SLOVENSKI STANDARD
oSIST prEN ISO 22432:2010

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Specifikacija geometrijskih veličin izdelka - Potrebne značilnosti za geometrijsko specifikacijo in preverjanje (ISO/DIS 22432:2007)

Geometrical product specifications (GPS) - Features utilized in specification and verification (ISO/DIS 22432:2007)

Geometrische Produktspezifikation (GPS) - Zur Spezifikation und Prüfung benutzte Geometrieelemente (ISO/DIS 22432:2007)

Spécification géométrique des produits - Éléments utilisés en spécification et vérification (ISO/DIS 22432:2007)

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Geometrical product specifications (GPS) - Features utilized in specification and verification (ISO/DIS 22432:2007)

Spécification géométrique des produits - Éléments utilisés en spécification et vérification (ISO/DIS 22432:2007)

This draft European Standard is submitted to CEN members for parallel enquiry. It has been drawn up by the Technical Committee CEN/TC 290.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Foreword

This document (prEN ISO 22432:2007) has been prepared by Technical Committee ISO/TC 213 "Dimensional and geometrical product specifications and verification" in collaboration with Technical Committee CEN/TC 290 "Dimensional and geometrical product specification and verification", the secretariat of which is held by AFNOR.

This document is currently submitted to the parallel Enquiry.

Endorsement notice

The text of ISO/DIS 22432:2007 has been approved by CEN as prEN ISO 22432:2007 without any modifications.

DRAFT INTERNATIONAL STANDARD ISO/DIS 22432

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Geometrical product specifications (GPS) — Features utilized in specification and verification

Spécification géométrique des produits — Éléments utilisés en spécification et vérification

ICS 17.040.01

ISO/CEN PARALLEL ENQUIRY

The CEN Secretary-General has advised the ISO Secretary-General that this ISO/DIS covers a subject of interest to European standardization. **In accordance with the ISO-lead mode of collaboration as defined in the Vienna Agreement, consultation on this ISO/DIS has the same effect for CEN members as would a CEN enquiry on a draft European Standard.** Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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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.

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 or all such patent rights.

ISO 22432 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification (GPS)*.

Introduction

This International standard is a Geometrical Product Specifications (GPS) standard and is to be regarded as a global GPS standard (see ISO/TR 14638). It influences all chain links in all chain of standards in the general GPS matrix.

NOTE To facilitate the reading and the understanding of this standard it is essential to refer to ISO/TS 17450-1 and ISO/TS 17450-2.

Geometrical features exist in three “worlds”:

— the world of nominal definition, where an ideal representation of the workpiece is defined by the designer;

— the world of specification, where the designer has in mind several representations of the workpiece;

— the world of verification, where a (or more) representation(s) of a given workpiece is (are) identified in the application of measuring procedure(s).

In the world of verification, mathematical operations can be distinguished from physical operations. The physical operations are the operations based on physical procedures, they are generally mechanical, optical or electromagnetic. The mathematical operations are mathematical treatments of the sampling of the workpiece. This treatment is generally achieved by computing or electronic treatment.

It is important to understand the relationship between these three worlds. ISO 22432 defines standardized terminology for geometrical features principally in the world of specification and the world of verification. Furthermore, it defines standardized terminology for the communication between each world.

The features defined in this document are well suited for specification of rigid parts and assemblies and may also be applied to non-rigid parts and assemblies by specifying allowable variation according to rigid solids.

Geometrical Product Specifications (GPS) — Features utilized in specification and verification

1 Scope

This International standard defines general terms and types of features for geometrical features of specifications for workpieces. These definitions are based on concepts developed in ISO/TS 17450-1 and they are given by using a mathematical description based on annex B of ISO/TS 17450-1.

This International standard is not intended for industrial use as such among designers, but is aimed to serve as the "road map" mapping out the interrelationship between geometrical features, thus enabling future standardisation for industry and software makers in a consistent manner.

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/TS 17450-1:1999, *Geometrical product specifications (GPS) — General concepts — Part 1 : Model for geometric specification and verification*

ISO/DTS 16610-1, *Geometrical product specifications (GPS) — Filtration — Part 1: Overview and basic concepts*

3 Terms and definitions

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

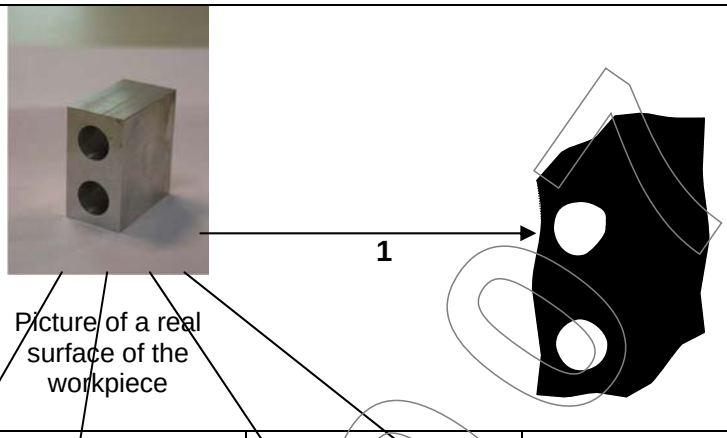
3.1
real surface of a workpiece

[TS 17450-1]

3.2
surface model
model of the real surface of the workpiece

NOTE 1 The surface model is a closed surface representing the complete interface of the workpiece with its environment (see Figures 1 and A.1)

NOTE 2 The surface model allows the definition of single features, sets of features, and/or portions of features. The total product is modelled by a set of surface models corresponding to every workpiece.



Surface model	a) nominal surface model	b) skin model	c) discrete surface model	d) sampled surface model
	2	2	2	2

Key

1 representation of the real workpiece for the purpose of this standard

NOTE It is impossible to predict the total geometry of the real workpiece due to its geometrical imperfections. In this document, a real surface of the workpiece is illustrated in solid black.

2 Representation of models of the real surface of a workpiece.

Figure 1 — Example of real surface of workpiece and its models

3.2.1
nominal surface model
surface model of ideal geometry defined by the technical product documentation

NOTE 1 A nominal surface model is an ideal feature (See Figure 1 and Table 1)

NOTE 2 A nominal surface model is a continuous surface constituted by an infinite number of points.

3.2.2
skin model
surface model of non-ideal geometry.

NOTE 1 The skin model is a virtual model used to express the specification operator and the verification operator considering a continuous surface (See Table 1 and ISO/TS 17450-1).

NOTE 2 A skin model is a non-ideal feature (See Figure 1).

NOTE 3 A skin model is a continuous surface constituted by an infinite number of points.

NOTE 4 The nesting index (See ISO/DTS 16610-1) of the skin model is equal to zero

3.2.3
discrete surface model
surface model obtained from the skin model by an extraction

NOTE 1 In addition to the required points, the extraction implies a interpolation.

NOTE 2 The discrete surface model is used to express the specification operator and the verification operator considering a finite number of points (See Table 1).

NOTE 3 A discrete surface model is a non-ideal feature (See Figure 1).

NOTE 4 A discrete surface model is a feature constituted by a finite number of points. The higher the number of points is, the lower the nesting index is. When the nesting index tends towards zero, the discrete surface model tends towards the skin model.

3.2.4
sampled surface model
approximation of the discrete surface model obtained by sampling of the workpiece with measuring instruments

NOTE 1 In addition to the sampled points, the verification may imply an interpolation.

NOTE 2 The sampled surface model is used in verification by co-ordinate metrology, not, for example in verification by gauge because there is no measurement of points. In verification by gauge, the real surface of the workpiece is directly considered (See Table 1).

NOTE 3 A sampled surface model is a non-ideal feature (See Figure 1).

NOTE 4 A sampled surface model is a feature constituted by a finite number of points. The lower the number of points is, the higher the nesting index is.

3.3
geometric entity
entity consisting of a finite or infinite set of points

NOTE 1 A geometric entity can represent a point, a line, a surface, a volume, or a set of these previous items.

NOTE 2 The non-ideal surface model is a particular geometric entity, corresponding to the infinite set of points defining the interface between the workpiece and the surrounding.

3.3.1
ideal feature

[ISO/TS 17450-1]

3.3.2
non-ideal feature

[ISO/TS 17450-1]

3.3.3
nominal feature
geometric entity of ideal geometry defined in the technical product documentation by the product designer.

NOTE 1 A nominal feature is defined by TPD (See Table 1).

NOTE 2 A nominal feature can be finite or infinite, by default it is infinite. When finite, it is called nominal integral feature.

NOTE 3 See B.1.

EXAMPLE a perfect cylinder defined in a drawing is a nominal feature.

3.3.4
specification feature
geometric entity identified from the skin model or from the discrete surface model and defined by the specification operator.

NOTE See Table 1 and B.2.

EXAMPLE 1 In the process of specification, a perfect cylinder identified from the skin model by an association is an ideal specification feature.

EXAMPLE 2 In the process of specification, an imperfect cylindrical surface identified from the skin model by a partition is a non-ideal specification feature

3.3.5
verification feature
geometrical entity (identified from the skin model, the discrete surface model or the sampled surface model) or real feature defined by the verification operator

NOTE 1 See Table 1 and B.3.

NOTE 2 Geometrical entity identified from the skin model or from the discrete surface model is used to define the verification operator. Geometrical entity identified from the sampled surface model and the real feature are used to implement the verification operator

EXAMPLE 1 In the process of verification, a perfect cylinder identified from the workpiece by an association is an ideal verification feature.

EXAMPLE 2 In the process of verification, an imperfect cylindrical surface identified from the workpiece by a partition is a non-ideal verification feature.

Table 1 — Use of surface models

	Surface model				Real surface
	Nominal surface model	Skin model	Discrete surface model	Sampled surface model	
TPD		Non applicable	Non applicable	Non applicable	Non applicable
Specification Operator	Non applicable			Non applicable	Non applicable
Verification Operator	Non applicable				

3.3.6
single feature
geometric entity which is a single point, a single line, or a single surface

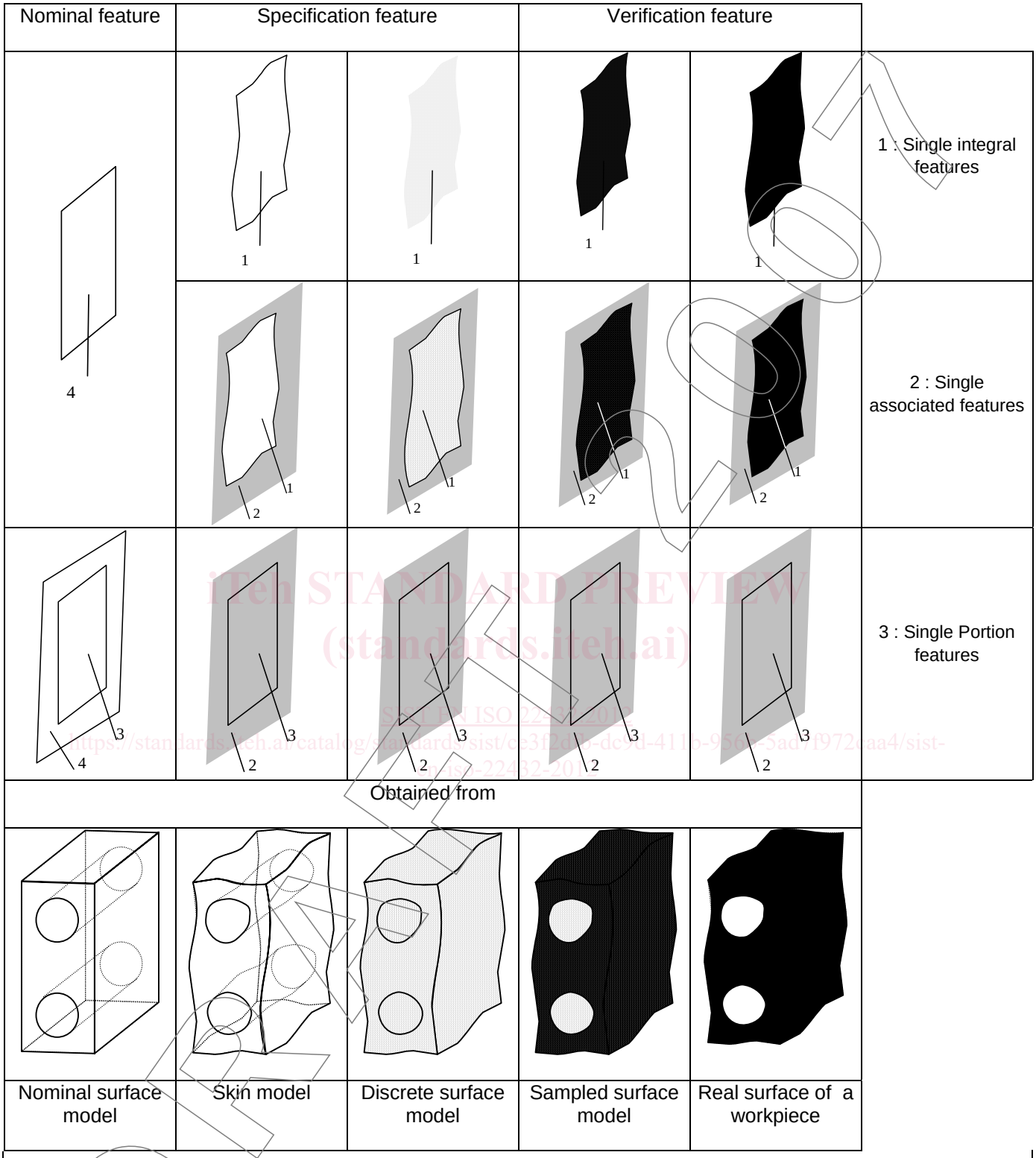
NOTE A single feature can have none, one or more intrinsic characteristics, e.g.:

— a plane is a single feature, has no intrinsic characteristic;

— a cylinder has only one intrinsic characteristic;

— a torus has two intrinsic characteristics

EXAMPLE A cylinder is a single feature (See Figure 2 and Figure 3). A set of surfaces made up of two intersecting planes is not a single feature, because one plane has a greater invariance degree than the two planes (see definition in ISO/TS 17450-1)



Key

1 Single integral features.
2 Single associated features
3 Single Portion features
4 Single nominal features

Figure 2 — Example of different specification or verification single features build from a workpiece or surface models for the same nominal plane

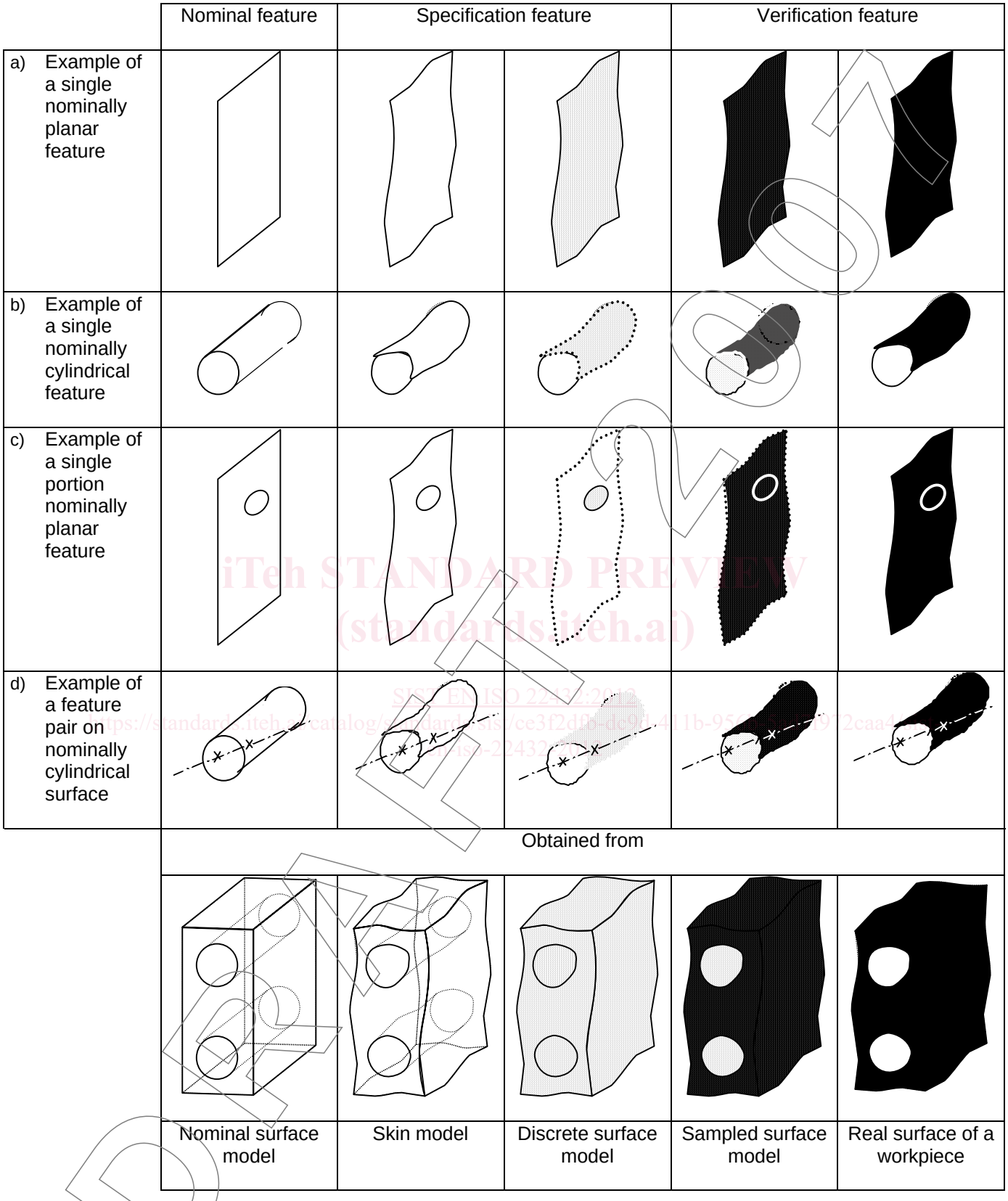


Figure 3 — Specification or verification single feature build from a workpiece or surface models

3.3.6.1
single point
geometric entity which is an isolated point