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Belt drives — Pulleys — Limiting values for adjustment of centres

Transmissions par courroies — Poulies — Limites de réglage d'entraxe

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Foreword

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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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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, Subcommittee SC 1, *Friction*.

This fourth edition cancels and replaces the third edition (ISO 155:1998), which has been technically revised. The main changes compared to the previous edition are as follows:

— adding of curvilinear sections to Table 6;

— editorial clarifications of the document.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Belt drives — Pulleys — Limiting values for adjustment of centres

1 Scope

This document specifies the limiting values for the adjustment of centres of two transmission pulleys.

It is applicable to:

— crowned pulleys for flat belts;

— grooved pulleys for V-belts, either single, multiple or joined;

— grooved pulleys for V-ribbed belts;

— toothed pulleys for synchronous belts.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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/

4 Symbols

For the purpose of this document, the following symbols apply.

Symbol	Definition	Unit
$d \pm \delta_1$	Limits of small flat pulley diameter	mm
$D \pm \delta_2$	Limits of large flat pulley diameter	mm
e	Groove pitch of a V-ribbed pulley	mm
E	Nominal centre distance	mm
$E - i$	Lower limit for the adjustment of centre distance	mm
$E + s$	Upper limit for the adjustment of centre distance	mm
i_1	Factor related to the pulley dimensions and tolerances	—
i_2	Factor related to belt length tolerances	—
L	Nominal belt length	mm

p_b	Pitch of synchronous belt teeth	mm
s_1	Factor related to the pulley dimensions and tolerances	—
s_2	Factor related to belt length tolerances	—
s_3	Factor related to flat pulley crowning	—
s_4	Factor related to elastic properties of the belt	—
W_d	Datum width of a V-groove	mm
W_e	Effective width of a V-groove	mm

5 Specifications

Limiting values for adjustment of centre distance are specified in terms of factors *i* and *s* which are respectively subtracted from and added to the nominal centre distance, *E* (see Figure 1).

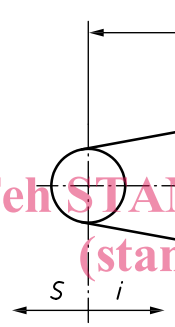

Figure 1 — Limiting values for adjustment of centre distance of pulleys

Values of *i* and *s* shall be rounded to the nearest millimetre.

Values of *i* and *s* are expressed as the sums of various components parts:

— for slack-off, see Formula (1):

$$i = i_1 + i_2 \tag{1}$$

where

i_1 is a factor related to the pulley dimensions and tolerances;

i_2 is a factor related to belt length tolerances;

— for take-up, see Formula (2):

$$s = s_1 + s_2 + s_3 + s_4 \tag{2}$$

where

s_1 is a factor related to the pulley dimensions and tolerances;

s_2 is a factor related to belt length tolerances;

s_3 is a factor related to flat pulley crowning;

s_4 is a factor related to elastic properties of the belt.

Factors with subscripts 1 to 3 determine the centre distance adjustment necessary to install a belt onto the pulleys and to readjust working tension.

Factor s_4 determines the centre distance adjustment necessary to maintain correct operation of a belt under the influence of belt extension and dimensional wear.

These limiting values should be considered by the belt manufacturers as maxima, and by the designers and makers of the machinery as minima.

6 Factors

The values of the different factors are given in the following tables:

— for factor *i* and factor *s*, see Table 1;

— for diameter tolerance for flat pulley, see Table 2;

— for datum widths for V-belts, see Table 3;

— for effective widths for joined V-belts, see Table 4;

— for Groove pitch for V-ribbed belts, see Table 5;

— for values of i_1 for synchronous belts, see Table 6;

— for values of s_4 related to belt material, see Table 7.

Table 1 — Factor *i* and *s*

Factor	Belt type					Variation of centre distance
	Flat	Classical and narrow V-belt		V-ribbed	Synchronous	
		Individual	Joined			
i_1	2 (δ_1+δ_2)	2 w_d	5,1 w_e	5,1 e[a]	(see Table 6)	Slack-off
i_2	0,01 L	0,009 L		0,009 L	0	
s_1	1,5 (δ_1+δ_2)	0	0	0	0	Take-up
s_2	0,01 L	0,009 L		0,009 L	0	
s_3	0,003 (d + D)	0		0	0	
s_4	(see Table 7)	0,011 L		(see Table 7)	0,005 L	

[a] In case of the pulleys with flanges, the value shall be agreed with the belt manufacturers.

Table 2 — Diameter tolerance for flat pulley

Dimensions in millimetres

d	δ_1
40	0,5
45 and 50	0,6
56 and 63	0,8
71 and 80	1
90 to 112	1,2
125 and 140	1,6
160 to 200	2
224 and 250	2,5
280 to 355	3,2
400 to 500	4
560 to 710	5

d	δ_2
800 to 1 000	6,3
1 120 to 1 400	8
1 600 to 2 000	10

Table 3 — Datum widths for V-belts

Dimensions in millimetres

Classical section	Narrow section	Datum width w_d
Y	—	5,3
Z	SPZ	8,5
A	SPA	11
B	SPB	14
C	SPC	19
D	—	27
E	—	32

Table 4 — Effective widths for joined V-belts

Dimensions in millimetres

Classical section	Effective width w_e	Narrow section	Effective width w_e
AJ	13	9J	8,9
BJ	16,5	15J	15,2
CJ	22,4	20J	20,9
DJ	32,8	25J	25,4

Table 5 — Groove pitch for V-ribbed belts

Dimensions in millimetres

Profile	Groove pitch e
PH	1,6
PJ	2,34
PK	3,56
PL	4,7
PM	9,4

Table 6 — Values of i_1 for synchronous belts

Dimensions in millimetres

Pitch designation	P_b	i_1[a]		
		With flange on belt assembly side of large pulley or on both pulleys	With flange on belt assembly side of small pulley only	Without flange on belt assembly side
MXL	2,032	2,5 p_b	1,3 p_b	0,9 p_b
XXL	3,175	2,5 p_b		
XL	5,08	1,8 p_b		
L	9,525	1,5 p_b		
H	12,7	1,5 p_b		
XH	22,225	2 p_b		
XXH	31,75	2 p_b		
H3M, R3M	3	4,8 p_b	2,5 p_b	2,0 p_b
H5M, R5M	5	4,8 p_b		
G8M, H8M, R8M, S8M	8	3,8 p_b		
H14M, R14M, S14M	14	3,8 p_b		
H20M, R20M	20	3,8 p_b		
T2.5	2,5	3,0 p_b	1,5 p_b	0,9 p_b
AT3	3	3,3 p_b	1,7 p_b	
T5/AT5	5	2,4 p_b	1,3 p_b	
T10/AT10	10	2,4 p_b	1,3 p_b	
T20/AT20	20	2,0 p_b	1,1 p_b	

[a] Values are valid for minimum flange heights as specified in ISO 19347:2015, Table A.1, ISO 13050:2014, Annex D and ISO 17396:2017, Table A.6. If these flange heights are exceeded, the centre adjustment values should be increased accordingly.

Table 7 — Values of s_4 related to belt material

Material of belt, tensile members	s_4
Low modulus of elasticity, e.g. polyamide or similar	0,016 L
Mid modulus of elasticity, e.g. polyester or similar	0,011 L
High modulus of elasticity, e.g. aramid, glass fibre or metal	0,005 L