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**Technical product specification (TPS) —  
Application guidance — International  
model for national implementation**

*Spécification technique de produits (TPS) — Lignes directrices  
d'application — Modèle international pour mises en oeuvre nationales*

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Published in Switzerland

# Contents

Page

Foreword .....	v
Introduction.....	vi
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	1
4 Global Standards underpinning ISO/TR 23605 .....	2
4.1 The GPS Matrix .....	2
4.2 Standard reference temperature .....	2
5 Expression of the concept .....	2
6 Types of documentation .....	3
6.1 General .....	3
6.2 Commentary and recommendations .....	3
6.2.1 Combined drawing .....	3
6.2.2 Document list (drawing list) .....	3
7 Relationship between design definition and interpretation .....	3
7.1 Targeting of a TPD.....	3
7.2 Uncertainty of specification .....	3
8 Presentation media .....	4
9 Scales .....	4
10 Lines, arrows and terminators .....	4
10.1 Lines .....	4
10.2 Arrows and terminators .....	4
11 Lettering .....	4
12 Projections .....	5
13 Views.....	5
14 Sections.....	5
15 Part references .....	5
16 Graphical representation (abbreviations and symbols).....	6
16.1 Abbreviations.....	6
16.2 Symbols used for physical quantities.....	6
16.3 General symbols.....	6
16.4 Textual equivalents .....	7
16.5 Representation of processes .....	7
17 Representation of features .....	8
18 Representation of components .....	8
19 Dimensioning and tolerancing .....	9
19.1 General .....	9
19.2 Decimal marker.....	9
20 Geometrical tolerancing .....	10
21 Surface texture indication .....	10
22 Security .....	11

22.1	Introduction .....	11
22.2	General security .....	11
23	Storage and retrieval .....	11
24	Protection notices .....	11
Annex A (normative)	Cross-referenced standards .....	12
Annex B (informative)	Geometrical product specification (GPS) — The standards matrix .....	18
Bibliography .....		20

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any of all such patent rights.

ISO/TR 23605 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

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## Introduction

Industry in all developed countries worldwide is showing an increasing tendency to focus on design and assembly activity and to contract out the manufacture of its components, and such procedures are unlikely to be constrained by national borders. Alongside this, many companies are extending their dependence on computerized systems and thereby reducing the opportunity for human intervention in manufacturing processes.

One effect of these parallel trends is the exposure of the limitations of some traditional specification processes, which highlights the urgent need for enhanced detail and accuracy in specifying the manufacture of technical products. This is coupled with the requirement to reduce ambiguity and the opportunity for interpretation at both manufacturing and verification stages.

ISO/TR 23605 is drafted with the sole objective of facilitating this improvement in technical product specification through the application of established International Standards and International Standards under development.

A primary objective of the responsible ISO committees is to ensure that the necessary tools to enable the preparation of detailed, accurate specifications are available. Their activity covers seven complementary generic subject areas:

- Methodology for design implementation
- Geometrical product specification
- Graphical representation (engineering drawings/diagrams and 3-D modelling)
- Verification (metrology and precision measurement)
- Technical documentation
- Electronic formats and controls
- Related tools and equipment

There are two ISO Technical Committees responsible for identifying and evaluating requirements for International Standards relating to the preparation, presentation and validation of technical specifications in the field of mechanical engineering and for the drafting of any such standards for which a genuine need is established. Their combined work programmes address the requirements for standardization in such technical specifications at all stages from the preparation of design concepts for physical realization to the validation of finished products.

Technical Product Documentation (TPD) is the province of ISO/TC 10, with the brief “to develop, co-ordinate and maintain International Standards for TPD, including technical drawings manually produced or computer based, for technical purposes throughout the product life cycle in order to facilitate preparation, management, storage, retrieval, reproduction, exchange and use”.

Although this committee is founded on the more traditional discipline of “Engineering Drawing”, its remit extends to include the presentation of all forms of specification for technical products, whatever the media selected to carry that specification. In particular, this includes the graphical representation and annotation of the output of 3-D modelling programmes. The work of ISO/TC 10 is closely linked to that of ISO/TC 213 (see below) and the closest practicable liaisons are maintained, both at the policy-making level and between the working groups.

ISO/TC 213 is the Technical Committee responsible for the development of standards for Geometrical Product Specification (GPS). Its primary objective is the development and promotion of an integrated system for specification and verification of workpiece geometry that can function as an enhanced engineering tool for product development and manufacturing. Such a system is essential as companies move ahead rapidly with new technologies, new manufacturing processes, new materials and technically advanced products, in the previously referred to environment of “international outsourcing”.

This ISO Technical Report sets out the format and overall content of a specification for the preparation of all forms of technical product specification (TPS). It is designed to facilitate the development of national standards for the definition, specification and graphical representation of technical products and includes cross-references to a range of International Standards (the core range) judged to be essential to the achievement of international compatibility between such national standards. This core range of cross-referenced standards incorporates not only those prepared by ISO/TC 213 but also by other relevant ISO Technical committees, principally by ISO/TC 10. It is intended that this model be adopted, in its entirety, by national standards bodies as the basis for their national standards in the field of mechanical engineering specification. Attention is drawn to the fact that its structure provides for the addition of supplementary information by way of commentary and recommendation where national requirements make such addition appropriate, provided that any such additions are not in conflict with the published International Standards.

The relationship between the cross-referenced standards is formally structured within this Technical Report. Additionally, an overview of the international standardization of geometrical product specification, explaining the concept and providing a matrix of the relevant standards, may be found in ISO/TR 14638.

Standards developed in the field of GPS form an interrelated standards structure providing fundamental rules for geometrical specification (see Annex B, Figure B.1).

In ISO/TR 23605 the Geometrical Product Specification (GPS) standards are applied in conjunction with the presentational Technical Product Documentation (TPD) standards to construct a comprehensive system for “Technical Product Specification (TPS)”.

It is appropriate to apply TPS principles throughout the development of a product, i.e. in design, manufacturing, metrology and verification, and it will be found that consistent application will lead to reduced ambiguity and misunderstanding which in turn will provide faster, more controlled “release-to-market” times, with significantly fewer re-starts and reduced requirement for corrective action.

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# Technical product specification (TPS) — Application guidance — International model for national implementation

## 1 Scope

This Technical Report provides guidance for the preparation of all technical product specifications in the mechanical engineering field. The document operates as an index to the many ISO standards applicable to a TPS by means of cross-reference, and, where appropriate, the subject references are supplemented by commentary and recommendations considered to be of significance but which are not otherwise covered.

## 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 10209-1, *Technical product documentation — Vocabulary — Part 1: Terms relating to technical drawings: general and types of drawings* (standards.iteh.ai)

ISO 10209-2, *Technical product documentation — Vocabulary — Part 2: Terms relating to projection methods*

ISO 14660-1, *Geometrical Product Specifications (GPS) — Geometrical features — Part 1: General terms and definitions*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10209-1, ISO 10209-2, ISO 14660-1 and the following apply.

NOTE Access to a list GPS terms (in English) providing reference to the ISO document in which the term is defined or used (if not defined) is available via the ISO/TC 213 homepage at <http://isotc213.ds.dk>.

### 3.1

#### technical product documentation

##### TPD

means of conveying all or part of a design definition or specification of a product

### 3.2

#### technical product specification

##### TPS

technical product documentation comprising the complete design definition and specification of a product for manufacturing and verification purposes

NOTE 1 A TPS, which may contain drawings, 3-D models, parts lists or other documents forming an integral part of the specification, in whatever format they may be presented, may consist of one or more TPDs.

NOTE 2 Attention is drawn to the fact that although the application of ISO/TR 23605 is voluntary, any TPS referred to within contractual obligations will itself become a legal document.

## 4 Global Standards underpinning ISO/TR 23605

### 4.1 The GPS Matrix

The GPS Matrix (see Annex B) embodies the concept of “Global” standards that underpin or influence the whole Technical Product Specification process. This principle is adopted in ISO/TR 23605, and the following standards are identified as being “Global” standards for this purpose.

ISO 1, *Geometrical Product Specifications (GPS) — Standard reference temperature for geometrical product specification and verification*

ISO 10579, *Geometrical product specifications (GPS) — Dimensioning and tolerancing — Non-rigid parts*

ISO 14253-1, *Geometrical Product Specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 1: Decision rules for proving conformance or non-conformance with specifications*

ISO/TS 14253-2, *Geometrical Product Specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 2: Guide to the estimation of uncertainty in GPS measurement, in calibration of measuring equipment and in product verification*

ISO/TR 16015, *Geometrical product specifications (GPS) — Systematic errors and contributions to measurement uncertainty of length measurement due to thermal influences*

In addition, the principles addressed in the following documents are considered to underpin the provisions of this Technical Report:

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

ISO/IEC Guide 99:2007, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

NOTE Amendments to these documents are available from (To be added - sources not yet determined).

### 4.2 Standard reference temperature

The standard reference temperature for technical product specification and verification is 20 °C (see ISO 1).

## 5 Expression of the concept

Before specifying a technical product, the broad requirement should be established, with particular attention being paid to the functions that the product will be expected to fulfil. The conceptual design intent can then be depicted in the form of a design layout, scheme or simplified computer-generated model, although this will not normally be used in the detailed technical product document for manufacturing purposes.

The importance of this stage cannot be over-emphasized. Clear understanding of the purpose and function intended for the eventual product, knowledge of the requirements of the available manufacturing methods and awareness of relevant verification procedures will help to ensure that the degree of complexity of the specification is appropriate and adequate.

It is not the aim of this Technical Report to attempt to instruct or constrain the design process. It is, however, of the greatest importance that the designer present the product of the design process, i.e. the TPD set containing the technical product specification, in a manner that avoids ambiguity and any risk of misunderstanding or misinterpretation. For this reason, it is imperative that the designer be familiar with the guidance within this document and aware of the increased precision that its use can bring.

For these and many other reasons, management of the overall design process can be complex, and it is strongly recommended that designers familiarize themselves with published standards in this field.

## 6 Types of documentation

### 6.1 General

The technical product document should, if practicable, be of a type listed in one of the following standards and be prepared in accordance with any corresponding recommendations therein:

ISO 7573, *Technical product documentation — Parts lists*

ISO 10209-1, *Technical product documentation — Vocabulary — Part 1: Terms relating to technical drawings: general and types of drawings*

ISO 16792, *Technical product documentation — Digital product definition data practices*

### 6.2 Commentary and recommendations

#### 6.2.1 Combined drawing

For some TPS, it might be appropriate to display an assembly, item list and constituent details, drawn separately, all on the same drawing (see ISO/TS 8062-2).

#### 6.2.2 Document list (drawing list)

For some TPS, it may be appropriate to provide a list of all graphical representations and selected specifications required to build a particular assembly, from which it derives its title and primary identifier.

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## 7 Relationship between design definition and interpretation

### 7.1 Targeting of a TPD

When producing a TPD for manufacturing purposes, there can be benefits in giving consideration to how it will be interpreted:

- including more detail than is necessary for the manufacturing operation can increase the risk of misinterpretation;
- including requirements which are beyond the capability of the manufacturing process will lead to an increase in non-compliance.

### 7.2 Uncertainty of specification

However much care is invested in the preparation of a TPS, there will inevitably be areas of uncertainty, both within the specification and between the specification and the verification processes. To ensure that the uncertainty is minimized, the principles applied should conform to the following standards:

ISO/TS 17450-1, *Geometrical product specifications (GPS) — General concepts — Part 1: Model for geometrical specification and verification*

ISO/TS 17450-2, *Geometrical product specifications (GPS) — General concepts — Part 2: Basic tenets, specifications, operators and uncertainties*

## 8 Presentation media

The presentation of the drawings should conform to the following standards:

ISO 5457, *Technical product documentation — Sizes and layout of drawing sheets*

ISO 7200, *Technical product documentation — Data fields in title blocks and document headers*

## 9 Scales

Scales should conform to:

ISO 5455, *Technical drawing — Scales*

## 10 Lines, arrows and terminators

### 10.1 Lines

Lines should conform to the following standards, as appropriate:

ISO 128-1, *Technical drawings — General principles of presentation — Part 1: Introduction and index*

ISO 128-20, *Technical drawings — General principles of presentation — Part 20: Basic conventions for lines*

ISO 128-21, *Technical drawings — General principles of presentation — Part 21: Preparation of lines by CAD systems*

ISO 128-22, *Technical drawings — General principles of presentation — Part 22: Basic conventions and applications for leader lines and reference lines*

ISO 128-24, *Technical drawings — General principles of presentation — Part 24: Lines on mechanical engineering drawings*

ISO 128-25, *Technical drawings — General principles of presentation — Part 25: Lines on shipbuilding drawings*

### 10.2 Arrows and terminators

Arrows and terminators composed of lines should conform to:

ISO 129-1, *Technical drawings — Indication of dimensions and tolerances — General principles*

## 11 Lettering

Lettering should conform to:

ISO 3098-0, *Technical product documentation — Lettering — Part 0: General requirements*

and to the following standards, as appropriate:

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

ISO 3098-3, *Technical product documentation — Lettering — Part 3: Greek alphabet*