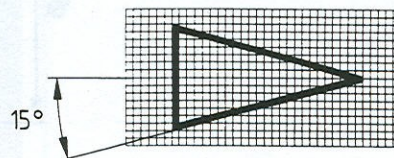


Figure 2

For the size and line thickness of the graphical symbol, see ISO 3461-2.

5 Dimensioning of cones

5.1 Characteristics of cones

In order to define a cone, the characteristics and dimensions shown in table 1 may be used in those combinations most appropriate for the function of the cone.

No more dimensions than are necessary shall be specified. However, additional dimensions (for example, half the included angle) may be given as "auxiliary" or "reference" dimensions in brackets for information.

Typical combinations of cone characteristics and dimensions are shown in figure 3, figure 4, figure 5 and figure 6.

Table 1 — Characteristics and dimensions of cones

Characteristics and dimensions	Letter symbol	Examples of indication	
		Preferred method	Optional method
Characteristics			
Rate of taper	C	1 : 5 1/5	0,2 : 1 20 %
Cone angle	α	35°	0,6 rad
Cone diameter			
— at the larger end	D		
— at the smaller end	d		
— at the selected cross-section	D_x		
Length			
Cone length	L		
Length including cone length	L'		
Length locating a cross-section at which D_x is specified	L_x		

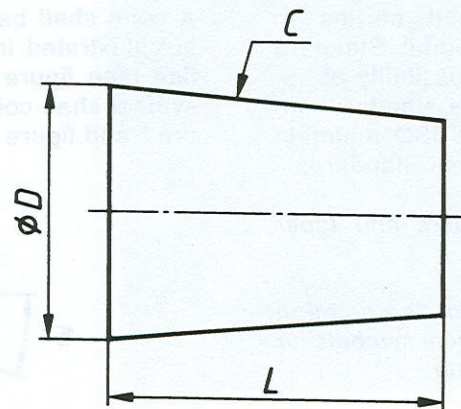


Figure 3

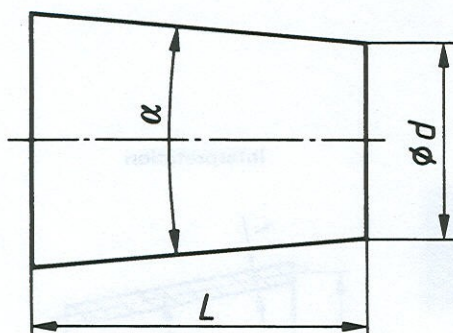


Figure 4

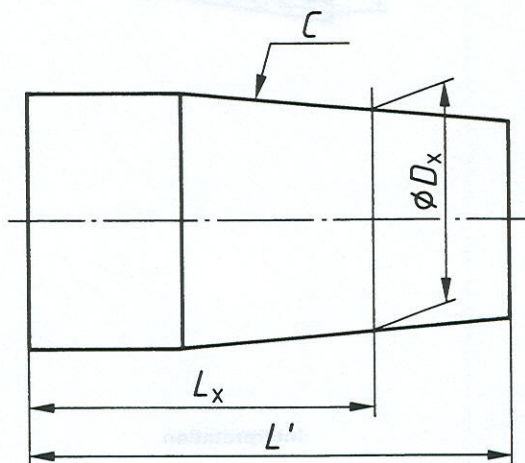


Figure 5

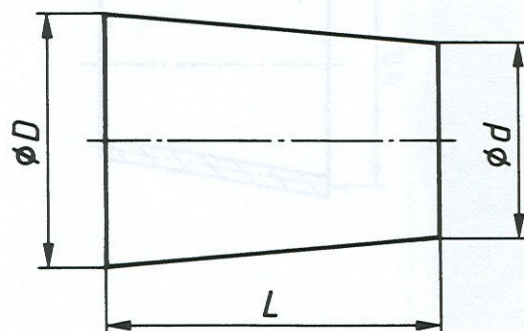


Figure 6

5.2 Indication of rate of taper on drawings

The graphical symbol and the rate of taper of a cone shall be indicated near to the feature, and the reference line shall be connected to the outline of the

cone by a leader line as shown in figure 7. The reference line shall be drawn parallel to the centre-line of the cone, and the orientation of the graphical symbol shall coincide with that of the cone.

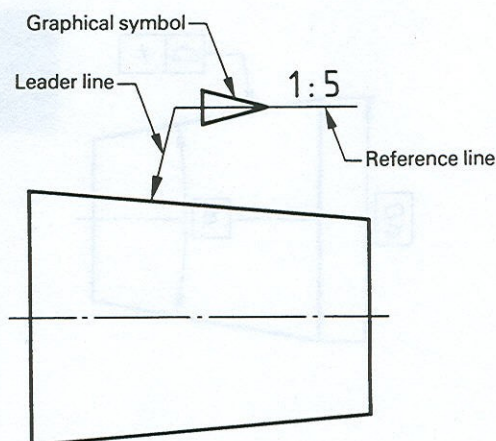


Figure 7

5.3 Standardized series of cones

When the taper to be indicated is one of a standardized series of conical taper (in particular Morse or metric taper), the tapered feature may be designated by specifying the standard series (see ISO 1119) and appropriate number (see figure 8).

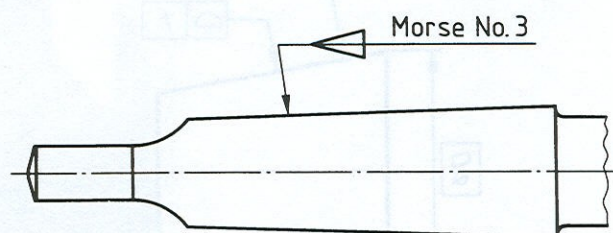


Figure 8

6 Tolerancing of cones

Cones shall be toleranced (both size and conical surface) in accordance with the methods given in 6.1 to 6.5.

The letter symbol t is used to define the width of the tolerance zone.

NOTE 3 Other methods of tolerancing using only dimensional tolerances do not give adequate indication with regard to the shape of the surface.

6.1 Tolerancing of cone, cone angle specified

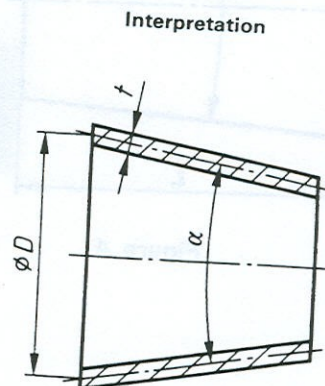
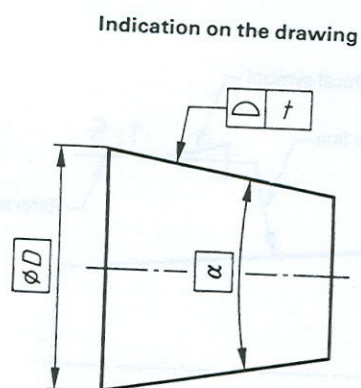


Figure 9

6.2 Tolerancing of cone, rate of taper specified

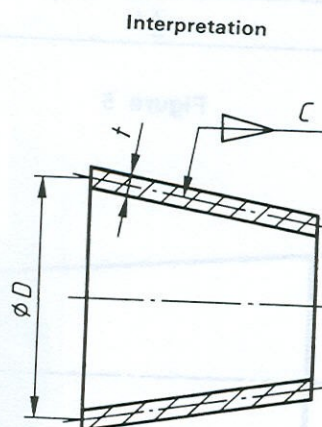
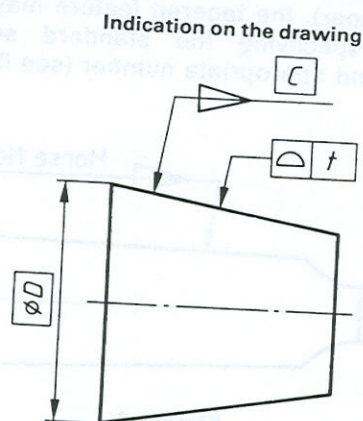


Figure 10

6.3 Tolerancing zone of cone defining simultaneously the axial location of the cone

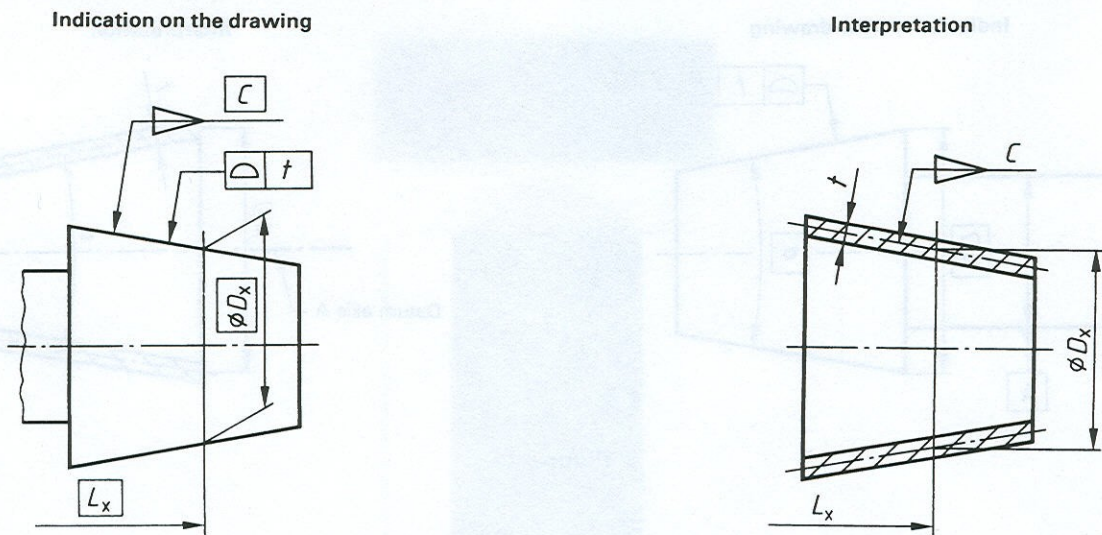


Figure 11

6.4 Tolerancing of cone separate from the tolerance of the axial location of the cone

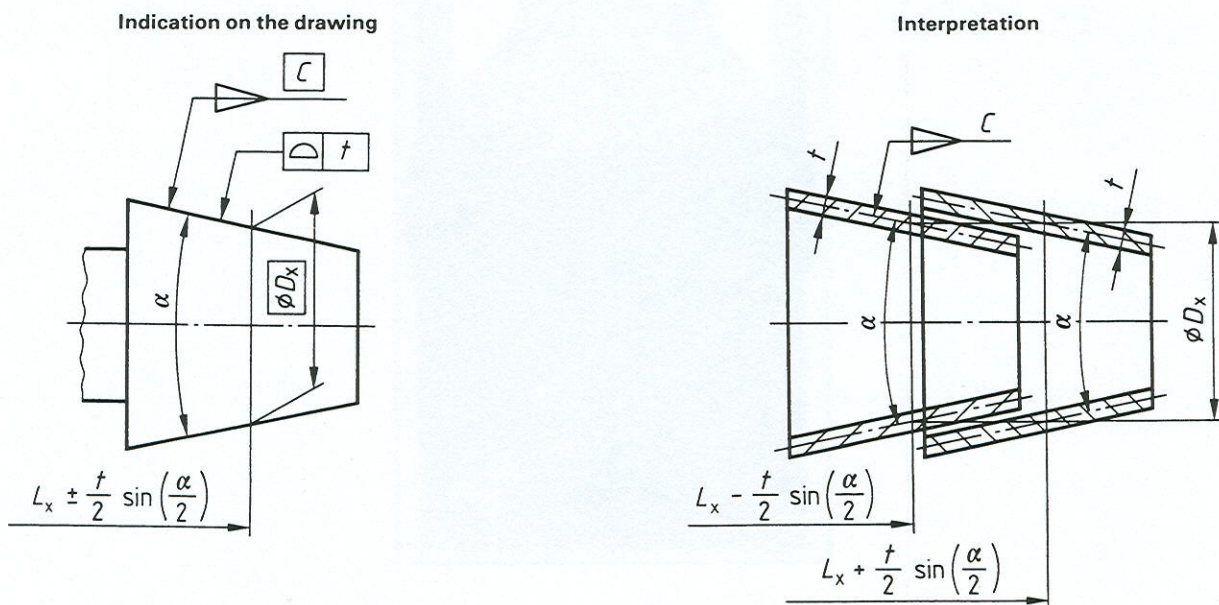


Figure 12

6.5 Tolerancing of cone related to a datum (simultaneously defining coaxiality)

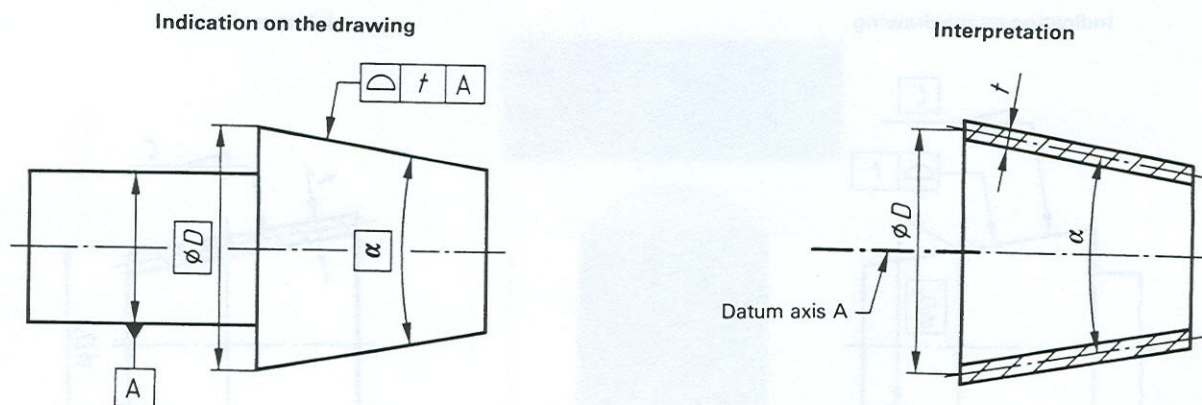


Figure 13

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