

Technical drawings — Screw threads and threaded parts

Part 1. General conventions

The European Standard EN ISO 6410-1 : 1996 has the status of a
British Standard

ICS 01.100.20; 21.040

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee TDE/4, Engineering drawing practice, upon which the following bodies were represented:

Atomic Weapons Establishment
British Gas plc
British Standards Society
Drawing Office Material Manufacturers' and Dealers' Association
Electricity Association
Gauge and Tools Makers' Association
HEVAC Association
Institution of Chemical Engineers
Institution of Engineering Designers
Power Generation Contractors' Association
Society of British Aerospace Companies Ltd.
University of Warwick

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on
15 August 1996

© BSI 1996

Amendments issued since publication

Amd. No.	Date	Text affected

The following BSI references relate to the work on this standard:
Committee reference TDE/4
Draft announced in *BSI News*
August 1996

Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	2
Introduction	2
Specification	
1 Scope	3
2 Normative references	3
3 Representation	3
4 Indication and dimensioning of threaded parts	7
Annexes	
A (informative) Bibliography	9
ZA (normative) Normative references to international publications with their relevant European publications	10

National foreword

This British Standard has been prepared by Technical Committee TDE/4 and is the English language version of EN ISO 6410-1 : 1996 *Technical drawings — Screw threads and threaded parts — Part 1: General conventions*, published by the European Committee for Standardization (CEN). It is identical with ISO 6410-1 : 1993 published by the International Organization for Standardization (ISO).

This British Standard partially supersedes BS 308 : Part 1. It is envisaged that when the full range of European Standards on technical drawing is implemented BS 308 will be withdrawn.

Cross-references

Publication referred to	Corresponding British Standard
EN 20225 : 1991 (ISO 225 : 1983)	BS EN 20225 : 1992 <i>Fasteners. Bolts, screws, studs and nuts. Symbols and designations of dimensions</i> BS EN ISO 6410 <i>Technical drawings — Screw threads and threaded parts</i>
EN ISO 6410-2 : 1996 (ISO 6410-2 : 1993)	BS EN ISO 6410-2 : 1996 <i>Screw thread inserts</i>
EN ISO 6410-3 : 1996 (ISO 6410-3 : 1993)	BS EN ISO 6410-3 : 1996 <i>Simplified representation</i>

Compliance with a British Standard does not of itself confer immunity from legal obligations.

ICS 01.100.20; 21.040

Descriptors: Drawings, technical drawings, screw threads, threaded parts, graphic methods, generalities

English version

Technical drawings — Screw threads and threaded parts — Part 1: General conventions

(ISO 6410-1 : 1993)

Dessins techniques — Filetages et pièces
filetées —
Partie 1: Conventions générales
(ISO 6410-1 : 1993)

Technische Zeichnungen — Gewinde und
Gewindeteile —
Teil 1: Allgemeines
(ISO 6410-1 : 1993)

This European Standard was approved by CEN on 1996-03-02. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

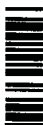
This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels



Foreword

The text of the International Standard from Technical Committee ISO/TC 10, Technical drawings, product definition and related documentation, of the International Organization for Standardization (ISO) has been taken over as a European Standard by the Technical Board of CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 1996, and conflicting national standards shall be withdrawn at the latest by October 1996.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

NOTE. Normative references to International Standards are listed in annex ZA (normative).

Introduction

ISO 6410 has been devised to provide a universal means of communication among the various interests involved in the design, manufacture and installation of fasteners.

Requirements within industries vary considerably; in recognition of this fact, ISO 6410 is presented in three parts.

Technical drawings — Screw threads and threaded parts —

Part 1: General conventions

1 Scope

This part of ISO 6410 specifies methods for representing screw threads and threaded parts on technical drawings.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6410. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6410 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 129:1985, *Technical drawings — Dimensioning — General principles, definitions, methods of execution and special indications*.

ISO 225:1983, *Fasteners — Bolts, screws, studs and nuts — Symbols and designations of dimensions*.

ISO 4753:1983, *Fasteners — Ends of parts with external metric ISO thread*.

ISO 6410-3:1993, *Technical drawings — Screw threads and threaded parts — Part 3: Simplified representation*.

3 Representation

3.1 Detailed representation of threads

In certain types of technical product documentation (e.g. publications, user manuals, etc.) the detailed representation of a thread either in a side view or in a section (see figures 1 to 3) may be needed to illustrate single or assembled parts. Neither pitch nor profile of the threads need usually be drawn exactly to scale.

In technical drawings, the detailed representation of threads (see figures 1 to 3) should only be used if absolutely necessary and whenever possible the helix should be represented by straight lines (see figure 2).

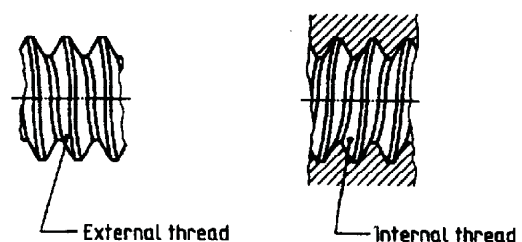


Figure 1

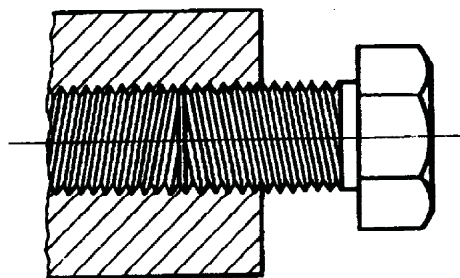


Figure 2

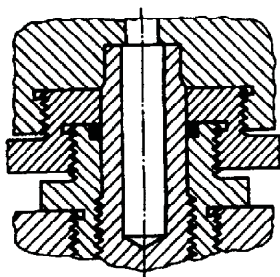


Figure 3

3.2 Conventional representation

Normally, by convention, the representation of threads and threaded parts in all types of technical drawings is simplified as shown in figures 4 to 7.

3.2.1 Views and sections of screw threads

For visible screw threads in side views and sections, the crests¹⁾ of threads shall be defined by a continuous thick line (type A, ISO 128), and the roots²⁾ of threads by a continuous thin line (type B, ISO 128), as shown in figures 4 to 13.

The space between the lines representing the crest and root of the thread should approximate as closely as possible the depth of the thread, but, in all cases, this spacing shall be not less than

- twice the thickness of the thick line, or
- 0,7 mm,

whichever is the larger.

NOTE 1 In certain cases, for example computer-aided draughting,

- a distance of 1,5 mm for threads of nominal diameter $d \geq 8$ mm is generally acceptable;
- a simplified representation is recommended for threads of nominal diameter $d \leq 6$ mm, see ISO 6410-3.

3.2.2 End view of screw threads

On an end view of a screw thread, the thread roots shall be represented by a portion of a circle, drawn with a continuous thin line (type B, ISO 128) approximately equal to three-quarters of the circumference (see figures 4 and 5), preferably open in the right-hand upper quadrant. The thick line representing the chamfer circle is generally omitted on the end view (see figures 4 and 5).

NOTE 2 The portion of the circle may also have any other position relative to the intersecting axes (see figure 6).

3.2.3 Hidden screw threads

Where it is necessary to show hidden screw threads, the crests¹⁾ and the roots²⁾ shall be represented by dashed thin lines (type F, ISO 128), as shown in figure 7.

3.2.4 Hatching of sections of threaded parts

For threaded parts shown in section, hatching shall extend to the line defining the crests of the thread (see figures 5 to 8).

1) "Crest" normally refers to the major diameter for external threads and to the minor diameter for internal threads.

2) "Root" normally refers to the minor diameter for external threads and to the major diameter for internal threads.

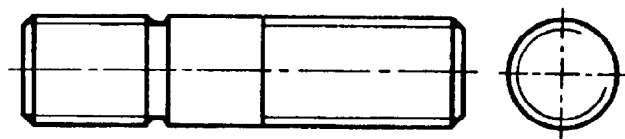


Figure 4

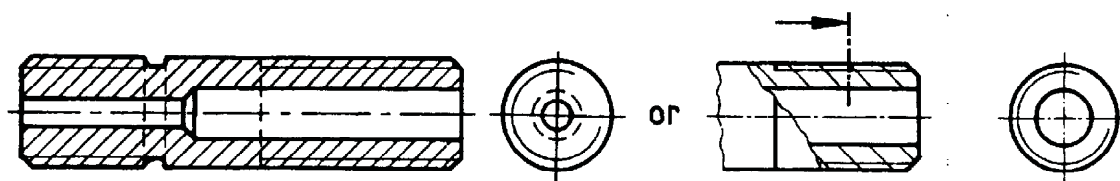


Figure 5

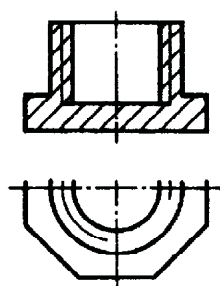


Figure 6

3.2.5 Limit of length of full depth thread

The limit of the length of full depth thread

- shall be shown, if visible, by a continuous thick line (type A, ISO 128)
- may be shown, if hidden, by a dashed line (type F, ISO 128).

These limit lines shall terminate at the lines defining the major diameter of the thread (see figures 4, 8 to 11 and 13).

3.2.6 Thread run-outs

Thread run-outs are beyond the effective ends of the thread except for the end of studs.

They shall be represented by a continuous inclined thin line (type B, ISO 128) if functionally necessary (see figure 8) or for dimensioning (see figure 13). However it is allowed not to represent the run-out wherever possible (see figures 4, 5 and 7).

3.3 Assembled threaded parts

The conventions specified in 3.2 apply also to assemblies of threaded parts. However, externally threaded parts shall always be shown covering internally threaded parts and shall not be hidden by them (see figures 8 and 10). The thick line representing the limit of the useful length of the internal screw thread shall be drawn to the root of the internal thread (see figures 8 and 9).



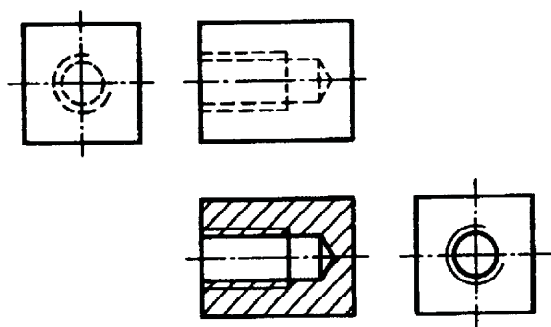


Figure 7

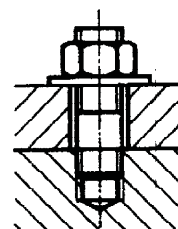


Figure 9

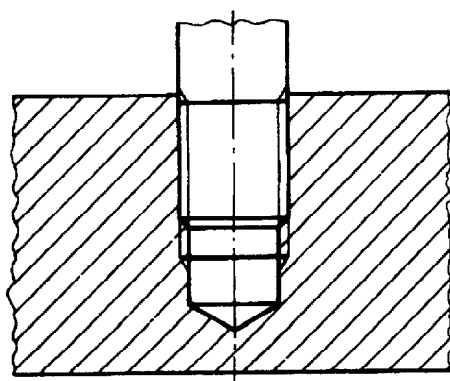


Figure 8

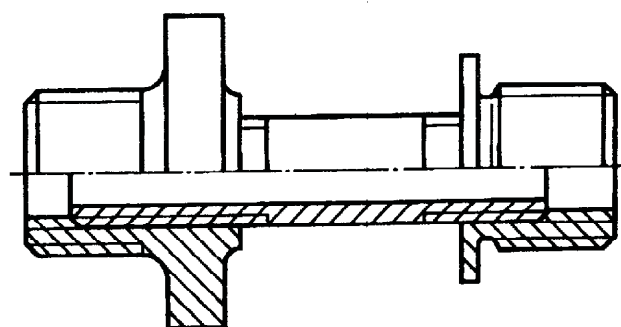


Figure 10

4 Indication and dimensioning of threaded parts

4.1 Designation

The type of screw thread and its dimensions shall be indicated by means of the designation specified in the relevant International Standards for threads.

When indicating the designation on technical drawings, the description block as well as the International Standard block shall be omitted.

In general, the screw thread designation covers

- the abbreviation of the kind of thread (standardized symbol, e.g. M, G, Tr, HA, etc.);
- the nominal diameter or size (e.g. 20; 1/2; 40; 4,5; etc.);

and, if necessary,

- the lead (L), in millimetres;
- the pitch (P), in millimetres;
- the direction of lead (see 4.4);

as well as additional indications, such as

- the tolerance class according to the relevant International Standard;
- thread engagement (S = short, L = long, N = normal);
- the number of starts.

EXAMPLES (taken from International Standards, see annex A)

- a) M20 × 2 - 6G/6h - LH
- b) M20 × L3 - P1,5 - 6H - S

c) G 1/2 A

d) Tr 40 × 7

e) HA 4,5

4.2 Dimensioning

4.2.1 The nominal diameter, d , always refers to the crest¹⁾ of the external thread (see figures 11 and 13 or the root²⁾ of the internal thread (see figure 12).

The dimension of the thread length normally refers to the length of the full depth thread (see figure 11) unless the run-out is functionally necessary (e.g. studs) and therefore specifically drawn (see figures 8 and 13).

NOTE 3 Ends of bolts (see ISO 4753) should be included in the length of full depth thread (b) or (l).

All dimensions shall be indicated in accordance with ISO 129 and ISO 225 or in accordance with 4.3.

4.3 Thread length and blind hole depth

It is generally necessary to dimension the length of thread but the blind hole depth may usually be omitted.

The need for indicating the blind hole depth depends mostly on the part itself and the tool used for threading. When the dimension of the hole depth is unspecified, it shall be depicted as being 1,25 times that of the thread length (see figure 14). A short designation as shown in figure 15 may also be used.

4.4 Indication of direction of lead

Right-hand threads need not be denoted in general. Left-hand threads shall be denoted by adding the abbreviation LH to the thread designation. Right-hand and left-hand threads on the same part shall be denoted, in every case. Right-hand threads shall be denoted, if necessary, by adding the abbreviation "RH" to the thread designation.

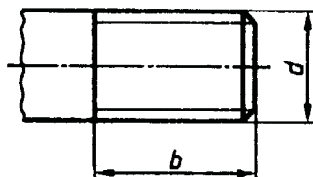


Figure 11

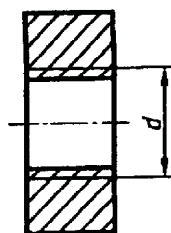


Figure 12

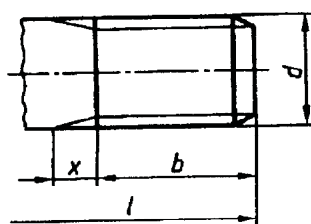


Figure 13

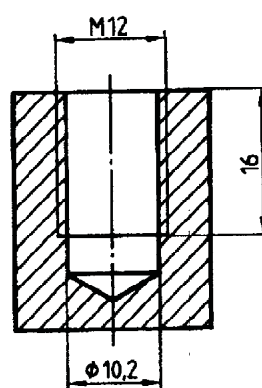


Figure 14

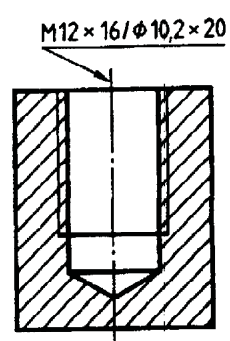


Figure 15

Annex A
(informative)

Bibliography

- [1] ISO 228-1:1982, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Designation, dimensions and tolerances.*
- [2] ISO 261:—³⁾, *ISO general-purpose metric screw threads — General plan.*
- [3] ISO 262:—⁴⁾, *ISO general-purpose metric screw threads — Selected sizes for screws, bolts and nuts.*
- [4] ISO 965-1:1980, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data.*
- [5] ISO 2902:1977, *ISO metric trapezoidal screw threads — General plan.*
- [6] ISO 5835:1991, *Implants for surgery — Metal bone screws with hexagonal drive connection, spherical under-surface of head, asymmetrical thread — Dimensions.*
- [7] *International guide to screw threads — Symbols, profiles and designations of threads in standards of various countries*, Beuth Verlag, Berlin.

3) To be published. (Revision of ISO 261:1973)

4) To be published. (Revision of ISO 262:1973)



Annex ZA (normative)

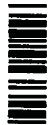
Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

Publication	Year	Title	EN	Year
ISO 225	1983	<i>Fasteners — Bolts, screws, studs and nuts — Symbols and designations of dimensions</i>	EN 20225	1991
ISO 6410-2	1993	<i>Technical drawings — Screw threads and threaded parts — Part 2: Screw thread inserts</i>	EN ISO 6410-2	1996
ISO 6410-3	1993	<i>Technical drawings — Screw threads and threaded parts — Part 3: Simplified representation</i>	EN ISO 6410-3	1996

List of references

See national foreword.



S

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Contract requirements

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.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the responsible technical committee, the identity of which can be found on the inside front cover. Tel: 0181 996 9000; Fax: 0181 996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services, Sales Department at Chiswick: Tel: 0181 996 7000; Fax: 0181 996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library, the Standardline Database, the BSI Information Technology Service (BITS) and its Technical Help to Exporters Service. Contact the Information Department at Chiswick: Tel: 0181 996 7111; Fax: 0181 996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Customer Services, Membership at Chiswick: Tel: 0181 996 7002; Fax: 0181 996 7001.

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

If permission is granted, the terms may include royalty payments or a licensing agreement. Details and advice can be obtained from the Copyright Manager, BSI, 389 Chiswick High Road, London W4 4AL.