



# **ISO/IEC Directives, Part 2**

*Directives ISO/CEI, Partie 2*

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## **Rules for the structure and drafting of International Standards**

*Règles de structure et de  
rédaction des Normes  
internationales*

Fifth edition, 2004

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## Foreword

The ISO/IEC Directives are published as two parts:

- Part 1: Procedures for the technical work
- Part 2: Rules for the structure and drafting of International Standards

They have been approved by the ISO Technical Management Board and the IEC Standardization Management Board.

This fifth edition incorporates changes agreed by both organizations. Changes which have been adopted in only one of the organizations are being published separately in the ISO Supplement and the IEC Supplement, respectively, which are to be used in conjunction with the Directives.

This fifth edition of the ISO/IEC Directives, Part 2, is presented in such a way that it serves as an example of the rules that it provides. In addition to a number of editorial improvements, the following main changes have been made with respect to the previous edition:

- the definition of “guides” has been changed (see 3.6);
- addition of a new Annex A, *Principles for drafting*;
- Annex E, dealing with product sizes, has been incorporated into A.6;
- Annex H, dealing with patent rights, has become Annex F, and the subsequent annexes renumbered.

This fifth edition of the ISO/IEC Directives is applicable to all enquiry drafts registered after 2005-01-01 and to all final drafts registered after 2005-04-01.

Both ISO and IEC have published guides on the use of templates and other tools for the preparation of documents prepared in accordance with the ISO/IEC Directives. These guides are available on the [ISO web site \(http://www.iso.org\)](http://www.iso.org) and [IEC web site \(http://www.iec.ch\)](http://www.iec.ch).

## Introduction

It is recognized that amongst standards writers many different tools are used for the drafting of documents, and that these tools will not necessarily permit the same options for the presentation of text elements. Therefore, wherever possible, optional presentations have been allowed for in these rules [e.g. it is permitted to precede the items in an unordered list by dashes or bullets (see 5.2.5)]. However, for such cases it should be noted that the ISO Central Secretariat and the IEC Central Office reserve the right to apply only one presentation.

NOTE This English version of the ISO/IEC Directives, Part 2, was prepared using the IEC template. The French version was prepared using the ISO template.

## ISO/IEC Directives — Part 2: Rules for the structure and drafting of International Standards

### 1 Scope

This part of the ISO/IEC Directives specifies rules for the structure and drafting of documents intended to become International Standards, Technical Specifications or Publicly Available Specifications. As far as practicable, these rules also apply to documents intended to become Technical Reports or Guides. All these document types are referred to collectively hereinafter as *documents*, unless otherwise necessary.

The rules are intended to ensure that such documents, prepared by the committee secretariats of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), are drafted in as uniform a manner as practicable, irrespective of the technical content.

It also gives some guidance with regard to presentation.

It does not specify the typography and layout of published documents, which are determined by the house style of the publishing organization.

### 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 31 (all parts), *Quantities and units* <sup>1)</sup>

ISO 78-2, *Chemistry — Layouts for standards — Part 2: Methods of chemical analysis*

ISO 128-30:2001, *Technical drawings — General principles of presentation — Part 30: Basic conventions for views*

ISO 128-34:2001, *Technical drawings — General principles of presentation — Part 34: Views on mechanical engineering drawings*

ISO 128-40:2001, *Technical drawings — General principles of presentation — Part 40: Basic conventions for cuts and sections*

ISO 128-44:2001, *Technical drawings — General principles of presentation — Part 44: Sections on mechanical engineering drawings*

ISO 639, *Codes for the representation of names of languages*

ISO 690 (all parts), *Information and documentation — Bibliographic references*

ISO 704, *Terminology work — Principles and methods*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units* <sup>1)</sup>

ISO 3098-2, *Technical product documentation — Lettering — Part 2: Latin alphabet, numerals and marks*

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

ISO 6433, *Technical drawings — Item references*

ISO 7000, *Graphical symbols for use on equipment — Index and synopsis*

ISO 10241:1992, *International terminology standards — Preparation and layout*

ISO 14617 (all parts), *Graphical symbols for diagrams*

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<sup>1)</sup> Published as a compilation in ISO Standards Handbook, *Quantities and units*.

ISO/IEC 17000, *Conformity assessment — Vocabulary and general principles*

IEC 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60417, *Graphical symbols for use on equipment*

IEC 60617, *Graphical symbols for diagrams*

IEC 61082 (all parts), *Preparation of documents used in electrotechnology*

IEC 61175, *Designations for signals and connections*

IEC 61346 (all parts), *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations*

IEC 61355, *Classification and designation of documents for plants, systems and equipment*

ISO/IEC Directives, Part 1, 2004, *Procedures for the technical work*

*IEC Supplement to the ISO/IEC Directives*

*ISO Supplement to the ISO/IEC Directives*

*ISO eServices Guide*, ISO, available at <<http://www.iso.org/ISOeServicesGuide>>

*ISO Template*, ISO, available at <<http://www.iso.org/sdis/templates>>

*IECStd Template*, IEC, available at <<http://www.iec.ch/tiss/templates.htm>>

*Quality management systems — Guidance and criteria for the development of documents to meet needs of specific product and industry/economic sectors*, ISO/TC 176, available at <<http://www.iso.org/sdis/directives>> in the section *Normative references*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### **standard**

document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context

NOTE Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.

[ISO/IEC Guide 2:2004, definition 3.2]

#### 3.2

##### **international standard**

standard that is adopted by an international standardizing/standards organization and made available to the public

[ISO/IEC Guide 2:2004, definition 3.2.1.1]

#### 3.3

##### **International Standard**

international standard where the international standards organization is ISO or IEC

#### 3.4

##### **Technical Specification**

##### **TS**

document published by ISO or IEC for which there is the future possibility of agreement on an International Standard, but for which at present

- the required support for approval as an International Standard cannot be obtained,
- there is doubt on whether consensus has been achieved,



- the subject matter is still under technical development, or
- there is another reason precluding immediate publication as an International Standard

NOTE 1 The content of a Technical Specification, including its annexes, may include requirements.

NOTE 2 A Technical Specification is not allowed to conflict with an existing International Standard.

NOTE 3 Competing Technical Specifications on the same subject are permitted.

NOTE 4 Prior to mid-1999, Technical Specifications were designated as Technical Reports of type 1 or 2.

### 3.5

#### Technical Report

##### TR

document published by ISO or IEC containing collected data of a different kind from that normally published as an International Standard or Technical Specification

NOTE 1 Such data may include, for example, data obtained from a survey carried out among the national bodies, data on work in other international organizations or data on the “state of the art” in relation to standards of national bodies on a particular subject.

NOTE 2 Prior to mid-1999, Technical Reports were designated as Technical Reports of type 3.

### 3.6

#### Guide

document published by ISO or IEC giving rules, orientation, advice or recommendations relating to international standardization

NOTE Guides may address issues of interest to all users of documents published by ISO and IEC.

### 3.7

#### Publicly Available Specification

##### PAS

document published by ISO or IEC to respond to an urgent market need, representing either

- a) a consensus in an organization external to ISO or IEC, or
- b) a consensus of the experts within a working group

NOTE 1 A Publicly Available Specification is not allowed to conflict with an existing International Standard.

NOTE 2 Competing Publicly Available Specifications on the same subject are permitted.

### 3.8

#### normative elements

elements that describe the scope of the document, and which set out provisions (3.12)

### 3.9 Informative elements

#### 3.9.1

##### preliminary elements

elements that identify the document, introduce its content and explain its background, its development and its relationship with other documents

#### 3.9.2

##### supplementary elements

elements that provide additional information intended to assist the understanding or use of the document

#### 3.10

##### required element

element the presence of which in a document is obligatory

#### 3.11

##### optional element

element the presence of which in a document is dependent on the provisions of the particular document

## 3.12 Provisions

### 3.12.1 requirement

expression in the content of a document conveying criteria to be fulfilled if compliance with the document is to be claimed and from which no deviation is permitted

NOTE Table H.1 specifies the verbal forms for the expression of requirements.

### 3.12.2 recommendation

expression in the content of a document conveying that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited

NOTE Table H.2 specifies the verbal forms for the expression of recommendations.

### 3.12.3 statement

expression in the content of a document conveying information

NOTE Table H.3 specifies the verbal forms for indicating a course of action permissible within the limits of the document. Table H.4 specifies the verbal forms to be used for statements of possibility and capability.

## 3.13 state of the art

developed stage of technical capability at a given time as regards products, processes and services, based on the relevant consolidated findings of science, technology and experience

[ISO/IEC Guide 2:2004, definition 1.4]

## 4 General principles

### 4.1 Objective

The objective of documents published by ISO and IEC is to define clear and unambiguous provisions in order to facilitate international trade and communication. To achieve this objective, the document shall

- be as complete as necessary within the limits specified by its scope,
- be consistent, clear and accurate,
- take full account of the state of the art (see 3.13),
- provide a framework for future technological development,
- be comprehensible to qualified persons who have not participated in its preparation, and
- take into account the principles for the drafting of documents (see Annex A).

### 4.2 Performance approach

Whenever possible, requirements shall be expressed in terms of performance rather than design or descriptive characteristics. This approach leaves maximum freedom to technical development. Primarily those characteristics shall be included that are suitable for worldwide (universal) acceptance. Where necessary, owing to differences in legislation, climate, environment, economies, social conditions, trade patterns, etc., several options may be indicated. See A.3 for further information.

### 4.3 Homogeneity

Uniformity of structure, of style and of terminology shall be maintained not only within each document, but also within a series of associated documents. The structure of associated documents and the numbering of their clauses shall, as far as possible, be identical.

Analogous wording shall be used to express analogous provisions; identical wording shall be used to express identical provisions.

The same term shall be used throughout each document or series of associated documents to designate a given concept. The use of an alternative term (synonym) for a concept already defined shall be avoided. As far as possible, only one meaning shall be attributed to each term chosen.

These requirements are particularly important not only to ensure comprehension of the document, or of the series of associated documents, but also to derive the maximum benefit available through automated text processing techniques and computer-aided translation.

#### **4.4 Consistency of documents**

In order to achieve the aim of consistency within the complete corpus of documents published by ISO and IEC, the text of every document shall be in accordance with the relevant provisions of existing basic documents published by ISO and IEC. This relates particularly to

- a) standardized terminology,
- b) principles and methods of terminology,
- c) quantities, units and their symbols,
- d) abbreviated terms,
- e) bibliographic references,
- f) technical drawings and diagrams,
- g) technical documentation, and
- h) graphical symbols.

In addition, specific technical aspects shall be drafted in accordance with the provisions of general documents published by ISO and IEC dealing with the following subjects:

- i) limits, fits and surface properties;
- j) tolerancing of dimensions and uncertainty of measurement;
- k) preferred numbers;
- l) statistical methods;
- m) environmental conditions and associated tests;
- n) safety;
- o) chemistry;
- p) electromagnetic compatibility;
- q) conformity and quality.

A list of basic reference works is given in Annex B.

#### **4.5 Equivalence of official language versions**

The texts in the different official language versions shall be technically equivalent and structurally identical.

The use of bilingualism from the initial stage of drafting is of great assistance in the preparation of clear and unambiguous texts.

#### **4.6 Fitness for implementation as a regional or national standard**

The content of a document published by ISO and IEC shall be drawn up in such a way as to facilitate its direct application and its adoption without change as a regional or national standard.

#### **4.7 Planning**

Rules for the planning of new work items are given in the [ISO/IEC Directives, Part 1, 2004, 2.3.4](#). In order to ensure the timely publication of a document or of a series of associated documents, the intended structure and any interrelationships shall be established before detailed drafting begins. In particular, consideration shall be given to the subdivision of the subject matter (see 5.1). In the case of a multipart document, a list of the intended parts together with their titles in English and French shall be drawn up. The rules given in the ISO/IEC Directives and ISO and IEC Supplements shall be applied from the very beginning of the work and throughout all subsequent stages to avoid delay at any stage.

### **5 Structure**

#### **5.1 Subdivision of the subject matter**

##### **5.1.1 General**

Documents are so diverse that no universally acceptable rules can be established for the subdivision of the subject matter.

However, as a general rule, an individual document shall be prepared for each subject to be standardized, and published as a complete entity. In specific cases and for practical reasons, for example if

- a) the document is likely to become too voluminous,
- b) subsequent portions of the content are interlinked,
- c) portions of the document could be referred to in regulations, or
- d) portions of the document are intended to serve for certification purposes,

the document may be split into separate parts under the same number. This has the advantage that each part can be changed separately when the need arises.

In particular, the aspects of a product which will be of separate interest to different parties (e.g. manufacturers, certification bodies, legislative bodies) shall be clearly distinguished, preferably as parts of a document or as separate documents.

Such individual aspects are, for example,

- health and safety requirements,
- performance requirements,
- maintenance and service requirements,
- installation rules, and
- quality assessment.

The terms which shall be used to designate the divisions and subdivisions that a document may have are shown in Table 1 in English and in French. For an example of numbering, see Annex C.

**Table 1 — Names of divisions and subdivisions**

English term	French term	Example of numbering
Part	Partie	9999-1
Clause	Article	1
Subclause	Paragraphe	1.1
Subclause	Paragraphe	1.1.1
Paragraph	Alinéa	[no number]
Annex	Annexe	A

### 5.1.2 Subdivision of the subject matter within a series of parts

There are two ways of achieving this.

- a) Each part deals with a specific aspect of the subject and can stand alone.

EXAMPLE 1

*Part 1: Vocabulary*

*Part 2: Requirements*

*Part 3: Test methods*

*Part 4: ...*

EXAMPLE 2

*Part 1: Vocabulary*

*Part 2: Harmonics*

*Part 3: Electrostatic discharge*

*Part 4: ...*

- b) There are both common and specific aspects to the subject. The common aspects shall be given in Part 1. Specific aspects (which may modify or supplement the common aspects and therefore cannot stand alone) shall be given in individual parts.

EXAMPLE 3 In ISO or IEC

*Part 1: General requirements*

*Part 2: Thermal requirements*

*Part 3: Air purity requirements*

*Part 4: Acoustical requirements*

EXAMPLE 4 In terms of numbering, non-consecutive numbering is permitted in IEC only

*Part 1: General requirements*

*Part 21: Particular requirements for electric irons*

*Part 22: Particular requirements for spin extractors*

*Part 23: Particular requirements for dishwashers*

EXAMPLE 5 In terms of numbering, subdivision of part numbers is permitted in IEC only

*Part 1: General requirements*

*Part 2-1: Requirements for plasma displays*

*Part 2-2: Requirements for monitors*

*Part 2-3: Requirements for LCDs*

Where the system described in b) is used, care shall be taken that the references from one part to another are valid. There are two ways of achieving this.

- If reference is made to a particular element, the reference shall be dated (see 6.6.7.5.3).
- Since the complete series of parts is normally under the control of the same committee, the use of undated references (see 6.6.7.5.2) is permitted, provided that corresponding changes are implemented simultaneously in all parts. The use of undated references requires a high degree of discipline by the committee responsible for the document.

Each part of a multipart document shall be drafted in accordance with the rules for an individual document as specified in this part of the ISO/IEC Directives.

### 5.1.3 Subdivision of the subject matter within an individual document

The elements that together form a document may be classified in two different ways:

- a) by their normative/informative nature and their position within the structure, i.e.
  - informative preliminary elements (see 3.9.1),
  - normative general and technical elements (see 3.8), and
  - informative supplementary elements (see 3.9.2);
- b) by their required or optional presence (see 3.10 and 3.11).

An example of a typical arrangement is given in Table 2. Table 2 also lists the permitted content of each of the elements constituting the arrangement.

**Table 2 — Example of a typical arrangement of elements in a document**

Type of element	Arrangement of elements <sup>a</sup> in document	Permitted content <sup>a</sup> of element(s) in document
Informative preliminary	<i>Title page</i>	<b>Title</b>
	<i>Table of contents</i>	<i>(generated content; see 6.1.2)</i>
	<b>Foreword</b>	<b>Text</b> <i>Notes</i> <i>Footnotes</i>
	<i>Introduction</i>	<i>Text</i> <i>Figures</i> <i>Tables</i> <i>Notes</i> <i>Footnotes</i>
Normative general	<b>Title</b>	<b>Text</b>
	<b>Scope</b>	<b>Text</b> <i>Figures</i> <i>Tables</i> <i>Notes</i> <i>Footnotes</i>
	Normative references	<i>References</i> <i>Footnotes</i>
Normative technical	Terms and definitions Symbols and abbreviated terms : : Normative annex	<i>Text</i> <i>Figures</i> <i>Tables</i> <i>Notes</i> <i>Footnotes</i>
Informative supplementary	<i>Informative annex</i>	<i>Text</i> <i>Figures</i> <i>Tables</i> <i>Notes</i> <i>Footnotes</i>
Normative technical	Normative annex	<i>Text</i> <i>Figures</i> <i>Tables</i> <i>Notes</i> <i>Footnotes</i>
Informative supplementary	<i>Bibliography</i>	<i>References</i> <i>Footnotes</i>
	<i>Indexes</i>	<i>(generated content; see 6.4.3)</i>
<sup>a</sup> <b>Bold type</b> = required element; upright type = normative element; <i>italic type</i> = informative element.		

A document need not contain all the normative technical elements shown and it may contain normative technical elements other than those shown. Both the nature of the normative technical elements and their sequence are determined by the nature of the document in question.

A document may also contain notes and footnotes to figures and tables (see 6.6.5.9, 6.6.5.10, 6.6.6.6 and 6.6.6.7).

Terminology standards have additional requirements for the subdivision of content (see Annex D).

## 5.2 Description and numbering of divisions and subdivisions

### 5.2.1 Part

**5.2.1.1** The number of a part shall be indicated by Arabic numerals, beginning with 1, following the document number and preceded by a hyphen; for example,

9999-1, 9999-2, etc.

Parts shall not be further subdivided. See also the examples in 5.1.2.

**5.2.1.2** The title of a part shall be composed in the same way as that of a document as described in 6.1.1. All the individual titles in a series of parts shall contain the same introductory element (if present) and main element, while the complementary element shall be different in each case in order to distinguish the parts from one another. The complementary element shall be preceded in each case by the designation "Part ...".

**5.2.1.3** If a document is published in the form of a number of separate parts, the first part shall include in its foreword (see 6.1.3) an explanation of the intended structure. In the foreword of each part belonging to the series, a reference shall be made to the titles of all other parts that have been or are planned to be published.

### 5.2.2 Clause

A clause is the basic component in the subdivision of the content of a document.

The clauses in each document or part shall be numbered with Arabic numerals, beginning with 1 for the "Scope" clause. The numbering shall be continuous up to but excluding any annexes (see 5.2.6).

Each clause shall have a title, placed immediately after its number, on a line separate from the text that follows it.

### 5.2.3 Subclause

A subclause is a numbered subdivision of a clause. A primary subclause (e.g. 5.1, 5.2, etc.) may be subdivided into secondary subclauses (e.g. 5.1.1, 5.1.2, etc.), and this process of subdivision may be continued as far as the fifth level (e.g. 5.1.1.1.1.1, 5.1.1.1.1.2, etc.).

Subclauses shall be numbered with Arabic numerals (see Annex C for an example).

A subclause shall not be created unless there is at least one further subclause at the same level. For example, text in Clause 10 shall not be designated subclause "10.1" unless there is also a subclause "10.2".

Each primary subclause should preferably be given a title, which shall be placed immediately after its number, on a line separate from the text that follows it. Secondary subclauses may be treated in the same way. Within a clause or subclause, the use of titles shall be uniform for subclauses at the same level, e.g. if 10.1 has a title, 10.2 shall also have a title. In the absence of titles, key terms or phrases (composed in distinctive type) appearing at the beginning of the text of the subclause may be used to call attention to the subject matter dealt with. Such terms or phrases shall not be listed in the table of contents.

### 5.2.4 Paragraph

A paragraph is an unnumbered subdivision of a clause or subclause.

“Hanging paragraphs” such as those shown in the following example shall be avoided since reference to them is ambiguous.

EXAMPLE In the following example, the hanging paragraphs indicated cannot be uniquely identified as being in “Clause 5” since strictly speaking the paragraphs in 5.1 and 5.2 are also in Clause 5. To avoid this problem it is necessary to identify the unnumbered paragraphs as subclause “5.1 General” (or other suitable title) and to renumber the existing 5.1 and 5.2 accordingly (as shown), to move the hanging paragraphs elsewhere, or to delete them.

Incorrect	Correct
<p><b>5 Designation</b></p> <p>The quick brown fox jumps over the lazy dog. }                      The quick brown fox jumps over the lazy dog. } hanging                      The quick brown fox jumps over the lazy dog. } paragraphs</p> <p><b>5.1 XXXXXXXXXXXX</b></p> <p>The quick brown fox jumps over the lazy dog.</p> <p><b>5.2 XXXXXXXXXXXX</b></p> <p>The quick brown fox jumps over the lazy dog.</p> <p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p><b>6 Test report</b></p>	<p><b>5 Designation</b></p> <p><b>5.1 General</b></p> <p>The quick brown fox jumps over the lazy dog.</p> <p>The quick brown fox jumps over the lazy dog.</p> <p>The quick brown fox jumps over the lazy dog.</p> <p><b>5.2 XXXXXXXXXXXX</b></p> <p>The quick brown fox jumps over the lazy dog.</p> <p><b>5.3 XXXXXXXXXXXX</b></p> <p>The quick brown fox jumps over the lazy dog.</p> <p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p><b>6 Test report</b></p>

### 5.2.5 Lists

Lists should be introduced by a sentence (see Example 1), a complete grammatical proposition followed by a colon (see Example 2), or by the first part of a proposition (without a colon — see Example 3), completed by the items in the list.

Each item in a list shall be preceded by a dash or a bullet or, if necessary for identification, by a lower case letter followed by a parenthesis. If it is necessary to subdivide further an item in the latter type of list, Arabic numerals followed by a parenthesis shall be used (see Example 1).

EXAMPLE 1 The following basic principles shall apply to the drafting of definitions.

- a) The definition shall have the same **grammatical form** as the term:
  - 1) to define a verb, a verbal phrase shall be used;
  - 2) to define a singular noun, the singular shall be used.
- b) The **preferred structure** of a definition is a basic part stating the class to which the concept belongs, and another part enumerating the characteristics that distinguish the concept from other members of the class.
- c) The **definition of a quantity** shall be formulated in accordance with the provisions of ISO 31-0:1992, 2.2. This means that a derived quantity may be defined by means of other quantities only. No unit shall be used in the definition of a quantity.

EXAMPLE 2 No switch is required for any of the following categories of apparatus:

- apparatus having a power consumption not exceeding 10 W under normal operating conditions;
- apparatus having a power consumption not exceeding 50 W, measured 2 min after the application of any of the fault conditions;
- apparatus intended for continuous operation.

EXAMPLE 3 Vibrations in the apparatus may be caused by

- unbalance in the rotating elements,
- slight deformations in the frame,
- the rolling bearings, and
- aerodynamic loads.

To aid comprehension, it may be preferable not to continue a sentence after the end of the type of list given in Example 3. Key terms or phrases may be composed in distinctive type to



call attention to the subject matter dealt with in the various list items (see Example 1). Such terms or phrases shall not be listed in the table of contents; if it is necessary that they be included in the table of contents, they shall not be presented as list items but as subclause titles (see 5.2.3).

### 5.2.6 Annex

For the description of the two types of annex, see 6.3.8 and 6.4.1.

Annexes shall appear in the order in which they are cited in the text. Each annex shall be designated by a heading comprising the word “Annex” followed by a capital letter designating its serial order, beginning with “A”, e.g. “Annex A”. The annex heading shall be followed by the indication “(normative)” or “(informative)”, and by the title, each on a separate line. Numbers given to the clauses, subclauses, tables, figures and mathematical formulae of an annex shall be preceded by the letter designating that annex followed by a full-stop. The numbering shall start afresh with each annex. A single annex shall be designated “Annex A”.

EXAMPLE Clauses in Annex A are designated “A.1”, “A.2”, “A.3”, etc.

### 5.2.7 Bibliography

A bibliography, if present, shall appear after the last annex. For the drafting rules, see 6.4.2.

### 5.2.8 Indexes

Indexes, if present, shall appear as the last element. For the drafting rules, see 6.4.3.

## 6 Drafting

### 6.1 Preliminary informative elements

#### 6.1.1 Title page

The title page shall contain the title of the document.

The wording of the title shall be established with the greatest care; while being as concise as possible, it shall indicate, without ambiguity, the subject matter of the document in such a way as to distinguish it from that of other documents, without going into unnecessary detail. Any necessary additional particulars shall be given in the scope.

The title shall be composed of separate elements, each as short as possible, proceeding from the general to the particular. In general, not more than the following three elements shall be used:

- a) an *introductory element* (optional) indicating the general field to which the document belongs (this can often be based on the title of the committee which prepared the document);
- b) a *main element* (obligatory) indicating the principal subject treated within that general field;
- c) a *complementary element* (optional) indicating the particular aspect of the principal subject or giving details that distinguish the document from other documents, or other parts of the same document.

Detailed rules for the drafting of titles are given in Annex E.

NOTE The title pages of enquiry drafts, final drafts and final publications are prepared in a standard format by the Central Secretariat of ISO or by the Central Office of the IEC, as appropriate. In addition to the title itself, the cover pages and, in IEC, title pages are prepared to include the reference number of the document (which is allocated by the Central Secretariat of ISO or by the Central Office of the IEC), and bibliographic and (for final publications) pricing information.

### 6.1.2 Table of contents

The table of contents is an optional preliminary element, but is necessary if it makes the document easier to consult. The table of contents shall be entitled “Contents” and shall list clauses and, if appropriate, subclauses with titles, annexes together with their status in parentheses, the bibliography, indexes, figures and tables. The order shall be as follows: clauses and subclauses with titles; annexes (including clauses and subclauses with titles if appropriate); the bibliography; indexes; figures; tables. All the elements listed shall be cited with their full titles. Terms in the “Terms and definitions” clause shall not be listed in the table of contents.

The table of contents shall be generated automatically and not composed manually.

### 6.1.3 Foreword

The foreword shall appear in each document. It shall not contain requirements, recommendations, figures or tables.

It consists of a general part and a specific part. The general part (supplied by the Central Secretariat of ISO or by the Central Office of the IEC, as appropriate) gives information relating to the organization responsible and to International Standards in general, i.e.

- a) the designation and name of the committee that prepared the document,
- b) information regarding the approval of the document, and
- c) information regarding the drafting conventions used, comprising a reference to this part of the ISO/IEC Directives.

The specific part (supplied by the committee secretariat) shall give a statement of significant technical changes from any previous edition of the document and as many of the following as are appropriate:

- d) an indication of any other international organization that has contributed to the preparation of the document;
- e) a statement that the document cancels and replaces other documents in whole or in part;
- f) the relationship of the document to other documents (see 5.2.1.3);
- g) in IEC, an indication of the next maintenance result date (see [ISO/IEC Directives, IEC Supplement, 2004, Clause 4](#)).

### 6.1.4 Introduction

The introduction is an optional preliminary element used, if required, to give specific information or commentary about the technical content of the document, and about the reasons prompting its preparation. It shall not contain requirements.

Whenever alternative solutions are adopted internationally in a document and preferences for the different alternatives provided, the reasons for the preferences shall be explained in the introduction [see A.6 d)]. Where patent rights have been identified in a document, the introduction shall include an appropriate notice. See Annex F for further information.

The introduction shall not be numbered unless there is a need to create numbered subdivisions. In this case, it shall be numbered 0, with subclauses being numbered 0.1, 0.2, etc. Any numbered figure, table, displayed formula or footnote shall be numbered normally beginning with 1.

## 6.2 General normative elements

### 6.2.1 Scope

This element shall appear at the beginning of each document and define without ambiguity the subject of the document and the aspects covered, thereby indicating the limits of applicability of the document or particular parts of it. It shall not contain requirements.

In documents that are subdivided into parts, the scope of each part shall define the subject of that part of the document only.

The scope shall be succinct so that it can be used as a summary for bibliographic purposes.

This element shall be worded as a series of statements of fact. Forms of expression such as the following shall be used:

- “This International Standard
- specifies { the dimensions of ...”  
a method of ...”  
the characteristics of ...”
  - establishes { a system for ...”  
general principles for ...”
  - gives guidelines for ...”
  - defines terms ...”

Statements of applicability of the document shall be introduced by wording such as:

“This International Standard is applicable to ...”

The wording shall be altered as a function of the document type concerned, i.e. International Standard, Technical Specification, Publicly Available Specification, Technical Report or Guide.

### 6.2.2 Normative references

This optional element shall give a list of the referenced documents cited (see 6.6.7.5) in the document in such a way as to make them indispensable for the application of the document. For dated references, each shall be given with its year of publication, or, in the case of enquiry or final drafts, with a dash together with a footnote “To be published.”, and full title. The year of publication or dash shall not be given for undated references. When an undated reference is to all parts of a document, the publication number shall be followed by the indication “(all parts)” and the general title of the series of parts (i.e. the introductory and main elements, see Annex E).

In principle, the referenced documents shall be documents published by ISO and/or IEC. Documents published by other bodies may be referred to in a normative manner provided that

- a) the referenced document is recognized by the ISO and/or IEC committee concerned as having wide acceptance and authoritative status as well as being publicly available,
- b) the ISO and/or IEC committee concerned has obtained the agreement of the authors or publishers (where known) of the referenced document to its inclusion and to its being made available as required — the authors or publishers will be expected to make available such documents on request,
- c) the authors or publishers (where known) have also agreed to inform the ISO and/or IEC committee concerned of their intention to revise the referenced document and of the points the revision will concern, and

- d) the ISO and/or IEC committee concerned undertakes to review the situation in the light of any changes in the referenced document.

The list shall be introduced by the following wording:

“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.”

The above wording is also applicable to a part of a multipart document.

The list shall not include the following:

- referenced documents which are not publicly available;
- referenced documents which are only cited in an informative manner;
- referenced documents which have merely served as bibliographic or background material in the preparation of the document.

Such referenced documents may be listed in a bibliography (see 6.4.2).

### 6.3 Technical normative elements

#### 6.3.1 Terms and definitions

This is an optional element giving definitions necessary for the understanding of certain terms used in the document. The following introductory wording shall be used where all terms and definitions are given in the document itself:

“For the purposes of this document, the following terms and definitions apply.”

In the case where terms defined in one or more other documents also apply (for example, in the case of a series of associated documents where Part 1 specifies the terms and definitions for several or all of the parts), the following introductory wording shall be used, altered as necessary:

“For the purposes of this document, the terms and definitions given in ... and the following apply.”

Rules for the drafting and presentation of terms and definitions are given in Annex D, together with special rules for terminology standards, such as vocabularies, nomenclatures or lists of equivalent terms in different languages.

Note that the introductory text is not a hanging paragraph, as described in 5.2.4, as the terms and definitions are a definitions list and not a series of subclauses.

#### 6.3.2 Symbols and abbreviated terms

This is an optional element giving a list of the symbols and abbreviated terms necessary for the understanding of the document.

Unless there is a need to list symbols in a specific order to reflect technical criteria, all symbols should be listed in alphabetical order in the following sequence:

- upper case Latin letter followed by lower case Latin letter (*A, a, B, b*, etc.);
- letters without indices preceding letters with indices, and with letter indices preceding numerical ones (*B, b, C, C<sub>m</sub>, C<sub>2</sub>, c, d, d<sub>ext</sub>, d<sub>int</sub>, d<sub>1</sub>*, etc.);
- Greek letters following Latin letters (*Z, z, A, α, B, β, ..., A, λ*, etc.);
- any other special symbols.

For convenience, this element may be combined with element 6.3.1 in order to bring together terms and their definitions, symbols, abbreviated terms and perhaps units under an appropriate composite title, for example “Terms, definitions, symbols, units and abbreviated terms”.

### 6.3.3 Requirements

This element is optional. If present, it shall contain the following:

- a) all characteristics relevant to the aspects of the products, processes or services covered by the document, either explicitly or by reference;
- b) the required limiting values of quantifiable characteristics;
- c) for each requirement, either a reference to the test method for determining or verifying the values of the characteristic, or the test method itself (see 6.3.5).

A clear distinction shall be made between requirements, statements and recommendations.

Contractual requirements (concerning claims, guarantees, covering of expenses, etc.) and legal or statutory requirements shall not be included.

In some product standards, it may be necessary to specify that the product shall be accompanied by warning notices or by instructions to the installer or user, and to specify their nature. On the other hand, requirements concerning installation or use as such shall be included in a separate part or a separate document, since they are not requirements applicable to the product itself.

Documents listing characteristics for which suppliers or purchasers are required to state values or other data not specified by the document itself shall specify how such values are to be measured and stated.

The policy to be adopted for accommodating more than one product size is given in A.6.

### 6.3.4 Sampling

This optional element specifies the conditions and methods of sampling, as well as the method for the preservation of the samples. This element may appear at the beginning of element 6.3.5.

### 6.3.5 Test methods

#### 6.3.5.1 General

This optional element gives all the provisions concerning the procedure for determining the values of characteristics or checking conformity to stated requirements, and for ensuring the reproducibility of the results. If appropriate, tests shall be identified to indicate whether they are type tests, routine tests, sampling tests and so on. In addition, the document shall specify the sequence of testing if the sequence can influence the results.

Test methods may be subdivided in the following order (where appropriate):

- a) principle;
- b) reagents and/or materials (see 6.3.5.2);
- c) apparatus (see 6.3.5.3);
- d) preparation and preservation of test samples and test pieces;
- e) procedure;

- f) expression of results, including method of calculation and precision of the test method, and, in ISO, the measurement uncertainty;
- g) test report.

Test methods may be presented as separate clauses, or be incorporated in the requirements (see 6.3.3), or be presented as annexes (see 6.3.8) or as separate parts (see 5.2.1). A test method shall be prepared as a separate document if it is likely to be referred to in a number of other documents.

Requirements, sampling and test methods are interrelated elements of product standardization and shall be considered together even though the different elements may appear in separate clauses in a document, or in separate documents.

When drafting test methods, account shall be taken of documents for general test methods and of related tests for similar characteristics in other documents. Non-destructive test methods shall be chosen whenever they can replace, within the same level of confidence, destructive test methods.

For the drafting of methods of chemical analysis, see [ISO 78-2](#). Much of [ISO 78-2](#) is also applicable to test methods for products other than chemical products.

Documents specifying test methods involving the use of hazardous products, apparatus or processes shall include a general warning and appropriate specific warnings. For recommended wording, see [ISO/IEC Guide 51](#) (see B.15).

A document which specifies test methods shall not imply any obligation to carry out any kind of test. It shall merely state the method by which the assessment, if required and referred to (for example in the same or another document, in a regulation, or in contracts), is to be carried out.

If a statistical method for the assessment of the conformity of a product, process or service is specified in the document, any statements of compliance with the document only relate to the conformity of the population or the lot.

If it is specified in the document that every single item is to be tested in accordance with the document, any statements concerning the conformity of the product to the document mean that every single item has been tested and that each has fulfilled the corresponding requirements.

If test methods which differ from that most acceptable for general application are in use, this shall not be a reason for not specifying the most acceptable in a document.

#### **6.3.5.2 Reagents and/or materials**

This is an optional element giving a list of the reagents and/or materials used in the document.

The content of a reagents and/or materials clause will usually comprise an optional introductory text together with a list detailing one or more reagents and/or materials.

The introductory text shall be used only to specify general provisions to which cross-reference is not made. Any item to which it is necessary to cross-refer shall not be included in this text but shall be listed as a distinct entry as described below.

Note that the introductory text explaining the general provisions is not a hanging paragraph as described in 5.2.4 since the list detailing the reagents and/or materials is not a series of subclauses but a list. It would be unreasonable to expect every document to include at least

two reagents and/or materials whereas it is not permissible to have a single subclause within a clause (see 5.2.3).

Each reagent and/or material entry shall be numbered for purposes of cross-referencing, even if there is only one.

The following example shows the presentation style used (for further examples of drafting, see [ISO 78-2:1999](#), A.10.1). Note that the typographic presentation is different from that of clauses and subclauses: the title of a clause or subclause shall appear on the same line as the clause or subclause number, but “on a line separate from the text that follows it”; a reagent and/or material in a reagents and/or materials list is followed optionally by a description of the reagent and/or material, which appears on the same line, with any further description being given in a separate paragraph.

EXAMPLE

### **3 Reagents**

Use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

**3.1 Cleaning medium**, for example methanol or water containing a few drops of liquid detergent.

### **6.3.5.3 Apparatus**

This is an optional element giving a list of the apparatus used in the document. The rules for the structure, numbering and presentation of the “Apparatus” clause are identical to those for the “Reagents and/or materials” clause (see 6.3.5.2). Wherever possible, equipment produced by a single manufacturer should not be specified. Where such equipment is not readily available, this clause shall include such specifications for the equipment as to ensure that comparable testing can be conducted by all parties. See also 6.6.3 regarding the use of trade names.

### **6.3.5.4 Alternative test methods**

If more than one adequate test method exists for a characteristic, only one shall in principle be the subject of a document. If, for any reason, more than one test method is to be standardized, the referee (often called “reference”) method shall be identified in the document to resolve doubts or dispute.

### **6.3.5.5 Choice of test methods according to accuracy**

**6.3.5.5.1** The accuracy of the chosen test method shall be such as to allow unambiguous determination of whether the value of the characteristic to be assessed lies within the specified tolerance.

**6.3.5.5.2** When it is considered technically necessary, each test method shall incorporate a statement as to its limit of accuracy.

### **6.3.5.6 Avoidance of duplication and unnecessary deviations**

Avoidance of duplication is a general principle in the methodology of standardization but the greatest danger of duplication appears in the field of test methods because a test method is often applicable to more than one product, or type of product, with little or no difference. Before standardizing any test method, it shall therefore be determined whether an applicable test method already exists.

If a test method is, or is likely to be, applicable to two or more types of product, a document shall be prepared on the method itself, and each document dealing with a given product shall refer to it (indicating any modifications that may be necessary). This will help to prevent unnecessary deviations.

If, in preparing a document related to a product, it is necessary to standardize some kind of testing equipment that is likely to be used for testing other products also, it shall be dealt with in a separate document, prepared in consultation with the committee dealing with such equipment.

### 6.3.6 Classification, designation and coding

This optional element may establish a system of classification, designation (see Annex G) and/or coding of products, processes or services that conform to stated requirements. For convenience, this element may be combined with element 6.3.3. It is left to the relevant committee to decide whether requirements concerning designation are to be included in a given document. If they are included, the requirements shall conform to Annex G. This element may be supplemented by an informative annex, giving an example of ordering information.

### 6.3.7 Marking, labelling and packaging

#### 6.3.7.1 General

Marking, labelling and packaging are complementary aspects that shall be included wherever relevant, particularly for product standards concerning consumer goods.

If necessary, the means of marking shall also be specified or recommended.

This element shall not deal with marks of conformity. Such marks are ordinarily to be applied under the rules of a certification system — see [ISO/IEC Guide 23](#). The marking of products with reference to a standards body or its documents is discussed in [ISO/IEC 17050-1](#) and [ISO/IEC 17050-2](#).

Provisions concerning safety standards and aspects related to safety are given in [ISO/IEC Guide 51](#).

This element may be supplemented by an informative annex giving an example of ordering information.

#### 6.3.7.2 Requirements concerning marking, labelling and packaging of products

Documents containing a reference to the marking of the product shall specify, where applicable, the following:

- the content of any marking that is used to identify the product including, where applicable, the manufacturer (name and address) or responsible vendor (trade name, trade mark or identification mark), or the marking of a product itself [e.g. manufacturer's or vendor's trade mark, model or type number, designation (see Annex G)], or the identification of different sizes, categories, types and grades;
- the means of presentation of such marking, for example by the use of plates (sometimes called "name-plates"), labels, stamps, colours, threads (in cables), as appropriate;
- the location on the product, or in some cases on the packaging, where such marking is to appear;
- requirements for the labelling and/or packaging of the product (e.g. handling instructions, hazard warnings, date of manufacture);
- other information as may be required.

If the application of a label is required by the document, the document shall also specify the nature of the labelling and how it is to be attached, affixed or applied to the product or its packaging.



Symbols specified for marking shall conform to relevant documents published by ISO and IEC. Documents relating to packaging are found under the ICS classification [55 in the ISO and IEC Catalogues](#).

### 6.3.7.3 Requirements concerning documentation accompanying the product

Documents may require that the product be accompanied by some kind of documentation (for example, test report, handling instructions, other information appearing in the product packaging). Rules for the classification and designation of such documentation for plants, systems and equipment are provided in [IEC 61355](#); rules for such documentation in administration, commerce and industry are found under the ICS classification [01.140.30](#). When relevant, the content of such documentation shall be specified.

### 6.3.8 Normative annexes

Normative annexes give provisions additional to those in the body of the document. Their presence is optional. An annex's normative status (as opposed to informative — see 6.4.1) shall be made clear by the way in which it is referred to in the text, by an indication in the table of contents and under the heading of the annex.

## 6.4 Supplementary informative elements

### 6.4.1 Informative annexes

**6.4.1.1** Informative annexes give additional information intended to assist the understanding or use of the document. They shall not contain requirements, except as described in 6.4.1.2. Their presence is optional. An annex's informative status (as opposed to normative — see 6.3.8) shall be made clear by the way in which it is referred to in the text, by an indication in the table of contents and under the heading of the annex.

**6.4.1.2** Informative annexes may contain optional requirements. For example, a test method that is optional may contain requirements but there is no need to comply with these requirements to claim compliance with the document.

### 6.4.2 Bibliography

For references to ISO and IEC documents, the presentation rules specified in 6.2.2 shall be followed. For other referenced documents, the relevant rules set out in [ISO 690](#) shall be followed.

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters as given in the source (see [ISO 690-2](#)).

EXAMPLE Available at <[http://www.abc.def/directory/filename\\_new.htm](http://www.abc.def/directory/filename_new.htm)>.

### 6.4.3 Indexes

Authors of non-terminology standards wanting to introduce indexes are invited to contact the ISO Central Secretariat or the IEC Central Office to discuss the best means of achieving their automated generation.

## 6.5 Other informative elements

### 6.5.1 Notes and examples integrated in the text

Notes and examples integrated in the text of a document shall only be used for giving additional information intended to assist the understanding or use of the document. These

elements shall not contain requirements or any information considered indispensable for the use of the document.

**EXAMPLE** The following note is incorrectly drafted as a note since it contains a requirement (highlighted in italics and explained in parentheses after the example) and clearly does not constitute “additional information”.

**NOTE** Alternatively, *test* at a load of ... (an instruction, expressed here using the imperative, is a requirement; see 3.12.1).

Notes and examples should preferably be placed at the end of the clause or subclause, or after the paragraph, to which they refer.

A single note in a clause or subclause shall be preceded by “NOTE”, placed at the beginning of the first line of the text of the note. When several notes occur within the same clause or subclause, they shall be designated “NOTE 1”, “NOTE 2”, “NOTE 3”, etc.

A single example in a clause or subclause shall be preceded by “EXAMPLE”, placed at the beginning of the first line of the text of the example. When several examples occur within the same clause or subclause, they shall be designated “EXAMPLE 1”, “EXAMPLE 2”, “EXAMPLE 3”, etc.

In drafts, all lines of a note or example shall be inset from the margin or shall be set in smaller type, so that its extent can be determined.

### 6.5.2 Footnotes to the text

Footnotes to the text give additional information; their use shall be kept to a minimum. A footnote shall not contain requirements or any information considered indispensable for the use of the document.

Footnotes to figures and tables follow different rules (see 6.6.5.10 and 6.6.6.7).

Footnotes to the text shall be placed at the foot of the relevant page and be separated from the text by a short thin horizontal line on the left of the page.

Footnotes to the text shall normally be distinguished by Arabic numerals, beginning with 1, followed by one parenthesis and forming a continuous numerical sequence throughout the document: 1), 2), 3), etc. The footnotes shall be referred to in the text by inserting the same numerals, as superscripts, after the word or sentence in question: <sup>1) 2) 3)</sup> etc.

In certain cases, for example in order to avoid confusion with superscript numbers, one or more asterisks or other appropriate symbols may be used instead: \*, \*\*, \*\*\*, etc.; †, ‡, etc.

## 6.6 Common rules and elements

### 6.6.1 Verbal forms for the expression of provisions

**6.6.1.1** A document does not in itself impose any obligation upon anyone to follow it. However, such an obligation may be imposed, for example, by legislation or by a contract. In order to be able to claim compliance with a document, the user needs to be able to identify the requirements he/she is obliged to satisfy. The user also needs to be able to distinguish these requirements from other provisions where there is a certain freedom of choice.

**6.6.1.2** Clear rules for the use of verbal forms (including modal auxiliaries) are therefore essential.

**6.6.1.3** Annex H gives, in the first column of each table, the verbal form that shall be used to express each kind of provision. The equivalent expressions given in the second column shall be used only in exceptional cases when the form given in the first column cannot be used for linguistic reasons.

### 6.6.2 Spelling and abbreviation of names of organizations, style, reference works and abbreviated terms

The spelling of the names of organizations, and their abbreviations, shall be as used by those organizations, in English, French or Russian.

To facilitate understanding by all readers, the style shall be as simple and concise as possible. This is particularly important for those readers whose mother tongue is not one of the official languages of ISO and IEC.

The following reference works for language are suggested:

- for English, *The Shorter Oxford English Dictionary*, *The Concise Oxford Dictionary*, *The Collins Concise English Dictionary*, *Webster's New World College Dictionary* or *Chambers Concise Dictionary*;
- for French, *Dictionnaire Robert*, *Dictionnaire Larousse* and *Dictionnaire des difficultés de la langue française* (V. Thomas, Larousse).

Abbreviated terms shall be used with care, and their use shall be limited to those cases where it is not likely to cause confusion.

If a list of abbreviated terms is not given in the document (see 6.3.2), then the first time that an abbreviated term is used, the full term shall be given with the abbreviated term following in parentheses.

An abbreviated term shall be specified only if used subsequently in the document.

The general rule is that an abbreviated term comprises capital letters, without a full-stop after each letter. Exceptionally, abbreviated terms consisting of the initial letters of words printed in lower case letters with a full-stop placed after each letter are used (for example, "a.c." for "alternating current"). However, technical specifications regarding marking may impose other requirements (for example, IEC 61293 specifies marking in the form "AC 230 V").

When a sentence begins with an abbreviated term, which, within the sentence, would consist of several lower case letters, all the letters of the abbreviated term shall be capital letters, for example "A.C."

### 6.6.3 Use of trade names

A correct designation or description of a product shall be given rather than a trade name (brand name).

Proprietary trade names (i.e. trade marks) for a particular product should as far as possible be avoided, even if they are in common use.

If, exceptionally, trade names cannot be avoided, their nature shall be indicated, e.g. by the symbol ® for a registered trade mark (see Example 1).

EXAMPLE 1 Instead of "Teflon®", write "polytetrafluoroethylene (PTFE)".

If it is known that only one product is currently available that is suitable for the successful application of the document, the trade name of the product may be given in the text of the document but shall be associated with a footnote as shown in Example 2.

EXAMPLE 2 "1) ... [trade name of product] ... is the trade name of a product supplied by ... [supplier] .... This information is given for the convenience of users of this document and does not constitute an endorsement by ... [ISO or IEC] ... of the product named. Equivalent products may be used if they can be shown to lead to the same results."

The wording shall be altered as a function of the document type concerned, i.e. International Standard, Technical Specification, Publicly Available Specification, Technical Report or Guide.

If it is considered essential to give an example (or examples) of commercially available products suitable for successful application of the document because the product characteristics are difficult to describe in detail, trade names may be given in a footnote as shown in Example 3.

EXAMPLE 3 “1) ... [trade name(s) of product(s)] ... is (are) an example(s) of a suitable product(s) available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ... [ISO or IEC] ... of this (these) product(s).”

The wording shall be altered as a function of the document type concerned, i.e. International Standard, Technical Specification, Publicly Available Specification, Technical Report or Guide.

#### **6.6.4 Patent rights**

For patented items, the rules given in Annex F shall be followed (see also the [ISO/IEC Directives, Part 1, 2004, 2.14](#)).

#### **6.6.5 Figures**

##### **6.6.5.1 Usage**

Figures should be used when they are the most efficient means of presenting information in an easily comprehensible form. It shall be possible to refer to each figure explicitly within the text.

##### **6.6.5.2 Form**

Figures shall be in the form of line drawings. Photographs may be used only if it is not possible to convert them into line drawings.

It is preferable to supply computer-generated artwork in accordance with the requirements for provision of graphics of the ISO Central Secretariat and IEC Central Office (available in the [ISO eServices Guide](#) and [IT Tools Guide — Guide on the use of information technology tools in the IEC](#)). Photocopies are not usable.

##### **6.6.5.3 Designation**

Figures shall be designated “Figure” and numbered with Arabic numerals, beginning with 1. This numbering shall be independent of the numbering of the clauses and of any tables. A single figure shall be designated “Figure 1”.

For the numbering of figures in annexes, see 5.2.6. For the numbering of subfigures, see 6.6.5.11.

##### **6.6.5.4 Layout of figure designation and title**

The figure designation and title (if present) shall be centred horizontally below the figure and laid out as in the following example:

**Figure # — Details of apparatus**

The figure designation and title shall be separated by a dash.

### 6.6.5.5 Choice of letter symbols, style of lettering, and labelling

Letter symbols used in figures to represent general cases of angular or linear quantities shall be in accordance with [ISO 31-1](#), subscripts being used where necessary to distinguish between different applications of a given symbol.

For a series of symbols indicating various lengths on a drawing use  $l_1$ ,  $l_2$ ,  $l_3$ , etc. and not, for instance,  $A$ ,  $B$ ,  $C$ , etc. or  $a$ ,  $b$ ,  $c$ , etc.

Lettering on drawings shall be in accordance with [ISO 3098-2](#). Inclined (italic) letters shall be used for

- symbols for quantities,
- subscripts representing symbols for quantities, and
- symbols representing numbers.

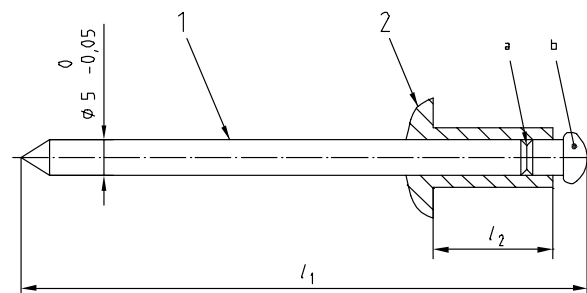
The vertical (upright) style shall be used for all other lettering.

In artwork, textual descriptions shall be replaced by item references (see [ISO 6433](#)) the meaning of which are explained in a key, or figure footnote (see 6.6.5.10) depending on their content. In graphs, labelling on the axes shall not be replaced by item references to avoid any possible confusion between the number representing an item reference and a number representing a value on the axis. Labelling of curves, lines, etc. on the graph shall be replaced by item references, however many curves, lines, etc. there are. In ISO, see the [ITSIG specification for the preparation and exchange of graphics](#) for further information.

When all units for a quantity are the same, a suitable statement (for example, "Dimensions in millimetres") shall be placed above the right-hand corner of the figure.

EXAMPLE

Dimensions in millimetres



$l_1$	$l_2$
50	10,5
70	15
90	19

#### Key

- 1 mandrel shank
- 2 blind rivet head

The mandrel shall be designed such that the blind rivet end deforms during installation, and the shank may expand.

NOTE This figure illustrates a type A rivet head.

<sup>a</sup> The break area shall be milled.

<sup>b</sup> The mandrel head is commonly chromium plated.

Figure # — Blind rivet

### 6.6.5.6 Mechanical engineering drawings and graphical symbols

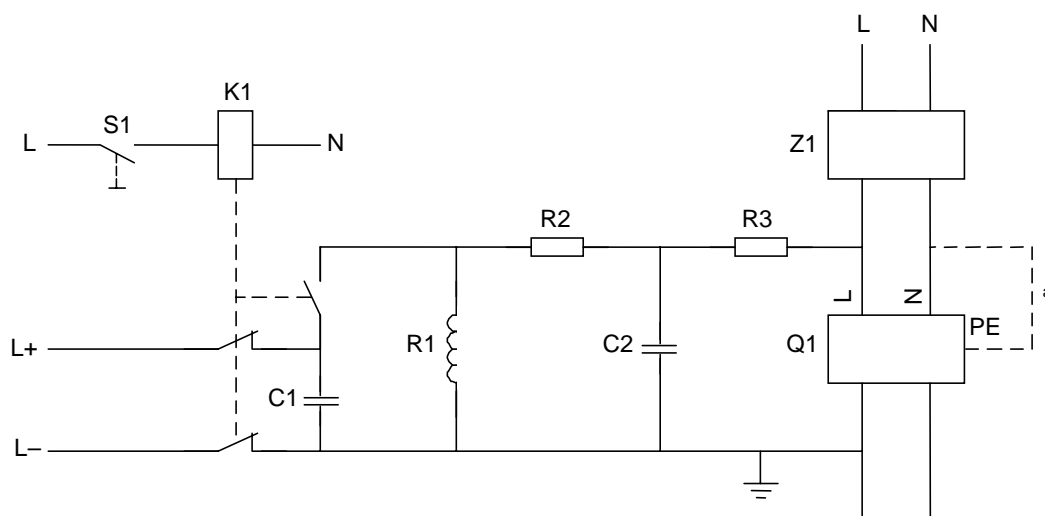
Mechanical engineering drawings shall be prepared in accordance with relevant ISO standards (see B.8). In ISO, the additional rules specified in the *ITSIG specification for the preparation and exchange of graphics* shall be followed.

Graphical symbols for use on equipment shall be in accordance with IEC 60417 and ISO 7000.

### 6.6.5.7 Diagrams

Diagrams, such as circuit diagrams and connection diagrams, for example for test circuits, shall be prepared in accordance with IEC 61082. Graphical symbols used in schematic diagrams shall be in accordance with IEC 60617 and ISO 14617. Reference designations and signal designations shall be in accordance with IEC 61346 and IEC 61175 respectively. In IEC, the additional rules specified in the ISO/IEC Directives, IEC Supplement, 2004, Annex K, shall be followed.

EXAMPLE



#### Components

C1	capacitor $C = 0,5 \mu\text{F}$
C2	capacitor $C = 0,5 \text{ nF}$
K1	relay
Q1	RCCB under test (with terminals L, N and PE)
R1	inductor $L = 0,5 \mu\text{H}$
R2	resistor $R = 2,5 \Omega$
R3	resistor $R = 25 \Omega$
S1	manual control switch
Z1	filter

#### Connections and supplies

L, N	supply voltage with neutral
L+, L-	d.c. supply voltage for the test circuit

<sup>a</sup> Connection to be made if the tested object has a terminal for PE.

**Figure # — Example of test circuit for the verification of resistance to unwanted tripping**

### 6.6.5.8 Continuation of figures

When a figure is continued over several pages, it may be useful to repeat the figure designation, followed by the title (optional) and by “(continued)”, as in the following example:

**Figure # (continued)**

Any statements concerning units shall be repeated on all pages after the first, where applicable.

### 6.6.5.9 Notes to figures

Notes to figures shall be treated independently from notes integrated in the text (see 6.5.1). They shall be located above the designation of the relevant figure and shall precede figure footnotes. A single note in a figure shall be preceded by "NOTE", placed at the beginning of the first line of the text of the note. When several notes occur in the same figure, they shall be designated "NOTE 1", "NOTE 2", "NOTE 3", etc. A separate numbering sequence shall be used for each figure. See the Example in 6.6.5.5.

Notes to figures shall not contain requirements or any information considered indispensable for the use of the document. Any requirements relating to the content of a figure shall be given in the text, in a footnote to the figure or as a paragraph between the figure and its title. It is not necessary that notes to figures be referred to.

### 6.6.5.10 Footnotes to figures

Footnotes to figures shall be treated independently from footnotes to the text (see 6.5.2). They shall be located immediately above the designation of the relevant figure.

Footnotes to figures shall be distinguished by superscript lower case letters, beginning with "a". The footnotes shall be referred to in the figure by inserting the same superscript lower case letter. See the Example in 6.6.5.5.

Footnotes to figures may contain requirements. As a consequence, it is particularly important when drafting the text of the figure footnote to distinguish clearly between different types of provision by using the appropriate verbal forms (see Annex H).

### 6.6.5.11 Subfigures

#### 6.6.5.11.1 Usage

In general, the use of subfigures should be avoided whenever possible since it complicates document layout and management.

Subfigures shall only be used when it is essential for comprehension of the subject matter.

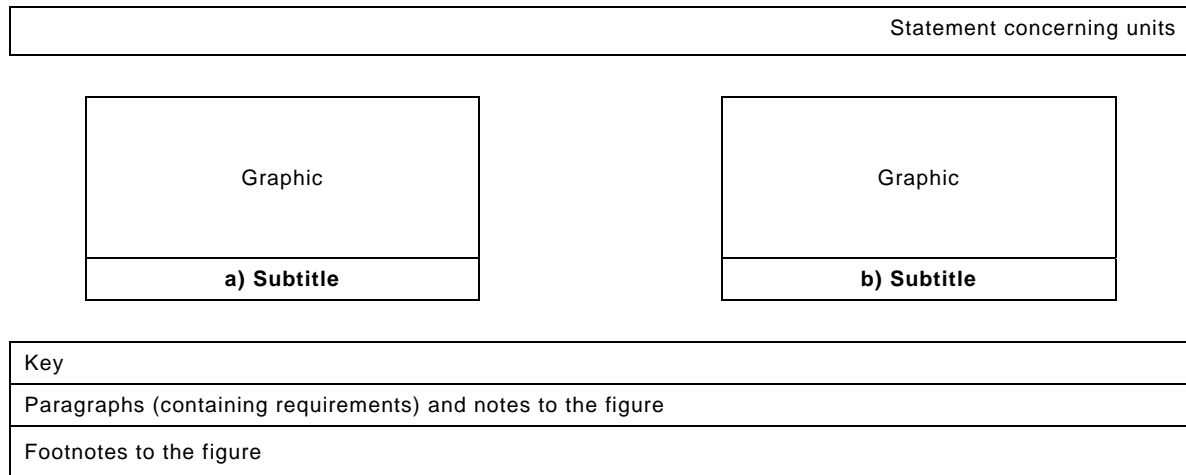
Different views, details and sections of a component or multicomponent object shall not be presented as subfigures but in conformity with [ISO 128-30](#), [ISO 128-34](#), [ISO 128-40](#) and [ISO 128-44](#).

#### 6.6.5.11.2 Designation and layout

Only one level of subdivision of a figure is permitted. Subfigures shall be identified by a lower case letter [e.g. Figure 1 may comprise subfigures a), b), c), etc.]. Other forms of identification of the subfigures such as 1.1, 1.2, ..., 1-1, 1-2, ..., etc. shall not be used.

The following example illustrates the layout of elements in a subdivided figure; it does not illustrate the typographic presentation. Frames are employed in the example only to illustrate the logical grouping of elements; frames shall not be used around figures or their constituent elements.

EXAMPLE



**Figure # — Title**

Where each of the subfigures contains a key, notes and footnotes (this case is not illustrated in the Example), an independent numbering sequence shall be applied per subfigure.

### 6.6.6 Tables

#### 6.6.6.1 Usage

Tables should be used when they are the most efficient means of presenting information in an easily comprehensible form. It shall be possible to refer to each table explicitly within the text.

A table within a table is not permitted. Subdivision of a table into subsidiary tables is not permitted.

#### 6.6.6.2 Designation

Tables shall be designated "Table" and numbered with Arabic numerals, beginning with 1. This numbering shall be independent of the numbering of the clauses and of any figures. A single table shall be designated "Table 1".

For the numbering of tables in annexes, see 5.2.6.

#### 6.6.6.3 Layout of table designation and title

The table designation and title (if present) shall be centred horizontally above the table and laid out as in the following example:

**Table # — Mechanical properties**

The table designation and title shall be separated by a dash.

#### 6.6.6.4 Headings

The first word in the heading of each column or row shall begin with a capital letter. The units used in a given column shall generally be indicated under the column heading. (See also 6.6.10.1.2.)



## EXAMPLE 1

Type	Linear density kg/m	Inside diameter mm	Outside diameter mm

As an exception to this rule, when all units are the same, a suitable statement (for example, "Dimensions in millimetres") shall instead be placed above the right-hand corner of the table.

## EXAMPLE 2

Dimensions in millimetres			
Type	Length	Inside diameter	Outside diameter

The presentation shown in Example 3 is not permitted and shall be altered as shown in Example 4.

## EXAMPLE 3

Type	A	B	C
Dimension			

## EXAMPLE 4

Dimension	Type		
	A	B	C

## 6.6.6.5 Continuation of tables

When a table is continued over several pages, it may be useful to repeat the table designation, followed by the title (optional) and by "(continued)", as in the following example:

**Table # (continued)**

The column headings together with any statement concerning units shall be repeated on all pages after the first.

## 6.6.6.6 Notes to tables

Notes to tables shall be treated independently from notes integrated in the text (see 6.5.1). They shall be located within the frame of the relevant table and shall precede table footnotes (see the following Example). A single note in a table shall be preceded by "NOTE", placed at the beginning of the first line of the text of the note. When several notes occur in the same table, they shall be designated "NOTE 1", "NOTE 2", "NOTE 3", etc. A separate numbering sequence shall be used for each table.

Notes to tables shall not contain requirements or any information considered indispensable for the use of the document. Any requirements relating to the content of a table shall be given in the text, in a footnote to the table or as a paragraph within the table. It is not necessary that notes to tables are referred to.

## EXAMPLE

Dimensions in millimetres

Type	Length	Inside diameter	Outside diameter
	$l_1^a$	$d_1$	
	$l_2$	$d_2^{b\ c}$	
A paragraph containing a requirement.			
NOTE 1 Table note.			
NOTE 2 Table note.			
<sup>a</sup> Table footnote. <sup>b</sup> Table footnote. <sup>c</sup> Table footnote.			

**6.6.6.7 Footnotes to tables**

Footnotes to tables shall be treated independently from footnotes to the text (see 6.5.2). They shall be located within the frame of the relevant table, and shall appear at the foot of the table (see the Example in 6.6.6.6).

Footnotes to tables shall be distinguished by superscript lower case letters, beginning with “a”. The footnotes shall be referred to in the table by inserting the same superscript lower case letter.

Footnotes to tables may contain requirements. As a consequence, it is particularly important when drafting the text of the table footnote to distinguish clearly between different types of provision by using the appropriate verbal forms (see Annex H).

**6.6.7 References****6.6.7.1 General**

As a general rule, references to particular pieces of text shall be used instead of repetition of the original source material, since such repetition involves the risk of error or inconsistency and increases the length of the document. However, if it is considered necessary to repeat such material, its source shall be identified precisely.

References shall be made in the forms indicated in 6.6.7.2 to 6.6.7.5 and shall not be made to page numbers.

**6.6.7.2 References to the document as a whole in its own text**

For an individual document the form “this International Standard” shall be used, except in the introductory texts for the “Normative references” (see 6.2.2) and the “Terms and definitions” (see 6.3.1) clauses, and in any patent notice (see F.3).

The wording shall be altered as a function of the document type concerned, i.e. International Standard, Technical Specification, Publicly Available Specification, Technical Report or Guide.

For a document published in separate parts, the following forms shall be used:

- “this part of ISO/IEC 2382” (reference to a part only);
- “IEC 60335” (reference to a whole series of parts).

Such references are understood to include all amendments and revisions to the document, since they are undated (see 6.6.7.5.2).

### 6.6.7.3 References to elements of text

6.6.7.3.1 Use, for example, the following forms:

- “in accordance with Clause 3”;
- “according to 3.1”;
- “as specified in 3.1 b)”;
- “details as given in 3.1.1”;
- “see Annex B”;
- “the requirements given in B.2”;
- “see the Note in Table 2”;
- “see 6.6.3, Example 2”;
- “see 3.1, Equation (3)”.

It is unnecessary to use the term “subclause”.

6.6.7.3.2 If there is a need to refer to an unordered list item in another document, the following formulation shall be used:

“as specified in ISO/IEC 15888:1996, 3.1, second list item”.

### 6.6.7.4 References to figures and tables

Every figure and table included in the document shall normally be referred to in the text.

Use, for example, the following forms:

- “shown in Figure A.6”;
- “(see Figure 3)”;
- “given in Table 2”;
- “(see Table B.2)”.

### 6.6.7.5 References to other documents

#### 6.6.7.5.1 General

References to other documents may be undated or dated. All normative references, undated and dated, shall be given in the “Normative references” clause (see 6.2.2).

#### 6.6.7.5.2 Undated references

Undated references may be made only to a complete document or a part thereof and only in the following cases:

- a) if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
- b) for informative references.

Undated references shall be understood to include all amendments to and revisions of the referenced document.

Use the following forms:

- “ ... as specified in ISO 128-20 and ISO 31 ... ”;
- “ ... see IEC 60027 ... ”.

### 6.6.7.5.3 Dated references

Dated references are references to

- a) a specific edition, indicated by the year of publication, or
- b) a specific enquiry or final draft, indicated by a dash.

Subsequent amendments to, or revisions of, dated references will need to be incorporated by amendment of the document referring to them.

NOTE In this context a part is regarded as a separate document.

References to specific divisions or subdivisions, tables and figures of another document shall always be dated.

Use the following forms:

- “ ... carry out the tests given in IEC 60068-1:1988 ... ” (dated reference to a published document);
- “ ... in accordance with ISO 1234:—, Clause 3, ... ” (dated reference to an enquiry or final draft);
- “ ... as specified in IEC 64321-4:1996, Table 1, ... ” (dated reference to a specific table in another published document).

See also 6.6.7.3.2.

## 6.6.8 Representation of numbers and numerical values

**6.6.8.1** The decimal sign shall be a comma on the line in all language versions.

**6.6.8.2** If a value less than 1 is written in decimal form, the decimal sign shall be preceded by a zero.

EXAMPLE 0,001

**6.6.8.3** Each group of three digits reading to the left or to the right of a decimal sign shall be separated by a space from preceding digits or following digits respectively, except for four-digit numbers designating years.

EXAMPLE 23 456 2 345 2,345 2,345 6 2,345 67 but the year 1997

**6.6.8.4** For clarity, the symbol  $\times$  rather than a point shall be used to indicate multiplication of numbers and numerical values.

EXAMPLE Write  $1,8 \times 10^{-3}$  (not  $1,8 \cdot 10^{-3}$  or  $1,8 \cdot 10^{-3}$ )

**6.6.8.5** To express values of physical quantities, Arabic numerals followed by the international symbol for the unit (see [ISO 31](#), [ISO 1000](#) and [IEC 60027](#)) shall be used.

## 6.6.9 Quantities, units, symbols and signs

The International System of units (SI) as set out in [ISO 31](#) shall be used. Symbols for quantities shall be chosen, wherever possible, from the various parts of [ISO 31](#) and [IEC 60027](#). For further guidance on application, see [ISO 1000](#).

The units in which any values are expressed shall be indicated.

The unit symbols for degree, minute and second (for plane angle) shall follow immediately the numerical value; all other unit symbols shall be preceded by a space. (See Annex I.)

Mathematical signs and symbols shall be in accordance with [ISO 31-11](#).

A list concerning quantities and units to be used is given for information in Annex I.

## 6.6.10 Mathematical formulae

### 6.6.10.1 Types of equation

**6.6.10.1.1** Equations between quantities are preferred to equations between numerical values. Equations shall be expressed in mathematically correct form, the variables being represented by letter symbols the meanings of which are explained in connection with the equations, unless they appear in a “Symbols and abbreviated terms” clause (see 6.3.2).

The style shown in Example 1 shall be followed.

EXAMPLE 1

$$v = \frac{l}{t}$$

where

- $v$  is the speed of a point in uniform motion;
- $l$  is the distance travelled;
- $t$  is the duration.

If, exceptionally, an equation between numerical values is used, the style shown in Example 2 shall be followed.

EXAMPLE 2

$$v = 3,6 \times \frac{l}{t}$$

where

- $v$  is the numerical value of the speed, expressed in kilometres per hour (km/h), of a point in uniform motion;
- $l$  is the numerical value of the distance travelled, expressed in metres (m);
- $t$  is the numerical value of the duration, expressed in seconds (s).

However, the same symbol shall never be used within a document both for a quantity and for its corresponding numerical value. For example, use of the equation in Example 1 and of the equation in Example 2 in the same context would imply that  $1 = 3,6$  which obviously is not true.

Descriptive terms or names of quantities shall not be arranged in the form of an equation. Names of quantities or multiletter abbreviated terms, for example presented in italics or with subscripts, shall not be used in the place of symbols.

EXAMPLE 3 Write

$$\rho = \frac{m}{V}$$

and not

$$\textit{density} = \frac{\textit{mass}}{\textit{volume}}$$

EXAMPLE 4 Write

$$\dim(E) = \dim(F) \times \dim(l)$$

where

- $E$  is energy;
- $F$  is force;
- $l$  is length.

and not

$$\dim(\textit{energy}) = \dim(\textit{force}) \times \dim(\textit{length})$$

or

$$\dim(\text{energy}) = \dim(\text{force}) \times \dim(\text{length})$$

EXAMPLE 5 Write

$$t_i = \sqrt{\frac{S_{ME,i}}{S_{MR,i}}}$$

where

- $t_i$  is the statistical value for the system  $i$ ;
- $S_{ME,i}$  is the residual mean square for the system  $i$ ;
- $S_{MR,i}$  is the mean square due to regression for the system  $i$ .

and not

$$t_i = \sqrt{\frac{MSE_i}{MSR_i}}$$

where

- $t_i$  is the statistical value for the system  $i$ ;
- $MSE_i$  is the residual mean square for the system  $i$ ;
- $MSR_i$  is the mean square due to regression for the system  $i$ .

#### 6.6.10.1.2 Notations such as

$$\frac{v}{\text{km/h}}, \frac{l}{\text{m}} \quad \text{and} \quad \frac{t}{\text{s}} \quad \text{or} \quad v/(\text{km/h}), l/\text{m}, \text{ and } t/\text{s}$$

for numerical values may be used; they are particularly useful on the axes of graphs and in the headings of columns in tables.

#### 6.6.10.2 Presentation

Guidance on the presentation of formulae is given in the [ISO eServices Guide](#) and the IEC [IT Tools Guide — Guide on the use of information technology tools in the IEC](#). As far as possible, symbols having more than one level of subscript or superscript (see Example 1) shall be avoided, as shall any symbols and formulae that would involve printing more than two lines of type (see Example 3).

EXAMPLE 1  $D_{1, \max}$  is preferable to  $D_{1_{\max}}$ .

EXAMPLE 2 In the text,  $a/b$  is preferable to  $\frac{a}{b}$ .

EXAMPLE 3 In a displayed formula, use

$$\frac{\sin[(N+1)\varphi/2] \sin(N\varphi/2)}{\sin(\varphi/2)}$$

rather than

$$\frac{\sin\left[\frac{(N+1)}{2}\varphi\right] \sin\left(\frac{N}{2}\varphi\right)}{\sin\frac{\varphi}{2}}$$

Further examples of the presentation of mathematical formulae are given in Examples 4 to 6.

EXAMPLE 4

$$-\frac{\partial W}{\partial x} + \frac{d}{dt} \frac{\partial W}{\partial \dot{x}} = Q \left[ \left( -\mathbf{grad} V - \frac{\partial A}{\partial t} \right)_x + (\mathbf{v} \times \mathbf{rot} A)_x \right]$$

where

- $W$  is the dynamic potential;
- $x$  is the  $x$ -coordinate;
- $t$  is time;

- $\dot{x}$  is the time derivative of  $x$ ;
- $Q$  is the electric charge;
- $V$  is the electric potential;
- $A$  is the magnetic vector potential;
- $v$  is the velocity.

**EXAMPLE 5**

$$\frac{x(t_1)}{x(t_1 + T/2)} = \frac{e^{-\delta t_1} \cos(\omega t_1 + \alpha)}{e^{-\delta(t_1 + T/2)} \cos(\omega(t_1 + \alpha + \pi))} = -e^{\delta T/2} \approx -1,392\ 15$$

where

- $x$  is the  $x$ -coordinate;
- $t_1$  is the time at the first turning point;
- $T$  is the period;
- $\omega$  is the angular frequency;
- $\alpha$  is the initial phase;
- $\delta$  is the damping coefficient;
- $\pi$  is the number 3,141 592 6... .

**EXAMPLE 6** To express a mass fraction the following method of expression is sufficient:

$$w = \frac{m_D}{m_S}$$

However, the following equation is also acceptable:

$$w = \frac{m_D}{m_S} \times 100 \%$$

but note that expressions such as “the percentage by mass” should be avoided.

**6.6.10.3 Numbering**

If it is necessary to number some or all of the formulae in a document in order to facilitate cross-reference, Arabic numbers in parentheses shall be used, beginning with 1:

$$x^2 + y^2 < z^2 \tag{1}$$

The numbering shall be continuous and independent of the numbering of clauses, tables and figures. Subdivision of formulae [e.g. (2a), (2b), etc.] is not permitted.

For the numbering of formulae in annexes, see 5.2.6.

**6.6.11 Values, dimensions and tolerances**

Values and dimensions shall be indicated as being minimum or maximum, and specified with their tolerances in an unambiguous manner.

**EXAMPLE 1** 80 mm × 25 mm × 50 mm (not 80 × 25 × 50 mm)

**EXAMPLE 2** 80 μF ± 2 μF or (80 ± 2) μF

**EXAMPLE 3** 80  $\begin{smallmatrix} +2 \\ 0 \end{smallmatrix}$  (not 80  $\begin{smallmatrix} +2 \\ -0 \end{smallmatrix}$ )

**EXAMPLE 4** 80 mm  $\begin{smallmatrix} +50 \\ -25 \end{smallmatrix}$  μm

**EXAMPLE 5** 10 kPa to 12 kPa (not 10 to 12 kPa or 10 – 12 kPa)

**EXAMPLE 6** 0 °C to 10 °C (not 0 to 10 °C or 0 – 10 °C)

In order to avoid misunderstanding, tolerances on values expressed in percent shall be expressed in a mathematically correct form.

**EXAMPLE 7** Write “from 63 % to 67 %” to express a range.

EXAMPLE 8 Write “(65 ± 2) %” to express a centre value with tolerance.

The form “65 ± 2 %” shall not be used.

The degree should be divided decimally, for example write 17,25° rather than 17°15′.

See also Annex I.

Any value or dimension that is mentioned for information only shall be clearly distinguishable from requirements.

## 6.7 Aspects of conformity assessment

Product standards, process standards and service standards shall be so written that conformity can be assessed by a manufacturer or supplier (first party), a user or purchaser (second party), or an independent body (third party).

These documents shall not include elements related to conformity assessment aspects other than testing provisions for the products, processes or services specified.

Committees shall not develop documents providing general requirements for conformity assessment schemes or systems. Development of such documents is the responsibility of the ISO policy committee *Committee on conformity assessment* (ISO/CASCO) in liaison with the IEC *Conformity Assessment Board* (IEC/CAB).

Committees wishing to propose the establishment of a conformity assessment scheme or system, or wishing to prepare documents specifying sector-specific operating procedures for use by conformity assessment bodies and others for conformity assessment purposes, shall consult with the secretariat of ISO/CASCO or IEC/CAB as appropriate, to ensure that the documents developed are in line with conformity assessment policies and rules approved by ISO/CASCO and IEC/CAB as relevant.

When a committee develops a document relating to conformity assessment systems or schemes or any other document addressing conformity assessment aspects, the document shall directly refer to all the relevant published ISO/IEC documents for conformity assessment procedures including [ISO/IEC 17000](#). It shall not delete, change or interpret the general requirements for conformity assessment procedures and vocabulary in those documents. Such documents shall be referred to the ISO/CASCO or IEC/CAB secretaries, as appropriate, for advice on correctly referencing the ISO/IEC conformity assessment documents. Any request for addition, deletion, changes or interpretation shall be submitted to the secretariat of ISO/CASCO and IEC/CAB for decision. For particular requirements in IEC, see [ISO/IEC Directives, IEC Supplement, Clause 7](#).

## 6.8 Aspects of quality management systems, reliability and sampling

### 6.8.1 General

General aspects are dealt with by [ISO/TC 69](#), [ISO/TC 176](#) and [IEC/TC 56](#). Documents developed by those technical committees shall be consulted for guidance.

Guidance on the preparation of documents for electronic components is given in [IEC Guide 102](#).

No product standard shall make product conformity dependent on a quality management systems standard, i.e. it shall not, for example, make normative reference to ISO 9001.



## 6.8.2 Sector policy

When an ISO or IEC committee wishes to develop quality management system requirements or guidance for a particular product or industry/economic sector it shall respect the following rules.

- a) Normative reference shall be made to [ISO 9001:2000](#) in its entirety or, subject to the “applicability” provisions detailed in the scope of [ISO 9001:2000](#), to its clauses or subclauses. Alternatively, subject to the “applicability” provisions detailed in the scope of [ISO 9001:2000](#), the clauses or subclauses may be reproduced verbatim.
- b) If text from [ISO 9001:2000](#) is reproduced in the sector document, it shall be distinguished from the other elements of the sector document [see d)].
- c) Terms and definitions specified in [ISO 9000:2000](#) shall be referred to in a normative manner or reproduced verbatim.
- d) The guidance and criteria provided in *Quality management systems — Guidance and criteria for the development of documents to meet needs of specific product and industry/economic sectors*, approved by ISO/TC 176, shall be considered not only when determining the need for a sector-specific requirements or guidance document but also in the document development process.

Any requests for guidance on this sector policy or for interpretation of [ISO 9000:2000](#) terms and definitions, [ISO 9001:2000](#) or [ISO 9004:2000](#) shall be submitted to the secretariat of ISO/TC 176.

## 7 Preparation and presentation of documents

The templates prepared by ISO and IEC shall be used for the preparation of documents. The templates and guidance on usage are available on the ISO web site:

<http://www.iso.org/sdis/templates>

and the IEC web site:

<http://www.iec.ch/tiss/templates.htm>.

## Annex A (informative) Principles for drafting

### A.1 General

Although the principles for drafting given in this Annex are expressed in terms of product documents, they also apply, where appropriate, to any other kind of document.

### A.2 The aim-oriented approach

**A.2.1** Any product has an infinite number of properties, and only some of them are subject to international standardization. The choice depends on the aims of the document to be prepared, the overriding aim being to ensure fitness for purpose of the product concerned.

Thus, a document or series of related documents may address, *inter alia*, questions of mutual understanding, health, safety, protection of the environment, interface, interchangeability, compatibility or interworking, and variety control.

A functional analysis of the product in question can help to identify the aspects to be included in the document.

In most documents, the aims of individual requirements are not usually indicated [although the purpose of a document and of some requirements can usefully be explained in the introduction (see 6.1.4)]. However, it is essential to identify these aims at the earliest possible working stage (not later than the first committee draft) to facilitate the taking of decisions regarding inclusion of the individual requirements.

In order to facilitate implementation by users, who may include not only manufacturers and purchasers but also certification bodies, testing laboratories and regulatory authorities who may wish to make reference to standards, the aspects of a product which will be of separate interest to the various parties shall be clearly distinguished, either in separate clauses of the document or, preferably, in separate documents or parts of a document. Such a distinction shall be made, for example, between

- health and safety requirements,
- performance requirements,
- maintenance and service requirements, and
- installation rules.

Products intended for various purposes or for use under various conditions (for example different climatic conditions), or by various groups of users, may require different values of some characteristics, each value corresponding to some category or level, intended for some particular purpose or conditions. These values may be included in one document or in different documents, as appropriate, but it is essential that the correlation between purposes and values is clearly indicated.

Different categories or levels in different regions or countries may also be included if justified by their importance for trade. Requirements concerning the fitness for purpose of a product are sometimes expressed in terms of the conditions which must be satisfied in order for a designation or marking to be applied to a product (for example “shock-resistant” in the case of a wristwatch).

**A.2.2** The promotion of mutual understanding usually necessitates the definition of terms used in the technical requirements, of symbols and signs, and the establishment of sampling methods and test methods, concerning each technical requirement specified in the document.

**A.2.3** If health, safety aspects, the protection of the environment or the economical use of resources are relevant to the product, appropriate requirements shall be included. Otherwise, they may, in some countries, be made additional mandatory requirements which, if not harmonized, would constitute technical barriers to trade.

These requirements may need to have certain characteristics with limiting values (maximum and/or minimum) or closely defined sizes and, in some cases, even constructional stipulations (for example, to achieve non-interchangeability for safety reasons). The levels at which these limits are fixed shall be such that the element of risk is reduced as much as practicable.

Documents may, when relevant, specify technical requirements for packaging and conditions of storage and transportation of the product, either to prevent hazards, contamination or pollution arising from inadequate packaging, or to protect the product.

Aspects such as requirements dealing with health and safety (see [ISO/IEC Guide 51](#) and [IEC Guide 104](#)) and requirements dealing with the environment (see [ISO Guide 64](#) and [IEC Guide 106](#)), which could form part of governmental regulations, or standards made mandatory, shall receive priority when preparing a standard. To facilitate the principle of reference to standards in governmental regulations (see [ISO/IEC Guide 15](#)) the relevant aspects shall be published in a separate standard or a separate part of a standard. When, however, such a separation is impracticable, such aspects shall be grouped together in one clause of the standard.

Environmental requirements are usually covered by governmental regulations rather than ISO or IEC documents, although there are exceptions particularly in the electrotechnical field.

However, the corresponding test methods shall, where appropriate, be standardized internationally. [ISO 14040](#), [ISO 14041](#), [ISO 14042](#) and [ISO 14043](#) provide procedures for the assessment of the environmental aspect of a product or process.

**A.2.4** Interface, interchangeability, compatibility and interworking requirements, if relevant, are subject to international standardization because they may constitute determining factors concerning the possible use of the product.

International standardization of a particular product may be limited to such aspects and disregard other aims. If the aim of international standardization is to ensure interchangeability, both the dimensional and functional aspects of the product shall be considered.

**A.2.5** Variety control is an important aim of international standardization of widely used materials, substances and elements such as fasteners, other machine parts, electronic components and electric cables (for such reasons as world trade, economy or safety, where the availability of interchangeable elements is essential and the standardization of a certain variety at the international level is justified).

Variety may relate to sizes as well as to other characteristics. The relevant document shall contain the selected values (usually a series) and specify their tolerances.

### **A.3 The performance approach**

If the performance approach (see 4.2) is adopted, care is necessary to ensure that important features are not inadvertently omitted from the performance requirements.

In the case of materials, if it is impossible to determine the necessary performance characteristics, the material may be specified but preferably with the inclusion of the phrase "... or other material which has been proved to be equally suitable".

Requirements concerning the manufacturing process shall usually be omitted in favour of tests to be made on the final product. There are, nevertheless, some fields in which reference to the manufacturing process is needed (e.g. hot rolling, extrusion) or even in which an inspection of the manufacturing process is necessary (e.g. pressure vessels).

However, the choice between specifying by description or by performance needs serious consideration because specification by performance may lead to complicated testing procedures of long duration and high cost.

#### **A.4 The principle of verifiability**

Whatever the aims of a product standard, only such requirements shall be included as can be verified.

Requirements in documents shall be expressed in well-defined values (see 6.6.11). Phrases such as “sufficiently strong” or “of adequate strength” shall not be used.

Another consequence of the principle of verifiability is that the stability, reliability or lifetime of a product shall not be specified if no test method is known by means of which compliance with this requirement can be verified in a reasonably short time. A guarantee by the manufacturer, although useful, is not a substitute for such requirements. Guarantee conditions are considered to be outside the aspects to be included, being a commercial or contractual, and not a technical, concept.

#### **A.5 Choice of values**

##### **A.5.1 Limiting values**

For some purposes, it is necessary to specify limiting values (maximum and/or minimum). Usually one limiting value is specified for each characteristic. In the case of several widely used categories or levels, several limiting values are required.

Limiting values of strictly local importance shall not be included in a document.

##### **A.5.2 Selected values**

For some purposes, values or series of values may be selected, particularly for variety control and some interface purposes. They may be selected according to the series of preferred numbers given in [ISO 3](#) (see also [ISO 17](#) and [ISO 497](#)), or according to some modular system or other determining factors, as appropriate. For the electrotechnical field, recommended systems of dimensional sizes are given in [IEC Guide 103](#).

Documents that have been established to specify such selected values for equipment or components that may be referred to in the provisions of other documents shall be regarded, in this respect, as basic standards. Examples are as follows: for electrotechnical work, [IEC 60063](#), which specifies series of preferred values for resistors and capacitors; for chemical testing, standards for laboratory glassware developed by [ISO/TC 48](#).

Values of strictly local importance shall not be included in a document. In seeking to standardize a rationalized series of values, examination shall be made as to whether any existing series would be acceptable for worldwide application.

If a series of preferred numbers is used, attention should be paid to the difficulties which may arise if fractions (such as 3,15) are introduced. They may sometimes be inconvenient or require unnecessarily high accuracy, in which case they should be rounded in accordance with [ISO 497](#). The introduction of different values for use in different countries (whereby both the precise value and the rounded value are contained in the document) should be avoided.

### **A.5.3 Values to be stated by the manufacturer**

There may be some properties of a product that should not necessarily be specified (even though they decisively influence the performance of the product), if any number of varieties may be allowed.

The document may enumerate all characteristics which can be chosen freely by the manufacturer but the values of which are to be stated by the manufacturer. This statement may take various forms (name-plate, label, accompanying document, etc.).

For most kinds of complex product, the listing of performance data (product information) to be supplied by the manufacturer is preferable to the inclusion of performance requirements provided that corresponding test methods are defined.

A requirement that the values of a characteristic be stated by the manufacturer instead of specifying the values themselves is not permissible in the case of health and safety requirements.

### **A.6 Accommodation of more than one product size**

If standardization on a single size is an ultimate goal for a given product, but there is more than one widely accepted size in worldwide use, a committee may, if substantial support has been obtained within the committee, decide to include alternative product sizes in a document. However, in such cases, every effort shall be made to reduce the number of alternatives to a minimum, taking the following points into account:

- a) the volume of international trade in the sort of product involved shall serve as a criterion for "worldwide use", rather than the number of countries concerned or the volume of production in those countries;
- b) only such practices shall be taken into consideration as are likely to be in worldwide use in the reasonably foreseeable future (for example, five years or more);
- c) practices based on scientific, technological or economic principles, such as economy of materials and conservation of energy, shall be given preference;
- d) whenever alternative solutions are to be adopted internationally, they shall all be included in the same document and preferences for the different alternatives shall be provided; the reasons for the preferences shall be explained in the introduction to the document;
- e) when agreed by the committee, a transitional period may be indicated during which the use of non-preferred values is permitted.

### **A.7 Avoidance of repetition**

**A.7.1** Any requirement concerning a product shall be specified in only one document: that which, according to its title, contains that requirement.

**A.7.2** In some fields it may be desirable to establish a document specifying generic requirements applicable to a group of products.

**A.7.3** If it is necessary to invoke a requirement elsewhere, this should preferably be done by reference, not by repetition. See 6.6.7.1.

If, for convenience, the repetition of a requirement in another document seems useful, this may be done, provided that it is made clear that the requirement is repeated for information only, and that an informative reference is made to the document from which the requirement is reproduced.

## Annex B (informative) Basic reference works

### B.1 Introduction

This annex gives the reference works for language (see 6.6.2) and a non-exhaustive list of the most generally applicable basic reference works (see 4.4). Details concerning currently valid ISO and IEC documents are available in the [ISO catalogue](#) and [IEC catalogue](#). Copies can be obtained from the ISO and IEC national bodies or may be consulted directly online. For specific subjects, the provisions of other, less generally applicable, documents will be relevant.

### B.2 Reference works for language

*The Shorter Oxford English Dictionary*

*The Concise Oxford Dictionary*

*The Collins Concise English Dictionary*

*Webster's New World College Dictionary*

*Chambers Concise Dictionary*

*Dictionnaire Robert*

*Dictionnaire Larousse*

*Dictionnaire des difficultés de la langue française*, V. Thomas, Larousse

### B.3 Standardized terminology

[ISO/IEC 2382](#) (all parts), *Information technology — Vocabulary*

[IEC 60050](#) (all parts), *International Electrotechnical Vocabulary*

NOTE See also the *IEC Multilingual Dictionary — Electricity, Electronics and Telecommunications* (available on CD-ROM and at <http://domino.iec.ch/iev>).

[ISO/IEC Guide 2](#), *Standardization and related activities — General vocabulary*

[ISO/IEC 17000](#), *Conformity assessment — Vocabulary and general principles*

Terminology standards developed by individual ISO technical committees are listed in the ISO Catalogue under group [01.040 Vocabularies](#).

*International vocabulary of basic and general terms in metrology*,  
BIPM/IEC/IFCC/ISO/IUPAC/IUPAP/OIML

### B.4 Principles and methods of terminology

[ISO 704](#), *Terminology work — Principles and methods*

[ISO 10241](#), *International terminology standards — Preparation and layout*

### B.5 Quantities, units and their symbols

[ISO 31](#) (all parts), *Quantities and units*

[ISO 1000](#), *SI units and recommendations for the use of their multiples and of certain other units*

[IEC 60027](#) (all parts), *Letter symbols to be used in electrical technology*

## B.6 Abbreviated terms

ISO 639 (all parts), *Codes for the representation of names of languages*

ISO 1951, *Lexicographical symbols and typographical conventions for use in terminography*

ISO 3166 (all parts), *Codes for the representation of names of countries and their subdivisions*

## B.7 Bibliographic references

ISO 690, *Documentation — Bibliographic references — Content, form and structure*

ISO 690-2, *Information and documentation — Bibliographic references — Part 2: Electronic documents or parts thereof*

## B.8 Technical drawings

ISO 128 (all parts), *Technical drawings — General principles of presentation*

ISO 129 (all parts), *Technical drawings — Indication of dimensions and tolerances*

ISO 406, *Technical drawings — Tolerancing of linear and angular dimensions*

ISO 3098 (all parts), *Technical product documentation — Lettering*

ISO 6433, *Technical drawings — Item references*

IEC 61082 (all parts), *Preparation of documents used in electrotechnology*

IEC 61175, *Designations for signals and connections*

IEC 61346 (all parts), *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations*

ISO eServices Guide, ISO, available at <<http://www.iso.org/ISOeServicesGuide>>

IT Tools Guide — Guide on the use of information technology tools in the IEC, IEC, available at <<http://www.iec.ch/tiss/it/it-tools-2001.pdf>>

## B.9 Technical documentation

IEC 61355, *Classification and designation of documents for plants, systems and equipment*

IEC 61360 (all parts), *Standard data element types with associated classification scheme for electric components*

Technical documentation standards developed by individual ISO technical committees are listed in the ISO Catalogue under group [01.140.30 Documents in administration, commerce and industry](#).

## B.10 Graphical symbols

ISO 7000, *Graphical symbols for use on equipment — Index and synopsis*

ISO 14617 (all parts), *Graphical symbols for diagrams*

IEC 60417 (all parts), *Graphical symbols for use on equipment*

IEC 60617 (all parts), *Graphical symbols for diagrams*

IEC 80416-1, *Basic principles for graphical symbols for use on equipment — Part 1: Creation of symbol originals*

ISO 81714-1, *Design of graphical symbols for use in the technical documentation of products — Part 1: Basic rules*

IEC 81714-2, *Design of graphical symbols for use in the technical documentation of products — Part 2: Specification for graphical symbols in a computer sensible form, including graphical symbols for a reference library, and requirements for their interchange*

## B.11 Limits, fits and surface properties

Documents developed by ISO/TC 213, *Dimensional and geometrical product specifications and verification* (see ISO Catalogue).

## B.12 Preferred numbers

ISO 3, *Preferred numbers — Series of preferred numbers*

ISO 17, *Guide to the use of preferred numbers and of series of preferred numbers*

ISO 497, *Guide to the choice of series of preferred numbers and of series containing more rounded values of preferred numbers*

IEC 60063, *Preferred number series for resistors and capacitors*

IEC Guide 103, *Guide on dimensional coordination*

Documents developed by ISO/TC 19, *Preferred numbers* (see ISO Catalogue).

## B.13 Statistical methods

ISO 3534 (all parts), *Statistics — Vocabulary and symbols*

Documents developed by IEC/TC 56, *Dependability* (see IEC Catalogue), and by ISO/TC 69, *Applications of statistical methods* (see ISO Catalogue).

*Guide to the expression of uncertainty in measurement*,  
BIPM/IEC/IFCC/ISO/IUPAC/IUPAP/OIML

## B.14 Environmental conditions and associated tests

ISO 554:1976, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 558:1980, *Conditioning and testing — Standard atmospheres — Definitions*

ISO 3205:1976, *Preferred test temperatures*

ISO 4677-1:1985, *Atmospheres for conditioning and testing — Determination of relative humidity — Part 1: Aspirated psychrometer method*

ISO 4677-2:1985, *Atmospheres for conditioning and testing — Determination of relative humidity — Part 2: Whirling psychrometer method*

ISO Guide 64, *Guide for the inclusion of environmental aspects in product standards*

IEC Guide 106, *Guide for specifying environmental conditions for equipment performance rating*

IEC Guide 109, *Environmental aspects — Inclusion in electrotechnical product standards*

Documents developed by IEC/TC 104, *Environmental conditions, classification and methods of test* (see IEC Catalogue).

## B.15 Safety

ISO/IEC Guide 50, *Safety aspects — Guidelines for child safety*

ISO/IEC Guide 51, *Safety aspects — Guidelines for their inclusion in standards*

IEC Guide 104, *The preparation of safety publications and the use of basic safety publications and group safety publications*

## B.16 Chemistry

ISO 78-2, *Chemistry — Layouts for standards — Part 2: Methods of chemical analysis*



## **B.17 EMC (electromagnetic compatibility)**

[IEC Guide 107](#), *Electromagnetic compatibility — Guide to the drafting of electromagnetic compatibility publications*

## **B.18 Conformity and quality**

[ISO 9000](#), *Quality management systems — Fundamentals and vocabulary*

[ISO 9001](#), *Quality management systems — Requirements*

[ISO 9004](#), *Quality management and quality system elements — Guidelines*

[ISO 17050-1](#), *Conformity assessment — Supplier's declaration of conformity — Part 1: General requirements*

[ISO 17050-2](#), *Conformity assessment — Supplier's declaration of conformity — Part 2: Supporting documentation*

[ISO/IEC Guide 23](#), *Methods of indicating conformity with standards for third-party certification systems*

[IEC Guide 102](#), *Electronic components — Specification structures for quality assessment (Qualification approval and capability approval)*

## **B.19 Adoption of International Standards**

[ISO/IEC Guide 15](#), *ISO/IEC code of principles on “reference to standards”*

[ISO/IEC Guide 21](#), *Adoption of International Standards as regional or national standards*

## **B.20 Environmental management**

[ISO 14040](#), *Environmental management — Life cycle assessment — Principles and framework*

[ISO 14041](#), *Environmental management — Life cycle assessment — Goal and scope definition and inventory analysis*

[ISO 14042](#), *Environmental management — Life cycle assessment — Life cycle impact assessment*

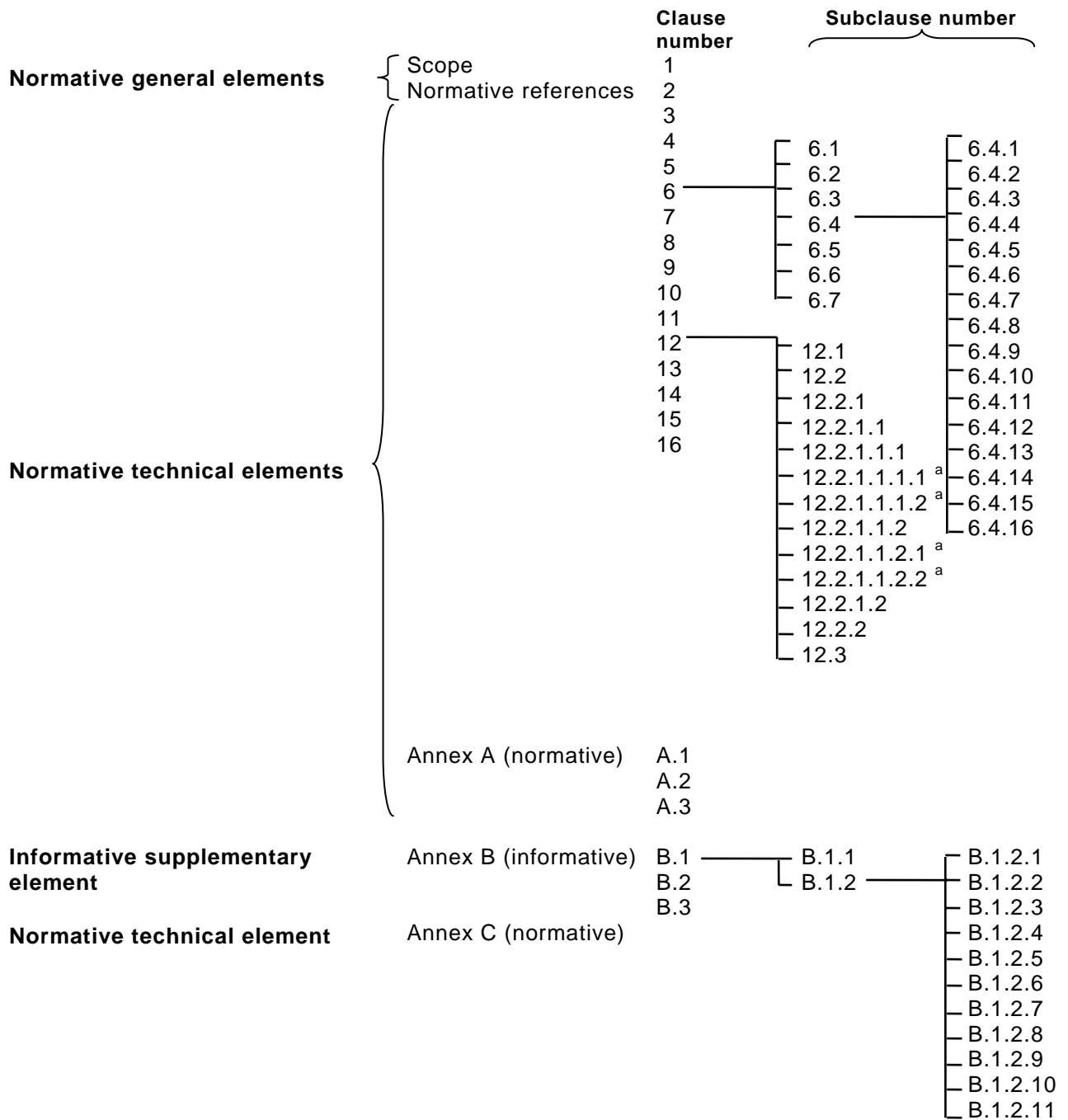
[ISO 14043](#), *Environmental management — Life cycle assessment — Life cycle interpretation*

## **B.21 Packaging**

Technical documentation standards developed by individual ISO technical committees are listed in the ISO Catalogue under group [55 Packaging and distribution of goods](#).

Technical documentation standards developed by individual IEC technical committees are listed in the IEC Catalogue under group [55 Packaging and distribution of goods](#).

## Annex C (informative) Example of numbering of divisions and subdivisions



<sup>a</sup> Maximum of six levels, i.e. a clause and five levels of subclauses.

## Annex D (normative)

### Drafting and presentation of terms and definitions

#### D.1 General principles

##### D.1.1 Rules for development

The principles and methods for terminology work are specified in [ISO 704](#). Rules for the development of standardized terminology in particular subject fields are given in [ISO 10241:1992](#), from which all examples in this annex are reproduced or adapted. Rules for the development of the *International Electrotechnical Vocabulary* are given in the [ISO/IEC Directives, IEC Supplement, 2004, Annex I](#).

##### D.1.2 Types of standard

Terminology may take the form of an independent terminology standard (a vocabulary, nomenclature, or list of equivalent terms in different languages) or be included in a “Terms and definitions” clause in a document that also deals with other aspects.

##### D.1.3 Choice of concepts to be defined

Any term which is not self-explanatory or commonly known and which can be differently interpreted in different contexts shall be clarified by defining the relevant concept.

Common dictionary or current technical terms shall be included only if they are used with a specific meaning in the relevant context.

Trade names (brand names) and archaic and colloquial terms shall be avoided.

Deprecated terms may be included after the preferred term but their nature shall be indicated (see D.3.3).

In an independent terminology standard, the concepts defined shall be restricted to the field corresponding to the scope of the document. In other documents, only such concepts shall be defined as are used in those documents, apart from any additional concepts and their terms that may be deemed necessary for the understanding of these definitions.

##### D.1.4 Avoidance of duplications and contradictions

Before a term and a definition are established for a concept, it should be ascertained that no other term and definition for that concept exist in another International Standard. In the case of electrotechnical terms, refer to the *International Electrotechnical Vocabulary*.

If the concept is used in several documents, it should be defined in the most general of those documents, or in an independent terminology standard. The other documents should then refer to this standard, without repeating the definition of the concept.

When the repetition of a definition is necessary, an informative reference shall be made to the document from which it is reproduced (see 6.6.7.5.3).

### **3.2.11**

#### **international rubber hardness degree**

##### **IRHD**

measure of hardness, the magnitude of which is derived from the depth of penetration of a specified indenter into a test piece under specified conditions

[ISO 1382:1982]

Where a standardized definition in another subject field has to be adapted, an explanation shall be given in a note.

### **1.1.2.3**

#### **natural language**

language which evolves and whose rules reflect usage without necessarily being explicitly prescribed

NOTE Adapted from ISO/IEC 2382-7:1989.

If a term and a definition for a concept are established in one document, the introduction in another document of a different term (synonym) for the defined concept is deprecated.

## **D.1.5 Drafting of definitions**

**D.1.5.1** Rules for the drafting of definitions are given in ISO 10241.

**D.1.5.2** A definition shall not take the form of, or contain, a requirement.

**D.1.5.3** The form of a definition shall be such that it can replace the term in context. Additional information shall be given only in the form of examples or notes (see D.3.9).

**D.1.5.4** A definition given without an indication of its applicability may be taken as representing the general meaning of the term. Special meanings in particular contexts shall be indicated by designating the subject field (see D.3.6).

## **D.2 Independent terminology standards**

### **D.2.1 Arrangement**

An independent terminology standard containing terms and definitions should be preferably classified according to the hierarchy of the concepts. The terms and definitions of general concepts shall precede those of less general concepts. If a mixed system of concepts is used in which several groupings (according to different criteria) appear, each grouping shall be kept separate and the relevant criteria shall be indicated.

The grouping of terms shall be evident from their numbering. Each entry shall be given a reference number, and alphabetical indexes of the terms shall also be given for each language.

Lists of equivalent terms in different languages may be presented either in systematic order as indicated above (in which case alphabetical indexes shall be given for each of the languages), or in alphabetical order of the terms in the first of the languages used (in which case alphabetical indexes shall be given for each of the other languages).

### **D.2.2 Languages other than official languages**

Documents containing terminology in languages additional to the official languages shall contain the following note (completed as appropriate) in the "Scope" clause:

“NOTE In addition to terms used in the three official ... [ISO or IEC] ... languages (English, French and Russian), this International Standard gives the equivalent terms in ... [language] ...; these are published under the responsibility of the member body/National Committee for ... (...) and are given for information only. Only the terms and definitions given in the official languages can be considered as ... [ISO or IEC] ... terms and definitions.”

The wording shall be altered as a function of the document type concerned, i.e. International Standard, Technical Specification, Publicly Available Specification, Technical Report or Guide.

The possibility of including languages other than the official languages applies only to the language content of terms and definitions and equivalent terms without definitions, and does not extend to the language content of other elements (e.g. the informative preliminary and normative general elements, etc.) except in the case of documents processed under a special agreement.

### D.3 Presentation

#### D.3.1 Rules

Rules for the presentation of standardized terminology are given in ISO 10241.

The following rules, taken from ISO 10241:1992, apply to the presentation of both independent terminology standards and the “Terms and definitions” clause (see 6.3.1) of other documents.

#### D.3.2 Layout

The preferred term (set in bold type in the printed publication) shall be placed on a new line, after its reference number, starting with a lower case letter except for any capital letters required by the normal written form in running text. The definition shall be placed on a new line, starting with a lower case letter, except for any capital letters required by the normal written form in running text, and shall not be followed by a full-stop.

#### 2.4.1

##### **delamination**

separation of two adjacent plies resulting from a lack of adhesion

#### D.3.3 Synonyms

Admitted terms (set in normal type in the printed publication) shall each be placed on a new line, after the preferred term.

#### 11.4.6

##### **serializer**

parallel-serial converter

dynamicizer

functional unit that converts a set of simultaneous signals into a corresponding time sequence of signals

Symbols shall be given following any admitted terms.

Symbols for quantities and units shall be taken from ISO 31 and IEC 60027, and printed as specified in ISO 31-0; i.e. symbols for quantities in italic type, symbols for units in roman type.

If a symbol is taken from an international authority, the authority shall be identified between square brackets after the symbol, on the same line.

Information regarding the units applicable to a quantity shall be given in a note.

**2.5.1**

**resistance**

*R* [IEC + ISO]

⟨direct current⟩ electric potential difference divided by current when there is no electromotive force in the conductor

NOTE Resistance is expressed in ohms.

Deprecated, obsolete and superseded terms (set in normal type) shall each be placed on a new line, after any symbols, and shall be followed by an indication of their status, in parentheses.

**5.3.8**

**radix**

base (deprecated)

positive integer by which the weight of any digit place is multiplied to obtain the weight of the digit place with the next higher weight

**D.3.4 Grammatical form of terms**

Terms shall in general be presented in their basic grammatical form, i.e. nouns in the singular, verbs in the infinitive.

**D.3.5 Symbol for missing terms**

If, for a defined concept, no equivalent term exists in one of the languages, the non-existent term shall be indicated by a symbol consisting of five points ( . . . . . ).

**1.4.6**

. . . . .

branch of learning that is concerned with the study and development of computer programming methods and computer programming languages

**1.4.6**

**programmatisation**, f

discipline traitant de l'étude et de la conception des méthodes de programmation et des langages de programmation des calculateurs

**D.3.6 Multiple meanings**

If a term is used to represent several concepts, the subject field to which each concept belongs shall be indicated between angle brackets, before the definition.

**2.1.17**

**die**, noun

⟨extrusion⟩ metal block with a shaped orifice through which plastic material is extruded

**2.1.18**

**die**, noun

⟨moulding⟩ assembly of parts enclosing the cavity from which the moulding takes its form

**2.1.19**

**die**, noun

⟨punching⟩ tool to punch sheet or film material

### D.3.7 Codes for countries and for languages

Codes for the representation of the names of countries shall be in accordance with ISO 3166-1.

<b>lift</b> GB <b>elevator</b> US <b>catalogue</b> CA GB <b>catalog</b> US
---

Codes for the representation of the names of languages shall be in accordance with ISO 639.

<b>3.4</b> <b>screw thread</b> continuous and projecting helical ridge of uniform section on a cylindrical or conical surface	<b>3.4</b> de Gewinde, n fi ruuvikierre it filetto, m filettatura, f
---	--

### D.3.8 Parentheses and brackets

Parentheses and square brackets shall be used only if they constitute part of the normal written form of the term. They shall not be used to show alternative terms.

<b>bis(dimethylthiocarbamyl) disulfide</b>
--

### D.3.9 Examples and notes

Examples of term usage, and notes concerning entries, shall be presented as shown below.

<p><b>1.3.2</b>  <b>power</b>          &lt;mathematics&gt; number of times, as indicated by an exponent, that a number occurs as a factor in a product</p> <p>EXAMPLE The 3rd power of 2 is 8.</p> <p><b>1.4.5</b>  <b>blowing agent</b>          substance used to cause expansion in the manufacture of hollow or cellular articles</p> <p>NOTE Blowing agents may be compressed gases, volatile liquids, or chemicals that decompose or react to form a gas.</p> <p><b>5.3.8</b>  <b>radix</b>          base (deprecated)          &lt;radix numeration system&gt; positive integer by which the weight of any digit place is multiplied to obtain the weight of the digit place with the next higher weight</p> <p>EXAMPLE In the decimal numeration system the radix of each digit place is 10.</p> <p>NOTE The term "base" is deprecated in this sense because of its mathematical use.</p>
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## Annex E (normative) Drafting of the title of a document

### E.1 Elements of the title <sup>2)</sup>

#### E.1.1 The introductory element

The introductory element is necessary if, without it, the subject indicated in the main element is not well defined.

##### EXAMPLE 1

**Correct:**     *Fork-lift trucks — Hook-on type fork arms — Vocabulary*  
**Incorrect:**                     *Hook-on type fork arms — Vocabulary*

If the main element of the title (together with the complementary element, where present) unequivocally covers the subject treated in the document, the introductory element shall be omitted.

##### EXAMPLE 2

**Correct:**                             *Sodium perborates for industrial use — Determination of bulk density*  
**Incorrect:**     *Chemicals — Sodium perborates for industrial use — Determination of bulk density*

#### E.1.2 The main element

The main element shall always be included.

#### E.1.3 The complementary element

The complementary element is necessary if the document covers only one or a few aspects of the subject indicated in the main element.

In the case of a document published as a series of parts, the complementary element serves to distinguish and identify the parts [the introductory element (if present) and the main element remaining the same for each part].

##### EXAMPLE 1

**IEC 60747-1**     *Semiconductor devices — Discrete devices — Part 1: General*  
**IEC 60747-2**     *Semiconductor devices — Discrete devices — Part 2: Rectifier diodes*

If the document covers several (but not all) aspects of the subject indicated in the main element, the aspects covered shall be referred to by a general term such as “specification” or “mechanical requirements and test methods” rather than be enumerated one by one.

The complementary element shall be omitted if the document both

- covers all essential aspects of the subject indicated in the main element, and
- is (and is intended to remain) the only document relating to this subject.

##### EXAMPLE 2

**Correct:**     *Coffee grinders*  
**Incorrect:**     *Coffee grinders — Terminology, symbols, material, dimensions, mechanical properties, rated values, test methods, packaging*

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<sup>2)</sup> See also 6.1.1.



## E.2 Avoidance of unintentional limitation of the scope

The title shall not contain details that might imply an unintentional limitation of the scope of the document.

However, if the document pertains to a specific type of product, this fact shall be reflected in the title.

EXAMPLE *Aerospace — Self-locking, fixed, single-lug anchor nuts, classification 1 100 MPa/235 °C*

## E.3 Wording

Uniformity shall be maintained in the terminology used in the titles of documents for indicating the same concept.

For documents dealing with terminology, whenever possible one of the following expressions shall be used: “Vocabulary” if the definitions of the terms are included, or “List of equivalent terms” if only equivalent terms in different languages are given.

For documents dealing with test methods, whenever possible one of the following expressions shall be used: “Test method” or “Determination of ...”. Expressions such as “Method of testing”, “Method for the determination of ...”, “Test code for the measurement of ...” and “Test on ...” shall be avoided.

In the title no indication is needed to describe the type or nature of the document as an International Standard, Technical Specification, Publicly Available Specification, Technical Report or Guide. Expressions such as “*International* test method for ...”, “*Technical Report* on ...”, etc. shall therefore not be used.

**Annex F**  
(normative)  
**Patent rights**

**F.1** All drafts submitted for comment shall include on the cover page the following text:

“Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.”

**F.2** A published document for which no patent rights are identified during the preparation thereof, shall contain the following notice in the foreword:

“Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO [and/or] IEC shall not be held responsible for identifying any or all such patent rights.”

**F.3** A published document for which patent rights have been identified during the preparation thereof, shall include the following notice in the introduction:

“The International Organization for Standardization (ISO) [and/or] International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning (...subject matter...) given in (...subclause...).

ISO [and/or] IEC take[s] no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the ISO [and/or] IEC that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO [and/or] IEC. Information may be obtained from:

... name of holder of patent right ...

... address ...

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. ISO [and/or] IEC shall not be held responsible for identifying any or all such patent rights.”

## Annex G (normative)

### Designation of internationally standardized items

#### G.1 General

For the purpose of this annex, an “internationally standardized item” signifies a concrete item (such as a material or a manufactured product), or may mean an intangible item (such as a process or system, a test method, a collection of symbols, or requirements for marking and delivery).

There are many circumstances in which, instead of using a lengthy description of an item, it is convenient to have a brief designation by means of which the item may be identified uniquely. Examples of this are references given to items in documents, in catalogues, in written communications, in technical and scientific literature, in the ordering of goods, materials and equipment and in the presentation of goods, etc., on display and for sale.

The designation system described in this annex is not a commodity code in which similar products having a particular application have identical codes. Nor is it a general product code in which any product is allocated a designation whether the product is standardized or not. Rather, it provides a standardized pattern of designation from which a rapid and unequivocal description of an item is communicated. The system is intended solely for application in International Standards, and in regional and national standards identical in content with them. It therefore provides mutual comprehension on the international level in regard to items which meet the requirements of the relevant International Standard.

The designation is no substitute for the full content of the document. In order to know what a document is about, it needs to be read.

It is to be noted that a designation system need not necessarily appear in every document that contains elements of choice, although it is particularly useful for product and material documents. The prerogative of deciding whether to include a designation system in a given document rests with the committee concerned.

#### G.2 Applicability

**G.2.1** Each standardized item has a number of characteristics. The values associated with those characteristics (for example the volume of a molar solution of sulfuric acid used in a test method, or a range of nominal lengths in millimetres of countersunk head screws in a specification) may be either single (as in the volume of acid) or multiple (as in the range of lengths of countersunk head screws). Where only a single value is specified for each characteristic in the document, it is sufficient only to quote the number of the document and the identification is unambiguous. Where several values are given, the users have to exercise a choice. In this case it is not sufficient for users to designate their need by quoting only the number of the document; the value or values required from the range also have to be designated.

**G.2.2** The designation system described may be applied in the following types of document.

- a) A document in which more than one choice is open in relation to a characteristic defined in the document.

**EXAMPLES** The choice from a range of alternative dimensions or other properties in a specification for a product; the choice of a particular method of test in a generic document covering a variety of methods for determining the value of a given characteristic of a product; the choice of specific values of certain testing parameters of which a number of alternatives are offered in the document. [For product or material standards, F.2.2 c) also applies.]

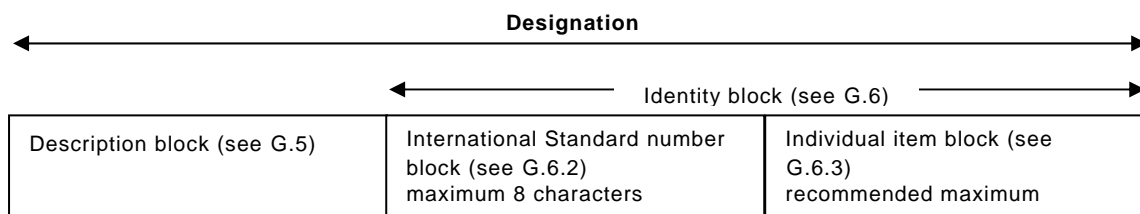
- b) A document which defines terms and symbols from which a selection has to be made in communicating information.
- c) For a product or material, a document which in itself, or by reference to other documents, provides a specification complete enough to ensure that the product or material conforming to it is fit for the purpose for which it is intended, and which contains alternatives in one or more of its requirements.

NOTE There would be considerable risk of misunderstanding by the purchaser if a designation system were applied to a specification that incompletely defined the suitability of a product for its purpose, since many users of the designation system, which is intended to make known only the "selection" aspects in a document, would assume that the other characteristics required to ensure suitability of purpose were covered by the document.

**G.2.3** The designation system is suitable for use in any type of communication, including automatic data processing.

### G.3 Designation system

**G.3.1** Each designation comprises a "Description block" and an "Identity block". The system is illustrated in Figure F.1.



**Figure F.1 — Structure of designation system**

**G.3.2** In the designation system described, the standard number, which identifies all the required characteristics and their values, is contained in the International Standard number block, and the chosen values of those characteristics to which several values have been assigned are contained in the Individual item block. For a document in which each characteristic is assigned only a single value, obviously no Individual item block need appear in the designation.

### G.4 Use of characters

**G.4.1** The designation consists of characters which shall be letters, digits or signs.

**G.4.2** Where letters are used, they shall be of the Latin alphabet. No distinction in meaning shall be made between capital letters and lower case letters. For the Description block, lower case letters, which are commonly used in writing or print, may be transformed into capital letters in automatic data processing. For the Identity block there is a preference for capital letters.

**G.4.3** Where digits are used, they shall be Arabic.

**G.4.4** The only signs permitted shall be the hyphen (-), the plus sign (+), the solidus (/), the comma (,) and the multiplication sign (×). In automatic data processing the multiplication sign is the letter "X".

**G.4.5** In the designation, spaces may be inserted for better readability. However, spaces are not counted as characters and they may be omitted when the designation is used in automatic data processing.

## G.5 Description block

A Description block shall be allotted to the standardized item by the committee responsible. This Description block shall be as short as possible and is preferably taken from the subject classification of the document (e.g. keywords, International Classification for Standards): that description which best characterizes the standardized item. When referring to the document, the use of the Description block is optional but when used it shall be placed in front of the International Standard number block.

## G.6 Identity block

### G.6.1 General

The Identity block shall be composed in such a way that it designates the standardized item unambiguously. It consists of two consecutive blocks of characters:

- the International Standard number block, comprising a maximum of 8 characters (the letters "ISO" or "IEC" plus a maximum of 5 digits);
- the Individual item block (digits, letters, signs), comprising a recommended maximum of 18 characters.

In order to mark the division between the International Standard number block and the Individual item block, a hyphen (-) shall be the first character of the Individual item block.

### G.6.2 International Standard number block

**G.6.2.1** The International Standard number block shall be as short as possible, for example ISO 1 in the case of the first ISO standard. Spaces or zeros may be added when recording on machine-readable medium (for example "ISO 1" or "ISO 00001").

**G.6.2.2** If a document is being revised and the former edition contained a method for the designation of the standardized item, care shall be taken that the designation to be specified in the new edition cannot lead to confusion with any designation applied according to the former edition of the document. In general this requirement can easily be met and therefore it is not necessary to include the year of publication in the International Standard number block.

**G.6.2.3** The same applies in cases when amendments or other modifications are issued: they shall modify the designation of the standardized item accordingly.

**G.6.2.4** If the document consists of several parts issued and referred to individually, the number of the relevant part (or its code, if so required by the document) shall be indicated in the Individual item block, immediately after the hyphen.

### G.6.3 Individual item block

**G.6.3.1** The Individual item block shall also be as short as possible and constructed to serve the purpose of the designation in the best way possible in the view of the committee which prepared the document.

**G.6.3.2** In order to allow an unambiguous coding of the designatory items, which, for certain products such as chemicals, plastics and rubber, may still be numerous in spite of selections, the Individual item block may be further subdivided into several Data blocks each containing specific information represented by a code (see G.6.3.3). These blocks shall be separated from each other by a separator, for example a hyphen. The meaning of the codes contained therein shall be bound by their position. One or more Data blocks, therefore, can be suppressed but the empty space shall be indicated by doubling the separators.

**G.6.3.3** The most important parameters shall appear first. Entries in plain language (for example “wool”) shall not be used as part of the Individual item block, as otherwise there would be a need for translation; they shall, therefore, be replaced by coded entries. The key to such coded entries shall be provided in the document concerned.

**G.6.3.4** In the Individual item block, where the use of the letters I and O could lead to confusion with the numerical digits “one” and “zero”, they shall be avoided.

**G.6.3.5** If the simplest way of enumerating the data required in the specification would require the use of a large number of characters (for example “1 500 × 1 000 × 15” contains 12 characters and covers only the aspect of size without even specifying the tolerances), a double coding can be used in which all possibilities of an aspect are enumerated and coded with one or more characters (for example 1 500 × 1 000 × 15 = A, 1 500 × 2 000 × 20 = B, etc.).

**G.6.3.6** If more than one document refers to a product, one of them shall be chosen as a basis in which the rules for the designation of the product (composed of the designation of the individual standardized items) are also laid down.

## G.7 Examples

**G.7.1** Examples for the designation of a short enclosed-scale thermometer for precision use according to ISO 656, graduation interval 0,2 °C, main scale 58 °C to 82 °C:

Thermometer ISO 656-EC-0,2-58-82

In this designation the elements have the following meaning:

- EC short enclosed-scale thermometer;
- 0,2 graduation interval = 0,2 °C;
- 58-82 the range of the main scale is from 58 °C to 82 °C.

NOTE In this designation the letters “EC” could be omitted because ISO 656 refers only to short enclosed-scale thermometers.

**G.7.2** Example for the designation of a throwaway carbide indexable insert, according to ISO 883, triangular, with side clearance, tolerance class G (precision ground), nominal size 16,5 mm, thickness 3,18 mm, corner radius 0,8 mm, for rounded cutting edges, to be used for both left-hand and right-hand cutting (designation according to ISO 1832), for group of application P20 according to ISO 513:

Throwaway insert ISO 883-TPGN160308-EN-P20

In this designation the elements have the following meaning:

- T symbol for the shape (triangular);
- P symbol for the side clearance (the relief angle is identified as being 11°);
- G tolerance class G (tolerance ± 0,025 mm on the height of triangle and ± 0,13 mm on the thickness of the insert);
- N symbol for the special features (N = no special features);
- 16 symbol for the size (nominal size of triangle = 16,5 mm);
- 03 symbol for the thickness (3,18 mm);
- 08 symbol for the corner configuration (corner radius = 0,8 mm);
- E symbol for the cutting edge condition (rounded cutting edges);
- N symbol for the cutting direction (both left-hand and right-hand cutting);
- P20 symbol for the application of carbide (applicable for steel, steel castings, malleable cast iron with long chips).

**G.7.3** Example for the designation of a slotted pan head screw with thread M5, nominal length 20 mm, product grade A, property class 4.8, according to ISO 1580:

Slotted pan screw ISO 1580-M5 × 20-4.8

This designation refers to ISO 1580 which is the International Standard in which the dimensions of the slotted pan head screws have been fixed and in which reference is made for the other characteristics of these screws to other standards as follows.

- a) The International Standard for the tolerances on metric screw thread (ISO 965-2) in which in turn reference is made to the International Standards for the basic data (ISO 965-1), the basic profile (ISO 68), the general plan (ISO 261) and the gauging (ISO 1502). The element "M5" of the designation determines which data of these standards are relevant for the designated screw, on the assumption that the relevant screw thread tolerance class is fixed in the standard mentioned under b).
- b) The International Standard for the tolerances (ISO 4759-1) on the dimensions and other features of the screws, which makes use of the symbols for limits and fits (ISO 286-1), for tolerances of form and position (ISO 1101), for tolerances of screw thread (ISO 965-3), and for surface roughness (ISO 468 and others). The relevant product grade (A) is fixed in ISO 1580 for the screw in question. It would be redundant to mention the product grade A in the designation because in ISO 1580 only one product grade is indicated.
- c) The International Standard for the mechanical properties of fasteners (ISO 898-1), in which in turn reference is made to International Standards for the tensile test of steel (ISO 6892), for hardness tests (ISO 6506 and ISO 6508) and for the impact test (ISO 83). The element "4.8" of the designation is sufficient to determine which data of the document are relevant.

With the relatively short designation the screw in question is defined completely, although several International Standards are involved.

**G.7.4** Example for the designation of the determination of ethyl ether soluble matter in plasticized cellulose acetate, procedure A:

Test method, cellulose acetate ISO 1875-A

## **G.8 National implementation**

**G.8.1** National implementation of the international designation system is applicable only when an International Standard is adopted as a national standard without change.

**G.8.2** In national implementation of International Standards, the international designation shall be used without change. However, the national standard identification may be inserted between the Description block and the International Standard number block.

EXAMPLE If the international designation of a screw is

Slotted pan screw ISO 1580-M5 × 20-4.8

its national designation may be

Slotted pan screw VN 4183-ISO 1580-M5 × 20-4.8

if VN 4183 is the identification of the national standard corresponding to ISO 1580 which has been adopted without change.

Another possibility for a national designation would be

Flachkopfschraube mit Schlitz OENORM ISO 1580-M5 × 20-4.8

if "OENORM ISO 1580" is the identification of the national standard corresponding to ISO 1580 which has been adopted without change.

**G.8.3** If an individual item is standardized nationally and that item is identical to an item specified in a corresponding, but not identical, International Standard, it is permitted to use the international designation of the standardized item for that particular item.

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If an individual item is standardized nationally and that item corresponds but is not identical to the item in a corresponding International Standard, the national designation of the standardized item shall not include reference to the International Standard.

In accordance with the principle in ISO/IEC Guide 21, a national standard may only use the international standard identification in its own identifier if it is identical with that International Standard.



## Annex H (normative)

### Verbal forms for the expression of provisions

NOTE Only singular forms are shown.

The verbal forms shown in Table H.1 shall be used to indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

**Table H.1 — Requirement**

Verbal form	Equivalent expressions for use in exceptional cases (see 6.6.1.3)
<b>shall</b>	is to is required to it is required that has to only ... is permitted it is necessary
<b>shall not</b>	is not allowed [permitted] [acceptable] [permissible] is required to be not is required that ... be not is not to be
<p>Do not use “must” as an alternative for “shall”. (This will avoid any confusion between the requirements of a document and external statutory obligations.)</p> <p>Do not use “may not” instead of “shall not” to express a prohibition.</p> <p>To express a direct instruction, for example referring to steps to be taken in a test method, use the imperative mood in English.</p> <p>EXAMPLE “Switch on the recorder.”</p>	

The verbal forms shown in Table H.2 shall be used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

**Table H.2 — Recommendation**

Verbal form	Equivalent expressions for use in exceptional cases (see 6.6.1.3)
<b>should</b>	it is recommended that ought to
<b>should not</b>	it is not recommended that ought not to
In French, do not use “devrait” in this context.	

The verbal forms shown in Table H.3 shall be used to indicate a course of action permissible within the limits of the document.

**Table H.3 — Permission**

Verbal form	Equivalent expressions for use in exceptional cases (see 6.6.1.3)
<b>may</b>	is permitted is allowed is permissible
<b>need not</b>	it is not required that no ... is required
<p>Do not use "possible" or "impossible" in this context.</p> <p>Do not use "can" instead of "may" in this context.</p> <p>NOTE 1 "May" signifies permission expressed by the document, whereas "can" refers to the ability of a user of the document or to a possibility open to him/her.</p> <p>NOTE 2 The French verb "pouvoir" can indicate both permission and possibility. For clarity, the use of other expressions is advisable if otherwise there is a risk of misunderstanding.</p>	

The verbal forms shown in Table H.4 shall be used for statements of possibility and capability, whether material, physical or causal.

**Table H.4 — Possibility and capability**

Verbal form	Equivalent expressions for use in exceptional cases (see 6.6.1.3)
<b>can</b>	be able to there is a possibility of it is possible to
<b>cannot</b>	be unable to there is no possibility of it is not possible to
NOTE See Notes 1 and 2 to Table H.3.	

## Annex I (informative) Quantities and units

This list comprises provisions that are specified elsewhere in the ISO/IEC Directives, or in the particular International Standards dealing with quantities and units.

- a) The decimal sign shall be a comma.
- b) International Standards shall use only
  - SI units, as given in the various parts of [ISO 31](#);
  - a few additional units used with the SI, namely minute (min), hour (h), day (d), degree (°), minute (′), second (″), litre (l), tonne (t), electronvolt (eV) and unified atomic mass unit (u), as shown in [ISO 31-0:1992](#), Tables 5 and 6;
  - the units neper (Np), bel (B), sone, phon and octave, which are also given in [ISO 31](#);
  - the units baud (Bd), bit (bit), octet (o), byte (B), erlang (E), hartley (Hart), natural unit of information (nat), shannon (Sh), and var (var), which are given in [IEC 60027](#) for use in electrical technology and information technology.

NOTE For consistency, in International Standards only the symbol “l” as shown above is used for litre, although the symbol “L” is also given in ISO 31.
- c) Do not mix symbols and names of units. Write, for example, either “kilometres per hour” or “km/h”, and not “km per hour” or “kilometres/hour”.
- d) Combine numerical values written in figures with unit symbols, e.g. “5 m”. Avoid such combinations as “five m” and “5 metres”. There shall be a space between the numerical value and the unit symbol except in the case of superscript-type unit symbols used for plane angle, e.g. 5°6′7″. However, the degree should preferably be subdivided decimally.
- e) Do not use non-standardized abbreviated terms for units, such as “sec” (instead of “s” for seconds), “mins” (instead of “min” for minutes), “hrs” (instead of “h” for hours), “cc” (instead of “cm<sup>3</sup>” for cubic centimetres), “lit” (instead of “l” for litres), “amps” (instead of “A” for amperes), “rpm” (instead of “r/min” for revolutions per minute).
- f) Internationally standardized unit symbols shall not be modified by adding subscripts or other information. Write, for example,
  - “ $U_{\max} = 500 \text{ V}$ ” and not “ $U = 500 \text{ V}_{\max}$ ”
  - “a mass fraction of 5 %” and not “5 % (m/m)”
  - “a volume fraction of 7 %” and not “7 % (V/V)”

(Remember that % = 0,01 and ‰ = 0,001 are “pure” numbers.)
- g) Do not mix information with unit symbols. Write, for example, “the water content is 20 ml/kg” and not “20 ml H<sub>2</sub>O/kg” or “20 ml of water/kg”.
- h) Abbreviated terms such as “ppm”, “pphm” and “ppb” shall not be used. They are language dependent, may be ambiguous and are not really needed since they only stand for numbers, which are always more clearly expressed by means of digits. Write, for example,
  - “the mass fraction is 4,2 µg/g” or “the mass fraction is  $4,2 \times 10^{-6}$ ” and not “the mass fraction is 4,2 ppm”
  - “the relative uncertainty is  $6,7 \times 10^{-12}$ ” and not “the relative uncertainty is 6,7 ppb”
- i) Unit symbols shall always be in roman type. Quantity symbols shall always be in italic type. Symbols representing numerical values shall be different from symbols representing the corresponding quantities.
- j) Equations between quantities are preferred to equations between numerical values.
- k) The quantity “weight” is a force (gravitational force) and is measured in newtons (N). The quantity “mass” is measured in kilograms (kg).
- l) Quotient quantities shall not contain the word “unit” in the denominator. For example, write “mass per length” or “lineic mass” and not “mass per unit length”.

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- m) Distinguish between an object and any quantity describing the object, e.g. between “surface” and “area”, “body” and “mass”, “resistor” and “resistance”, “coil” and “inductance”.
- n) Write, for example,
- “10 mm to 12 mm” and not “10 to 12 mm” or “10 – 12 mm”
  - “0 °C to 10 °C” and not “0 to 10 °C” or “0 – 10 °C”
  - “24 mm × 36 mm” and not “24 × 36 mm” or “(24 × 36) mm”
  - “23 °C ± 2 °C” or “(23 ± 2) °C” and not “23 ± 2 °C”
  - “(60 ± 3) %” and not “60 ± 3 %” or “60 % ± 3 %”
- o) Two or more physical quantities cannot be added or subtracted unless they belong to the same category of mutually comparable quantities. Accordingly, the method of expression for a relative tolerance such as 230 V ± 5 % does not conform to this basic law of algebra. The following methods of expression may be employed instead:
- “(230 ± 11,5) V”
  - “230 V, with a relative tolerance of ± 5 %”
- The following form is often used, although not correct: (230 ± 5 %) V.
- p) Do not write “log” in formulae if the base needs to be specified. Write “lg”, “ln”, “lb” or “log<sub>a</sub>”.
- q) Use the mathematical signs and symbols recommended in [ISO 31-11](#), e.g. “tan” and not “tg”.