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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Synchronous belt drives — Automotive belts

Transmissions synchrones par courroies — Courroies pour la construction automobile

Reference number
ISO 9010 : 1987 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 9010 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts).*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Synchronous belt drives — Automotive belts

1 Scope and field of application

This International Standard specifies the principal characteristics of synchronous endless belts for use in automotive applications such as engine camshaft drives.

The principal characteristics include

a) nominal tooth dimensions;

b) pitch spacing;

c) width tolerances;

d) pitch length tolerances;

e) pitch length measuring specifications.

2 Belt types

Two belt types for synchronous drives for automotive application are standardized :

— type ZA light-duty automotive belt;

— type ZB heavy-duty automotive belt.

Both types of belt are characterized by their tooth dimensions (profile), the pitch p_b being 9,525 mm [1].

3 Designation

A belt is designated by a series of numbers and letters as follows :

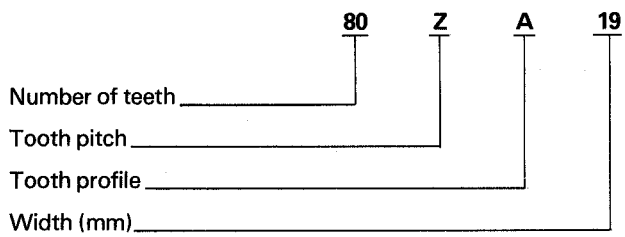
a) the first set of numbers indicates the number of teeth;

b) the first letter indicates tooth pitch;

c) the second letter indicates tooth profile;

d) the second set of numbers indicates the width in millimetres.

Example :



1) Carried to the third decimal place because belt pitch is a defined value.

4 Dimensions and tolerances

4.1 Belt tooth dimensions

The nominal belt tooth dimensions are shown in figure 1 and given in table 1.

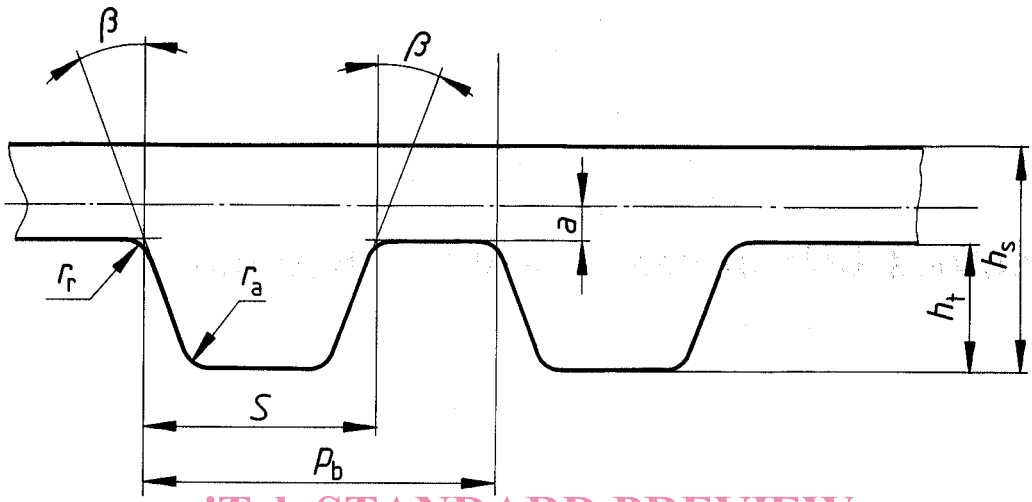


Figure 1 — Nominal tooth dimensions (profile)

Table 1 — Nominal tooth dimensions

Dimensions in millimetres, angle in degrees

Term	Symbol	Nominal profile	
		Type ZA	Type ZB
Pitch	p_b	9,525	9,525
Tooth angle	2β	40	40
Height	h_s	4,1	4,5
Pitch line differential	a	0,686	0,686
Root radius	r_r	0,51	1,02
Tip radius	r_a	0,51	1,02
Tooth height	h_t	1,91	2,29
Tooth width	S	4,65	6,12

4.2 Belt pitch length and tolerances

The number of teeth, z, i.e., the belt pitch length, L_p, shall be agreed between the parties concerned. Pitch length tolerances are given in table 2.

Table 2 — Pitch length tolerances

Dimensions and tolerances in millimetres

Number of teeth z	Belt pitch length L_p	
	Range	Tolerance
$z \leqslant 40$	$L_p \leqslant 381$	± 0,45
$41 \leqslant z \leqslant 53$	$390{,}525 \leqslant L_p \leqslant 504{,}825$	± 0,5
$54 \leqslant z \leqslant 80$	$514{,}35 \leqslant L_p \leqslant 762$	± 0,6
$81 \leqslant z \leqslant 104$	$771{,}525 \leqslant L_p \leqslant 990{,}6$	± 0,65
$105 \leqslant z \leqslant 128$	$1\,000{,}125 \leqslant L_p \leqslant 1\,219{,}2$	± 0,75
$129 \leqslant z \leqslant 160$	$1\,228{,}725 \leqslant L_p \leqslant 1\,524$	± 0,8
$161 \leqslant z \leqslant 187$	$1\,533{,}525 \leqslant L_p \leqslant 1\,781{,}175$	± 0,85
$188 \leqslant z \leqslant 213$	$1\,790{,}7 \leqslant L_p \leqslant 2\,028{,}825$	± 0,9
$214 \leqslant z \leqslant 240$	$2\,038{,}35 \leqslant L_p \leqslant 2\,286$	± 0,95
$241 \leqslant z \leqslant 267$	$2\,295{,}525 \leqslant L_p \leqslant 2\,543{,}175$	± 1

4.3 Belt widths and tolerances

The belt width, b_s, shall be agreed between the parties concerned. Width tolerances are given in table 3.

Table 3 — Width tolerances

Dimensions and tolerances in millimetres

Width, b_s		
Range	Tolerances	
	Range of belt pitch lengths	
	$L_p < 840$ ($z < 88$)	$L_p \geqslant 840$ ($z \geqslant 89$)
$b_s < 40$	± 0,8	± 0,8
$b_s \geqslant 40$	± 0,8	+ 0,8 − 1,3

NOTE — For special applications, smaller tolerances can be adopted.

5 Pitch length measurement

5.1 Measuring fixture (see figure 3)

The pitch length of a synchronous belt shall be determined by placing the belt on a measuring fixture composed of the following elements.

5.1.1 Two pulleys of equal diameter, as specified in table 4, of the proper belt type and having standard tooth space dimensions. These pulleys should be made to the tolerances shown in table 4 and have the proper clearance, C_m, between the pulley tooth space and the theoretical belt tooth width as specified in table 4 (see figure 2). One pulley shall be free to rotate on a fixed-position shaft, while the other shall be free to rotate on a movable shaft to permit the centre distance to change.

5.1.2 Means of applying a total measuring force to the movable pulley.

5.1.3 Means of measuring the centre distance between the two pulleys with the necessary degree of accuracy to check the allowed tolerances (tolerances for centre distance measurement should be one-half of the allowed length tolerances in table 2).

5.2 Total measuring force

The total measuring force, F_t, to be applied for measuring belts shall be calculated as follows:

$$F_t = (b_s \times 29) - 100$$

where

b_s is the width in millimetres;

F_t is the total force, in newtons.

5.3 Procedure

In measuring the pitch length of a synchronous belt, the belt should be rotated at least two revolutions to seat it properly and to divide the total force equally between the two lengths of the belt.

The pitch length shall be calculated by adding the pitch circumference of one of the pulleys to twice the measured centre distance.

Table 4 — Belt pitch length measuring pulleys

Pitch code	Number of teeth z	Pitch circumference $p_b \times z$	Outside diameter d_o	Runout radial	Runout axial	Clearance C_m	h_g	r_b	r_t	$2a$	θ
		mm	mm	mm	mm	mm	mm	mm	mm	mm	degrees
ZA	20	190,5	59,266 ± 0,013	0,013	0,025	0,33	2,68 ± 0,1	0,85 ± 0,1	0,85 ± 0,1	1,372	20 ± 1,5
ZB	20	190,5	59,266 ± 0,013	0,013	0,025	0,38	3 ± 0,1	1,23 ± 0,1	1,23 ± 0,1	1,372	20 ± 1,5

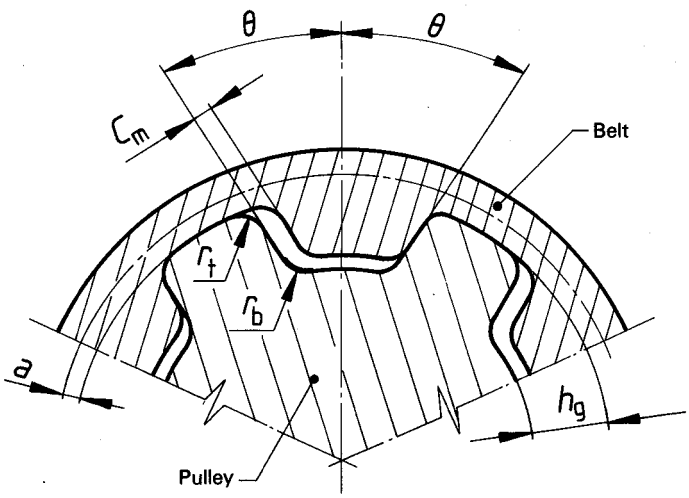


Figure 2 — Clearance between measuring pulley and belt

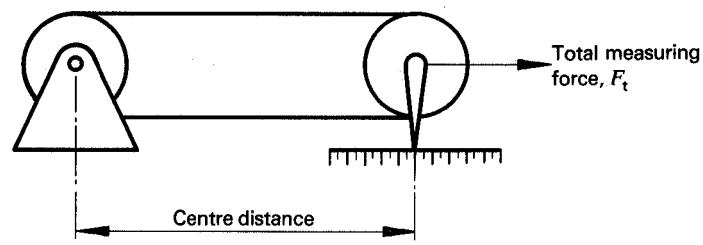


Figure 3 — Pitch length measuring fixture

UDC 621.85.052.44 : 629.11

Descriptors : road vehicles, internal combustion engines, belt drives, synchronous transmission, belts, snychronous belts, dimensions, dimensional measurements, designation.

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