INTERNATIONAL STANDARD

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Geometrical Product Specifications (GPS) — Series of angles and slopes on prisms

Spécification géométrique des produits (GPS) — Séries d'angles et d'inclinaisons de prismes

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.

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.

International Standard ISO 2538 was prepared by the Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

This second edition cancels and replaces the first edition (ISO 2538:1974), of which the tables have been corrected and updated, but not technically modified.

Annexes A and B of this International Standard are for information only.

Introduction

This International Standard is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences chain links 1 and 2 of the chain of standards on angle.

For more detailed information of the relation of this International Standard to other standards and the GPS matrix model, see annex A.

Geometrical Product Specifications (GPS) — Series of angles and slopes on prisms

1 Scope

This International Standard specifies two series of prism angles from 120° to 0° 30' and a series of prism slopes from 1:10 to 1:500, for general mechanical engineering purposes.

2 Definitions

For the purposes of this International Standard, the following definitions apply.

2.1
prism
part of a piece which is limited by two intersecting planes

See figure 1.

NOTE — Both planes are termed "prism planes". When these are intended for fits, they are termed "mating planes for the prism".

2.2
multiple prism
part of a piece which is limited by several pairs of intersecting planes

See figure 2.

NOTES

1   A double prism is limited by two pairs of intersecting planes.

2   When the intersection of each pair of planes is a point, the multiple prism is a pyramid (see figure 3).

2.3
wedge
prism with a small angle

2.4
slide prism
vee-block
dovetail
typical prism with a large angle

NOTE — These special prisms are used, for example, as a slideway on machine tools (see figures 4 and 5).

2.5
prism angle
β
angle at which both prism planes intersect each other

See figure 1.

NOTE — The angle between the mating surfaces for prism is called "mating angle for prism".

2.6
prism slope
S
ratio of the difference between the heights H and h in two determined cross-sections to the distance L between both cross-sections

$$S = \frac{H - h}{L} = \tan\beta$$

See figure 6.

2.7
rate of prism
C_P
ratio of the difference between the thicknesses T and t in two determined cross-sections to the distance L between both cross-sections

$$C_P = \frac{T - t}{L} = 2\,\tan\frac{\beta}{2}$$

See figure 7.

2.8
prism edge
theoretical intersection line of both prism planes

2.9
centre plane of prism
E_M
plane passing through the prism edge which bisects the prism angle β

2.10
height of prism
height measured at a given cross-section which is parallel to the edge and perpendicular to one prism plane

See figure 6.

2.11
thickness of prism
thickness measured at a given cross-section which is parallel to the edge and perpendicular to the prism centre plane

See figure 7.

2

3 Values

Angle series 1 and 2 as specified in table 1 are to be used in this order of preference.

Table 2 is only to be used for special applications as mentioned in the last column.

Table 3 shows the calculated values for slope and angle respectively and rate, corresponding to each recommended prism angle and prism slope.

Table 1 — General purpose prisms

Prism angle				Prism slope
Series 1		Series 2		
β	$\beta/2$	β	$\beta/2$	S
120°	60°	—	—	—
90°	45°	—	—	—
—	—	75°	37° 30'	—
60°	30°	—	—	—
45°	22° 30'	—	—	—
—	—	40°	20°	—
30°	15°	—	—	—
20°	10°	—	—	—
15°	7° 30'	—	—	—
—	—	10°	5°	—
—	—	8°	4°	—
—	—	7°	3° 30'	—
—	—	6°	3°	—
—	—	—	—	1:10
5°	2° 30'	—	—	—
—	—	4°	2°	—
—	—	3°	1°	—
—	—	—	—	1:20
—	—	2°	1°	—
—	—	—	—	1:50
—	—	1°	0° 30'	—
—	—	—	—	1:100
—	—	0° 30'	0° 15'	—
—	—	—	—	1:200
—	—	—	—	1:500

Table 2 — Special purpose prisms

Prism angle		Application
β	$\beta/2$	
108°	54°	Vee-blocks
72°	36°	Vee-blocks
50°	25°	Dovetails

Table 3 — Calculated values

| Basic value		Calculated value		
β	S	C_P	S	β
120°	—	1:0,288 675	—	—
108°	—	1:0,363 271	—	—
90°	—	1:0,500 000	—	—
75°	—	1:0,651 613	1:0,267 949	—
60°	—	1:0,866 025	1:0,577 350	—
50°	—	1:1,072 253	1:0,839 100	—
45°	—	1:1,207 107	1:1,000 000	—
40°	—	1:1,373 739	1:1,191 754	—
30°	—	1:1,866 025	1:732 051	—
20°	—	1:2,835 641	1:2,747 477	—
15°	—	1:3,797 877	1:3,732 051	—
10°	—	1:5,715 026	1:5,671 282	—
8°	—	1:7,150 333	1:7,115 370	—
7°	—	1:8,174 928	1:8,144 346	—
6°	—	1:9,540 568	1:9,514 364	—
—	1:10	—	—	5°42'38,1"
5°	—	1:11,451 883	1:11,430 052	—
4°	—	1:14,318 127	1:14,300 666	—
3°	—	1:19,094 230	1:19,081 137	—
—	1:20	—	—	2°51'44,7"
2°	—	1:28,644 981	1:28,636 253	—
—	1:50	—	—	1°8'44,7"
1°	—	1:57,294 325	1:57,289 962	—
—	1:100	—	—	34'22,6"
0°30'	—	1:114,590 832	1:114,588 650	—
—	1:200	—	—	17'11,3"
—	1:500	—	—	6'52,5"
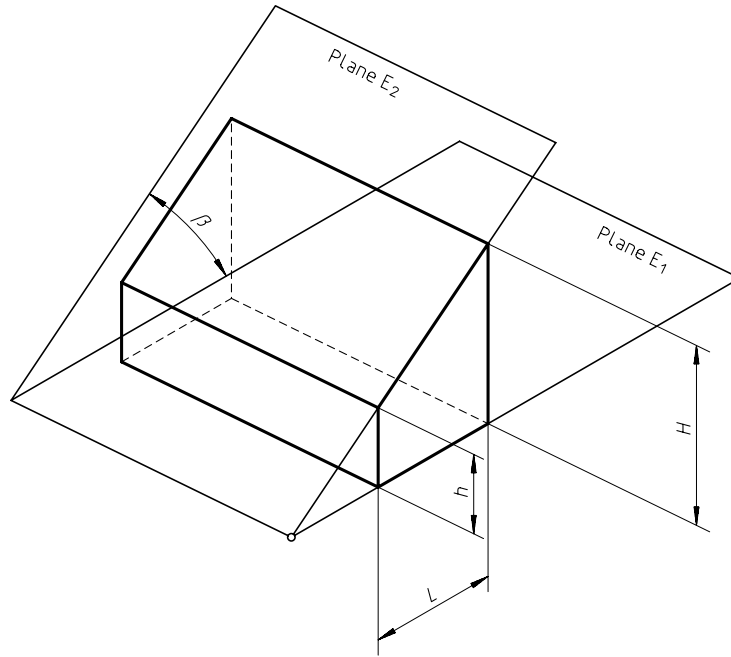
Figure 1 — Prism or wedge
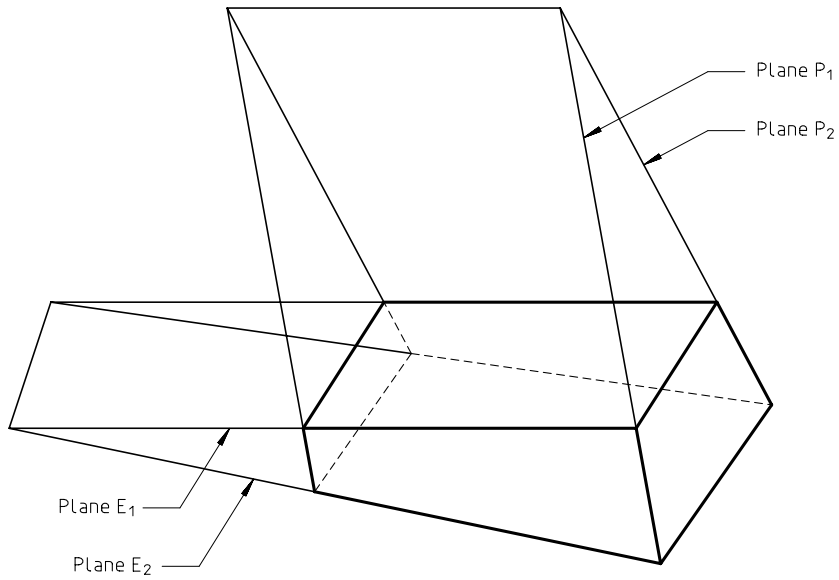
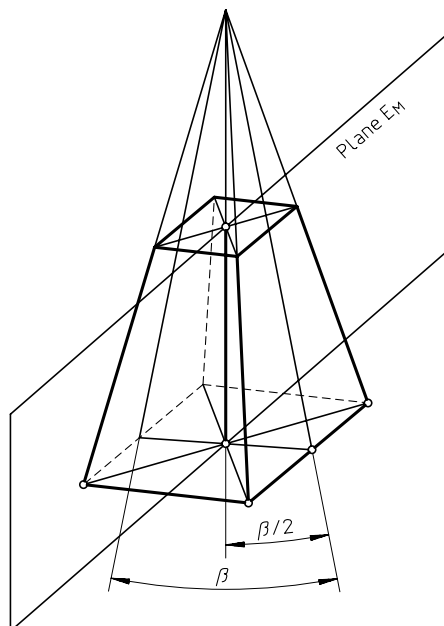**Figure 2 — Multiple (double) prism**
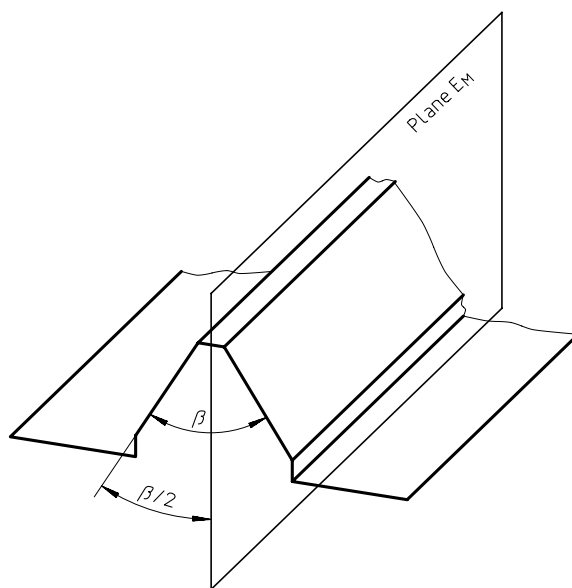
Figure 3 — Double prism (pyramid)

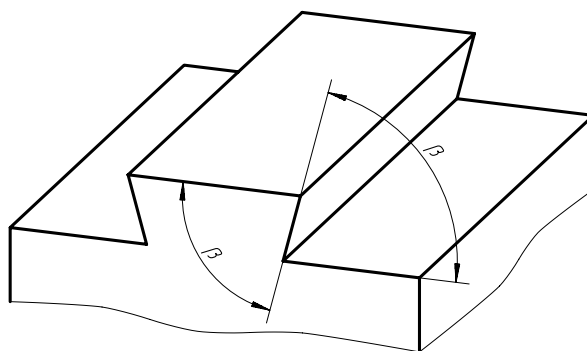**Figure 4 — Slide prism or vee-block**
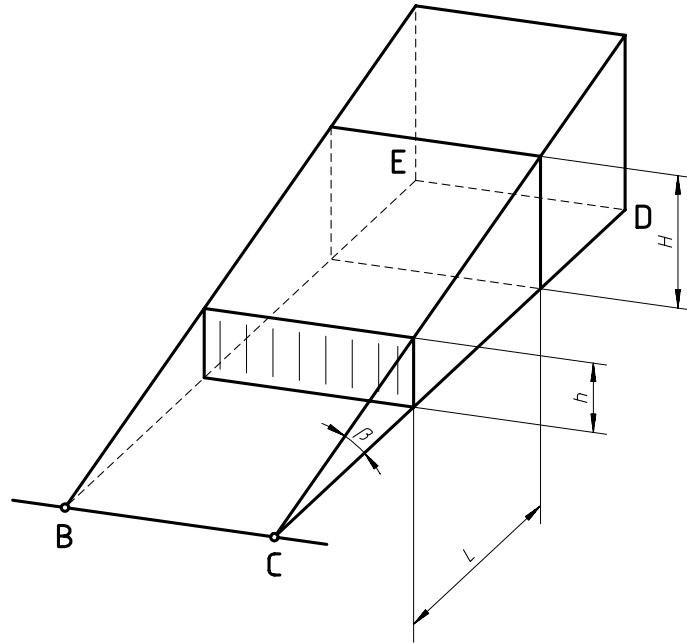

Figure 5 — Prism or dovetail

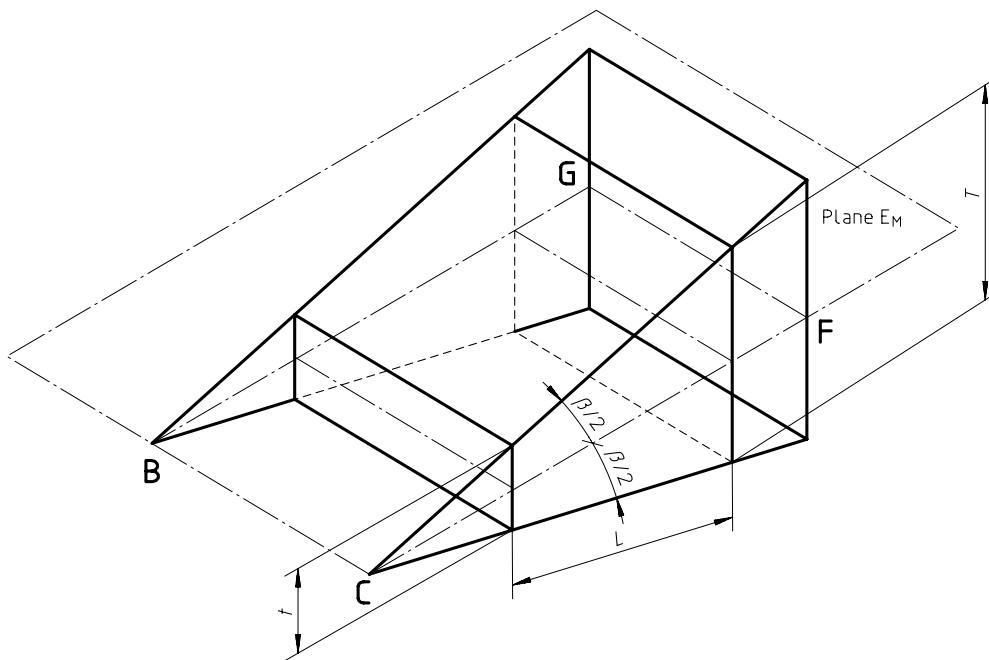**Figure 6 — Height of prism**

Figure 7 — Thickness of prism

Annex A
(informative)

Relation to the GPS matrix model

For full details about the GPS matrix model see ISO/TR 14638.

A.1 Information about the standard and its use

This International Standard on conical tapers covers definitions of parameters and corresponding values for some applications. It should be completed by standards covering chain links 3 to 6 in order to allow an unambiguous understanding.

A.2 Position in the GPS matrix model

This International Standard is a general GPS standard, which influences chain link 1 and 2 of the chain of standards on angle in the general GPS matrix, as illustrated in figure A.1.

Fundamental GPS standards	Global GPS standards					
	General GPS matrix					
	Chain link number	**1**	**2**	**3**	**4**	**5**	**6**
	Size						
	Distance						
	Radius						
	Angle						
	Form of line independent of datum						
	Form of line dependent on datum						
	Form of surface independent of datum						
	Form of surface dependent on datum						
	Orientation						
	Location						
	Circular run-out						
	Total run-out						
	Datums						
	Roughness profile						
	Waviness profile						
	Primary profile						
	Surface imperfections						
	Edges						

Figure A.1

A.3 Related standards

The related standards are those of the chains of standards indicated in figure A.1.

Annex B
(informative)

Bibliography

[1]   ISO/TR 14638:1995, *Geometrical product specifications (GPS) — Masterplan*.