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Geometrical product specifications (GPS) — Types of documents with GPS

Spécification géométrique des produits (GPS) — Types de documents avec les GPS

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

Introduction

This document is a geometrical product specifications (GPS) standard and is to be regarded as a fundamental GPS standard (see ISO 14638). It influences all chain links of all chains of general GPS standards (see Annex A for further information).

The ISO/GPS Matrix model given in ISO 14638 gives an overview of the ISO/GPS system of which this document is a part. The fundamental rules of ISO/GPS given in ISO 8015 apply to this document and the default decision rules given in this document apply in ISO/GPS, unless otherwise indicated.

Traditionally, functional requirements, manufacturing requirements and verification requirements are mixed up in one and the same specification. Furthermore, the basic function of a part may be jeopardized when changing the manufacturing and/or the verification process.

Consequently, the functional requirements may not be identified easily and, furthermore, traceability to functional needs often gets obscured or impossible to derive.

Therefore, it is necessary to provide a structure to organize the mindset of the involved stakeholders (such as designers, process engineers, verifiers, purchasers and suppliers). The design intent as expressed in the functional specification is imperative and constitutes the master for all subsequent specifications.

This document provides such a structure for documents with GPS, thus enabling:

— easier communication;

— clear distinction between the three basic types of specifications applied;

— improved contractual reliability.

Geometrical product specifications (GPS) — Types of documents with GPS

1 Scope

This document specifies the basic types of documents with geometrical product specifications (GPS), their relationship and their related terms and definitions.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Technical product documentation — Vocabulary — Terms relating to technical drawings, product definition and related documentation*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
designer
party who defines and specifies a *component* (3.6), a *sub-assembly* (3.5) or an *assembly* (3.4)

3.2
manufacturer
party who produces a *component* (3.6), a *sub-assembly* (3.5) or an *assembly* (3.4)

3.3
verifier
party proving conformity of a *component* (3.6), a *sub-assembly* (3.5) or an *assembly* (3.4)

3.4
assembly
set of one or more *sub-assemblies* (3.5) or *components* (3.6) constituting a single end-use product

3.5
sub-assembly
set of more than one *component* (3.6) intended to be assembled together with other such sets or components

3.6
component
constituent part of equipment that cannot be physically divided into smaller parts without losing its character

3.7
specification
document stating requirements

Note 1 to entry: "Document" in this document can be, for example, a drawing or digitized information.

[SOURCE: ISO 9000:2015, 3.8.7, modified – Note 1 to entry has been replaced; Note 2 to entry has been removed.]

3.8
functional specification
FUN-SPEC
document stating functional requirements

3.9
manufacturing specification
MAN-SPEC
document stating manufacturing-process-related requirements

3.10
verification specification
VERI-SPEC
document stating verification-process-related requirements

3.11
contractual specification
CON-SPEC
specification (3.7) made part of a contract between two parties

4 Basic concepts

4.1 General

The following basic types of specifications exist in GPS:

— Functional specification (FUN-SPEC);

— Manufacturing specification (MAN-SPEC);

— Verification specification (VERI-SPEC).

All basic types of specifications can exist in the following three levels (see Table 1):

— assembly;

— sub-assembly;

— component.

Table 1 — Types and levels of specifications

Level	Types of specifications related to:		
	Function	Manufacturing	Verification
General	FUN-SPEC	MAN-SPEC	VERI-SPEC (F) VERI-SPEC (M)
Assembly	FUN-SPEC-ASM	MAN-SPEC-ASM	VERI-SPEC (F)-ASM VERI-SPEC (M)-ASM
Sub-assembly	FUN-SPEC-SUB	MAN-SPEC-SUB	VERI-SPEC (F)-SUB VERI-SPEC (M)-SUB
Component	FUN-SPEC-COM	MAN-SPEC-COM	VERI-SPEC (F)-COM VERI-SPEC (M)-COM

The functional specification (FUN-SPEC) of the assembly is the master specification for the functional sub-assembly specification(s) (FUN-SPEC-SUB) and the functional component specification(s) (FUN-SPEC-COM).

All functional specifications in the three levels are master specifications for the manufacturing specification and the verification specification.

All three types of specifications can be used in a contract. This specification shall then be fulfilled, independent of which type of specification it is, independent of whether the supplier knows which type it is or not and independent of whether the supplier is internal or external.

4.2 Functional specification (FUN-SPEC)

Typically, the designer is the sole party responsible for the three levels of FUN-SPECs. A FUN-SPEC specifies all the intended functions of the assembly, sub-assembly or component by emulating functions by means of tolerancing independent of manufacturing and verification.

Ideally, the FUN-SPEC should not state any requirements on how to manufacture, in which sequence, and which equipment to use. It should be up to the manufacturer to decide this.

4.3 Manufacturing specification (MAN-SPEC)

One or more MAN-SPECs can be derived from the FUN-SPEC, for example taking into account detailed knowledge of the capabilities of the manufacturing processes.

The party who transforms the FUN-SPEC to the MAN-SPEC(s) is responsible for ensuring a sufficiently low transformation ambiguity related to the transformation.

It is recognized that this process may transform requirements in the FUN-SPEC into modified requirements on one or more MAN-SPECs based on an economical and/or technical evaluation covering different manufacturing operations, if required (see Figure 2). However, the transformation process from FUN-SPEC to MAN-SPECs shall respect the rule that conformity with the combination of MAN-SPECs will always result in conformity with the FUN-SPEC, i.e. the transformation ambiguity shall be taken into account when determining the requirement on the MAN-SPEC.

Interrelated MAN-SPECs covering different manufacturing operations may differ from the FUN-SPEC, but when the final operation is performed, the FUN-SPEC shall be met.

However, a MAN-SPEC or a combination of MAN-SPECs can never supersede or alter a FUN-SPEC (the master), therefore, the FUN-SPEC shall always be maintained for reference and never be deleted for any reason.